Ephemerality as temporal convergence of stability and transformation: Advancing concepts of time and temporality for information systems research

OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Ephemerality as Temporal Convergence of Stability and Transformation: Advancing Concepts of Time and Temporality for Information Systems Research

Ronan T. Doyle

Submitted in Fulfilment of the Requirements

for the Degree of Doctor of Philosophy

Primary Supervisor: **Professor Kieran Conboy**

Secondary Supervisor: **Doctor David Kreps**

J.E. Cairnes School of Business and Economics

University of Galway

May 2025

Abstract

This thesis delineates ephemerality as a distinct temporal perspective and a new conceptual tool for information systems (IS) research. The research is structured around four key PhD research papers.

The first key paper introduces Zygmunt Bauman's sociological lens of liquid modernity, outlines core liquid-modern principles, and applies the principles to Covid-19-related IS contexts.

The second paper shifts research focus from liquid modernity to ephemerality, a concept closely aligned with liquid-modern themes of fluidity, transience, and change. Through interdisciplinary review, the second key paper develops this study's first iteration of a conceptual framework for ephemerality.

The third paper strengthens the framework's philosophical rationale by drawing on seminal processual texts. It also introduces digital trace data as an illustrative IS context for understanding ephemerality.

The final key paper articulates the third and definitive thesis iteration of the ephemerality framework. Its applicability is then illustrated through analysis of a social media digital trace data case study, which examines a Covid-19 conspiracy theory that briefly went viral during the pandemic.

The main contribution of this thesis is the ephemerality framework. Through the concepts of mechanical repetition and creative repetition, ephemerality is characterised as simultaneously short-lived and durable. The parsimonious delineation of framework concepts and their interrelations advances IS approaches to conceptualising time and temporality, particularly in relation to digital trace data. More broadly, the framework provides IS researchers with a structured and actionable temporal lens for holistic analysis of IS phenomena in ephemeral sociotechnical contexts.

Acknowledgements

I am deeply grateful to Professor Kieran Conboy for the opportunity to pursue this research project. Kieran's support, advice, and insight have been instrumental in shaping the trajectory of this thesis. I would also like to thank Dr David Kreps. David's patience, good humour, and keen eye for detail were invaluable across many discussions on ephemerality, philosophy, and much more besides.

I am grateful too for the many helpful comments and suggestions provided by my Graduate Research Committee and members of the J.E. Cairnes School of Business and Economics at the University of Galway. In particular, I want to thank Dr Noel Carroll, Prof. Lorraine Morgan, Prof. Willie Golden, Prof. Eoin Whelan, and Dr Anastasia Griva.

I would also like to thank my PhD viva examiners, Prof. Ojelanki Ngwenyama and Dr Simeon Vidolov. Their questioning, feedback, and generous advice were sincerely appreciated.

Finally, my deepest thanks go to my wife, Charlotte; her support and encouragement through the ups and downs of the PhD made this project possible. I am also incredibly grateful for our two children, Clara and Oscar. The final word of thanks is to my parents, Marian and Terry, the support of whom remains the fundamental constant of my life.

Declaration

I, the Candidate, certify that the thesis is all my own work and that I have not obtained a degree in the University of Galway or elsewhere on the basis of any of this work. All research contained herewith is entirely my own and the use of all material from other sources has been properly and fully acknowledged.

Signed

21 May 2025

Date

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Overarching Thesis Context

This PhD thesis began with a research proposal that discussed the idea of digital storytelling (Boje, 2019) and the sociological perspective of liquid modernity (Bauman, 2000). The initial research aim was to develop a set of digital storytelling guidelines for information systems (IS) researchers through the lens of liquid modernity. Four key PhD papers later, the contribution of the thesis is a conceptual framework for ephemerality. This submission details the development of the research.

Time is the unifying theme of this thesis. Through the lens of ephemerality, the research explores how time is conceptualised and experienced, its interplay with the social and technical, and its significance for understanding foundational IS concepts like change, stability, structure, and transformation.

Although ephemerality does not become the primary research focus until key paper 2, the initial research proposal notes the "ephemeral core" of the liquid-modern perspective and questions the applicability for IS research of "chrono-centric" (Reinecke & Ansari, 2015) temporal frameworks in liquid-modern conditions (see PhD research proposal, Appendix A (8.1)).

Such questions are relevant for IS because chrono-centric temporal frameworks historically dominate the field. This means that time is typically conceptualised as a clock-based, linearly unfolding, mappable, measurable, and organising construct. Event-based and socially constructed temporal frameworks (Ancona et al., 2001; Orlikowski & Yates, 2002) challenge chrono-centricity but can also implicitly reproduce its assumptions (see 4.7.2 and 5.8.2.1). Alternative temporal frameworks remain comparatively underexplored (H. Lee, 1999; Saunders & Kim, 2007; Shen et al., 2015).

Ephemerality is a case in point. Although the significance of ephemerality as a phenomenon is acknowledged in IS (e.g.: Desouza et al., 2006; Yoo, 2010; Morlok et al., 2018; vom Brocke et al., 2021)—as well as broader social and cultural discourse (e.g.: Castells, 1996; Urry, 2000; Kallinikos, 2009; Bakker et al. 2016; Vázquez-Herrero et al., 2019)—its conceptual depth is typically addressed superficially. There are many reasons for why this is so, including disciplinary bias toward more durable concepts, structures, patterns, and processes; research methods that traditionally favour more stable, quantifiable constructs, and the operational ambiguities that arise from the inherent instabilities of ephemeral phenomena. Furthermore, when reduced to quantitative or qualitative limits, ephemerality directs us to foundational philosophical conundrums around the interplay of stability and change.

Therefore, while ephemerality—as a concept—*should* be well suited to IS analysis of contemporary conditions characterised by rapid change (Bauman, 2000; Demetis & Lee, 2018) and fleeting stabilisations of people, technologies, and everyday practice (Orlikowski, 2007), in practice it is more often reduced to a vague idea than robustly framed as an analytical concept. As a type of time, ephemerality is either conceptualised using overly simplistic, reductive criteria (e.g.: the quantifiable duration of an instant message) or its temporal complexity is backgrounded to highlight more durable phenomena (e.g.: many process-based and sociomaterial studies). For some IS scholars, for example, "the ephemeral character of sociomateriality" is a fundamental "challenge for any attempt to unravel it or its temporal nature" (Alter, 2012).

However, recent IS research in top-tier journals has advanced our understanding of alternative temporal frameworks—like those based on processual philosophy (Baygi et al., 2021; Kreps & Rowe, 2024)—and has developed guidelines for conducting temporally sensitive research (Kishore et al., 2024). Process-based (Pentland et al., 2021) and sociomaterial (Orlikowski & Scott, 2015; Østerlund et al., 2020) perspectives also provide strong foundations for further exploration of temporality in IS research.

Through its eventual contribution, this thesis aims to build upon the insights of these research streams, positioning ephemerality as a novel temporal lens for analysing IS phenomena. By integrating both the structural and processual qualities of ephemerality in a holistic temporal framework, the research hopes to enrich IS understanding of time and temporality by articulating a parsimonious and nuanced conceptualisation of ephemerality as simultaneously short-lived and durable.

1.2 Mapping the Thesis: Structure, Scope, and Contribution

This thesis is structured around four key PhD papers, and its scope is interdisciplinary from the outset. The primary contribution of the thesis is a conceptual framework for ephemerality, developed across three iterations. The thesis is structured as follows.

Each of the four main thesis chapters (Chapters 2, 3, 4, and 5) presents one of the four key PhD research papers (see also 1.4 and Table 1). Each chapter begins with an "Introductory Remarks" subsection. The introductory remarks for Chapter 2 discuss the development of key paper 1. The introductory remarks for Chapters 3, 4, and 5 reflect on research issues arising from the respective preceding chapters.

- Chapter 2 is primarily informed by Zygmunt Bauman's sociological critique of "liquid modernity" (Bauman, 2000). Key paper 1 (Doyle & Conboy, 2020b) introduces a selection of liquid-modern principles and establishes thematic and conceptual grounding for the subsequent focus on ephemerality.

- Chapter 3 describes the research transition from liquid modernity to ephemerality. Key paper 2 develops the first iteration of the ephemerality framework (EF1; Table 5, pp. 62-63) (Doyle et al., 2022a). The interdisciplinary scope of the review in this chapter—drawing on insights from philosophy, sociology, organisation studies, management studies, performance studies, media studies, and IS research—underscores the depth and breadth of the ephemerality literature. EF1 establishes a preliminary understanding of ephemerality as both short-lived and durable.

- Chapter 4 presents the second iteration of the ephemerality framework (EF2; Table 8, pp. 101-102). Building on a more focussed analysis of selected review texts, key paper 3 explicates the foundational logic of the framework: ephemerality characterised as simultaneously short-lived and durable. This chapter introduces two central framework concepts—mechanical repetition and creative repetition—primarily grounded in the processual philosophies of Bergson (1910, 1911, 1922, 1946) and Deleuze (1990, 1994).

- Chapter 5 develops the third and final thesis iteration of the ephemerality framework (EF3; Table 11, p.124). Key paper 4 parsimoniously refines the core concepts established in EF2.

The introductory remarks in Chapters 4 and 5 also signpost key issues and subsequent developments from the preceding framework iteration, setting the stage for discussion in the corresponding key paper.

The primary contributions of this thesis are developed in the following sections:

- **Chapter 4 (key paper 3)**
  ⇒ *Section 4.8:* in relation to EF2, subsections 4.8.1 and 4.8.2 concisely describe the emergent contribution of the ephemerality framework as a conceptual tool for IS research and practice. While these contributions are articulated with greater specificity in Chapter 5, these sections represent a significant progression toward that refinement.

- **Chapter 5 (key paper 4)**
  ⇒ *Section 5.6* presents the third iteration of the ephemerality framework (EF3) (Table 11, p.124), which constitutes the primary contribution of the thesis (see also 1.8.6).

  EF3 is best understood through its development in chapter 4. In particular, sections 4.1.5, 4.4, and 4.6 detail reviews of ephemerality across all review disciplines, while sections 4.7.1 and 4.7.2 detail EF2. Table 3 and Figure 2 (pp. 19-20) in this chapter provide further grounding for EF3 by summarising its key principles and conceptual structure.

⇒ *Section 5.8* outlines the key contributions of EF3 to IS research. Subsection 5.8.1 positions the framework as a conceptual advance in how IS scholars understand the temporality of digital trace data (DTD), addressing tensions across structural, performative, and flow-based approaches. Subsections 5.8.2 and 5.8.2.1 explain how EF3 functions as a conceptual tool for IS research by presenting ephemerality as a distinct temporal perspective and introducing conceptual vocabulary for analysing IS phenomena across diverse contexts. Finally, section 5.8.3 proposes a set of guiding research questions to support future application of the framework (see Table 13, pp.142-143).

As detailed in Section 5.8, EF3 contributes to IS by reconceptualising ephemerality not merely as fleetingness or disappearance, but as the temporal convergence of short-lived, repetitive, and durable temporalities—of stability and transformation. This reframing supports the identification and interpretation of IS phenomena that may otherwise escape analysis. By integrating the dualities of (1) short-lived and durable, (2) mechanical repetition and creative repetition, and (3) occurrence and moment (see also Section 1.8.6), EF3 provides a temporally rich, philosophically grounded, and methodologically applicable framework for IS researchers.

- **Chapter 6**

⇒ *Section 6.1.3* of the concluding thesis chapter defines each EF3 concept and is designed to further support application of EF3 in IS research (see Table 14, pp.145-146).

1.3 Situating the Thesis in IS Research Contexts

Each chapter—and key paper—illustrates the relevance of this research for IS. Chapter 2 applies liquid-modern principles to the IS concepts of control, big data, and privacy in the contexts of the Covid-19 pandemic. Chapter 3 discusses EF1 in relation to social media. Chapter 4 introduces digital trace data (DTD) as a key illustrative domain and discusses three distinct views of time in IS research. Chapter 5 extends this focus by applying EF3 to a social media digital trace data case study and identifying and addressing tensions in three extant IS approaches to conceptualising the temporality of DTD. Chapter 5 also ties back to the storytelling theme of the initial research proposal and reintroduces the paper 1 context of the Covid-19 pandemic. The four key papers are listed below (see 1.4).

In addition to the four key papers, this thesis also documents additional research efforts. Chapter 3 references three attempts to apply liquid-modern principles in the contexts of digital transformation and "fake news". Chapter 4 references a short, journal-published application of EF1 to metaverse research (Doyle et al., 2022c in Dwivedi et al., 2022). Two proceedings papers (one research-in-progress; one

complete) are also referenced (Doyle & Conboy, 2020a; Doyle et al., 2022b). Reference to these texts is useful for discussing the challenges that emerged as the research progressed. All additional research is also listed below (1.5). Unpublished texts are included in the appendices (see 8.2; 8.3, and 8.4).

Finally, the ephemerality framework also integrates four contexts: time, space, object, and action. As such, the framework development from EF1 through EF3 foregrounds foundational research contexts that shape IS research. The relevance of each context is highlighted in the remainder of this section.

In relation to time, it is well documented that time—as both concept and analytical dimension—has received too little attention from the IS community (Boland, 2001; Saunders & Kim, 2007; Shen et al., 2015; Venkatesh et al., 2021). This is true even of process and processual-based studies, where it might be assumed that time is always a critical research context. In fact, meaningful consideration of time is often lacking in such studies, which tend to prioritise dynamic processes and flows of action respectively. More broadly, IS research is predominantly—and typically implicitly—shaped by discrete and static conceptualisations of time that are underpinned by substantialist, entitative-based ontology (Cecez-Kecmanovic, 2016; Kreps & Rowe, 2024; Kreps, 2020).

The integration of time as an ephemerality framework context ensures that time is foregrounded in applications of the framework. The framework's synthesis of process (or structural) and processual (or flow-based) perspectives of time (see 4.7.3, 5.8.1, and 5.8.2.1) also ensures that time is holistically addressed (as both discrete (or structural) and open-ended (or flow-based).

In relation to the remaining framework contexts, IS studies of space, object, and action typically adopt either/or approaches or background specific contexts altogether. Via either/or approaches, space, object, and action are typically considered *either* temporally discrete and static *or* dynamic and emergent. Processual, flow-based research approaches typically background contexts like space and object.

For example, IS conceptualisation of space encompasses fixed, entitative-based views; relational and emergent views, as well as formless, fluid views of space (Haj-Bolouri et al., 2024). Temporal studies typically either adopt one of these views (e.g.: through static, process, or sociomaterial approaches) or background space as a primary research focus (e.g.: through processual research approaches).

Similarly, IS views of technology as artifact—or object (see 4.1.4.2)—typically emphasise artifacts as "stable, discrete, independent, and fixed" (Orlikowski & Iacono, 2001); as mutually dependent, entangled, and/or emergent (Benbasat & Zmud, 2003; Markus & Robey, 1988; Orlikowski, 2000; Leonardi, 2011), or as decentred, unbounded, and nonlinear (Baygi et al., 2021), characterised by multiplicity and heterogeneity (Kreps & Rowe, 2024). Again, IS research typically adopts just one of

these conceptualisations of technology as artifact. Digital artifacts and/or objects are also tied up with issues of materiality and non-materiality (Ekbia, 2009; Kallinikos et al., 2013; Faulkner & Runde, 2019) as well as broader design issues (Lee & Baskerville, 2015) and social concerns (Demetis & Lee, 2018).

Finally, IS research similarly treats action as discrete enactment (e.g.: D. Lazer et al., 2009; Van der Aalst, 2016); as dynamic, complex, adaptive, and/or emergent practice, performance, or interaction (e.g.: Benbya et al., 2020; Feldman & Pentland, 2003; Orlikowski, 1996, 2007), or as the definitive context *for* processual analysis at the expense of the other contexts (Baygi et al., 2021). The ephemerality framework develops a holistic view of action as both discrete and open-ended.

Building on Pentland et al. (2020), as well as insights from process, sociomaterial, and processual-based research (e.g.: Baygi et al., 2021; Lindberg, 2020; Østerlund et al., 2020; Pentland et al., 2021), EF3 (Table 11) positions the contexts of time, space, object, and action as permeating dimensions that enable rich description of ephemeral phenomena (see 4.6.2, 4.7.1, and 5.7). To this end, time and action as ephemeral are discrete *and* open-ended; space and object as ephemeral are static *and* flow-based. The implication is that time, space, object, and action—as ephemeral contexts—can be understood and revealed as both stabilising *and* transformational. This view provides a novel lens for the description of ephemeral phenomena, such as social media digital trace data.

1.4 Four Key PhD Papers

This section lists the four key papers that—along with the "Introductory Remarks" for each subsequent chapter—constitute the core academic contribution of the thesis.

Paper 1: The role of IS in the Covid-19 pandemic: a liquid-modern perspective.

Doyle, R., & Conboy, K. (2020b). International Journal of Information Management, 55, 102184. https://doi.org/10.1016/J.IJINFOMGT.2020.102184

Paper 2: An interdisciplinary review of ephemerality for information systems research.

Doyle, R., Conboy, K., & Kreps, D. (2022a). IFIP advances in information and communication technology; co-creating for context in the transfer and diffusion of IT, pp. 3-23. Springer International Publishing. https://doi.org/10.1007/978-3-031-17968-6_1

Paper 3: An interdisciplinary framework for conceptualising ephemerality in everyday digital contexts.

(Doyle et al., P3; unpublished manuscript; ready for submission)

Paper 4: Advancing conceptualisation of digital trace data: the duality of short-lived and durable ephemerality through mechanical repetition and creative repetition.

(Doyle et al. P4[1]; unpublished manuscript; ready for submission)

1.5 Additional Research Outputs

This section lists the additional research outputs as outlined in section 1.3.

1. Considering the merits of applying "liquid modernity" as a theoretical lens for IS research.

Doyle, R., & Conboy, K. (2020a). European Conference on Information Systems (ECIS) 2020 Research-in-Progress Papers. 90. https://aisel.aisnet.org/ecis2020_rip/90

2. On conceptualising fake news in conditions of liquid modernity.

Extended abstract accepted for Journal of the Association for Information Systems (JAIS) theory development workshop, 2020 (appendix 8.2).

3. Developing a liquid-modern framework of digital transformation for IS.

Extended abstract accepted for JAIS special issue theory development workshop, 2021 (appendix 8.3).

4. Theorising liquid-modern digital transformation.

Extended abstract accepted for proceedings of Collective Intelligence Conference, Copenhagen, 2021 (appendix 8.4).

5. The ephemeral and IS research: conceptualising ephemerality in a post-pandemic world.

Doyle, R., Conboy, K., & Kreps, D. (2022b). In: The Role of Digital Technologies in Shaping the Post-Pandemic World: 21st IFIP WG 6.11 Conference on e-Business, e-Services and e-Society, I3E 2022, Newcastle upon Tyne, UK, September 13–14, 2022, Proceedings, 434–455. https://doi.org/10.1007/978-3-031-15342-6_34

6. The metaverse and ephemerality.

Doyle, R., Conboy, K., & Kreps, D. (2022c). Short journal contribution in Dwivedi, Y., et al. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. International Journal of Information Management, https://doi.org/10.1016/j.ijinfomgt.2022.102542

[1]Throughout this submission, key paper 3 is cited as "Doyle et al., P3" and key paper 4 as "Doyle et al., P4".

1.6 Aims, Objectives, and Overarching Research Question

The overarching aim of this thesis is to develop ephemerality as a distinct temporal perspective and a holistic conceptual tool for IS research. As outlined in subsection 1.1, this was the not the original aim. The research instead evolved toward this focus in response to issues identified at different stages of the study. The emergent nature of the overarching research aim is reflected in the structure of the thesis and in the development of its four key papers, as discussed in subsection 1.2. The aim was clarified both iteratively and hermeneutically (see section 1.7). Table 1 summarises the papers, their respective objectives or research questions, and highlights their corresponding IS research contexts.

Table 1. Key PhD Papers, Research Objectives, and IS Research Contexts

Key Paper Title	**Research Objectives/Questions**	**IS Research Contexts**
1. The role of IS in the covid-19 pandemic: a liquid-modern perspective.	Delineate a set of liquid-modern principles. Apply the principles in IS research contexts.	Control; big data; privacy. Social media.
2. An interdisciplinary review of ephemerality for information systems research.	Develop EF1 through interdisciplinary review.	Social media.
3. An interdisciplinary framework for conceptualising ephemerality in everyday digital contexts.	Develop EF1 through EF2. Explicate the logical foundation of the ephemerality framework.	Views of time in IS research. Everyday digital contexts. Digital trace data.
4. The Ephemerality of Digital Trace Data: Conceptualising Short-lived and Durable Temporality through Mechanical and Creative Repetition	Refine EF2 through EF3. RQ: How can ephemerality advance approaches to conceptualising the temporality of digital trace data in IS research?	IS approaches to conceptualising the temporality of digital trace data. Social media digital trace data.

Taken together, these four key papers—as well as the "Introductory Remarks" for each chapter that follows—form a cumulative research trajectory. Paper 1 establishes the relevance of liquid modernity—and its volatile, ephemeral temporal logic—for IS research. Paper 2 transitions to a direct focus on ephemerality and introduces EF1. Paper 3 develops EF2, strengthens the conceptual rationale of the framework, and introduces digital trace data as a key context. Paper 4 refines EF2 through EF3 and focusses explicitly on the temporality of digital trace data.

As such, this thesis retrospectively coheres around the following guiding research question:

> *How can ephemerality—conceptualised as the temporal convergence of stability and transformation—advance information systems perspectives of time and temporality?*

The question aligns with and supports the emergent ambition of the thesis: to contribute a new temporal perspective for IS research that bridges key tensions in how time and temporality are conceptualised—particularly in relation to digital trace data and everyday digital contexts.

1.7 Methodological Approaches

This thesis adopts interdisciplinary review, hermeneutical interpretation, and (ante)narrative analysis as methodological approaches to research, conceptual framework development, and case study analysis. These methodologies are established recursively over the course of the project and are tightly integrated with the core concerns of this thesis: time, temporality, ephemerality, and, ultimately, the temporal conceptualisation of digital trace data (DTD). The relevance of each method is described below.

1.7.1 Interdisciplinary review as concept building

Literature review plays a sustained methodological role in this thesis, featuring prominently in each of its four key papers. Reviews in papers 1, 2, and 3 are broad, interdisciplinary, and conceptually driven—addressing liquid modernity (paper 1) and ephemerality (papers 2 and 3). The review disciplines for ephemerality are IS, organisation and management studies, media studies, performance studies, sociology, and philosophy. The review in paper 4 is more focused, targeting a selection of "basket" journal articles to identify how the temporality of digital trace data is conceptualised in IS research.

The three-stage review guidelines proposed by Webster and Watson (2002) provide the initial methodological grounding for the reviews in papers 1 through 3. The review in paper 1 aligns with Rowe's (2014) categorisation of review for describing, while the reviews in papers 2 and 3 are more closely aligned with reviews for understanding and explaining. Paper 3 is also positioned as a "review/theory development paper" (Leidner, 2018).

In paper 3, the review strategy serves as a form of inductive top-down *concept building* (Shepherd & Sutcliffe, 2011; see also Leidner & Tona, 2021 and section 4.5). As an explanatory device, inductive top-down *concept building* is suited to vast and diffuse literatures and requires identifying tensions in extant understandings of ephemerality. Framed by review processes and guided by an overarching hermeneutic methodology (see 1.7.2), inductive top-down *concept building* supports the refinement of EF1 through EF3 and the broader goal of conceptualising ephemerality in relation to digital trace data.

The interdisciplinary reviews and types are discussed further in the introductory remarks and relevant key papers for chapters 2, 3, 4, and 5. Table 2 provides an overview of review contexts, review types, and additional methodological approaches (see 1.7.2 and 1.7.3) in relation to each key paper.

Table 2. Overview of Review Contexts, Types, and Additional Methodological Approaches

Key Paper Review Context	**Interdisciplinary Review Type**	**Additional Methodology**
1. Liquid-modern principles.	Review for description.	Hermeneutics.
2. Ephemerality framework iteration 1 (EF1).	Review for description and understanding.	Hermeneutics.
3. Ephemerality framework iteration 2 (EF2).	Review for understanding (with aspects of review for explaining).	Hermeneutics. Inductive top-down *concept building*
4. Ephemerality framework iteration 3 (EF3). Digital trace data.	Review for understanding (with aspects of review for explaining). Select IS review for description.	Hermeneutics. Narrative repetition.

1.7.2 Hermeneutics, *mimesis*, and recursive development

Hermeneutics—specifically Paul Ricoeur's (1981, 1984) hermeneutical approach—provides a methodological foundation "for understanding and describing the literature review process" (Boell & Cecez-Kecmanovic, 2014) through which the forms of the ephemerality framework recursively emerge.

Hermeneutics (Gadamer, 1982; Heidegger, 1962) refers not only to "the study of interpretation" but to "the process of coming to understand a text" (Boland, 1991). The notion of "text" is broad and evolving, including, for example, words, signs, and symbols, spoken discourse, the self, information systems, social phenomena, and understanding (Boell & Cecez-Kecmanovic, 2014; Boland, 1991; Boland et al., 2010; T. Butler, 1998; Introna, 2011; Østerlund et al., 2016). In this thesis, "text" encompasses the review literature, the concept or phenomenon of ephemerality, the evolving ephemerality framework (EF1–EF3), empirical case materials, and the thesis itself as a site of recursive interpretation.

Fundamental to hermeneutic method is the idea of the hermeneutic circle (Klein & Myers, 1999) or a "tacking back and forth between detail and whole" (Boland et al., 2010). For example, in relation to EF1, EF2, and EF3, the whole can be read as the framework for ephemerality, and the details as specific framework components (e.g.: "short-lived", "repetitive", "durable"). Interpretation of the hermeneutic whole—the concept of ephemerality as articulated through the framework—begins with examination of its component phenomena (T. Butler, 1998), which are interpreted and understood in recursive, reciprocal relation to the whole.

For example, understandings of "short-lived" in relation to "ephemerality"—and of "ephemerality" in relation to "short-lived"—emerge through recursive, reciprocal interpretive readings, so that the part helps form the whole, and the whole reconfigures the meaning of the part. The interpretation of "short-

lived" through EF1 differs fundamentally from its refiguration through EF3, where it is delineated in active relation to the forms of repetition and durability that both shape and are shaped by ephemerality.

Although understanding is never complete—knowledge "is a process, not a state" and "research cannot fix its momentary states" (Boland et al. (2010) citing Piaget (1977))—hermeneutic understanding remains fundamentally incomplete without movement between detail and whole. This methodological foundation supports the development of "a framework of understanding" and "a way of viewing reality" (Cole & Avison, 2007) that aligns with the emergent qualities of the focal research phenomenon.

Deepening this alignment, Ricoeur's hermeneutics is grounded in a philosophy of phenomenology and temporality that supports a processual account of understanding. The threefold concept of *mimesis* is a central component of Ricoeur's hermeneutical method (Ricoeur, 1984). *Mimesis* is used here as a methodological structure for tracing and articulating the temporal development of EF1, EF2, and EF3. The three stages of *mimesis* as distinguished by Ricoeur can be outlined as follows:

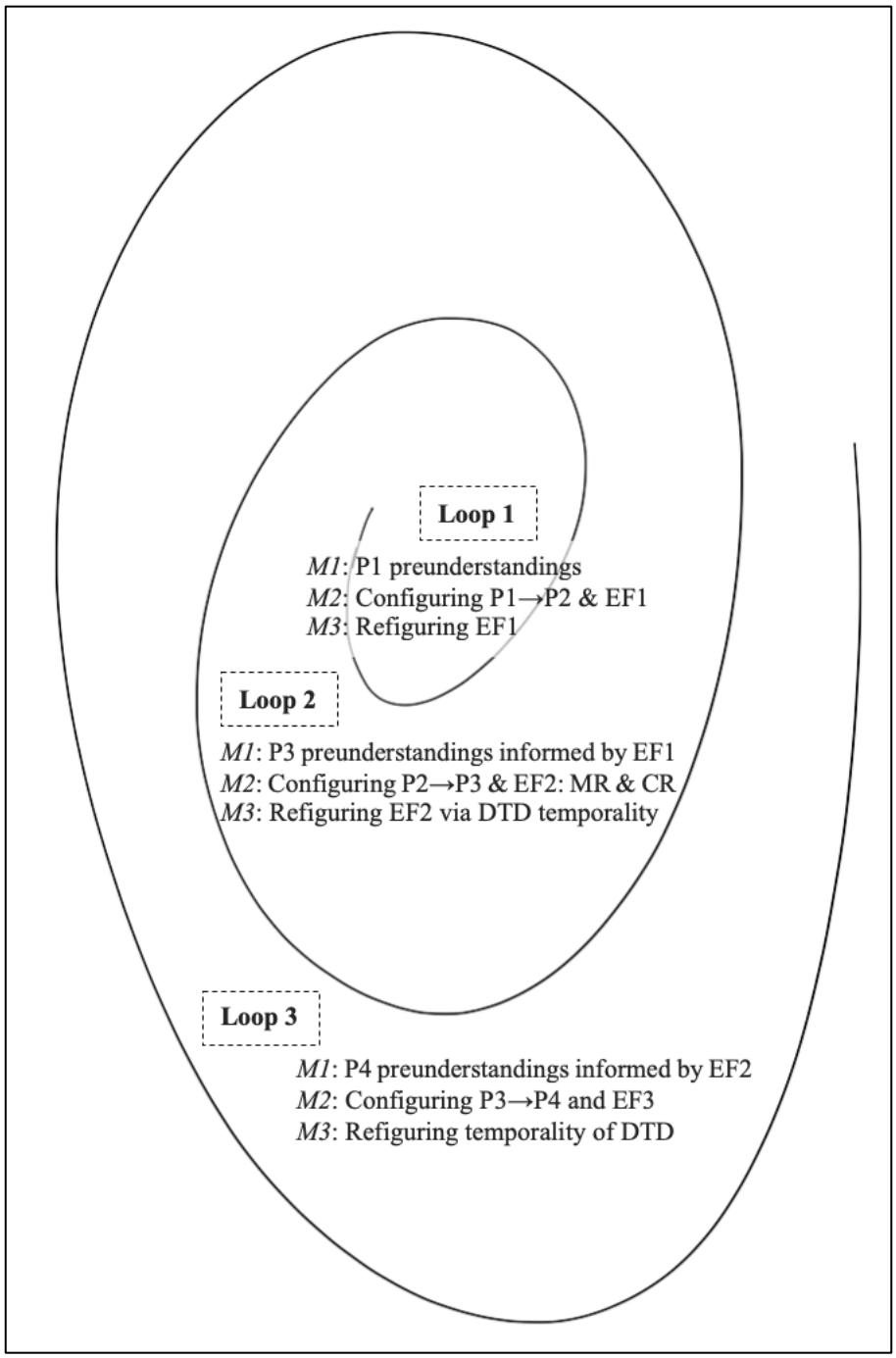
- *Mimesis* 1 (*Prefiguration*): the lived experience and preunderstandings that shape how a field or phenomenon is initially encountered and understood.
- *Mimesis* 2 (*Configuration*): the narrative synthesis through which understanding is organised into a coherent whole.
- *Mimesis* 3 (*Refiguration*): the transformation of understanding as the narrative returns to lived experience, reshaping interpretation and active engagement.

In Figure 1, the temporal progression of this thesis is represented as three spiralling, mimetic loops. Each loop comprises the recursive interplay of prefiguration (*mimesis* 1), configuration (*mimesis* 2), and refiguration (*mimesis* 3). Although presented sequentially, the stages of *mimesis* are not linear but recursive, enabling iterative deepening of understanding. Each stage presupposes and transforms the others through hermeneutic movement. Movements between part and whole occur within and between loops. As such, each loop represents a research stage in the recursive production of understanding that shapes the emergence of the ephemerality framework.

The interior loop—Loop 1—represents the initial research stage: key paper 1 (P1), paper 2 (P2), and the first iteration of the ephemerality framework (EF1). During this loop, *mimesis* 1 (M1) refers to the preunderstandings through which the initial focal concerns of this thesis—liquid modernity, time and temporality, and IS—are encountered and made meaningful. The loop 1 preunderstandings include assumptions about time and temporality, assumptions shaped by liquid-modern perspectives, and assumptions about IS and the meaning of ephemerality. The emergence of EF1 through P2 constitutes a relatively coherent narrative configuration, corresponding to *mimesis* 2 (M2). Through ongoing

engagement with the literature, the refiguration of this narrative—*mimesis* 3 (M3)—transforms the preunderstandings made coherent in Loop 1 and simultaneously prefigures M1 in Loop 2.

Figure 1. Spiral Model of Hermeneutical Thesis Development



Therefore, each mimetic loop involves movement from prior assumptions (M1), through narrative and conceptual synthesis (M2), to reconfigured understandings (M3) that reshape earlier interpretations and inform subsequent inquiry. The preunderstandings of Loop 2 (M1) are made coherent through paper 3 (P3) and EF2 (M2)—especially the framework concepts of mechanical repetition (MR) and creative

repetition (CR)—and are subsequently refigured through initial engagement with the digital trace data literature, which prefigures M1 for Loop 3. In turn, the preunderstandings of Loop 3 (M1) are made coherent through paper 4 (P4) and EF3 (M2) and refigured through application to a digital trace data case study (M3), which further evolves the coherence of the ephemerality framework.

Ricoeur "helps us see that the problem of interpretation is always an open one" (Boland, 1991) and that appropriation of the meaning of a text "is not an end point [but] the beginning" (Introna, 2011). Each loop of M1–M3 involves an interpretive iteration, but not as simple repetition. Instead, the hermeneutic spiral (Figure 1) depicts an emergent process of understanding, where refiguration transforms not only the configured concept of inquiry but the horizon of preunderstanding itself. As such, Figure 1 serves as both a temporal map of thesis development and a reflection of its recursive epistemology.

1.7.3 Integrating the methodological roles of antenarrative and narrative repetition

This thesis also draws on two narrative-based methodological approaches: *antenarrative* (Boje, 2001) and *narrative repetition* (Dailey & Browning, 2014).

Antenarrative is an analytical supplement to traditional narrative frameworks, which typically impose coherence through devices like causality, linear progression, and plot. As Boje (2001, p.5) writes:

> "The postmodern condition of fragmentation and simulation makes coherence problematic. There is no whole story to tell, only fragments, which even with retrospective sensemaking cannot find a plot that will make the fragments cohere… Rather than reified plots, there are fragments of stories, bits and pieces told here and there, to varying audiences, so that no one knows a whole story and there are no whole stories anyway."

This understanding resonates with established modern, postmodern, and processual perspectives on ephemerality (Simmel, 1903; Harvey, 1989; Bauman, 1992; Chia, 1995). In response to the problem of coherence, *antenarrative* foregrounds stories that are fragmented, nonlinear, emergent, and unfinished. It is storytelling, Boje argues (2001, p.5), that is "constituted out of the flow of lived experience."

Antenarrative retrospectively clarifies the methodological development of this thesis as recursive and always-open movements between fragments of preunderstanding and evolving conceptualisations of ephemerality. In this sense, *antenarrative* complements the threefold model of Ricoeurian mimesis that guides this research—Boje draws significantly from Ricoeur, particularly in discussing plot (see Boje 2001, Chapter 7)—and here provides an additional lens for interpreting the epistemological conditions that shape the development of this thesis and the emergence of EF1, EF2, and EF3.

Antenarrative also offers a way of understanding how EF3 engages with the fragments—or digital traces—of everyday sociotechnical interaction that are central to Chapter 5. Although not explicitly applied in the illustration of EF3 in Section 5.7, *antenarrative* analysis similarly highlights how people assemble fragmented experiences into provisional or causal assertions (*ibid*., p.126). Antenarrative temporality can also be seen as a defining feature of the EF3 illustration, where meaning emerges not only through linearity but also through nonlinear and open-ended patterns of repetition.

Narrative repetition (Dailey & Browning, 2014) *is* explicitly applied as a methodological tool in Section 5.7. *Narrative repetition* refers to the retelling or reoccurrence of story elements in ways that highlight both sameness and difference (see 5.7.1). The dualities of sameness and difference—control/resistance, differentiation/integration, and stability/change—provide an interpretive structure through which key fragments of the *#FilmYourHospital* conspiracy theory (Gruzd & Mai, 2020) are re-read as ephemeral (5.7.4). The key fragments—or digital traces—include the FilmYourHospital hashtag and specific associated tweets. By mapping the dualities of EF3 (see 1.2, 6.2.1.1, 6.3.1, and Figure 2 in 1.8.6) onto those of *narrative repetition*, these fragments are reinterpreted and retold as ephemeral durations where stability and transformation mutually constitute meaning. In practice, this alignment of method and ephemerality framework also reflects the overarching hermeneutic approach.

In sum, interdisciplinary review, hermeneutic development and interpretation, and forms of narrative analysis are the primary methodological approaches that structure this research.

1.8 Clarification and Validity of Thesis Claims

Before proceeding to Chapter 2, this section clarifies the assumptions and aims of this thesis for an IS audience by addressing a selection of "basic" research claims as delineated by Ngwenyama (2023). Addressing the claims helps clarify the *what* (empirical contexts and contribution), the *why* (research question and theoretical perspective), and the *how* (methodological design and application) of the research. The validity of each claim is briefly assessed.

1.8.1 Is the research question relevant and persisting in IS?

The overarching research question (RQ) for this thesis (see Section 1.6) asks: *How can ephemerality—conceptualised as the temporal convergence of stability and transformation—advance IS perspectives of time and temporality?* In this thesis, the RQ emerges in retrospective response to a persistent and relevant area of concern for IS research: the nature and significance of ephemerality as a phenomenon.

IS scholars have long recognised ephemerality as fundamental to sociotechnical reality. For example, an observation in a 1987 *MIS Quarterly* article, which highlights core IS concerns, might well have

been discussing digital transformation today: "One important fact about accommodating increasing rates of technology change is the recognition that organisational structures are truly ephemeral" (Lorin et al., 1987). This recognition of organisational ephemerality resonates with the well-established view in IS—and the social sciences broadly (see Table 7, p.91)—that ephemerality and durability are interrelated and mutually constitutive (Lee, 1994; Orlikowski, 2007). Today, ephemerality is considered partially characteristic both of what digital *is* (Lyytinen, 2022; von Briel, 2018; Yoo, 2010) and the increasingly fleeting, everyday contexts through which it is experienced and understood (Alaimo & Kallinikos, 2020; Lehrer et al., 2023; Yoo, 2010). In other words, the *idea* of ephemerality has long shaped perception, analysis, and understanding of archetypal IS concerns.

Against this backdrop, the problem is that ephemerality—*as a concept*—is typically addressed superficially in IS research. Though its symptoms and effects are widely acknowledged, ephemerality is rarely treated as a coherent conceptual construct. When it is—most often as an instrumental feature or technical affordance in social media research—its temporal complexity and interrelation with durability are typically overlooked. This conceptual neglect limits how IS research can engage with the ephemeral temporal dynamics of everyday digital contexts. The persistent relevance of ephemerality—and its conceptual underdevelopment—justify *why* the RQ appropriately frames this thesis.

1.8.2 Is the theoretical perspective relevant for investigating the RQ?

The perspectives identified through interdisciplinary review are the theoretical foundation upon which the RQ is investigated. The review disciplines are IS, organisation and management studies, media studies, performance studies, sociology, and philosophy (see also sections 1.2 and 1.7.1).

While each review discipline reveals discipline-specific views on ephemerality (see sections 4.1.5 and 4.4), in common to each are theoretical perspectives that explore the interrelation of ephemerality and durability: how ephemeral phenomena emerge from, shape, and are shaped by more durable structures, practices, processes, and forms. However, across reviewed disciplines, the analytical tendency typically emphasises durability, with ephemerality often treated peripherally rather than richly conceptualised.[2]

The central theoretical anchor is processual philosophy, particularly as developed by Bergson (1910, 1911, 1922) and Deleuze (1990, 1994, 2007). By conceiving time as flow-based duration—through which the ephemeral present interpenetrates past and future through repetition and transformation—processual philosophy provides deep ontological foundations for conceptualising ephemerality.

---

[2] The reviews also discuss discipline-specific exceptions, such as traditional views of performance ephemerality or contemporary IS views of ephemerality in social media contexts.

Therefore, while theoretical perspectives across review disciplines contribute to the understanding of ephemerality in this thesis, processual perspectives are particularly relevant to the RQ. First, processual perspectives are underpinned by—and stand in contrast to—foundational views of time and temporality. Second, they reveal *why* ephemerality is not adequately understood through non-processual models of time alone. And finally, processual perspectives support understanding of ephemerality as the temporal convergence of stability and transformation (EF3). Ultimately, EF3 provides a processual perspective of ephemerality that incorporates a processual critique of chrono-centric views of time.

This thesis will argue, however, that even processual temporal models can lose sight of ephemeral phenomena by analytically foregrounding the durability of continual flows of action.

1.8.3 Is methodology appropriate to RQ, theoretical perspective, and empirical context?

Interdisciplinary literature review is the principal method through which knowledge of the relevant theoretical and conceptual perspectives is developed, and through which disciplinary assumptions and conceptual tensions are surfaced. The method is appropriate because the RQ emerges through comparing and contrasting *how* ephemerality is conceptualised and empirically approached across multiple domains. The reviews are conducted iteratively: initial mappings (liquid modernity) direct the transition toward emergent ephemerality framework components (EF1), which, in turn, direct deeper reviews (EF2) and more focussed framework applications (EF3 and digital trace data).

Hermeneutic interpretation and narrative analysis are appropriate to the RQ and underlying theoretical perspectives because they support recursive, reflexive, and temporally sensitive sensemaking. Both methods foreground the contingent and unfolding character of knowledge and interpretation, aligning with the centrality of the processual theoretical perspective and the time and temporality focus of the RQ. As such, the three views of time in IS research (static, process, processual; see Table 9) delineated in paper 3 provide the theoretical foundation for methodologically delineating the three approaches to conceptualising the temporality of trace data in paper 4 (structural, performative, flow-based; see Table 10). Hermeneutically developed through iterative review, these views of time and analytical approaches enable the recursive positioning of the ephemerality framework in chapters five and six.

These methods are also well suited to the empirical context because the interpretive reconstruction of the #FilmYourHospital conspiracy theory requires methods that are attuned to the temporal ambiguity, multiplicity, and heterogeneity of digital traces. Through the ephemerality framework (EF3), digital traces are not merely linear and objective records of events but temporally layered and interpretable fragments that accumulate meaning through repetition and recontextualisation. Together, interdisciplinary review, hermeneutic interpretation, and narrative analysis constitute a methodological

approach that clarifies *how* the research engages recursively, interpretively, and processually with time, temporality, and digital trace data. The approaches are appropriate to the emergent research question, the core theoretical perspectives, and the empirical contexts of this thesis.

1.8.4 Is the empirical context appropriate to the phenomenon being investigated?

In IS research, digital trace data (DTD) are commonly treated as fixed "points in time" (Hedman et al., 2013; Grisold et al., 2024) and relatively durable "records of activity" (Howison et al., 2011). Even process-based IS approaches typically view DTD as relatively static occurrences, whose sequencing constitutes events and process (e.g.: Pentland et al., 2021; Zhang et al., 2022; Kishore et al., 2024). As such, associating ephemerality with digital trace data may seem counterintuitive, since ephemerality is traditionally associated with phenomena that quickly disappear, evade capture, or resist recording.

However, the sociotechnical interactions and conditions through which trace data are generated are typically ephemeral in nature. Moreover, Yoo's (2010) broad ontological characterisation of digital as "ephemeral, fungible, and indeterministic" frames ephemerality not merely as subjective interpretation or experiential effect, but as a condition of digital materiality. Some IS scholars argue that trace data are "inherently processual" (Pentland et al., 2020), being representative *or* constitutive of a world in continual flux. This tension—between the assumed durability of traces and the short-livedness of the contexts that produce them—underscores the appropriateness of DTD as empirical focus of this thesis.

The ambiguity surrounding the temporality of digital traces (Berente et al., 2019; Grover & Lyytinen, 2023) makes them well-suited to methodological approaches that explore ephemerality as convergence of stability and transformation. Foregrounding how meaning is not merely static in traces but emerges through recontextualisation and interpretation challenges IS assumptions around the temporal fixity and neutrality of digital trace data. Through the lens of EF3, the digital trace is discrete (as static record), open-ended (as flow-based duration), and always already temporalised through repetition.

The empirical application of EF3 to a case study of the *#FilmYourHospital* (FYH) conspiracy theory (Gruzd & Mai, 2020) illustrates these tensions and ambiguities. The conspiracy theory develops from a single tweet that generates the FYH hashtag and poses a simple question: "Can this become a thing?" Through the hashtag, social media users share digital content to support the view that the Covid-19 pandemic is a hoax. The initial tweet is not widely shared—and is eventually deleted—but the hashtag circulates rapidly across platforms, with accompanying images, videos, and texts.

Although the hashtag seems fixed—providing trace records of contexts at specific moments in time—through mechanical and creative repetition, its meaning at any moment *in time* stabilises and transforms all past and future moments of the FYH narrative *over time*. The ephemerality framework (EF3) allows

digital traces (such as the FYH hashtag or, indeed, the deleted tweet that generated the hashtag) to be analysed as layered temporalities of contexts. As such, the empirical context of this study exemplifies the types of digitally mediated, temporally complex phenomena that the study aims to investigate.

1.8.5 Is the methodology systematically applied and documented?

Across the four key papers and section 4.1.5, the breadth and depth of the literature reviews document the comprehensiveness of the review approach. While reviews are informed and guided by established IS review protocols (Webster and Watson, 2002), typologies (Rowe, 2014), and guidelines (Boell & Cecez-Kecmanovic, 2014; Templier & Paré, 2015; Leidner, 2018), review choices are not systematically applied as fixed procedures but respond to unfolding insight, consistent with the recursive, interpretive, and processual orientations of the thesis. In the hermeneutic approach to literature reviews, Boell and Cecez-Kecmanovic (2014) write that the typical review phases of "searching, reading, mapping and classifying, critical assessment, and argument development… do not follow each other in a simple linear fashion, but are part of an iterative process (hermeneutic circle) that successively leads to improved understanding" (see also sections 1.7.2, 1.8.3, and 6.3.3).

Antenarrative (Boje, 2001), as outlined in Section 1.7.3, provides retrospective complementary framing for the hermeneutical review approach, as well as a way of understanding the fragments—or the digital traces—that EF3 illustrates in Chapter 5. In the same chapter, narrative repetition (Dailey & Browning, 2014) *is* applied as a methodological tool (see Section 5.7). To retell the story of *#FilmYourHospital*, Section 5.4.7 reads the dualities of narrative repetition (1.7.3) through the dualities of the ephemerality framework (see Figure 2, p.20), which, again, is an active documentation of the hermeneutic method.

1.8.6 Do the results of the research contribute to the IS field?

The ephemerality framework (EF3; see Table 11, p.124) is the primary contribution of this thesis. The following section outlines the core concepts of EF3 before highlighting its contribution to IS. Table 3 presents the framework's key principles, while Figure 2 visualises its structure as three interdependent dualities. Both Table 3 and Figure 2 were developed after completion of key paper 4 and EF3.

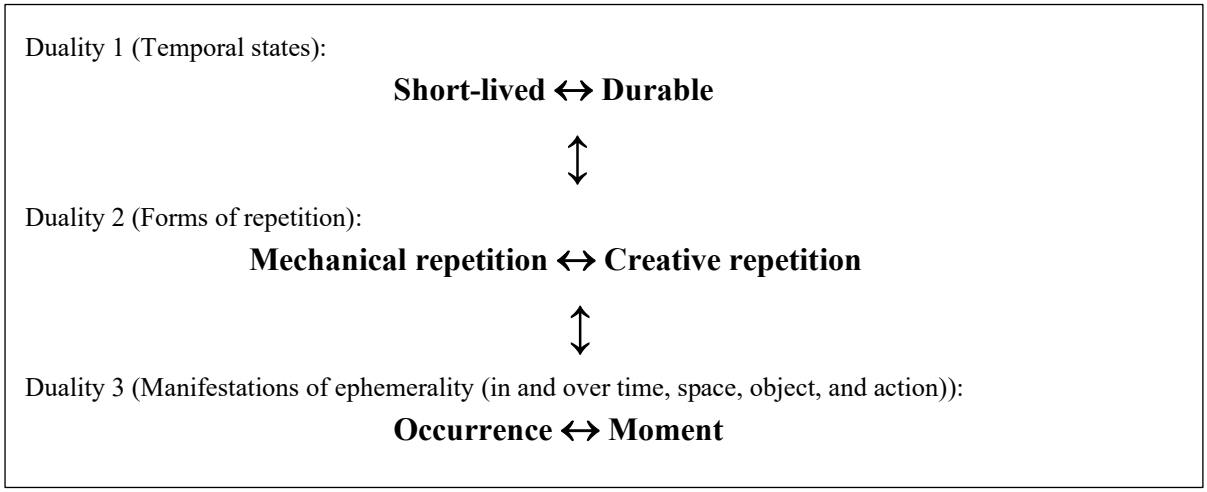
EF3 characterises ephemeral phenomena as simultaneously short-lived, repetitive, and durable across the contexts of time, space, object, and action. The guiding principles of Table 3 outline the underlying logic of the framework by concisely describing its core concepts and relationships. By so doing, the principles provide answers to the *what*, *why*, and *how* of ephemerality as understood through EF3. The concepts and relationships as a contribution to IS are more fully articulated in Section 5.8.2.1 (see also Table 14, Section 6.1.3, pp. 145-146).

Table 3. Ephemerality Framework (EF3) Key Principles

1 (a): *Durational states*	**Ephemeral duration is simultaneously short-lived *and* durable.** • Short-lived durations are constituted/composed *in* time, space, object, and action. • Durable durations are reconstituted/recomposed *over* time, space, object, and action.
1 (b): *Temporal manifestations*	**Ephemeral duration is simultaneously occurrence *and* moment.** • Occurrences are discrete; entitative-based. • Moments are open-ended; flow-based.
2 (a) & (b): *Why ephemeral duration is short-lived and durable*	**(a) Occurrences are constituted and reconstituted** – in *and* over time, space, object, and action. **(b) Moments are composed and recomposed** – in *and* over time, space, object, and action.
3 (a) & (b): *How ephemeral duration repeats*	**(a) Occurrences manifest through mechanical repetition.** • Repetition of linear, reducible, stabilising similarities. **(b) Moments manifest through creative repetition.** • Repetition of nonlinear, irreducible, transformational differences.
4. *Contexts*	**Time, space, object, and action reveal ephemeral durations of occurrences/moments.**

The four principles in Table 3 describe the core logic of EF3 as iteratively developed through this thesis. Figure 2 visualises the principles—their concepts and relationships—as three interdependent dualities (see also Sections 6.2.1.1 and 6.3.1). As dualities, the temporal states of ephemerality (short-lived and durable) are conditioned by the two forms of repetition (mechanical and creative) that manifest in and over time, space, object, and action (as occurrence and moment). Together, the principles and dualities answer the *what*, *why*, and *how* of ephemerality and provide a structured analytical approach for understanding its manifestation as the convergence of stability and transformation.

Figure 2. Ephemeral Duration (EF3) as Three Dualities



Via EF3, this thesis develops ephemerality from a widely acknowledged but vaguely defined phenomenon *in* IS research into a rigorously constructed conceptual lens *for* IS research. Doing so better equips IS scholars to critically address the temporal assumptions that underpin IS research.

Temporal assumptions in IS are typically underpinned by static conceptualisations of time. In practice, this means that clock-time, linearity, and fixed granularity (seconds, minutes, timestamps, event brackets, etc.) predominantly shape IS approaches to conceptualising temporality. IS temporal assumptions need to be challenged (Kishore et al., 2024; Venkatesh, 2021) because IS phenomena are often fluid and temporally ambiguous (Berente et al., 2019; Grover & Lyytinen, 2023).

IS frameworks underpinned by static conceptualisations of time lack the vocabulary to address the temporal fluidity and ambiguity of IS phenomena. Even process-based and sociomaterial temporal conceptualisations fail to describe ephemeral occurrences (or moments, or events, or instances) without either reducing them to discrete, static units or losing them to continual, open-ended flows of action.

Temporal fluidity and ambiguity are well suited to processual analyses of time. However, IS research around processual phenomena is "just getting started" (Pentland et al., 2021) and rich description of processual dynamics—like repetition (Grisold et al., 2024)—is required (Kishore et al., 2024; Kreps & Rowe, 2024). This thesis contributes to IS by developing a processual framework for ephemerality—with repetition at its conceptual core—that critically addresses temporal assumptions in IS (see Section 5.8.1 for EF3 in relation to structural, performative, and processual approaches to conceptualising the temporality of digital trace data.)

EF3 conceptualises ephemerality by positioning the duality of occurrence/moment as the convergence of stability and transformation: in and over every ephemeral occurrence/moment, the contexts of time, space, object, and action are always more or less similar (stabilising) *and* more or less different (transformational). Mechanical repetition of similarity and creative repetition of difference are the forms through which occurrences/moments manifest. Short-lived ephemeral durations endure because occurrences/moments are constituted/reconstituted and composed/recomposed through repetitions of similarity and difference that are themselves short-lived.

Ultimately, EF3 incorporates a processual critique of discrete and static views of time to show that every discrete and static occurrence is simultaneously an open-ended and flow-based moment.

Framing ephemerality as a specific type of time provides IS researchers with a structured conceptual lens and opens new pathways for future research (see Table 13, p.142-143). For example, while digital trace data may be "inherently processual" (Pentland et al., 2020), IS researchers typically—if

sometimes implicitly—treat them as discrete occurrences *in time* rather than open-ended moments of ongoing meaning-making *over time*. Through EF3, DTD are both discrete and open-ended, are static and flow-based, are short-lived and durable. Through EF3, stability and transformation are not tracked as competing phenomena. Instead, the ephemeral nature of every digital trace is always short-lived and durable—an ephemeral manifestation of stability and transformation.

1.9 Transition to Chapter 2

The development of this thesis from chapters 2 through 5 reflects the emergent nature of the research focus and the eventual PhD contribution. Each chapter builds toward the thesis conclusion, where broader contributions, limitations, and potential future research directions are discussed (chapter 6). Through the "Introductory Comments" and key papers for chapters 2 through 5, the articulation of the research focus and aim sharpens incrementally, reflecting a PhD learning curve that recursively shapes a coherent, parsimonious, structured, and actionable conceptualisation of ephemerality (EF3). Chapter 2 introduces the initial research contexts of liquid modernity.

2 Paper 1: Liquid Modernity

2.1 Introductory Remarks

2.1.1 Paper 1 development

Key paper 1 (Doyle & Conboy, 2020b) is built upon developmental work presented at the SIGPrag pre-ICIS workshop in December 2019 and a research-in-progress paper (Doyle & Conboy, 2020a) in the ECIS proceedings.[3] The collective research introduces liquid modernity, outlines core liquid-modern principles, illustrates their application in IS contexts, and evaluates their analytical limitations. The introductory remarks here provide a brief overview of liquid modernity, of the liquid-modern principles, and of the limitations of the liquid-modern perspective.

2.1.2 An introduction to liquid modernity

Liquid Modernity (Bauman, 2000) is the core text of the liquid-modern perspective, although Bauman was developing its themes from at least the late 1980s until his death in 2017 (e.g.: Bauman, 1987, 2004, 2005, 2007, 2011a, 2017). With over 26,000 citations, the work continues to have a significant impact on the social sciences. Liquid modernity has been interpreted as:

1. A sociological theory of modernity (Blackshaw, 2005).
2. Conceptualising a world with weakened structures and relationships (Hewer, 2022; Jay, 2010), where stability, coherence, and consensus are illusory (Deuze & Witschge, 2018).
3. A societal condition characterised by pervasive uncertainty (Bryant, 2020; Clegg & Baumeler, 2010) and the failure to rationalise intensifying change (Sheptycki, 2017).
4. A culture that devalues durability (R. Lee, 2005) and emphasises ephemerality (Bardhi & Eckhardt, 2017; Binkley, 2008; Hewer, 2022; Lekakis, 2013).
5. A context where preceding agendas, strategies, and structures impede action and intervention (Bryant, 2007).

Liquid modernity is developed around two central metaphors: “solid” and “liquid”. Solid modernity, associated with industrialisation, emphasises rootedness, rigidity, and durability. Liquid modernity, associated with globalisation, emphasises mobility, flexibility, and ephemerality. In liquid modernity, globalisation encompasses social, economic, cultural, technological, and political change that

[3] SIGPRAG: Association of Information Systems Special Interest Group on Pragmatist IS Research.
ICIS: International Conference on Information Systems. ECIS: European Conference on Information Systems.

intensifies individual-level and systemic instability and uncertainty. Globalisation is partially driven by software innovation that mediates requisite societal interconnectedness, fluidity, and ephemerality. Bauman's sociology complements and critiques broader sociological discussion around the impacts of globalisation and the erosion of traditional structures (e.g.: Beck, 1994; Giddens, 1991).

2.1.3 An overview of liquid-modern principles

Table 4 presents a set of ten liquid-modern principles. The table structure and text is adapted from Doyle and Conboy (2020a & 2020b). Table 4 is presented here for reference because, although key paper 1 discusses and contextualises the same ten principles, the paper lacks such a table.

Table 4. Toward a Framework of Liquid-Modern Principles for IS Research

#	**Liquid-Modern Principle**
1	Technology significant in driving and sustaining liquid-modern conditions
2	Dominant "solid modernity" epistemologies require reassessment
3	All solid objectives are necessarily undermined by liquid conditions
4	Present-oriented temporality fosters ethical adiaphorization[4]
5	Exterritorial power resists regulation and reinforces inequalities
6	Private individualism undermines collective agency and citizenship
7	Identity is commodified and continuously reconstructed
8	Liquid-modern conditions generate and require uncertainty
9	Liquid modernity generates paradoxical conditions
10	Uneven liquid differentiation generates wicked problems

2.1.4 Establishing inclusion/exclusion criteria for liquid-modern principles

Across disciplines, application of Bauman's liquid-modern ideas typically utilise two broad approaches: research that uses the metaphors of "solidity" and "liquidity" as explanatory devices and research that isolates and interprets a prominent liquid-modern theme or themes in relation to a specific phenomenon.

[4] Adiaphorization, in Bauman's work (e.g.: Bauman, 1989, 2000), refers to institutional, technological, and bureaucratic processes that displace ethical responsibility onto societal structures rather than individuals. In solid modernity, adiaphorization was apparent, for example, in Nazi bureaucracy. In liquid modernity, adiaphorization is evident in digital surveillance, trace data harvesting, and automated algorithmic decision-making. The distinct but related concept of moral ambivalence highlights the individual-level anxiety and uncertainty that results around moral decision-making in a liquid-modern world where solid ethical frameworks have eroded.

Of the former, many studies apply liquid modernity metaphorically to describe perceived shifts from solidity to liquidity across, for example, social (Lee, 2005; 2011; 2014; Palese, 2013; Jacobsen 2004), economic (Abrahamson, 2004), organisational (Clegg & Baumeler, 2010), consumerist (Biraghi et al., 2018; Hewer, 2022), and technological domains (Davis, 2013; Bryant, 2020). It should be noted that Bauman often cautions against reductive, binary conceptualisation of solidity and liquidity. For Bauman, it is not the case that forms of solidity no longer exist in liquid modernity, but rather that forms of solidity are increasingly ephemeral and prone to destabilisation.

The second approach (often in tandem with the first) foregrounds specific liquid-modern themes. The most prominent—liquidity—has informed novel thinking around, for example, "liquid surveillance" (Lyon, 2010; Bauman & Lyon, 2013), "liquid consumption" (Bardhi & Eckhardt, 2017), "liquid journalism" (Deuze, 2008; Deuze & Witschge, 2018), and "liquid organisation" (Clegg & Baumeler, 2010). Additional liquid-modern themes include identity (Blühdorn & Butzlaff, 2019; Singh & Doherty, 2007), precarity and uncertainty (Campbell, 2013; Sultana, 2018), the fragility of relations (Bauman, 2003; Branaman, 2013; Hobbs et al., 2017), and the ethical concerns around power, control, and digital technology (Bachmann, 2019; R. L. M. Lee, 2022).

It should also be noted that in both approaches—metaphorical and thematic—liquid modernity serves more as a descriptive concept to be contextually interpreted than a robust, prescriptive conceptual tool (see 3.1.1, 3.1.2, and 3.1.4). Clegg and Baumeler (2010), for example, discuss Weber's (1978) metaphor of the iron cage in relation to liquid modernity before applying their interpretations to project teams and a research agenda for analysing the ethical, political, identity-related, and organisational implications of "liquidity" for contemporary organisation. Bardhi and Eckhardt (2017), on the other hand, apply their interpretations more narrowly to a "new dimension of consumption along a solid-to-liquid spectrum." In their analysis, "solid consumption" is characterised as "enduring, ownership-based, and material" and "liquid consumption" is viewed as "ephemeral, access based, and dematerialised".

The inclusion and exclusion criteria for delineating the liquid-modern principles (Table 4) are primarily informed by the thematic approach. Direct references to "solidity" inform just two of the ten principles (principles 2 and 3). However, the aim of paper 1 is not to delineate a specific liquid-modern theme, like fluidity or consumption, but to articulate an integrative set of principles that describe the broader structural, ethical, and epistemic dynamics shaping the liquid-modern perspective. In other words, the framework should provide an overarching and comprehensive set of guiding liquid-modern principles for IS researchers. To the best of my knowledge, such a framework remains absent from the literature.

Criteria for principle development and inclusion were:

1. Alignment with the core themes of liquid modernity
2. Highlighting the paradoxes, contradictions, and tensions of liquid-modern conditions (see principles 3, 8, 9, 10)
3. Highlighting the structural, individual, and ethical implications of liquid-modern conditions (see principles 2, 4, 5, 6, 7)
4. Demonstrating relevance to IS contexts as appropriate and possible (principles 1, 8, 10).

Criteria for exclusion were:

1. Unnecessary extension beyond the core themes of liquid modernity
2. Overly rigid or deterministic explication/interpretation of liquid-modern conditions
3. Redundancy through excessive abstraction or conceptual overlap.

2.1.5 Limitations of the liquid-modern perspective

As an analytical lens, liquid modernity is criticised for and, perhaps, limited by its abstract, inductive, literary style (R. Lee, 2011) and its lack of empirical validation (Bryant, 2020; Jay, 2010). Its loosely developed themes are difficult to categorise or define. As will be discussed in the introductory remarks for chapter 3, these possible limitations are also evident in the selection of liquid-modern principles presented in key paper 1 (see Table 4 and section 2.4 for the principles and 3.1.1 for the discussion).

2.1.6 Paper 1 title: The Role of IS in the Covid-19 Pandemic: A Liquid-Modern Perspective

The following subsections (2.2–2.8) present key paper 1 (Doyle & Conboy, 2020b) as published (minor edits are made for clarity, flow, and in-text cross-referencing). The references for all four key papers are listed in the bibliography (chapter 7).

2.2 Paper 1 Abstract

History shows that pandemics can catalyse enormous change, fundamentally transforming the way people make sense of the world. Technologies can also be catalysts of change. Digital technologies are playing a vital role in tackling the Covid-19 pandemic, but the pandemic also presents significant opportunities for digital technology. Some experts believe the pandemic may permanently normalise the comprehensive societal use of digital technology. This article casts a critical eye over the potential implications of this opportunity in the context of information systems (IS) research and development. We outline selected principles of Zygmunt Bauman's theory of liquid modernity. We then apply the liquid-modern principles to illustrative examples drawn from the Covid-19 literature by focussing on three IS domains: control, big data, and privacy. We show that traditional conceptualisations of both scientific and societal control need to be reassessed; that big data alone cannot safely order paths out of

the current crisis, and that information privacy regulations are irrelevant when undermined or circumvented by both public and private actors. We conclude by making four recommendations for IS pandemic researchers and five practical recommendations in the context of the pandemic.

2.3 Introduction: the Pandemic, Digital Technology, and the Future

Digital technologies are helping to combat the Covid-19 pandemic. Technologies are enhancing diagnoses of Covid-19, shaping spatiotemporal visualisations of virus transmission (Ting et al., 2020; Zhou et al., 2020), providing real-time information updates (e.g.: www.worldometers.info/coronavirus), and facilitating personal, professional, and administrative communication during lockdown (E. Chen et al., 2020). The pandemic also presents "a great opportunity for digital technology" (Ting et al., 2020) and may "permanently normalise the use of digital technologies for socialising, business, education, healthcare, religious worship, and government" (Griffin & Denholm, 2020). Consulting firm McKinsey & Company phrase it thus: "As physical doors close, new digital doors swing open" (Fitzpatrick et al., 2020). The overarching objective of this article is to critically examine the multi-level implications entangled with this opportunity beneath a liquid-modern lens.

The Covid-19 pandemic is a complex and unpredictable crisis. Agile approaches (Conboy, 2009) and complexity theories (Guo et al., 2009; Hung & Tu, 2014) can be undermined by methodological objectives that seek to manage, control, or organise change (Benbya et al., 2020; McKelvey, 2004; Sekara et al., 2016). Such frameworks may well be too rigid for the fluid and volatile nature of present conditions. A core premise of Zygmunt Bauman's theory of liquid modernity (Bauman, 2000, 2004, 2007, 2011a) is that change cannot be rationalised, ordered, or controlled (Sheptycki, 2017). For Bauman, theories, methods, and concepts that are based on an ability to do so are fundamentally flawed.

Emergent Covid-19-related IS literature suggests that the pandemic is relevant to almost every strand and sub-strand of the IS discipline. We suggest that three IS areas are particularly relevant:

1. **Control** (Maruping et al., 2009): control in this article refers to positivist epistemologies that underpin IS research, to related IS research objectives, and to sociopolitical measures that aim to control the impacts of the pandemic. For example, through a liquid-modern lens, research objectives for controlling pandemic fake news (Depoux et al., 2020) are critically compromised by sociopolitical tensions (see subsection 2.5.8).
2. **Big Data** (Abbasi et al., 2016; Agarwal & Dhar, 2014): we consider the epistemological and practical implications of big data in the context of the pandemic. For example, the holistic efficacy of automated diagnostic systems (Alimadadi et al., 2020) must be established in the

context of big data being intrinsically erratic (subsection 2.5.3) and not in isolation from the human beings that the systems are diagnosing (subsections 2.5.4 and 2.6.2).

3. **Information Privacy** (Bélanger & Crossler, 2011; J. A. Smith et al., 2011): we also highlight IS privacy concerns in the context of the pandemic. Through a liquid-modern lens, privacy concerns can seem irrelevant when regulations can be so fluidly circumvented (2.5.5 and 2.6.1).

References to digital technology in sections 2.5 and 2.6 refer the reader to one or more of these areas.

We need to assess how technologies are helping the pandemic response. Perhaps more importantly, we will need to assess how they could have helped more. We argue that this analysis should not be conducted using frameworks built for a pre-Covid-19 way of thinking. Liquid modernity, characterised by constant change, uncertainty, and turbulence is a theory built for this analysis.

Section 2.4 introduces the theory of liquid modernity (Bauman, 2000) and outlines a selection of liquid-modern principles. Section 2.5 applies those principles to illustrative examples primarily selected from the Covid-19-related literature. In this way, subsection 2.5.1 is informed by subsection 2.4.1, subsection 2.5.2 by 2.4.2, and so on. Sections 2.6 and 2.7 make four research recommendations and five practical recommendations respectively in the IS contexts of the pandemic response.

2.4 The Liquid-Modern World: Uncertain, Unstable, and Unfair

Ten liquid-modern principles (Doyle & Conboy, 2020a) are outlined for consideration in the context of IS research and development.

2.4.1 Technology driving and sustaining liquid-modern conditions

Technological innovation is a catalyst of volatile liquid-modern conditions, alongside modernising processes of order-building, economic progress, and globalisation (Bauman, 2004). Initially facilitating increased speed and organisation, technological innovation now accelerates the instability and fluidity characteristic of liquid modernity. The point is not to critically challenge technological innovation *per se* but rather the "organisation of mobility" through "digital capitalism" (Fuchs, 2017).

2.4.2 Dominant "solid modernity" epistemologies require reassessment

At the mutable core of the liquid-modern perspective are the epistemological—and ethical—impacts of wicked, postmodern change as it relates to our modernist, human need for rationalistic order and control. In the preceding "solid" phase of modernity (Bauman, 2000), change was habitually seen to facilitate a grander design, as if change was a temporary detour to the same collective destination. In liquid

modernity, change is effectively our only permanence (Bauman, 2011b), critically undermining our theoretical and practical conceptualisations of destination—and goal or objective—altogether.

2.4.3 All solid objectives are *necessarily* undermined by liquid conditions

Multi-level maximising of readiness for mobile adaption, irrespective of the ability to do so, best meets liquid-modern criteria for success and simultaneously creates its "aqueous foundations" (R. Lee, 2005). Liquid modernity prioritises mobility over rootedness, flexibility over rigidity, adaptability over endurance, ephemerality over durability, and responsiveness over restraint. Innovation creates the liquid modern space for further innovation, while simultaneously downgrading or rejecting the original theory, structure, objective, technology, or person. We remain, however, solidly predisposed to the imposition of order and control upon conditions that are now necessarily liquid and mutable.

2.4.4 Present-oriented temporality fosters ethical adiaphorization

The past and the future hold little meaning in the context of unrelenting mutability. In liquid modernity, time is effectively unrestricted and can no longer be unilaterally disciplined, enclosed, divided, and controlled as it was in solid modernity (Till, 2013). Ethical adiaphorization occurs when the past and the future are sacrificed to the demands of the present (Campbell, 2013) and "systems and processes become split off from any consideration of morality" (Bauman & Lyon, 2013).

2.4.5 Exterritorial power resists regulation and reinforces inequalities

Power in liquid modernity is separated from political agency and exists primarily in the exterritoriality of digital networks, where it can be transferred, manipulated, or undermined instantaneously (Bauman, 2000). The exterritorial power principle highlights how regulations and guidelines are habitually circumvented. Liquid modernity's most immobile actors are trapped by the limits imposed by provided technologies, as well as broader, entangled institutional factors that constrain opportunity (Andrade & Urquhart, 2012).

2.4.6 Private individualism undermines collective agency and citizenship

The traditional public space is contracted and delegitimised by the agency of fragmented, inward-oriented, liquid-modern individuals (Bauman, 2000). No aspect of citizenship can be taken for granted (Ellison, 2013). The privatisation of liquid-modern individualism will not reliably support coherence or synchronicity. A liquid-modern lens can expose the unintended human disconnections and the erosion of mutual interest that is intensified by sociotechnical interrelation.

2.4.7 Identity is commodified and continuously reconstructed

In liquid modernity, societal members are engaged as consumers, not producers, so that consumerist values promote self-construction of identity that must be solid enough for effective identification but liquid enough to allow for continual re-construction. Increased freedom is not a simple result of this "paradigm shift" (Baldwin & von Hippel, 2011). Should the upgraded identity not satisfy individual expectations there is no one to blame but oneself. The results are counterproductive homophilisation[5], hyper-competitiveness, uncertainty (see subsection 2.4.8), and increased division.

2.4.8 Uncertainty is generated and required in liquid modernity

Instability creates the conditions for innovation; innovation creates uncertainty; uncertainty creates instability. For example, continual technological upgrades are associated with an endemic feeling of insecurity (Sheptycki, 2017). Uncertainty is the state that liquid modernity requires. Mitigating uncertainty by solidifying individual options counters the liquid-modern instinct by restricting both freedom and the space for innovation. Rather than being dominated or controlled, steered or tamed, uncertainty must now be absorbed, lived with, and manipulated.

2.4.9 Liquid modernity creates paradoxical conditions

Paradoxes reveal problematic elements in logical reasoning (Dietrich, 2020). Hence, the solution to intensified technological complexity is enhanced technological innovation (M. Davis, 2013). In liquid modernity, the structures that once defined solidity—institutions, relationships, identities, and roles—are now in constant flux. The paradoxical principle reveals tensions that can sensitise IS researchers, developers, and practitioners to the fact that technological solutions are not always the remedy for problematic conditions that technologies have helped to create (M. Davis, 2013).

2.4.10 Uneven liquid differentiation generates wicked problems

Degrees of solidity and liquidity can be conceived as interlocked within the modernising processes of order-building, economic progress, and globalisation. For example, stages of organisational, sectoral, or regional development can characterise degrees of solidity and liquidity. The proviso is that liquidity is now continually undermining solidity. Modernising, capitalist-motivated, technocentric IS efforts to

[5] Homophilisation refers to processes by which individuals or groups increasingly associate with others who share similar characteristics, values, beliefs, or behaviours. Homophilisation reveals that, despite the fluidity of identity construction in liquid modernity, individuals are more inclined to seek stability in sameness rather than embrace diversity—gravitating toward the very social structures that liquid modernity is ostensibly eroding (see also 2.5.9).

order, control, and manage are in continual tension with the complex, fluctuating, and liquidly differentiated (Turner, 2003) end-user sites for their systems and technologies.

2.5 A Liquid-Modern Perspective of the Covid-19 Pandemic

The liquid-modern principles outlined in 2.4 inform the perspective applied to the Covid-19-related literature cited in the 2.5 subsections. Subsection 2.4.1 informs subsection 2.5.1, and so on. References to technology refer to control, big data, and information privacy (see 2.3).

2.5.1 Technology driving and sustaining liquid-modern conditions

Economic progress is facilitated by technologies during the pandemic. Social media enable lockdown communication. ICTs facilitate the transition from office-work to work-in-the-home (E. Chen et al., 2020). Video conferencing app Zoom, with 10 million "daily meeting participants" in December 2019, reports 300 million daily users six months later (T. Warren, 2020). Financial institutions that invested heavily in digitisation following the 2007–2008 financial crisis have infrastructures in place to maintain flows of capital (Arner et al., 2020). *The Economist*, referencing British power cuts and TV channels shutting down early during the 1970s miners' strike, captures the present contrast: "The pandemic has not turned the lights off" (The Economist, 2020c).

Neither has the pandemic "killed" *globalisation* (The Economist, 2020a). The global economy faces the worst recession since the Great Depression (World Economic Outlook, 2020) but between 18 March 2020 and 19 May 2020 the combined wealth of the top five US billionaires increases by 19% and the combined wealth of Amazon CEO Jeff Bezos and Facebook CEO Mark Zuckerberg increases by 14% (Americans for Tax Fairness, 2020). The wheels of "software capitalism" (Bauman, 2000) continue to turn during lockdown: "the very richest of the tech billionaires... dominate the highest ranks of the [*Forbes*] list. Nine of the 20 wealthiest people in the world are tech tycoons" (LaFranco et al., 2020).

Order-building is evident in the global aggregation of Covid-19 big data. One study employs the 'Linguistic Inquiry and Word Count' tool to extract content from social media posts "because the words and linguistic patterns people use in their text could reveal their emotions, perceptions, and their needs for affiliation, power, achievement, and so on" (L. Li et al., 2020). The research objective is cited verbatim, not only because liquid-modern principles undermine such claims but because the application of machine learning to social media content for the purposes of "extracting relevant entities, their semantic relationship as well as the emotional sentiment they express" (Del Vicario et al., 2017) is order-building science that risks upgrading the technological artifact at the expense of its social object. We trust meta-data but not meta-theories (Anderson, 2008) and prioritise machine learning over human understanding. During the pandemic we must prioritise people, not technology (N. Klein, 2020). Ideals

of sociotechnical interconnection are undermined by technocentric ontology and capitalist motivation, which can both generalise and isolate the experience of individual people and places: “most hospitals are overcrowded, nearing collapse, while medications, mechanical ventilators, oxygen, and personal protective equipment are not available... We have been in quarantine since March 10. Unfortunately, the outside world seems unaware that in Bergamo, this outbreak is out of control” (Nacoti et al., 2020).

2.5.2 Dominant modernist epistemologies must be reassessed and updated

The pandemic is a crisis where the speed of response is justifiably vital. It may also be the catalyst for “an even faster adoption of activities relying on digital” (Arner et al., 2020). For example, “the scale of the change and the speed at which it is happening is shining a bright light on the fact that companies are facing a once-in-a-generation shift” (Fitzpatrick et al., 2020). However, the intense focus of that light—and its illumination of a singular catalyst—presently concentrates collective attention on a rate of change that was in liquid flow long before the light was switched on. It is increasingly evident that people are more conditioned to change than was perhaps realised. Early empirical evidence shows 83% of 7,241 island-of-Ireland-based surveyed workers who never worked remotely before the crisis began would like to continue working remotely when the crisis is over (McCarthy et al., 2020). How quickly people have adapted to lockdown is not “remarkable” (Fitzpatrick et al., 2020). Unconsciously or otherwise, people are habituated to change, not least through rapid technological innovation.

Habituation to change is undermined by our modern inclination to order and control. Pandemic control measures can be undermined by the very criteria used to define the measure. Inherently mutable Covid-19 case definitions (Tsang et al., 2020) frequently reorder the course of action demanded of people that the definitions are designed to protect. Similarly, the common practice of ordering pandemic priorities is not necessarily useful because “changing conditions lead to changing priorities” (J. H. Williams & Dawson, 2020).

Implementation of control measures to combat virus spread are defined and imposed on a nation-by-nation basis (Nanni et al., 2021). Sweden, arguably, is the most prominent example of a liquid-modern control approach (Qi et al., 2020), with China, arguably, the most prominent “solid” controller. In fluctuating, wicked environments both solid and liquid control strategies present complex problems. Decentralised, “liquid” control measures (Nanni et al., 2021) increase instability (see 2.5.3). Centralised control approaches (L. Li et al., 2020) are fraught with ethical risk (see 2.5.5).

In the associated context of big data, decision-makers must remember that big data is a narrowed, solid snapshot of wider, inherently liquid processes, with data itself momentarily shaped not only by the technology, but by the data ontology employed and its regulatory environment (Kitchin, 2014). The

Surgisphere Covid-19 big data scandal is a case in point (Piller, 2020) (see 2.6.2). The pandemic has underscored the need to reassess dominant research epistemologies. Efforts to control inherently liquid processes—whether the spread of a virus or sociotechnical change—must evolve beyond relatively static frameworks to better navigate the complex, ever-shifting landscapes of a liquid-modern world.

2.5.3 All solid objectives are *necessarily* undermined by liquid conditions

Pandemic control measures have sparked multiple national and international debates around, for example, the necessity of lockdowns, the duration of lockdowns, the timing of lockdowns, the efficacy of specific drugs, the benefits or otherwise of facemask and glove-wearing, and precise distances for social distancing. Technologies can instantaneously connect these sparks, creating viral online stories. In the contexts of Covid-19, fake news is adjudged to spread faster than the virus itself (Depoux et al., 2020) (see 2.5.8). The liquid-modern fluidity of information undermines institutional efforts to stabilise public understanding during the pandemic.

In the context of big data, some experts are proposing the integrated, centralised, and global collection of Covid-19 patient and citizen data (Alimadadi et al., 2020; Depoux et al., 2020). Solid, centralised, patterns in big data are inherently mutable, continually undermined by the flow of the data. Small input errors that can result in magnified research inaccuracies and implementations (Ienca & Vayena, 2020). Moreover, scientific and jurisdictional differences pose a dilemma: homogenise the differences, which risks creating misleading or untrustworthy data representations, or impose rigid categorisation of incoming data, which disrupts the fluidity and adaptability needed for accurate analysis. In the contexts of Covid-19, automated diagnostic systems (Alimadadi et al., 2020) exemplify these challenges, as society struggles to provide a coherent, multi-level, big data snapshot of itself.

There is no simple solution for stakeholders. Deepening concerns about the "robustness of fundamental digital infrastructures" (Arner et al., 2020) can overlook the reality that digital infrastructure must be sufficiently flexible to support continuous innovation. Robustness is a feature of solidity, not liquidity.

In the contexts of information privacy and control, there are calls for the European Commission to mitigate concerns of social control by issuing legislative commitments to delete Covid-19 data at the end of the crisis (Knight, 2020). The European Commission should act in a centralised manner because, it is suggested, legislative measures developed nationally by individual member states could "ultimately compromise the fragile Schengen area" (Barbieri & Darnis, 2020). A solid, traditionally sound, and centralising proposal, which fails to recognise that the Schengen area now necessarily depends upon its fragility to foster innovation and maximise globalised potentiality and economic progress.

2.5.4 Present-oriented temporality fosters ethical adiaphorization

The spread of the virus, incubation periods, self-isolation periods, lockdown durations, flattening the curve, relaxing restriction phases, measuring the R-nought, the race for a vaccine: the language of the pandemic is shaped by space and time. In turn, technology-enabled maps, graphs, and curves shape our temporal awareness by ordering our understanding of the progress of the virus *through* space and time. Before the crisis, many adults spoke of having "no time". Time was "managed" in perceivable, episodic chunks, rather than uncertain, extended lengths. During lockdown there is an "excess" of time and a seemingly extended, intensified duration of uncertainty. The solid, time-based routines rigidly imposed upon our liquid lives, as well as the solid routines imposed upon us have, at least temporarily, been made redundant, with potential now for further long-term change (see subsection 2.7.3).

The long-term is of little perceivable interest in liquid modernity. To mitigate adiaphorization, decision-makers must consider the long-term impacts of control measures under significant pressures of real-time implementation and scrutiny, with "the most ethically contentious" measures in pandemic-response typically those that require people to change their behaviour (J. H. Williams & Dawson, 2020). A liquid-modern lens anticipates that those least likely or able to meet liquid-modern criteria for success will fall further outside the scope of collective care during the crisis.

In the context of control, it is ironically those groups perhaps least impacted by pandemic control measures—the chronically poor (UNICEF, 2020), the homeless (Ellis, 2020), asylum seekers (Grandi, 2020), and nursing home residents (The Economist, 2020b)—who suffer most during lockdown. The plight of nursing home residents in many jurisdictions is particularly egregious, not least because the elderly are the demographic deemed most vulnerable to the virus. Not recording the deaths of nursing home residents in data reports (Comas-Herrera et al., 2020) is not only a corruption of the data but a grave ethical calamity. Decision-makers will claim the pandemic presented a situation of unprecedented uncertainty. The reality is that these complex, uncertain conditions have been developing for some time. Beth Galetti, senior vice president at Amazon: "We are frequently doing things that have never been done before... there is often no playbook to teach nor experts to follow, so we empower people to try new things and learn along the way" (McKinsey, 2020). When the past and the future are subsumed by the present and "systems and processes become split off from any consideration of morality" (Bauman & Lyon, 2013), liquid modernity becomes a perpetual series of short-termist, disconnected Sisyphean events.

2.5.5 Exterritorial power resists regulation and reinforces inequalities

Exterritorial power resists regulation on multiple levels. Big data is collected at speed, in vast quantities, continuously, and—in a very liquid-modern way—"more often than not, without a specific purpose in

mind" (Müller et al., 2016). One pandemic study has collected more than 50 million Covid-19-related tweets and will continue collection "uninterruptedly for the foreseeable future" (E. Chen et al., 2020). As "informatics of domination" (Haraway, 2013) and surveillance (Zuboff, 2019), big data enables concentrations of power (Crawford et al., 2014). The responsibilities of technology developers (Ienca & Vayena, 2020) with respect to the secondary, tertiary, and opaque uses of our personal information must be expanded and highlighted. As it stands, technologies are rapidly upgraded and deployed while our social responsibilities seem to rest upon liquid aspiration and jargon.

Twitter, for instance, grants real-time access to its complete stream of tweets to select partners only (Boyd & Crawford, 2012) but such regulations are easily, liquidly circumvented with technological tools (e.g.: Hydrator (E. Chen et al., 2020)). Regulations are also politically circumvented. The Global System for Mobile Communications (GSMA), an organisation representing more than 750 mobile operators worldwide, published guidelines for the protection of information privacy during the 2014–2016 Ebola outbreak in West Africa (GSMA, 2014). The guidelines include anonymisation of phone numbers and individual identify; not transferring data beyond the individual operating system, and not sharing data with third parties. China Mobile, China Telecom, and China Unicom, three state-owned Chinese companies, are signed-up members of GSMA. During the current pandemic crisis, major concerns (Davidson, 2020) have already been raised about the Alibaba-developed, Chinese-state-supported, Alipay Health Code app, which spatiotemporally and publicly tracks citizens (Barbieri & Darnis, 2020) and breaks each of the GSMA guidelines. There are suggestions that collected data are being shared with state police (Ienca & Vayena, 2020) and reports that Beijing is censoring criticism, scrubbing the internet, and detaining citizens for spreading "rumours" (Y. Li, 2020).

Hungary, a member of the "fragile" Schengen area, passed emergency Covid-19 legislation allowing Prime Minister Victor Orbán to rule by decree indefinitely (Vijaya et al., 2020). Five days later Prime Minister Orbán suspended "the individual data subject's rights pursuant to... European GDPR" (privacy-ticker.com, 2020). Although, since 4 May 2020, Hungarian lockdown measures are being relaxed (hungarytoday.hu, 2020), as of the time of writing information privacy restrictions have not changed. When exterritorial liquid-modern power is so easily circumvented, appropriated, manipulated, and undermined, frequent IS and technology developer calls to give the "power" to the end-users (Nanni et al., 2020) seem not only disingenuous but an abdication of social responsibility, akin to merely blaming the person pulling the trigger and not the gun itself. A global trading system with "an unstable web of national controls" will not necessarily be safer or more "humane" (The Economist, 2020a).

2.5.6 Private individualism undermines collective agency and citizenship

Müller et al. (2016) note that the authors of many high-impact big data studies are affiliated with companies like Google (Ginsberg et al., 2009; Michel et al., 2011) and Facebook (Kramer et al., 2014). Kitchin (2014) points out that big data is not 'free from 'the regulating force of philosophy'" (Berry, 2011). The philosophies underlying big data production are informed by the "solid" priorities of order-building, economic progress, and globalization. The Goldman Sachs-coined 'FAAMG Stocks', which refer to Facebook, Amazon, Apple, Microsoft, and Google (investopedia.com, 2020), make up 21% of the S&P 500's market value during the first quarter of 2020, approximately equal to the combined stock market value of the financial, industrial, and energy sectors. "No physical contact and lockdowns [ensure that Covid-19] is a crisis that almost works in technology's favour" (Egan, 2020).

The privatisation of information is "the result of the powerful normative effect exerted by technology" (Lucchi, 2007) but information privacy is rarely studied as a multi-level concept with multi-level impacts (Smith et al., 2011). Calls for the European Commission to act in a centralised manner in relation to data collection (Barbieri & Darnis, 2020) might seem to present a window of controlling opportunity to the public sector in the EU, where private concerns now habitually supersede public agency. However, the public sector, with its own vested interests for maintaining its fragile instability (subsection 2.5.3), is now increasingly susceptible to undermining itself. The 19 March 2020 statement issued by the European Data Protection Board (EDPB) is, in this context, revealing. Highlighting transparency, accessibility, security, and confidentiality, each EDPB data processing "core principle" for European employers refers the employer *back* to national legislation (EDPB, 2020).

The corporate, political, and individual motivations of privatism contract the traditional public space and threaten the efficacy of democratic agency by, firstly, fragmenting the interests of a public that is now effectively private and, secondly, by blatantly enabling attacks on the democratic ideal through scandals like Cambridge Analytica. The 520-mile roundtrip by Dominic Cummings (chief advisor to UK prime minister Boris Johnson) during lockdown is a blatant illustration of private incentive undermining public duty. In the context of control, it is suggested that "only by collaborating with concerned communities... can we ensure the efficacy of quarantine orders" (Depoux et al., 2020). There is no way that the efficacy of quarantine orders can be ensured but there is a burden of responsibility on those proposing sociotechnical solutions to be precise in language, lest the deterministic myth of a technological solution for every social problem (Leetaru, 2019) be further perpetuated. The European "personal data store" approach (Nanni et al., 2020), whereby citizens voluntarily—or liquidly—share spatiotemporal information during lockdown, as well as all proposals requiring voluntary downloading of contact tracing apps, will be critically undermined by the unstable reliability of private agents acting voluntarily and unilaterally. The ideal of the Platonic citizen, with incumbent civic responsibilities and

a communal meeting place in the agora, is liquified in exterritorial liquid modernity by privatised individualism that undermines and erodes genuine mutual interest.

2.5.7 Identity is commodified and continuously reconstructed

Does emancipated, mutable identity enforce or erode ethical responsibility? Ethical considerations for the individual consumer during the pandemic (Steele, 2020), particularly before purchasing a "non-essential" item, might include: Is my purchase putting the health of workers at risk? Does not purchasing put their livelihoods at risk? Alibaba's first quarter revenue in 2020 rises 22% year over year (Lavin, 2020). Amazon's net sales are up more than $10 billion from first quarter 2019 (The Irish Times, 2020). Beneath a liquid-modern lens, and seemingly supported by cited sales figures, the ethical indifference of the distantiated, isolated mouse-click for a non-essential online purchase emerges as an ephemeral symbol of pandemic adiaphorization. Whatever a purchase may imply about the consumer in the instant of the purchase can be forgotten instantaneously and will certainly not apply when the purchased item is delivered, as possession of the item itself will define identity differently.

The identity on the other side of the mouse-click is also mutable. If Henry Ford and the Fordist factory (Gramsci, 2005) were the prototypical symbols of solid modernity and industry, Jeff Bezos and Amazon may be the prototypical symbols of liquid modernity. The Covid-19 Amazon blog is updated daily with positive proclamations about company implementations for Amazon employees, customers, and the wider community (blog.aboutamazon.com, 2020). By contrast, a coalition of thirteen US state attorneys general have signed an open letter to Amazon, detailing inadequate health and safety measures at warehouses, noting company retaliation against employees raising health concerns, and requesting that data concerning infected employees, which is being withheld, be publicly disclosed (MASS.gov, 2020). In relation to the data, when questioned during an interview on CBS's "6o Minutes", Amazon's senior vice president of worldwide operations, Dave Clark, says: "I don't have the number right on me at this moment because it's not a particularly useful number" (Romano, 2020). Should this aspect of Amazon's identity amend the Australian and Canadian governments' decision to contract with Amazon for storage of Covid-19 data (Klein, 2020)? Or can these aspects of identity be easily—liquidly—ignored?

2.5.8 Liquid-modern conditions generate and require uncertainty

To apply the liquid-modern uncertainty principle, we turn to the area of fake news (Conroy et al., 2015), which is now considered one of the main threats to twenty-first century global society (Del Vicario et al., 2017). In the context of the pandemic, the WHO Director General says: "we're not just battling the virus, we're also battling the trolls and conspiracy theories that undermine our response" (BBC News, 2020). Defining fake news and effectively distinguishing it from similar constructs, like misinformation and disinformation, is challenging. Although each construct has been inconsistently characterised by an

intention to knowingly disseminate false information (D. M. J. Lazer et al., 2018), only fake news is consistently associated with anti-establishment, marginalised actors of nefarious threat to mainstream society, such as trolls and conspiracy theorists (BBC News, 2020), "political activists, scammers, alternative news media, and hostile governments" (Bernard et al., 2019). When control measures to stop fake news end in forms of solid censorship, fake news itself becomes quintessentially liquid-modern and democratic.

First, the right to distribute fake news speaks to emancipated, privatised individualism by, in practice, providing internet users with platforms for their voices to be made public. Second, disseminating fake news can be seen as a demonstration of unanchored liquid-modern "control", where control itself is a form of disruption. Third, the liquefication of institutional credibility *by* fake news (Lazer et al., 2018) necessarily creates the liquid-modern space for counterpoint information. Fourth, the counterpoint information creates the space for *counter*-counterpoint information, and so on. The process is inherently liquid-modern: the uncertainty (and/or anxiety, frustration, or anger) generated by fake news motivates the need for enhanced certainty, which motivates in turn the propagation of further information. A liquid-modern lens frames the exponential rise of fake news and attendant uncertainties as being both inevitable *and* required in the current conditions. Consequently, it is now "almost impossible" to determine whether a news item is false or accurate based upon the news item itself (Laato et al., 2020).

Fake news will not be controlled. Global platforms aiming to combat the real-time spread of Covid-19 rumour may do more harm than good, despite research aiming to enable stakeholders with "proactive and engaging" response-narratives (Depoux et al., 2020). Will algorithms make the subtle sociopolitical distinction between rumour and concern within and between jurisdictions? Will algorithms, like so many technology researchers and developers, seem to assume stakeholder integrity? On 30 January 2020, should a concerned, uncertain American citizen be calmed and act accordingly when US head of state Donald Trump says: "We only have five people, we pretty much shut it down coming from China" (The Guardian, 2020a)? On 12 March 2020, should a concerned, uncertain British citizen be calmed and act accordingly when Prime Minister Boris Johnson announces the UK's initial herd immunity approach to the pandemic (The Atlantic, 2020)? Was news that the Trump administration tried to buy a future vaccine fake news (Die Welt, 2020)? Was news that the Trump administration did not try to buy a future vaccine fake news (Politico, 2020)? If data has been withheld are our data stories fake news?

Fake news is not simply a tool for the disenfranchised, dissatisfied, misguided, and marginalised—fake news represents us all and the old aphorism still applies: just as we often get the politicians we deserve, in liquid modernity we may now get the news that we deserve. Fake news is an innovative function of the liquid-modern world. Fake news will be disseminated, absorbed, and rejected regardless of external

control measures. Fake news is an ephemeral solidification of our liquid-modern values. We must learn how to live in these uncertain times, rather than fail and fail again to control the uncontrollable.

2.5.9 Liquid modernity creates paradoxical conditions

Efforts to stabilise often catalyse instability. In the context of data analysis, one study highlights solid findings around homophilous behaviour on social media platforms (Del Vicario et al., 2017), while another states that up to 15% of Twitter accounts are automated social bots, with bot-detection success prompting countermeasures by bot producers (Lazer et al., 2018). How reliable can IS research on human social media dynamics be when not all actors are human? The patterns found in datasets are neither "inherently meaningful nor reliable" and interpreting them as such risks producing "serious ecological fallacies" (Kitchin, 2014). Did pandemic big data patterns account for nursing home residents? And if not, why? The point is not to dismiss the value of analytics in the pandemic response but to emphasise that in liquid modernity, with data inherently mutable, it is not the case for analytics under threat but the role of accumulated human intuition (see 2.6.1).

In these contexts, 'Cognitive Load Theory' undermines trust between people (Samson & Kostyszyn, 2015) and the trust of people toward AI systems (Zhou et al., 2020). Laato et al. (2020) note that humans experiencing information overload are more likely to make careless decisions (Samson & Kostyszyn, 2015). Liquid modernity exacerbates these problems: increased information exposure increases the motivation to order information, which increases information load, which increases instability and uncertainty, which collapses of and increases the potential for dangerous decision-making. "In a world of communication, the problem is noise" (Bauman, 1987).

Through this lens, individual choice often limits exposure to ideologically diverse news and opinion more than algorithmic filtering (Bakshy et al., 2015). While human, identity-affirming choices may foster harmony *within* social sub-groups, they foster division *between* sub-groups (Settle, 2018). A liquid-modern perspective anticipates that individuals will not embrace the emancipatory power of social media (Castells, 2007). Instead, they are likely to ease uncertainty in the familiarity of routinised internet pathways and newsfeeds that reinforce their subjective worldviews: liquid-modern actors still require at least a semblance of stability. In this light, IS findings that social media paradoxically support both emancipation and hegemony (S. M. Miranda et al., 2016) are not surprising. Homophily and polarisation are a solid, human response to the uncertainty and instability inherent in liquid modernity.

2.5.10 Uneven liquid differentiation generates wicked problems

If the rapid spread of Covid-19 is indeed partly a result of technological changes over the past century (Keesara et al., 2020), we might consider it a "liquid" pandemic. By contrast, the Influenza Pandemic

of 1918, which spread more slowly and accounted for the majority of its fatalities during a second wave (Barro et al., 2020), might be considered a "solid" pandemic. Over the intervening century, modernity has established a globally interconnected yet unevenly differentiated world (Bauman, 2004).

It is often suggested that technologies hold global solutions for local problems (weforum.org, 2018). However, as we know, local solutions cannot always scale globally (Turchin et al., 2019). Liquid modernity's uneven spread, particularly between "developed" and "developing" regions, means that policymakers increasingly face the reverse challenge: finding local solutions for global problems (Bauman, 2004). However, uneven liquid differentiation generates wicked problems. In the contexts of Covid-19, control measures reasonably suggested in one region may well be inappropriate for another. And vaccine research customarily assumes "the conditions of a liberal western democracy" because the "overwhelming majority" of vaccine literature originates in Europe and North America (Williams & Dawson, 2020).

Uneven liquid differentiation (Turner, 2003) intensifies the scaling challenges of technological interventions, revealing disparities in infrastructure and technological reliance. Developing nations may often depend on more solid infrastructures, while developed nations may support more liquid, rapidly evolving systems. Similarly, in the contexts of urban and rural divides, pandemic research notes that social media users from cities "attract more social capital which will enlarge their influence upon others" (L. Li et al., 2020). These disparities raise critical questions about how big data research and the pandemic interventions it informs might propagate regional inequalities.

Finally, the pandemic exposes a deepening "data divide" (Marton et al., 2013). Companies like Google (Ginsberg et al., 2009; Michel et al., 2011), Facebook (Kramer et al., 2014), and Twitter (Boyd & Crawford, 2012) often assert solid control over their data, reinforcing disparities between those with and without access to critical information (Trauth, 2017). During the pandemic, for example, Amazon has been accused of monopolising data (Romano, 2020) and China is widely suspected of withholding data (Scissors, 2020). Differentiated, fragmented, and biased data ecosystems undermine equitable decision-making, especially when data is never "free of human bias or framing" (Kitchin, 2014).

2.6 Four Liquid-Modern Recommendations for IS Researchers

2.6.1 Embrace interpretive, critical, and ethical approaches

Historical pandemics, such as the Black Death in 14th-century Europe, catalysed profound societal, cultural, and philosophical transformations (Griffin & Denholm, 2020). The Covid-19 pandemic, entangled with technological change, has the potential to similarly reshape how we make sense of the

world (Gregor & Klein, 2014; Kitchin, 2014). To navigate these shifts, this moment calls for IS researchers to more meaningfully adopt interpretive, critical, and ethical research approaches.

Data-driven claims of "the end of theory" (Anderson, 2008) echo the solid modernist ethos of Henry Ford, who, in 1916, dismissed tradition in favour of innovation (Butterfield, 1965). These perspectives risk devaluing the intuitive, interpretive, and critical skills that humanity has honed over millennia. As technology evolves, IS researchers must remain vigilant, safeguarding the human capacity for interpretative and critical thinking, as well as ethical reasoning. These approaches are vital for addressing the societal consequences of technological transformations during the pandemic and beyond.

2.6.2 Adapt IS research for fluid and dynamic knowledge contexts

The scientific method, rooted in the desire to impose order, faces challenges in liquid-modern conditions where truth-claims are inherently mutable and unstable. Covid-19-related scandals, such as the Surgisphere data controversy (Piller, 2020) and the Paxil "Study 329" case (Lane, 2015) illustrate how flawed research can have wide-reaching impacts. In a world where data-supported empirical snapshots are inherently fluid, IS research must embrace fluid, adaptive theory and method.

Order-building, state-funded pandemic research objectives informed by the need to assist "concerned authorities... sense the mood of the public [and] the information gaps between the authority and the public" (L. Li et al., 2020) is potentially compromised from the outset by issues of transparency and reflexivity. Liquid-modern perspectives urge us to accept the provisional nature of findings, fostering dialogue that prioritises adaptability and contextual relevance. In liquid-modern conditions, we must relax—or make more liquid—the autarchic need for establishing scientific order.

2.6.3 Prioritise human-centric and equitable research approaches

Bauman's decision to prioritise ethics over ontology (Campbell & Till, 2010) positions liquid modernity as an alternative to predominating technocentric IS theories (Sahay et al., 2017) that are imbued with an informational capitalist agenda that can intensify societal inequalities (Trauth & Howcroft, 2006). In that spirit, the responsibility for meaningful human interconnection must rest with humans, not technologies. Technologies should facilitate interconnection without dictating its terms. To that end, IS research should be more broadly representative of society, ensuring that IS serves diverse populations rather than a narrow subset of stakeholders and researchers that may be predisposed to specific ontologies, methods, and worldviews.

This requires expanding the range of voices and perspectives represented in IS research. Policymakers, frontline workers, and marginalised communities must be included alongside academic and corporate

researchers. Furthermore, independent researchers should have equitable access to data, countering the monopolisation of information by large technology companies.

2.6.4 Foster interdisciplinary, reflexive, and hermeneutic research methods

Liquid modernity is not a technophobic thesis. Neither is it a theory *for* sociology, which is a line of argument that contributes to the solid siloing of academic interest and intent, ignores the wicked nature of the problems outlined in section 2.5, and puts researchers and developers at risk of making unreflexive, inaccurate assumptions about the integration of people and technologies. Liquid modernity challenges the siloing of academic disciplines, underscoring the need for reflexive, interdisciplinary approaches in IS research. Hermeneutic research approaches (Boland, 1991; T. Butler, 1998; Myers, 1995) present challenges (Cole & Avison, 2007) but also offer a promising path forward.

In Bauman's approach to hermeneutics, "by spotting the general in the particular" (Bauman, 1978) our understanding becomes circuitous and everything remains necessarily open to reinterpretation (M. Davis, 2020). Hermeneutic methods can reilluminate empirical data (J. A. Smith, 2007) and enable researchers to engage with the fluid, dynamic realities of a liquid-modern world. While these understandings may lack permanence, they may also represent the most stable outcomes achievable in a liquid-modern context. Embracing such methods requires that IS researchers collaborate across disciplines and integrate diverse epistemologies and worldviews.

2.7 Five Liquid-Modern Recommendations for IS Practitioners

2.7.1 Focus on adaptable, transparent strategies and avoid excessive control

In the context of the pandemic, it is essential to distinguish between what we must try to control and what cannot be controlled. For example, pre-vaccine prioritisation of groups for vaccine access can be fatally counterproductive as conditions evolve (J. H. Williams & Dawson, 2020). With temporal horizons effectively framed by the present, postponing pandemic mitigations based on any prioritisation criteria is fraught with danger. The developing situation in Brazil (The Guardian, 2020b) is a case in point. Trying to control the spread of pandemic fake news is similarly misguided. Moreover, we must the efficacy of official regulations and guidelines that are easily circumvented must be critically examined. If they can be easily circumvented, they risk becoming mere bureaucratic exercises and wasting valuable resources. Recognising current realities is not defeatism. Instead, it can inspire new research approaches, increase societal trust, and reallocate resources more effectively.

2.7.2 Balance solidity and liquidity in pandemic interventions

As pandemics exacerbate social inequalities (F. Ahmed et al., 2020), it may be helpful for decision-makers to conceptualise solidity and liquidity when designing pandemic interventions. All control measures, while potentially stimulating benefit in one area, will necessarily destabilise another. Country of residence, for example, will likely become "a significant contributing factor" determining access to vaccine (Williams & Dawson, 2020). If solid interventions, structures, and systems are designed with the knowledge that they are being undermined, conceptualisations of the optimal balance between solidity and liquidity may be inspired. In organisations, for example, it is noted that "entrenched systems that... supported businesses for years—tech stacks, reporting lines, processes—have been no match for the dynamic fluidity of the current crisis (Fitzpatrick et al., 2020). The crisis intensifies awareness of fluidity but the passing of the crisis will not see fluidity solidified, only more widely differentiated in ways that diminish the current awareness. Policymakers should leverage the present opportunity to rethink approaches, rather than imposing the same solid objectives on conditions that have been for some time fundamentally more fluid.

2.7.3 Rethink management for decentralised work environments and fluid work times

Liquid modernity challenges traditional management models, requiring a fundamental rethink of how organisations operate. Twitter's announcement permitting staff to work from home "forever" (Earley, 2020) is indicative of a shift that many organisations—big, medium, and small—may need to adopt to stay competitive. IS will play a pivotal role in enabling this transition, but systems must be designed that consider the individual, societal, and organisational risks inherent in such changes. As the creation of wealth now "coincides with the whole time of life" (Terranova, 2006), the boundaries between work and personal life blur, introducing complexities that conventional management structures may struggle to address. At its limit, remote work could render traditional management obsolete. As decision-making authority is no longer necessarily tied to a specific location or time zone, IS practitioners must prioritise decentralisation and fluidity in system design..

2.7.4 Prioritise ethics and people in data-driven decision-making

Decision-makers must recognise that data patterns are often mutable, corruptible, and incomplete. Holistic decision-making processes must be more than superficially inclusive and collaborative. The plight of nursing home residents during the pandemic may have been alleviated by decision-making frameworks limiting adiaphorization. This subsequently raises the question: can big data and automated decision-making processes be ethical?

The safest route into the future is the one that prioritises people over technology, and facilitates the shift from "technology-centered development toward human-centered design" (Crang & Graham, 2007). In the contexts of information privacy, for example, it is problematic that IS research is habitually conducted in isolation from the actual users of the privacy tools (Bélanger & Crossler, 2011). Covid-19 contact-tracing applications exemplify this issue. Practitioners should be guided not only by what can be done with digital technology and data, but by what should be done.

2.7.5 Adopt cautious, pragmatic approaches to digital transformation in liquid modernity

The pandemic presents "a great opportunity for digital technologies" (Ting et al., 2020) but this opportunity demands a cautious approach to digital transformation.. For example, the U.S. health system may require a "digital revolution" to "unleash the power of digital technologies" (Keesara et al., 2020), but framing this process as an unequivocal solution to entrenched problems risks oversimplifying complex realities. Similarly, the use of terms like "missionaries" for digital transformation leaders (Datta et al., 2020) hints at the dangers of digital evangelism. The pandemic response should instead be viewed as "a largescale social experiment" (Arner et al., 2020), where pre-existing liquid-modern conditions have been brought into sharper focus. By recognising the pandemic as an opportunity to deepen understanding and address liquid-modern realities, practitioners can avoid reductive narratives and foster more thoughtful and pragmatic approaches to digital transformation.

2.8 Conclusion

In liquid modernity, there is no definitive playbook. The trajectory of progress and innovation remains uncertain, as does the origin or timing of the next pandemic—or any future crisis. As of 19:19 on 12 June 2020, 'Worldometer' reported 2,099,910 confirmed Covid-19 cases in the United States, with 116,273 recorded deaths (worldometers.info, 2020). Fresh virus outbreaks have raised fears of a second wave. Yet, with "Black Lives Matter" protests escalating, it is unclear which crisis presently holds priority in the minds of the public and the authorities.

In these uncertain contexts, the real opportunity presented by the Covid-19 pandemic is the opportunity for those researching, developing, and using digital technologies to engage in fundamental reflection (Sein, 2020). This is an exciting time for the IS field, but it also requires that IS researchers and practitioners remain acutely aware of the potential negative impacts of digital technologies (Chiasson et al., 2018). Liquid modernity, with its inherent conceptual fluidity, complex interdependencies, and layered nuances, offers a valuable lens for critically examining these challenges and guiding responses. Our collective aspirations must extend beyond the pursuit of technological innovation to prioritise greater awareness of, and ethical engagement with, the fluid complexities of contemporary society.

3 Paper 2: Liquid Modernity to Ephemerality Framework Iteration 1 (EF1)

3.1 Introductory Remarks

3.1.1 Issues Arising from Key Paper 1

The principles developed and applied in key paper 1 (Table 4; sections 2.4 and 2.5) offer a descriptive overview of liquid modernity's key features and illustrate its relevance in IS contexts. However, without a clear delineation of relationships between the principles they do not constitute an integrated, cohesive conceptual framework. Paper 1 brought into clearer focus the need for a more structured, parsimonious articulation of the liquid-modern principles and their interconnections.

However, as noted in 2.1.4, liquid modernity resists categorisation. Bauman's approach is intentionally non-empirical, aiming to provoke critical discourse rather than produce testable hypotheses (Elliott, 2013; Kilminster, 2016). From this perspective, Bauman's "hermeneutical method" (Davis, 2020), lying "somewhere between social science and literature" (Jacobsen & Marshman, 2008), and its lack of robust empirical validation, are deliberate methodological choices rather than shortcomings (Bryant, 2020).

At the same time, Bauman's unsystematic approach has drawn significant criticism (Atkinson, 2008; Garrett, 2012; Rattansi, 2017). Bauman himself remarked that his works "justify [his] filing among the least systematic thinkers on record" (Tester & Jacobsen, 2005). While this resistance to categorisation is a defining feature of Bauman's work, articulating liquid modernity within a structured conceptual framework is more essential for its applicability in IS research.

A second major issue, intertwined with the first, reflects broader, foundational questions that shaped the PhD learning process: What is a theory? What is a concept? How do theoretical frameworks differ from conceptual frameworks, or principles from concepts or constructs? What constitutes a robust theoretical or conceptual contribution in IS research? What kinds of theories and concepts have historically gained traction in IS research, and why? And what is (an) information system?

Such questions underscored basic limitations in my ability to assess Bauman's work. Was liquid modernity a theory, a concept, a perspective, or perhaps even a narrative? If classified as a theory in sociology, would it qualify as a theory in IS? How might the epistemological foundations of IS shape its openness to ideas like liquid modernity? Should liquid modernity be framed as a set of constructs, of loosely connected concepts, or a grouping of principles? And what did it mean to say that liquid

modernity resists framing? Was this a damning indictment of its relevance and utility, a reflection of its interpretive flexibility and a valid critique of rigid empirical boundaries, or something in between?

The development of key paper 1 (as well as the additional three key papers) occurred in tandem with reading around these and related questions in IS and adjacent disciplines (e.g.: Benbasat & Zmud, 2003; Benbya et al., 2020; Burton-Jones et al., 2021a; Constantinides et al., 2012; Faulkner & Runde, 2019; Fisher et al., 2021; Gregor, 2006; Grover & Lyytinen, 2015; Hassan et al., 2019; A. S. Lee, 2004; Markus & Rowe, 2023; Markus & Saunders, 2007; Orlikowski & Baroudi, 1991; Orlikowski & Scott, 2008; Rivard, 2014; Sutton & Staw, 1995; Wand & Weber, 1995; Weber, 2003; Weick, 1995).

In sum, the first issue highlighted the need for a more cohesive, structured framework of liquid-modern principles, while the second highlighted fundamental questions related to theory, concepts, and IS, as well as significant limitations in my ability to answer and interpret these questions.

3.1.2 On Three Responses to the Issues Arising from Paper 1

To pragmatically address the issues outlined above, three potential responses were considered, each with distinct implications for the trajectory of the PhD.

The first response would involve working toward a more structured and integrated framework of liquid-modern principles. This approach promised the most direct resolution to the issues raised in 3.1.1 as it would retain liquid modernity as the primary research focus and preserve the overarching research aims established in the first key paper. However, a concern with this response now related to the inherent fluidity of liquid modernity: was framing of the liquid-modern perspective possible without critically undermining both its fluid epistemological position and interpretative analytical potency?

The second potential response would narrow the research focus to a reduced selection of core liquid-modern principles or to a single liquid-modern concept. A narrowed research focus would potentially enhance conceptual clarity and the ten principles outlined in paper 1 also provided a starting point for selecting and assessing potential focal concepts. It was unclear at this stage, however, if this narrowed focus would serve as a partial conceptual framing of liquid modernity or result in the delineation of a standalone concept.

The third response involved explicitly downgrading liquid modernity and its associated concepts as the primary research focus. Via this approach, a more conventional IS topic, such as digital transformation (see Appendices C and D), would be foregrounded and liquid modernity would serve as a secondary analytical perspective to be integrated in the latter sections of subsequent key research papers.

Although the second response outlined above most significantly shaped the trajectory of this thesis, this direction was not fully evident until completion of key paper 2. Attempts to address the major paper 1 issues were initially directed toward developing a more structured and integrated framework of core liquid-modern principles (see 3.1.3 and Appendices B and C). Ultimately, however, these efforts clarified the downgrading of liquid modernity and the emergence of ephemerality as the singular PhD research focus.

3.1.3 Attempts to Address Paper 1 Issues (Appendices B, C, and D)

3.1.3.1 Extended abstract 1: liquid modernity and fake news

As indicated by a section heading in the first extended abstract (Appendix B; p. 207), the aim here, in alignment with the first potential response to paper 1 issues (3.1.1), was to work "toward a framework of liquid-modern theoretical principles." The application domain was "fake news" (Figure 1). However, to identify core liquid-modern principles and narrow the research focus (aligning with response 2), the number of principles was reduced from ten to four (see Table 15). The outline of the second principle notes "liquid modernity prioritises mobility over rootedness, flexibility over endurance, *ephemerality over durability*, elusiveness over fidelity, and responsiveness over restraint" (see also Figure 4).

Figure 3. A Liquid-Modern View of Fake News

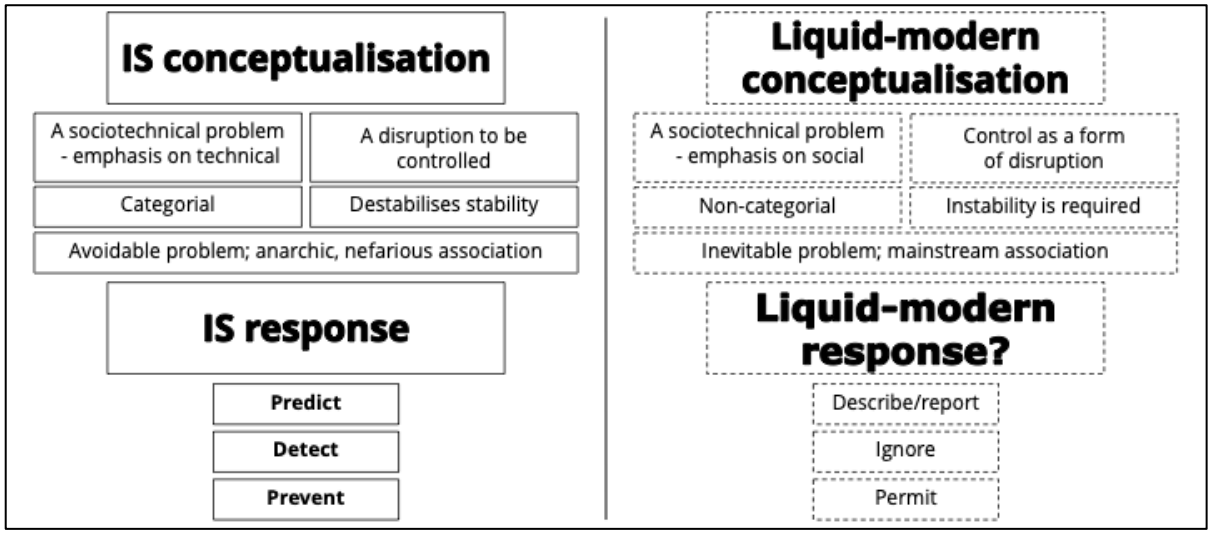
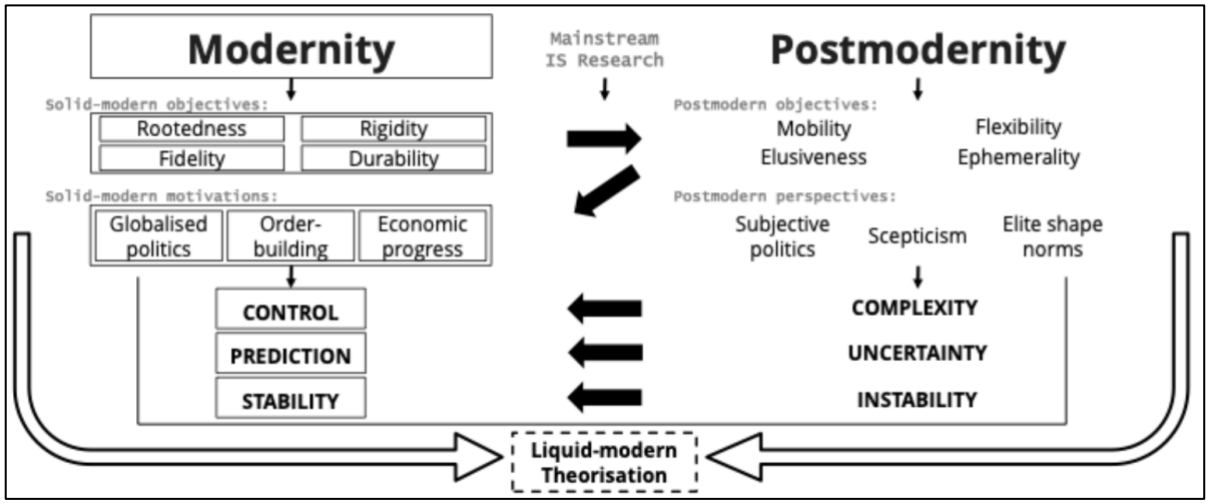


Figure 3 contrasts standard IS conceptualisation of fake news with a liquid-modern view. The liquid-modern principles challenge the IS view by emphasising fake news as an unstable social phenomenon rather than a solvable technical problem. As liquid-modern conditions require instability, IS attempts to impose control can be counterproductive, ultimately intensifying instability. However, the passivity of the liquid-modern response (describe, ignore, permit) made me question if a different conceptual lens was needed—one that could better account for the complexities of digital phenomena like fake news.

Figure 4. Bridging Modernity and Postmodernity: A Liquid-Modern View of IS Research



3.1.3.2 Extended abstract 2: liquid modernity and digital transformation (1)

A second extended abstract (Appendix C) further reduced the number of core liquid-modern principles from four to three (see Table 16). The principle highlighting ephemerality remained. The aim here, aligning with responses 2 and 3, was to work toward "a conceptual framework of digital transformation based upon the core principles of liquid modernity." In comparative terms, a certain downgrading of the liquid-modern perspective is evident at this point.

However, the idea of processes being "simultaneously solid and liquid" is introduced in this abstract. "Degrees of solidity and liquidity" are described as "interlocked in modernising processes" (p. 216). While "degrees" suggests a continuum *a la* Bardhi and Eckhardt (2017; see 2.1.4), "simultaneity" and "interlocked" are more evocative of duality. This is notable because the concept of duality will be central to the ephemerality framework. At different levels—such as modernity and postmodernity, solidity and liquidity, stability and instability, and durability and ephemerality—liquid modernity emphasises that liquid-modern conditions erode, dissolve, or destabilise apparent opposites. Ultimately, this thesis will highlight the interrelation and interdependence of opposites.

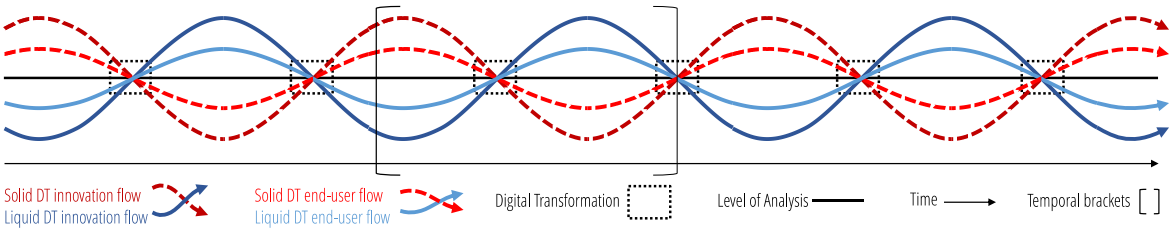
3.1.3.3 Extended abstract 3: liquid modernity and digital transformation (2)

In the third extended abstract (Appendix D), digital transformation became the primary research focus. In alignment with response 3, liquid modernity provided an analytical perspective but no liquid-modern principles were outlined. However, in contrast to the singular references to ephemerality in abstracts 1 and 2, it is notable that ephemerality is referenced 8 times in the third abstract. Digital transformation, for instance, from the liquid-modern perspective, is described as "continually ephemeral" (p. 225-226).

Abstract 3 also introduced the relevance of processual philosophy (Baygi et al., 2021) for understanding the temporality of digital transformation in liquid modernity. Processual philosophy will be fundamental

to the logic of the ephemerality framework. Abstract 3 concludes by presenting a developmental model of "processual" liquid-modern digital transformation (Figure 3). In retrospect, the model indicates how ephemeral timeframes, and the temporal simultaneity of liquidity and solidity, of process and structure, and of processual flows of action were now increasingly the research focus.

Figure 5. A Processual Model of Liquid-Modern Digital Transformation



3.1.4 Liquid Modernity, Time, and Ephemerality

Time is "a constant and recurrent motive" (Tarkowska, 2006) in Bauman's work (Elliott, 2013; R. L. M. Lee, 2022; Simanowski, 2017; Till, 2013). Bauman explores the "juxtaposition of the modern and postmodern experience of time" (Tarkowska, 2006), contrasting the linear, measurable, routinised time of modernity with the nonlinear, fleeting, discontinuous time of postmodernity (Bauman, 1992, p. 190; Elliott, 2013; Simanowski, 2017; Tarkowska, 2006).

Ephemerality is a key feature of liquid-modern temporality. The liquid-modern principles explicitly tie liquid modernity to ephemerality (2.4.3), to continual change (2.4.2; 2.4.7 & 2.4.9), and to episodic events and present-oriented temporalities (2.4.4). Moreover, the central chapter in *Liquid Modernity*, entitled "Time/Space", describes time as fragmented, episodic, and unstable, marked by momentariness, relentless change, and a diminishing sense of continuity and consequence (Bauman, 2000, pp. 118-119).

Liquid-modern time is experienced as succession of isolated, ephemeral moments rather than continual flow. For Bauman, "the *pointillist* time of liquid modernity is sliced [into moments]" (Bauman, 2010) so that liquid-modern temporality "is the fragmentation of time into episodes, each one cut from its past and from its future, each one self-enclosed and self-contained" (Bauman, 2012). "Time," for Bauman, "is no longer a river, but a collection of ponds and pools… an arbitrary sequence of present moments; a continuous present" (*ibid.*). Accordingly, liquid-modern conditions demand "manipulation of transience rather than durability" (Bauman, 2000, p.125) because "the fleeting, the ephemeral… and the suddenly proximate are of increasing importance" in liquid modernity (Law & Urry, 2004). In liquid modernity, "transience has replaced durability at the top of the value table" (Bauman & Tester, 2001, p. 95). Or as Raymond Lee (2006) puts it, "liquid modernity is critically concerned with the ephemeral condition of contemporary society."

Given Bauman's highly abstract writing style, interpretations of ephemerality in liquid modernity vary (Hewer, 2022), spanning pragmatic perspectives on short-lived consumer value (Bardhi & Eckhardt, 2017) to critical analyses of the weakening of social and political bonds (Binkley, 2007; Lekakis, 2013). While most interpretations associate liquid-modern ephemerality with rapid change and fleeting value, ephemerality also reveals the paradoxical potential to anchor "solid" forms of digital control in liquid modernity under the guise of flexibility and fluidity (R. L. M. Lee, 2022). This theme will later reemerge in the contexts of ephemerality and digital trace data (Chapter 5; key paper 4).

From key paper 2 through 4, this research reviews and develops ephemerality as a distinct temporal feature, probing the meaning of concepts like "moment", "the present", "sequence", and "discontinuity". In the contexts of this thesis, liquid modernity provides the departure point for this analysis. In one respect, this thesis will ultimately provide a better basis from which to assess Bauman's (2012) claim that "time is no longer a river, but a collection of ponds and pools" (see 6.4).

Through papers 2 to 4, ephemerality will emerge, at least in this thesis, as a more analytically tractable concept than liquid modernity, offering an opportunity to address the issues outlined in 3.1.1 through a more structured and more empirically grounded framework. Key paper 2 marks this transition. By foregrounding ephemerality, the research focus now shifts from a broad analysis and application of liquid modernity to, ultimately, a more cohesive and applicable analysis of ephemerality. It is important to note that, from the vantage point of completed paper 4, it is possible, through the PhD "write-up", to "correct" any newly perceived inaccuracies or errors in key papers 3 or 4 because neither paper has yet been published. Doing so, however, would obscure the natural iterative development of this thesis and the ephemerality framework and is not how this write-up proceeds. Therefore, the introductory remarks for chapters four and five make limited use of retrospective analysis.

3.1.5 Paper 2 title: An Interdisciplinary Review of Ephemerality for IS Research

Key paper 2 develops the first iteration of the ephemerality framework. The following subsections (3.2–3.7) present key paper 2 (Doyle et al., 2022a) as published (minor edits are made for clarity, flow, and in-text cross-referencing).

3.2 Paper Two Abstract

Ephemerality should be a significant concept for the information systems discipline but has not been developed as such. On the one hand, ephemerality is considered a characteristic of the IS "core" and research focus, of data, information, and knowledge, and of digital material and the experience of digital technologies. On the other, IS reference to ephemerality is relatively scarce, and use of the term tends to implicitly rely upon the dictionary definition only. As a result, ephemerality is not well defined in

the IS literature. Our aim in this study is to contribute to broader and deeper IS understanding of ephemerality. This is important because diverse and rapidly changing systems of people and technology are reformulating the meaning of ephemeral. While our ultimate focus is ephemeral in digitalised contexts, our overarching focus is ephemerality as a standalone concept. We conduct an interdisciplinary review of the temporal and material qualities of the ephemeral in disciplines including sociology, philosophy, organisation studies, performance studies, new media studies, and IS. From this review, we propose a definition for ephemeral and develop a conceptual framework of ephemeral dimensions and characteristics, in which ephemerality is not only characterised by short-lived, unstable duration, but also by repetition, recombination, and durability. We conclude by briefly situating the framework in an IS context.

3.3 Introduction

The Oxford English Dictionary (Oxford English Dictionary, 2004) defines "ephemeral" as "lasting or used for a very short time." Ephemeral phenomena shape human experience of the world (Döring et al., 2013). Indeed, it is routinely assumed (Conboy et al., 2020; Kavanagh et al., 2007) and theorised that our increasingly digitised world is particularly ephemeral (Bauman, 2000; Castells, 1996; Urry, 2000). The lifespans of digital technologies, of digital information and its circulation, of work and news cycles, and of popular culture and market trends seem progressively evanescent. In the information systems (IS) context, ephemerality is considered characteristic of the IS "core" and focus (Lyytinen & King, 2004; Niederman et al., 1991), of digital material (Lyytinen, 2022; Yoo, 2010), and of the human experience of digital technologies (Yoo, 2010). Ephemerality is now emerging in IS as an intentional design choice (Xu et al., 2016) in areas like the Internet of Things (IoT) (Huang et al., 2020), blockchain (Henry et al., 2018), and social media (Morlok et al., 2018), not least because the technical, regulatory, and social scenarios that require ephemerality are seemingly escalating (Giallorenzo et al., 2019).[6]

The problem is that the concept of ephemerality is not well defined in the literature. Ephemerality is most frequently applied in IS as an adjective but with little qualification (e.g.: ephemeral online communities (Quintarelli et al., 2019), ephemeral blockchain functions (Gisdakis et al., 2015), or ephemeral design knowledge (vom Brocke et al., 2021)). Yoo's (2010) impactful experiential computing paper notes ephemerality as one of three characteristics of digital but does not delineate what ephemeral means. In such cases, IS researchers are informed only by the dictionary definition for

[6] Technical scenarios include storage constraints around IoT systems. Regulatory scenarios include concerns around persistence of data. Social scenarios include user desire for more authentic forms of digital communication. Mark Zuckerberg claims that ephemeral-type social media 'are by far the fastest growing areas of online communication' (Zuckerberg, 2019).

ephemeral and the context of the individual study. If digital is the future of IS (Burton-Jones et al., 2021) and ephemerality partially characterises digital, we believe that a broader and deeper understanding of ephemerality will benefit IS stakeholders.

Bødker (2017), for example, suggests that IS must "move towards a more general concern with how ubiquitous and pervasive computing is entangled with mundane 'being'." Broader and deeper conceptualisation of everyday ephemerality can augment theorisation of digital. As Taylor (2003, pp. 4–5) puts it, "digital technologies... further ask us to reformulate our understanding of... the ephemeral."

The challenge, therefore, is to determine not only how digital *is* ephemeral, but also how digital is reformulating the meaning of ephemeral. IS researchers are well positioned to provide new theoretical perspectives on, for example, the ephemerality of digital transformation boundaries (Sandberg et al., 2020),(Alavi & Leidner, 2002; Salovaara & Tuunainen, 2015)02; Salovaara & Tuunainen, 2015), of organisations (Prester et al., 2019), and of the ephemeral nature of th(Baygi et al., 2021; Orlikowski & Scott, 2008)2021; Orlikowski & Scott, 2008). Enhanced understanding can also contribute to disentangling the ephemeral from associated (and similarly elusive) digital-related concepts such as acceleration (Fichman et al., 2014) and fluidity (Malhotra & Majchrzak, 2022).

Lack of conceptual depth stymies development of normative principles around ephemerality, raising potentiality for ephemerality-related risk (McPeak, 2018; Shein, 2013). The ephemeral highlights, for example, regulatory and corporate compliance concerns around the technical preservation of knowledge (Kelly & Baron, 2019). Ephemerality-based social media[7] are implicated in US election interference (Mueller, 2019), and Uber has directed employees to no longer use such platforms for Uber-related business. We will not adequately regulate for the consequences of digital ephemerality without better understanding what ephemerality implies. Enhanced understanding may also help to disentangle the ephemeral from issues like privacy, anonymity, and trust (Schlesinger et al., 2017; Welsh, 2020).

However, despite noteworthy IS reference to the ephemeral, to the best of our knowledge no IS study characterises the concept in depth. Ephemerality is receiving attention in other fields. In the humanities and social sciences, the ephemeral informs interpretations of modernity and postmodernity (Bauman, 2000; Castells, 1996; Harvey, 1989; Rosa, 2019; Simmel, 1903). There is a rich lineage of ephemerality as a concept in the performance arts (Reason, 2006) and in media studies (Grainge, 2011). Philosophers

[7] Examples of "ephemerality-based platforms" (Morlok et al., 2018) include Snapchat, Telegram, Wickr, Clubhouse, and Confide. Other apps are also adding ephemeral functionality to their platforms, such as Facebook and Instagram Vanish Mode, TikTok Stories, WhatsApp View Once, and Twitter Spaces. And web-tools like TweetDelete enable automatic deletion of tweets.

(Bergson, 1910, 1911; Buci-Glucksmann, 2012; Grosz, 2013), artists (Purpura, 2009), and urban theorists (Crane, 2015; Lefebvre, 1970; Vera & Mehrotra, 2015) have been motivated by ephemerality. Ephemerality is also a significant feature of studies in the philosophy of science (Glennan, 2010), organisation studies (Bakker et al., 2016; Elkjaer, 2017; Sydow, 2017), computer science (Schlesinger et al., 2017), consumer research (Bardhi & Eckhardt, 2017), cyberpsychology (Utz et al., 2015), marketing (Belanche et al., 2019), and communication (Bayer et al., 2016; Kaun & Stiernstedt, 2014). The contexts of digitalisation are common to most recent studies.

We suggest the IS perspective on ephemerality should be widely and uniquely informative, not least because ephemerality is seen to challenge both social and technical norms (Haber, 2019; McRoberts et al., 2017). For example, with the rate of digital innovation, digital product introduction, and digital diffusion accelerating (McGrath, 2013), we might consider how ephemeral materials, spaces, timelines, and interactions challenge traditional theory around technology adoption and diffusion (E. M. Rogers, 1962). The objective of this research, therefore, is to contribute toward overcoming the issues and realising the benefits outlined above by providing a rich definition and characterisation of the ephemeral based upon an interdisciplinary literature review of the term.

The remainder of this article is structured as follows: in section 3.4, we discuss the theoretical background relevant to the review; in section 3.5, we outline our methodological approach; in section 3.6, we present our interdisciplinary review, develop a conceptual framework of ephemeral dimensions and characteristics, and propose a definition for ephemeral. Section 3.7 situates our conceptualisation of ephemeral in an IS context.

3.4 Theoretical Background

As per Merriam-Webster (Merriam Webster, 2022), the etymological roots of "ephemeral" are found in the Greek word *ephēmeros* from the stems *epi-* (meaning "on" or "in") and *hemēra* (meaning "day"), which, in combination, yield the adjective *ephemeron* (meaning "lasting (only) a day"). Young provides an excellent account of the historical development of the term and its derivatives, noting *ephemera* (plural of ephemeron) as the source of our contemporary "short-lived" understanding (Young, 2003).

Today, *ephemera* is largely employed as a noun for things that exist or are used for a short time only. Early usage includes Aristotle describing insects of very brief life span as *ephemera*, as well as the astronomical and astrological use of tabulated texts called *ephemerides* (plural noun derived from the adjective) to identify the regular placement of celestial bodies on specific days. It is not until the 1800s, however, that an increase is noted in the use of the adjectival form *ephemeral* through its "application to transitory objects and abstract ideas" (*ibid.*).

"Ephemeral" thus emerges in the nineteenth century as a "signifier" of modernity (Marcus & Saka, 2006). Baudelaire (1964), characterizing modernity (in part) as "the ephemeral, the fugitive, the contingent," worries about "a riot of [ephemeral] details. As such, the task is to "distill the eternal from the transitory" (*ibid.*), which sets an antagonistic and dualistic template of sorts, particularly in Western thinking, for the modernist relationship with the ephemeral. In modernity, the ephemeral is "that which is resistant to meaning" (Doane, 2002). For Marx, Dostoevsky, and Goethe, the ephemeral must be "confronted" and, as is possible, "dealt with" (Harvey, 1989). And even though, for Benjamin (1918, p.100) "the integrity of an experience that is ephemeral" must be established on its own terms, for he too the perceived rise of the ephemeral in modernity is a form of "hell" (Osborne & Charles, 2020). This negative, acutely modernist sense of the ephemeral is borne not only of its problematic "representability" (Doane, 2002, p.11), of our inability to fix and quantify ephemeral value, but also of an emergent sense of the implications of ephemerality for stable societal structures, processes, and relations. In ephemeral digital contexts, for example, where the ephemeral is "commonly seen more as a problem than as a solution" (Cotta et al., 2015), "fixing" the ephemeral remains the predominant objective. The imposed aim for technologies, in the main, has historically been to "de-ephemeralise" the ephemeral (Evans, 2011).

The ephemeral is perhaps most directly confronted in postmodern thinking. Given its basis in a "'weak' ontology of *becoming*" (Chia, 1995), postmodernism "wallows" in "total acceptance of... ephemerality" (Harvey, 1989). By challenging the logic of language and organising, the postmodernist aims to more adequately express "the ephemeral aspects of process" (Chia, 1995). It is not surprising then that the ephemeral receives particular attention in research traditions that, firstly, are significantly defined by their relation to the transitory and, secondly, wrestle with postmodern perspectives. For example, Artieri and colleagues (Artieri et al., 2021) note ephemerality is a core focus in performance studies (Phelan, 1993) and in media studies (Grainge, 2011). On one level, the primary research challenge of the ephemeral is to "write time" (Reason, 2006), which, as we know, can be exceptionally difficult (Dawson, 2014). However, time is not the only concern when considering what counts as ephemeral.

Across the literature, two dimensions of the ephemeral reflect dictionary definitions: the temporal and the material. The temporal refers, as per standard definition (*ephemeral*), to experiences or perceptions of short duration: the perception of a rainbow, the experience of verbal interaction, the brief timeline of an ephemeral digital text. The material refers, as per standard definition (*ephemera*), to objects or things of time-limited and insubstantial value: train tickets, event programs, the content of an ephemeral digital text. In our view, it is essential to consider both the temporal and material aspects of the ephemeral for three reasons. Firstly, because digital is theorised to have material properties (Leonardi, 2012; Yoo, 2010). If digital is ephemeral, it is ephemeral in material and temporal ways. Secondly, because the

qualities of material ephemera "reflect the fact that they [are] only designed for short-term existence" (Crowther & Cumhaill, 2018). In other words, the material qualities of the ephemeral shape the temporal qualities of the ephemeral, and vice versa. And thirdly, because conceptualisation of the ephemeral as solely temporal (or material) will be complicated by several additional factors. As will be developed in section. 4, the ephemeral is not merely time-bound, singular, and insubstantial: the unstable ephemeral is also repetitive, recombinatory, and durable, with agency and meaning distributed in time.

3.5 Methodological Approach

Motivated by an interdisciplinary IS review (J. A. Smith et al., 2011) of another "hard-to-fix" concept (privacy), the three-stage, concept-centric review approach proposed by Webster and Watson (Webster & Watson, 2002) is followed. First, we performed a broad search spanning the information systems, social sciences, philosophy, humanities, marketing, management, and organisation theory literatures. We queried relevant library catalogues, journal databases, and conference proceedings. Search terms included "ephemeral", "ephemeral AND definition", "ephemeral AND information systems", and "ephemeral AND digital". Secondly, working backward to broaden the scope further (*ibid*.), we reviewed the citations for the articles identified in step one, identifying literature of potential interest in other disciplines, including performance and media studies. Finally, we used Web of Science to work forward (*ibid*.), identifying further candidate articles citing the key articles previously identified. In total, 135 articles and 26 books were selected.

3.6 Interdisciplinary Review of the Ephemeral

Sub-sections 3.6.1 through 3.6.4 present our interdisciplinary review of the ephemeral. A conceptual framework of ephemeral dimensions and characteristics follows in sub-section 3.6.5 (Table 5). A definition for the ephemeral is proposed in sub-section 3.6.6.

3.6.1 Short-Lived: Speed, Compression, Limitation

Ephemeral timespans are relative, ranging from split seconds, through minutes, weeks, and months, to years (Datry, 2017; Döring et al., 2013; Vidal-Abarca et al., 2020) and millions of years in, for example, geological contexts (Rohr et al., 1995). Nevertheless, in any specific context, the ephemeral always seems relatively short-lived (S. M. Schneider & Foot, 2004), always conveys "connotations of brevity and evanescence" (Grainge 2011, p.3). For example, ephemeral products (such as ephemeral hygiene products (López-Forniés et al., 2021) or ephemeral digital products, like Snapchat (Villaespesa & Wowkowych, 2020)) are "short-term oriented" (Janssen et al., 2014). Approached as form, process, or perspective, the ephemeral always seems short-term (Bakker et al. 2016). Ephemeral "briefness",

however, is not only defined in terms of duration. The short-lived quality of the ephemeral is also shaped by interrelated forms of speed, compression, and limitation.

Firstly, social theorists have described the ephemeral in terms of an accelerated (and accelerating) pace of change and life (Bauman, 2000; Rosa, 2013; Urry, 2000). Ephemeral speed is evident in the turnover of technologies, fashions, products, labour processes, ideas, and images (Urry, 1995, p. 177); in the "high-speed temporality" of social media practice (Arda, 2021); in ephemeral organisations having to "quickly convert decision into action" (Lanzara, 1983), and in the speed of access to ephemeral forms of consumption (Bardhi & Eckhardt, 2017). Ephemeral speed is further illustrated in relationships that are quickly formed and disbanded (Biraghi et al., 2018), in the speed of production and circulation for various types of new media (Grainge 2011, p.3), and in the acceleration of sociotechnical innovation (Heylighen, 2007). However, Chun (2008) advises that we need to "think beyond speed" because "flow and segmentation do not quite encompass digital media's ephemerality."

Secondly, the ephemeral compresses perceptual boundaries of value to timeframes localised to the present. As Young (2003) puts it, "immediacy binds the ephemeral object more tightly to the occasion." This compressed relationship of the ephemeral and the present time reinforces its short-lived nature. That the ephemeral "inhabits the present" (Chun 2016, p.160) and is perceivable in the "here and now" is not only "essential for [its] effectiveness" (Grudin, 2002) but also intensifies the impact—both immediate *and* longer term—of the ephemeral. High-level social theory abstractions like "time-space compression" (Harvey 1989), "timeless time" (Castells 1996), "liquid modernity" (Bauman 2000), and "instantaneous time" (Urry 2000) theorise this quality of the ephemeral. Liquid modernity, for example, describes a rate of societal change so short-lived, quickly changing, and present-oriented that effective stabilisation of societal structures is no longer feasible. Eckhardt and Bardhi (2020), who draw from Bauman to develop their "liquid consumption" framework around three liquid-modern constructs (one construct is ephemerality (Bardhi and Eckhardt 2017)), note that the ephemeral refers to "the expiration date of value increasingly shortening." And in characterising the ephemerality of "instantaneous time", Urry observes (2000, p.125) that time-horizons for decision-making are dramatically compressed.

Thirdly and consequently, the short-lived ephemeral is by nature limited. "Anchored in the present" (D. He & Kivetz, 2016), the nature of ephemeral time is "fundamentally perishable" (Reason, 2006) and the ephemeral moment seems materially "constrained" (Bayer et al. 2015). The ephemerality of live performance is one clear example (Barba, 1992; Kirby, 1974; Schieffelin, 2017). Dance is said to exist at a "perpetual vanishing point" (Siegel, 1972) whereby, "at the moment of its creation it is gone." Phelan (1993) and Auslander (1999) note that ephemeral live performance is predicated upon disappearance; ephemeral organisations "are there to disappear" (Lanzara, 1983); for Grainge (2011),

the ephemerality of web content means that "digital materials are always under threat of disappearing"; ephemeral digital texts can be materially restricted to a specific number of views or a pre-determined span of viewing time (K. J. Chen & Cheung, 2019; Vázquez-Herrero et al., 2019), and ephemeral edge computing proposes computation limited by "stringent time constraints" (G. Lee et al., 2020).

In sum, the short-lived (durational) quality of the ephemeral is characterised by speed (of change), compression (of space, time, artifact, action, experience, value, and/or relevance to the present), and limitation (of space, time, artifact, action, experience, value, and/or relevance).

3.6.2 Repetitive: Anticipated, Varied

Ephemeral time is a time "of repetitions and variations" (Buci-Glucksmann, 2012). Performance scholars illuminate the repetitive quality of the ephemeral through the logic that "ephemerality [is] repeated each night of a repeated live performance" (Reason, 2006). For media scholars, television programs are "ephemeral in the sense of being both fleeting and repeated," with the *most repeated* programs considered particularly ephemeral (Uricchio, 2011, pp. 28–31). And Schneider and Foot (2004) write that digital content is "ephemeral in its construction" because it must be reconstructed or reproduced to be experienced. The ephemeral is also cyclically repetitive. Brassley (1998) describes ephemeral cycles of change in the study of landscapes, ranging from twice-daily (i.e.: the movement of tides) to the progression of the seasons. Archaeological ephemeral artworks related to rites and performances are cyclical (2019). And for Vera and Mehrotra (2015), the cyclically celebrated religious event in the ephemeral city of Kumbh Mela expresses "a range of [material and temporal] ephemeral configurations." In such places—and others, like humanitarian camps, natural disaster shelters, work settlements, and music festivals—the life cycle of the material ephemeral object (be it city, camp, shelter, settlement, or festival environment), aligns with the duration of the activity so that objective start and end times are predictable. Applying the same logic to theatre spaces, we might say that ephemerality is repeated, Wednesday through Sunday, from 8pm to 11pm, for three months.[8]

Ephemeral repetition, therefore, not only infers orientation to the ephemeral "past" but also anticipation of the ephemeral "future". Anticipation can range from the relative certainty of "anticipated ephemera" (Brassley, 1998) (that is, ephemeral repetition we fully expect to occur) to the uncertainty of the ephemeral as "a space of projective anticipation" (Crane, 2015). For example, we may accurately

[8] Opposing this perspective is the view that the ephemerality of performance is ontologically unrepeatable; the idea that "a gesture, once made, can never be made the same way twice" (Artaud, 1958, p. 75). Albeit an extreme example, the staging of the 20,000th performance of *The Mousetrap* in London on 16 December 2000 challenges the demonstrable practicality, if not the essence, of this perspective (Reason, 2006, p.16).

anticipate the future repetition of tide movements, the upcoming run of a play, or the materialisation of a revisited webpage. Similarly, "anticipation of the future embodied actions and activities," or *how* ephemerality *might be* repeated, is an important feature in ephemeral work settings (Hindmarsh & Pilnick, 2007). The ephemeral is "full of anticipation" (Purpura, 2009). Drawing from Lefebvre (1970), Crane (2015) describes the ephemeral urban space as one of "projective anticipation", where "groups take control of spaces for expressive actions and constructions, which are soon destroyed" (Lefebvre, 1970, p.130). Pop-up spaces, demonstration or celebration spaces, walls or hoardings displaying flyers and graffiti, and virus-testing or vaccination clinics are illustrative instantiations of ephemeral urban space. The ephemerality of these spaces is characterised not only by being short-lived but also by the anticipation that the ephemeral will be repeated *in* the space.

Finally, ephemeral repetition is further evident in the habituation of ephemeral actions. Consider, for example, the ephemerality of a mouse-click or the ease with which the ephemeral is enacted through taps, swipes, and scrolls on mobile digital platforms. "Repetition breeds expertise," writes Chun (2016). In this sense, following Bergson and Deleuze, repetition through the habitual enables forms of stability "in a universe in which nothing truly repeats" (Grosz, 2013). For Deleuze (1994), to repeat "is to behave in a certain manner, but in relation to something unique or singular." Using the example of festivals, Deleuze writes that repetitions "do not add a second and a third time to the first, but carry the first time to the 'nth' power." Hindmarsh and Pilnick (2007) reflect this understanding in their study of ephemeral workteams in surgical settings, where actors '*(re)produce* the routine or normative character of activities *for the first time again*.' We might say in summation that ephemeral repetition orients to the past to stabilise the present in a variation of that past, and, simultaneously, anticipates the future in repeated and varied forms of the ephemeral present.

Consequently, the short-lived limitation of disappearance does not negate the possibility of ephemeral repetition. For Phelan (1993), repetition marks the repeated as "different". In other words, the ephemeral repeats in ephemeral ways: there is always some variation, something unique, in repetitions of the ephemeral.

3.6.3 Recombinatory: Multiple Possibilities

The short-lived ephemeral is recombinatory. Ephemeral recombination repurposes the "old" ephemeral artifact, action, space, or experience in a "new" ephemeral present. The ephemeral city is dismantled and its material components "recycled or repurposed" (Vera & Mehrotra, 2015). Ephemeral architecture" is a "system in which entire fragments of the building may be reclaimed and preserved" (Armada, 2012). And "old" ephemeral media texts are recombined again and again in "new" ephemeral sequences and contexts (Urrichio, 2011, p.28). Digital technology intensifies the ephemeral capacity

for recombination. For example, the ephemeral recombination of prodigious volumes of diverse and ephemeral digital texts (Grainge 2011, p.3; Chun 2008) is endemic in copying, cutting, pasting, splicing, and circulation *of* ephemeral digital texts. Mashup applications similarly enable recombination of diverse functionalities from multiple web domains (Kreps & Kimppa, 2015).

We distinguish the ephemerally repetitive from the ephemerally recombinatory in two interrelated ways. Firstly, where the meaning or knowledge gained from the ephemerally repetitive is sufficiently *similar* to the past or "first" ephemeral, the meaning or knowledge gained from the ephemerally recombined is sufficiently *different*. For example, the roof of a food stall in the ephemeral city is recombined as one wall of a dwelling in a work settlement. Or the rerun of a television series recombines the ephemeral meaning of the artifact (the "framework of coherence" (Urrichio, 2011, p.28) for both old and first-time viewers. The ephemeral not only implies "degradation or disappearance, but... is also productive, transformative" (Purpura, 2009).

And secondly, where the ephemerally repetitive *anticipates* the future, the ephemerally recombinatory opens up the future in *multiple possibilities*. Lefebvre (1970) defines the urban ephemeral space as "multifunctional, polyvalent, transfunctional" (Crane 2015). In the ephemeral city, there are "infinite possibilities for recombination" (Vera and Mehrotra 2015). Guillaume and Huysmans (2018) suggest the ephemeral "introduces a multiplicity of political temporalities." In ephemeral organisations, the "possibilities for action and response are multiplied" (Lanzara, 1983). And in the context of consumer entrepreneurship, for Biraghi and colleagues (2018) it is the ephemerality of digital platforms that "holds together the whole business model, throughout creating, de-configuring, and re-configuring." In the examples cited, however, there remains a sense of linearity and succession, which the ephemeral is theorised to disrupt. Time is also recombined through the ephemeral.

In its future orientation, the ephemerally recombinatory is more fragmented and disjointed than the ephemerally repetitive. For Castells (1996), the temporality of "timeless time" disorders succession and fosters simultaneity, creating what he terms "structural ephemerality" (Castells, 2004, p. 57). For example, remote and non-linear work-day models (Dong et al., 2023; Gibbs et al., 2021) disorder the traditional segregation and linear flow of the working day, highlighting overlaps between "ephemeral computing" and "ubiquitous computing" (Camacho, 2018; Cotta et al., 2015).

In a similar vein, media scholars note that as the digitised file can be recombined (that is, stopped, repeated, rearranged, edited, catalogued, and discarded (Kompare, 2002)), it disorders the traditional, linear temporal logic of broadcast flow (R. Williams, 1974). In cultures organised around systems of electronic media, the various forms of "ephemeral symbolic communication" (Castells 2000) become productive constituents of ephemeral "timeless time" (i.e.: reality) (Castells 1996; Buci-Glucksman

2012). Fundamental to these systems, through digitalisation and recurrent communication, is their recombinatory ability (Castells, 2004, p. 12). While the digitised media file should, in theory, resist ephemerality, online streaming of files is ultimately considered ephemeral because, in part, files are amenable to external recombination.

In sum, recombination of the "past" ephemeral (space, time, artifact, action, or experience) enables repurposing *of* the ephemeral *from* the ephemeral in fragmented, disjointed ways that opens up the future in multiple possibilities.

3.6.4 Unstable, Durable

The short-lived ephemeral is unstable. Ephemerality is directly associated with organisational instability (Bechky, 2006; van Marrewijk et al., 2016). Ephemeral art is "inherently unstable" (Purpura, 2009) and ephemeral digital art "utterly unstable and prone to endless transformations" (Sawyer, 2005, pp. 210–214). Digital is ephemerally unstable because, for example, software and hardware "constantly change, manically upgrade" (Chun, 2016). Ephemeral computing environments are unstable and ever-changing (Cotta et al. 2016; Camacho et al. 2018). And ephemeral time is "unstable time, made up of fragments" (Guillaume & Huysmans, 2018). In processual terms, "ephemeral emergence" (Sawyer, 2005, pp. 210–214) cannot be known in advance because it occurs within "episodic interactive encounters" (Tsoukas, 2017). In postmodern terms, the unstable ephemeral "is interested in following traces, glimmers, residues, and specks of things" (Muñoz, 1996).

The instability of the ephemeral underpins the modernist challenge of "fixing" the ephemeral. Archivists have a difficult time categorising, storing, and defining ephemera (Young, 2003). Political scientists suggest the ephemeral cannot be represented statically (Guillaume and Huysmans, 2018).[9] The concept of "stage detritus" highlights the "unstable" state of live performance (Reason, 2006, p. 54). And in media research the ephemeral has been used to signify "moving image detritus" (Grainge, 2011, p. 2), like out-takes, outdated television sets, and the trash associated with movie theatres (Hastie, 2007). Finally, the ephemeral as a concept is somewhat passed over in the processual literature (Kreps et al., 2020), where it is reality that is ephemerally unstable and it is stability, not change, that must be accounted for (Chia & Nayak, 2017). The Bergsonian, not "short-lived," sense of duration applies in processual thinking, where "temporariness" is "centerstage" (Bakker et al., 2016) and "the ephemeral and dynamic becomingness of human experience as a continuous flow of creative action" is the focus (R. Garud et al., 2015).

[9] Performance art scholars directly address this tension through, for example, critical review.

However, the short-lived, unstable ephemeral is also durable. For archaeologists, the ephemeral is "embodied or materialised in durable objects" (López-Bertran 2019). Anthropologists note that ephemeral objects of value are also "the durable material of cultural resilience and continuity" (Lepani, 2012, p. 75), with the short-lived limitation of such objects catalysing their durability (MacCarthy, 2017). Ephemeral architecture sustains cultural meaning (Armada, 2012) and legacy (Colfer, 2019). "Resilience" is a key property of any algorithm operating in ephemeral environments (Camacho et al. 2018). And the limitations of ephemeral social media content result in "less loss (or forgetting)" of ephemeral content than of content perceived as more stable (Bayer et al., 2016; van Nimwegen & Bergman, 2019). Digital technology intensifies ephemeral durability, complicating "any clear division between technology as *either* permanent *or* ephemeral" (Evans, 2011, p. 157; emphasis added). Chun (2016) writes that digital information is "curiously undead, constantly regenerating." And media scholars note that although the "configuration of space/time constructed through online media" is unstable and fragmented, the ephemeral fragments "are so abundant as to be inexhaustible" and "connect us into a network" (Grainge, 2011, p. 224). In the workings and experience of this network, the ephemeral is "made to endure" (Chun, 2008).

Ephemeral durability attunes us to the anticipation and possibility *in* the ephemeral and distributes the ephemeral in time. Repetition and recombination prolong the durability of the ephemeral by extending or repurposing the "prior" ephemeral in the "new" ephemeral present. The past of a primary ephemeral text (e.g.: a tweet) is "reactivated" through "knowledge that has since been acquired (Uricchio, 2011, pp. 29–30). Or the "affective ephemera of likes and comments" (Haber, 2019) stimulates what has objectively passed, regenerating new agency, meaning, and durability in the ephemeral.

Finally, the durability of the unstable ephemeral guides us toward the idea that the ephemeral is not only short-lived but also "eternal" (e.g.: Benjamin's "eternal ephemerality" (2004, p. 281); Castells' "eternal ephemerality" (1996, p. 497), Bauman's "continuous present" (2012), and what Jameson (1991, pp. 64–68; 71–72), after Lacan, calls the "eternal present" (the unification of past and future with present)). In a landmark new media paper, Chun (2008) observes that digital technology originates non-linear temporalities that move "simultaneously towards the future and the past," proliferating what she terms "enduring ephemerals." When digitalisation facilitates the ephemeral gathering of "everything into the present' (Chun 2016), the modernist tension inherent to the unstable ephemeral is no longer a dualism but a duality, no longer "either/or" but "and": the ephemeral is fleeting *and* persistent (van Nimwegen & Bergman, 2019), old *and* new (Chun, 2008), "open-ended *and* constrained" (Tsoukas, 2016), short-lived *and* durable (Gale, 2009; Pimlott, 2011). We are given a sense of this perspective in Prado and Sapsed's (2016) study of ephemeral innovations in project-based organisations, where "permanence is only realised through activation in the temporary."

Husserl emphasises that no experience is ephemeral merely in the sense of being short-lived or momentary (Moran, 2011). The short-lived ephemeral "is not fleeting" (Haber, 2019). Rather, lived experience and "the objective moment constituted in it, may become "forgotten"; but for all this, it in no way disappears without a trace... it has merely become latent" (Husserl, 1964, p. 122). Husserlian traces are afforded material and temporal durability in digital networks. And through material documentation of ephemeral live performance, it is noted that representations of the ephemeral "contain something of the thing itself... which are not the thing itself" (Reason, 2006, p. 232). The unstable ephemeral, in ephemeral ways, endures.

3.6.5 A Framework of Ephemeral Dimensions and Characteristics

The dialectical tension (van de Ven & Poole, 1995) of "ephemeral" as short-lived *and* durable is not, in our view, a condition to be resolved but rather a condition that is inherent to the ephemeral. This logic of opposition (Robey & Boudreau, 1999) is described and enabled by repetition and recombination. Below, we characterise the ephemeral through the four dimensions of Yoo's (2010) schematic for experiential computing: space, time, artifacts, and actors. We consider the schematic appropriate for three reasons. Firstly, experiential computing is concerned with "computing in everyday life experiences" (*ibid*.). The ephemeral is that which is processed and encountered in the everyday (Guillaume & Huysmans, 2018). Secondly, experiential computing describes a spatiotemporal context "that is temporary and unfolds over time" (Yoo 2010). The material and temporal ephemeral is both short-lived and distributed in space and time. Thirdly, we consider the schematic an appropriately broad structure for conceptualising the ephemeral for IS research.

Table 5. A Conceptual Framework of Ephemeral Dimensions and Characteristics (EF1)

Ephemeral dimensions	*Ephemeral characteristics*			
	Short-lived	**Repetitive**	**Recombinatory**	**Unstable, Durable**
Time	*Speed:* of change *Compression:* of and to the present time *Limitation:* by transience, disappearance	*Repetitive:* recycling of past in repetition; ephemerality increased through repetition *Anticipated:* looks to future repetition *Varied:* present stabilized in variation of past	*Recombinatory:* repurposing of past in present; repurposed present sufficiently different to past; repurposed time disordered *Multiple possibilities:* future is open, uncertain	*Unstable:* emergent, volatile, non-linear, fragmented, fleeting temporal traces *Durable:* duality of ephemeral time as short-lived *and* durable/ "eternal"
Space	*Speed:* of spatial transformation	*Repetitive:* recycling of space; ephemerality increased through repetition *Anticipated:*	*Recombinatory:* repurposing of space that is sufficiently different to past use or form of the space	*Unstable:* short-lived spatial limitations *Durable:* ephemeral materialised

	Compression: of space and the present time *Limitation:* of spatial value, use, and relevance	ephemeral will be repeated in the space *Varied:* present space stabilized in similar variation of past	*Multiple possibilities:* future ephemerality of the space is open, uncertain	and extended in space through repetition and/or recombination; endurance catalysed by being short-lived
Artifact	*Speed:* of material production, circulation, and consumption *Compression:* of material value, use, and relevance *Limitation:* of social and technical functions	*Repetitive:* recycling of artifact; ephemerality increased through repetition *Anticipated:* ephemeral will be repeated through the artifact *Varied:* present artifact stabilized in similar variation of past	*Recombinatory:* repurposing of artifact that is sufficiently different to past use or form of the artifact *Multiple possibilities:* future ephemerality of the artifact is open, uncertain	*Unstable:* short-lived material limitations *Durable:* ephemeral materialised and extended in artifacts through repetition and/or recombination; endurance catalysed by being short-lived
Actor	*Speed:* of perception, experience, agency *Compression:* of perception, experience, agency to the present time *Limitation:* of perception, experience, agency to the present time	*Repetitive:* recycling of agency, experience; ephemerality increased through repetition *Anticipated:* looks to future repetition of agency, experience *Varied:* present agency, experience stabilized in variation of past	*Recombinatory:* repurposing of perception, experience, agency that is sufficiently different to past perception, experience, agency *Multiple possibilities:* future ephemerality of perception, experience, agency is open, uncertain	*Unstable:* short-lived limitations of perception, experience, and agency *Durable:* ephemeral embodied and extended in perception, experience, and agency through repetition and/or recombination; endurance catalysed by being short-lived

3.6.6 A Definition for Ephemeral

Out of our review and framework, we propose the following definition for "ephemeral":

the ephemeral refers to unstable times, spaces, artifacts, and actors that are both relatively short-lived and repetitive, recombinatory, and durable.

3.7 Conclusion: Situating the Ephemeral in an IS Context

Ephemerality can help describe the diverse, fast-paced, and unstable contexts for transfer and diffusion of digital technology.[10] For example, the periodicity between major innovations in traditional theories of diffusion (e.g.: Rogers, 1963) is less plausible in ephemeral conditions where innovation, adoption,

[10] "Co-creating for Context in the Transfer and Diffusion of IT" was the IFIP WG 8.6 conference theme.

and diffusion can quickly be undone (e.g.: Hollingsworth, 2022). Even if delays remain determinable, they are compressing because of accelerating innovation (Heylighen, 2007).

As cited in section 1, ephemerality is relevant to multiple IS contexts, including digital transformation (Baygi et al., 2021) and social media (Urquhart & Vaast, 2012). The dictionary definition of ephemeral, together with study context, implicitly informs most IS reference to the term.[11] This is problematic, as we outline below in the context of social media.

In IS social media research the ephemeral is routinely conceptualised as short-lived (e.g.: Browne et al., 2017; Morlok et al., 2017, 2018; Xu et al., 2016). The degree of ephemerality is subsequently determined by the perceived duration of the singular ephemeral event, with shorter timespans denoting "stronger" ephemerality and vice versa (Morlok et al. 2018; Xu et al. 2016). Through this lens, for example, a three-second Snapchat "snap" is considered more ephemeral than a ten-second "snap" (Morlok et al. 2018). However, the ephemeral characteristics of repetition and recombination attune us to ephemeral durability, and has practical implications for how ephemerality is described in research and design.

The short-lived-only conceptualisation typically sees the ephemeral set against, rather than containing, its perceived opposite: persistence or durability (e.g.: Xu et al., 2016). However, too rigid categorisation accommodates excessively technical conceptual approaches to sociotechnical problems, whereby "ephemerality is perceived as a technical remedy" for its perceived opposite (Morlok et al., 2018). Through our framework, ephemerality is not merely "an artificial technical restriction" (Morlok et al. 2017). That ephemeral social media content can be captured through screenshotting illustrates a characteristic of ephemerality, not its conceptual opposite. Ephemerality-based IS research must more meaningfully and necessarily address durability.

Unchallenged assumptions around the meaning of ephemeral result in a social media IS literature base that is user-centric and focussed on user characteristics, rationale, and experience in relation to ephemerality-based platforms at the expense of the ephemerality concept. Users, however, are very much "cogs in a machine" and increasingly "part of the applications that emerge and disappear" (Kreps & Kimppa, 2015). The behaviours and experiences of people should not be offset against ephemeral technical affordances but factored into conceptualisation of the ephemeral.

---

[11] Notable exceptions include conceptual association of the ephemeral with malleability (von Briel, 2018; Yoo, 2010), editability (Kallinikos et al., 2010, 2013), fluidity (Lytinnen, 2021; Ahuja & Choudhury, 1999), and performance (Marabelli et al., 2016).

In conclusion, systems of people and technologies are reformulating the nature of the ephemeral. We suggest that the unstable ephemeral is not only short-lived, but also repetitive, recombinatory, and durable. We conclude by noting that in their organisational study of subjective time, Shipp and Jansen (2021) note the importance of "studying the past, present, and future simultaneously." The ephemeral as characterised here offers such an opportunity.

4 Paper 3: Ephemerality Framework and Everyday Digital Contexts (EF2)

4.1 Introductory Remarks

The transition from paper 2 (and the first iteration of the ephemerality framework (EF1)) through the completion of paper 3 (and the second iteration of the framework (EF2)) was the most challenging period of the PhD. This chapter, therefore, requires a more extensive introductory section that reflects the depth of the issues faced and establishes ground for EF2 and EF3 development of the framework.

In this section, the key features of EF1 are outlined (4.1.1); the main issues arising from paper 2 are discussed (4.1.2); an EF1 application is referenced (4.1.3), and paper 3 responses to the outlined issues are signposted (4.1.4). Then, summaries of the paper 3 review of ephemerality in five core disciplines—sociology, organisation and management studies, performance studies, media studies, and philosophy—are presented (4.1.5). Finally, the paper 3 theme of "everyday digital contexts" is introduced (4.1.6).

4.1.1 Key Features of Paper 2 and Ephemerality Framework Iteration 1 (EF1)

4.1.1.1 Framework structure

The first iteration of the ephemerality framework (EF1) establishes a framework structure that is maintained through the second (EF2) and third (EF3) iterations: ephemerality characteristics are organised across the top horizontal axis of the table and dimensions along the vertical axis (Table 5).

4.1.1.2 Framework characteristics

EF1 delineates five characteristics of ephemerality: short-lived, repetitive, recombinatory, unstable, and durable. Although "unstable" and "durable" are discussed (3.6.4) and presented (Table 5) as a single characteristic in EF1, this decision is referenced as an issue arising from key paper 2 below (4.1.2.1).

4.1.1.3 Framework dimensions

The four EF1 framework dimensions—time, space, artifact, and actor—are adapted from Yoo's (2010) schematic for experiential computing. While other IS papers discuss ephemerality in greater detail (e.g.: He et al., 2024; Lehrer et al., 2023; von Briel, 2018), Yoo's analysis of experiential computing was a key IS reference point for EF1, EF2, and EF3. Two key excerpts are quoted at length below.

Yoo's distinction between digital as "fungible, ephemeral, and indeterministic" and physical as "rigid, stable, and tangible" initially prompted some fundamental questions: What does ephemeral mean? How

is digital ephemeral? Is physical not ephemeral? Is digital not durable? These questions were first considered in relation to Yoo's articulation of the four dimensions of experiential computing:

> "The digitally mediated experience begins with the human body, which exists in *space*. Humans can never experience things independent of the experiences as a bodily engaged being in the world… Physical space is always in relation to the body as situated within the material world. The body can only be present *here*, as an anchor of the lived experience…
>
> "Similarly, humans experience *time* through the body. Humans can never be in two places at once. We are always situated in the *now*, on the way somewhere as having been somewhere. Thus, digitally mediated experiences are always temporary and in the process of becoming—that is, temporally emergent (Orlikowski 2007; Pickering 1995).

Yoo then references Merleau-Ponty's phenomenological conceptualisation of time, which aligns with key principles of processual philosophy, before introducing artifacts and actors as additional dimensions:

> "According to Merleau-Ponty (1962), the embodied experience of time is not a line that is strung together by a series of discrete moments, but a network of intentionalities…
>
> "In this spatiotemporal context that is temporary and unfolds over time, humans come to experience *artifacts* (and the natural world) and other social *actors*."

Non-spatial conceptualisations of temporality, often prioritising experience and subjectivity, are central to processual philosophy. Yoo's sociomaterial description of the "temporally emergent" "process of becoming" is inherently processual. In contrast, spatialised conceptualisations of temporality, often emphasising fixed temporal structures and measurable frameworks, underpin non-processual analytical approaches. Both conceptualisations of time ultimately shape the ephemerality framework. At this early stage of framework development, Yoo's emphasis on addressing both time and space as analytically significant (in the contexts of embodied experience) influenced a multidimensional approach to EF1.

More broadly, the article highlights sociological and philosophical issues around time, space, and the notion of "the everyday" that would also inform the development of the ephemerality framework:

> "How digital technology influences our experience of time and space presents another major opportunity for individual-level theory development. It has been noted that the emergence of the global information infrastructure led to time–space distanciation (Giddens, 1990). The evolution of modern communication and transportation technology has "lifted out" social life from the here and now, causing a divorce between time and space. In the premodern era, *when*

was almost always associated with *where* (Giddens, 1990). Aided by the mechanical clock and communication technology, the invention of standard time, however, separated time from space (Galison, 2003). Subsequent developments in communication technology further made it possible for social interactions that used to be situated in a local context bound by time and space to routinely take place somewhere out there. Reflecting this historical role of information technology, the emphasis in the literature has been the emergence of the sense of space out there that is boundless and global (Castells, 2003; Giddens, 1990; Schultz & Boland, 2000). To the contrary, however, experiential computing brings us back to a *place* of here and now. When we engage in everyday activities, our experiences do not happen somewhere out in a virtual space. Instead, they happen in a *place* with the urgency of now. There is no denying the important and transformative consequences of time–space distanciation in information technology, as has been argued in the IS literature. What is being argued here, instead, is that the emergence of experiential computing in our everyday life will force us to pay closer attention to what is happening immediately around us. The emphasis of place does not mean that we are going back to the premodern configuration of time and space. Instead, we will have to think more carefully about the emergence of a new meaning of place with digital technology mediating our experience of material surroundings. The focus should be how technology "pulls down" the digital representations into the immediate activities in the material world of here and now."

Through established perspectives on modernity, postmodernity, and globalisation, digital technologies are often seen as distancing, compressing, or restructuring time and space (e.g.: Augé, 2009; Castells, 1996; Giddens, 1990; Harvey, 1989; Virilio, 1977). Experiential computing intensifies these dynamics, creating new forms of immediacy and presence that transform everyday processes of distanciation and compression. In ubiquitous digital contexts, interaction is typically shaped by the immediacy of engagement and the ephemerality of experience—by the "here and now." While Yoo's analysis—in the excerpt above—emphasises space, or "the emergence of a new meaning of place", the ephemerality framework prioritises the meaning of "now" in relation to time, space, artifact, and actor (EF1).

As such, Yoo's paper raises a further question, particularly in relation to the ephemeral immediacy of everyday experience: if "time is not a line that is strung together by a series of discrete moments," then what is "now"? While this question is backgrounded in the development of key paper 2 and EF1, it is addressed in paper 3 and EF2 (see also subsection 4.1.5.1 below).

4.1.1.4 Framework novelty

The novel aspect of EF1 lies in its dual characterisation of ephemeral phenomena as short-lived and durable. This reframing introduces a more nuanced conceptual perspective and potentially challenges

traditional views of ephemerality. Additionally, the incorporation of four dimensions potentially offers a multidimensional lens for understanding ephemerality and analysing diverse IS phenomena. However, key paper 2 and EF1 also present several significant issues that are discussed in the next section.

4.1.2 Issues Arising from Key Paper 2 and EF1

4.1.2.1 Logical ambiguity

The conceptual coherence of EF1 is limited. The most pressing issue at this point may be the logical ambiguity of the core framework tension: ephemerality as short-lived and durable. The nature of this relation is not made sufficiently clear, which undermines the logic of EF1. One reason for the lack of clarity is the breadth of the review scope. This central issue is discussed in more detail in 4.1.2.5.

Similarly, presenting "Unstable, Durable" as a single characteristic downgrades the conceptual clarity of both characteristics. The rationale for this presentation was that durability and instability are mutually implicated, with one giving rise to the other. However, this reasoning overlooks that all framework characteristics are mutually implicated, prevents a more nuanced reading of each characteristic, and reflects an early-stage understanding of foundational topics (frameworks, concepts, characteristics, etc.) as discussed in 3.1.1. Instability and durability *are* mutually implicated, but their merging oversimplifies their interaction and obscures the distinct role of each characteristic in the framework. For example, merging instability and durability negates the relevance of instability as short-lived.

Finally, the repetitive and recombinatory characteristics do require merging. Both characteristics describe processes of recurrence and relation to prior phenomena, leading to conceptual redundancy. However, their differentiation in EF1 (3.6.3) does bring the concepts of "similarity" and "difference" into the framework. These concepts are foundational to the logic of the framework as it evolves through key paper 3 and EF2 (see 4.1.4.1 below).

4.1.2.2 Contextual complexity

The inclusion of the four framework dimensions (time, space, artifact, actor) creates complexity. The simultaneous interplay of the four dimensions complicates the practical use of the framework and exacerbates conceptual ambiguity, making it more difficult to consistently interpret ephemerality in specific research contexts. While the dimensions enrich the framework, without clearer application guidelines their relevance introduces the risk of contextual overload.

4.1.2.3 Interdisciplinary accessibility

Paper 2 draws heavily on interdisciplinary sources, including sociology, media studies, performance studies, and philosophy, which may alienate IS researchers unfamiliar with these fields. Moreover, while the philosophical underpinnings—as they are in paper 2— provide depth, they do not translate

effectively into practical insights or methodologies that are tailored to IS contexts. This creates a further disconnect between conceptual relevance and practical application, potentially limiting the accessibility of the framework to a wider IS audience.

4.1.2.4 Operational challenges

Abstract concepts like "ephemerality" are inherently difficult to operationalise in empirical IS research. The framework issues outlined in the preceding subsections—logical ambiguity, contextual complexity, and interdisciplinary accessibility—compound this difficulty. The "unfixable" nature of ephemerality resists simple framing, much like the epistemological fluidity of the liquid-modern perspective. Additionally, repetition, a core framework characteristic, is broadly defined in the literature and context-dependent, making it challenging to operationalise consistently across different empirical studies.

4.1.2.5 Review scope

Each of the paper 2 and EF1 issues outlined above have a basis in the issue of the broad review scope. This issue is double-edged. The broad interdisciplinary approach aims to provide a comprehensive understanding of ephemerality. This is reflected in both the outline and illustration of each framework characteristic. For example, the "short-lived" characteristic is sub-characterised in terms of "speed", "compression", and "limitation". Like the liquid-modern principles produced in the paper 1 review, the sub-characteristics aim to represent generalised qualities that describe the phenomenon of ephemerality, consistent with a review for describing, or with "classifying what has been produced by the literature" (Rowe, 2014). Each sub-characteristic is subsequently illustrated—or supported—across a broad range of interdisciplinary contexts. The same is true of the "repetitive" and "recombinatory" characteristics (although not the outlines of the "unstable" and durable" characteristics (as detailed in 4.1.2.1)).

However, comprehensive review ambition comes at the expense of conceptual focus. Reviews for describing do not necessarily help us to understand the phenomenon at hand. Spread too thinly over multiple review domains, paper 2 and EF1 is conceptually shallow, lacking deeper, focussed support from the most critical review domains. As a result, paper 2 is superficially descriptive, cataloguing a wide range of ephemeral characteristics and illustrative contexts without sufficiently attending to the logical nuances of the framework or adequately suggesting how the framework can be leveraged in IS. The issues of conceptual depth and logical nuance are directly addressed in key paper 3 and EF2.

4.1.3 Applying Ephemerality Framework Iteration 1

EF1 is applied in a short contribution (Doyle, Conboy & Kreps, 2022c) to a state-of the-art metaverse article (Dwivedi et al., 2022). The short article outlines and applies each EF1 characteristic. The issues described above are naturally evident in the application. For later EF1 reference, the outline of each

characteristic is presented in Table 6. In terms of logical ambiguity (4.1.2.1), it is notable that the outlines for "unstable" and "durable" are particularly brief, underscoring the lack of conceptual clarity. As these two characteristics are separated in the short article, they are separated in Table 6.

Table 6. Outline of Ephemerality Framework 1 (EF1) Characteristics

Characteristic	**Outline**
Short-lived	The short-lived ephemeral is characterised by *speed* (of change), *compression* (of space, time, artifact, action, experience, value, and/or relevance to the present), and *limitation* (of space, time, artifact, action, experience, value, and/or relevance).
Repetitive	Ephemeral repetition orients to the past to stabilise the present in a variation of that past and, simultaneously, anticipates the future in repeated and varied forms of the present.
Recombinatory	Recombination of the past ephemeral (space, time, artifact, action, or experience) enables repurposing *of* the ephemeral *from* the ephemeral in fragmented, disjointed ways that opens up the future in multiple possibilities.
Unstable	The ephemeral is temporally, spatially, and materially unstable.
Durable	The ephemeral is durable.

4.1.4 Signposting Developments in Key Paper 3 and EF2

The main key paper 3 developments in response to the issues outlined in 4.1.2 are signposted below, with further discussion in the "Introductory Remarks" section for key paper 4.

4.1.4.1 Addressing the issue of logical ambiguity

1. **"Mechanical repetition" and "creative repetition":** the introduction of mechanical repetition (MR) and creative repetition (CR) as core processes of "repetitive" reduces logical ambiguity. These forms of repetition provide a clearer rationale for how ephemeral phenomena can be simultaneously short-lived and durable.

2. **"Unstable" and "durable":** Paper 3 undoes the conflation of "unstable" and "durable", ensuring that each characteristic contributes distinctly to the framework logic. The separation improves conceptual clarity and allows for independent articulation of each characteristic. For example, via MR and CR, instability interrelates with short-lived and durable in EF2.

3. **No "recombinatory" characteristic:** removing "recombinatory" simplifies the framework, reducing ambiguity without sacrificing conceptual depth. The "recombinatory" characteristic was largely developed upon a reading of the media studies and IS literature. However, in the paper 3 review, the characteristic is less relevant to the philosophical underpinnings of the framework. At the same time, the key "recombinatory" effects can be described as "repetitive". The distinction of MR and CR make this possible: the concepts of "similarity" and "difference", introduced via the recombinatory characteristic in 3.6.3, partially define MR and CR.

4.1.4.2 Addressing the issue of contextual complexity

1. **"Dimensions" to "Contexts":** the four framework dimensions are reframed as contexts (Pentland et al., 2020). This reframing shifts the focus from more rigid dimensional categories to more fluid interpretative lenses and aligns better with both relational and processual thinking in IS research (Avgerou, 2019). Contexts emphasise the dynamic and situational nature of phenomena, allowing for greater analytical flexibility when interpreting ephemerality.

2. **"Artifact" to "Object":** EF2 replaces "artifact" with "object". "Artifact" is a loaded term in IS, historically associated with debates around the nature of the field's identity and research focus (Benbasat & Zmud, 2003; Hevner et al., 2004; Orlikowski & Iacono, 2001). "Artifact" also often connotes human-made or technical constructs. "Object" encompasses a wider range of material and non-material phenomena, including non-material digital objects like datasets, files, or social media posts (Faulkner & Runde, 2019). In EF2, "object" can refer to both material technologies (e.g.: a mobile phone) and non-material technologies (e.g.: an app).

3. **"Actor" to "Action":** "Actor" can imply a relatively stable or static entity (e.g.: individual, organisation, system), which may obscure the emergent, processual features of the ephemerality framework. EF2 replaces "actor" with "action". "Action" inherently reflects movement, change, and temporality. "Action" is also better aligned with the performative and processual underpinning of the framework, which increases through EF2 and EF3.

4.1.4.3 Addressing the issue of interdisciplinary accessibility

While no outlined issue is resolved in paper 3, accessibility remains particularly problematic. The introduction of MR and CR enhances the logical clarity of EF2 (4.1.4.1), but this logic is primarily based upon a close reading of foundational and challenging philosophical texts (Bergson, 1910, 1911, 1922; Deleuze, 1990, 1994; Deleuze & Parnet, 2002). Adding these new framework features has the dual effect of strengthening the framework's logic and increasing its interdisciplinary complexity.

4.1.4.4 Addressing the issue of operational challenges

Clear delineation of MR and CR in paper 3 and EF2 makes the abstract concept of repetition more actionable, enabling researchers to interpret short-lived and durable phenomena empirically. Digital trace data also emerges as a key IS application area for this thesis in paper 3.

4.1.4.5 Addressing the issue of review scope

In paper 2, the review scope was broad but shallow (4.1.2.5). The scope of paper 3 remains broad. However, paper 3 narrows and deepens its focus by delineating a reduced number of core characteristics

and by prioritising seminal and well-cited texts across all review domains. For example, while the logic of EF2 is primarily grounded in philosophical texts, the organisation and management studies literature prove particularly rich with research that supports and illustrates the framework. The following section summarises the reviews of ephemerality in the core interdisciplinary review domains.

4.1.4.6 Paper 3 Theme: Everyday Digital Contexts

Finally, the theme of "the everyday" (de Certeau, 1984; Dourish, 2001; Guillaume & Huysmans, 2018; Lefebvre, 1961; Urry, 2000) emerges in key paper 3. More specifically, the focus is on "everyday digital contexts" (see 4.7.1). Experiential computing, as outlined in 4.1.1.3, invites IS researchers to explore the "fusions and contrasts" of digital and physical (Yoo, 2010). These fusions and contrasts are evident in the ephemeral contexts of everyday life, where digital artifacts are woven into the fabric of routine activities (Bødker et al., 2014). Digital trace data (4.1.4.4) are implicated in everyday digital contexts.

Referencing Bergson, Yoo (2010) asks: "How does the use of… digital artifacts in the *durée* of everyday life shape digitally mediated experiences? How do digitalised environments affect our experience of time and space? How do digitally mediated experiences transform the meanings of familiar, everyday activities?" A background focus of paper three is how mundane, ephemeral sociotechnical interactions shape the experience of digital technology in everyday contexts.

4.1.5 Summaries of Ephemerality Reviews in Five Disciplines

To address the paper 2 issues (4.1.2 and 4.1.4), it was necessary to re-review ephemerality. This section provides summaries of the reviews of sociology, organisation and management studies, performance studies, media studies, and philosophy. The reviews are foundational to the development of paper 3.

For example, paper 3 describes three broad views of time in IS research, and situates ephemerality as a distinct type of time in relation to these views. This positioning required engagement with the relevant literature on time and temporality (see 4.1.4.3 & 4.1.4.5). Although concise summaries of the philosophical and information systems literature are included in paper 3, many insights from the paper 3 reviews of non-IS disciplines in particular are backgrounded or excluded from paper 3.

Therefore, the following summaries highlight information that is critical to the understanding of time, temporality, and ephemerality as developed in paper 3 and EF2. Given the centrality of philosophical perspectives to the logic of EF2 (and EF3), the section concludes with an expanded summary of the reviewed philosophy literature.

4.1.5.1 Sociology

Perhaps the earliest sociological analysis of ephemerality is that of Georg Simmel (1900, 1903, 1908), who was a formative influence on Zygmunt Bauman. Simmel's sociology begins with the metaphysical principle that all phenomena are "interrelated… [and] in perpetual flux" (Frisby, 1985, p. 87). In this reality, "things do not last for any length of time" because "every form is immediately dissolved… in the very moment when it emerges" (Simmel, 1900, p.510). For Simmel, social life is shaped by fleeting interactions, where "only fragments of the individual" are ever involved (Frisby, 1985, p.268). Yet, these fragments are not insignificant; they contain, in relation to other fragments, the potential to reveal "total social meaning" (*ibid*., p.57-58). This focus on transience and flux makes Simmel a foundational figure in the sociological analysis of the experiential dimensions of everyday life (M. S. Davis, 1997).

Simmel's ideas also laid the groundwork for the development of social network theory, particularly regarding the ephemerality of social ties. Pescosolido and Rubin (2000) argue that Simmel's work anticipated the ways in which social networks would become increasingly ephemeral, marked by fleeting interactions and weak ties that rapidly dissolve. Others have suggested that Simmel was a "web theorist" before digital, anticipating the transient nature of contemporary networks (Chayko, 2015).

Simmel's seminal influence endures across sociological traditions. His work informs Goffman's (1959) analysis of fleeting performance, Bauman's (2000) perspective of liquid modernity, Thrift's (2008) non-representational theory, and theories of social acceleration (Aho, 2007; Rosa, 2013; Wajcman & Dodd, 2016). Bauman, for instance, describes a society so transient and fluid that effective stabilisation is no longer possible; Rosa identifies three dimensions of social acceleration (technological, social change, and pace of life), with each contributing to the increasing ephemerality of social processes, while non-representational theory examines how relatively stable social structures can emerge from fundamentally ephemeral, everyday practices. In IS, Reimers et al. (2014) note that "durable socially reproduced elements and ephemeral social interactions are core theoretical constructs in all forms of practice theory." Indeed, Giddens (1984), de Certeau (1984), Bourdieu (1977), and Lefebvre (1961) each highlight the interdependence of the ephemeral and durable, emphasising their co-constitution. For de Certeau, for example, everyday actions, strategies of resistance, and subversive behaviours, while ephemeral, can repeat and reform in social structures that endure.

However, despite its relevance, the ephemeral is often overshadowed in sociological analysis by a focus on durability and permanence. As Law and Urry (2004) put it, social science historically deals poorly with the ephemeral, or "that which is here today and gone tomorrow, only to reappear again the day after tomorrow." Many sociological narratives depict ephemeral contexts, like Debord's (1970) fleeting distractions, Augé's (2009) transient spaces, or Rosa's (2013) social acceleration, yet rarely interrogate

the fundamental meaning of ephemeral. Susen (2016) critiques theorists like Bourdieu for failing to adequately distinguish between foundational, contingent, and ephemeral fields, rendering the ephemeral theoretically underdeveloped.

Ingold and Simonetti (2022) advise that divisions between "long-term and short-term phenomena need to be revised." In sociology, Lefebvre (1961), De Certeau (1984), Urry (2000), Thrift (2008), and even Bauman (2000) offer scope for new insight. For example, Lefebvre and Levich (1987) observe that it is the very repetitiveness of everyday life that paradoxically underscores its ephemeral flux. Repetition of the ephemeral can be a site for novelty and creativity (Bissell, 2014; Grosz, 2013). Everyday actions, no matter how fleeting, can accumulate significance, creating patterns, habits, and structures. De Certeau reminds us, however, that no matter how durable the structures may seem, they are but "ephemeral islands" in a "sea" of "perpetual mutation" (1984, p. 41).

In sociology, ephemerality challenges traditional binaries, revealing interdependencies of flux and form. From habitual practices to fleeting interactions, ephemerality shapes and is shaped by the social, and provides a vital lens for understanding the transient yet enduring dynamics of everyday life.

4.1.5.2 Organisation and Management Studies

Ephemerality plays an important role in organisation and management (O&M) studies, emerging in diverse research streams that explore transient and fleeting phenomena. The concept of the "ephemeral organisation" (Lanzara, 1983) is one stream. Traditionally conceptualised as *ad hoc* organisational structures designed for singular events or crisis response (Sydow, 2017), ephemeral organisations are typically seen as short-term arrangements that quickly disappear once their purpose has been fulfilled (Lanzara, 1983). For example, Bakker et al. (2016) delineate the ephemeral organisation from the semi-temporary and semi-permanent organisation, so that organisations are only "ephemeral" under "extreme" circumstances (Sydow, 2017), like one-off events or short-lived interorganisational arrangements. However, ephemerality is not confined to extreme or crisis contexts; even large-scale, ostensibly durable organisational forms such as global projects can be seen as "fleeting constellations" of interrelated subprojects and shifting alliances (van Marrewijk et al., 2016). This observation challenges the traditional notion of stable organisational structures, and suggests that all organisations, to some extent, exhibit ephemeral characteristics (Savage et al., 2018).

The growing conceptual relevance of ephemerality in O&M research reflects the broader assumptions of "constant changeability" in contemporary organisational life (Sydow et al., 2020). As in sociology, relation of ephemerality and durability is a recurring theme, particularly in research around ephemeral events, such as communication, that shape more durable organisational states, like institutional logics (Ocasio et al., 2015; Chen et al., 2022). Ancona et al. (2021) suggest that the populations constituting

ephemeral organisational forms may begin to exhibit traits that endure beyond the initial moment of their formation.

The study of ephemerality also highlights the transient nature of identity in organisations. Identity is increasingly viewed not as a fixed, stable construct (Järventie-Thesleff & Tienari, 2015) but as a fluid, "ephemeral configuration" that is shaped by momentary actions, something that "people can step into and move away from, through a particular glance, gesture or utterance" (Llewellyn, 2015). As such, organisational identity is a "perpetually revolving ephemeral construction" (Knights & Clarke, 2014).

Ephemerality is also evident in the dynamics of organisational relationships and interorganisational arrangements (Nayak et al., 2020). Organisations may appear to have long-lasting ties, but these ties are often characterised by temporary, unstable interactions that nonetheless contribute to the ongoing social structure of the organisation. A focus on "momentary, transient phenomena" can show how creativity emerges through organisational interactions (Hargadon & Bechky, 2006). Bechky (2006) challenges the notion of "ephemeral organisations," suggesting these structures maintain continuity through enduring role systems that are negotiated in situ. Such arrangements, however, do not negate the ephemeral nature of organisational dynamics but further implicates the short-lived and durable.

Process theory, which places ephemerality at the heart of organisational dynamics, argues that entities like people, organisations, and things are continually constituted by processes that are transient and emergent (Garud et al., 2015; Langley & Tsoukas, 2016). This view is complemented by practice theory, which emphasises the integration of processes and things in the continual construction of organisational practice (Holt & Johnsen, 2019). Where practice theory emphasises integration, process theory emphasises process. In both frameworks, however, the ephemeral is inseparable from the enduring: the repetition of fleeting events or actions contributes to the establishment of patterns, norms, structures, practices, or processes that shape relatively durable organisational outcomes (Fortwengel et al., 2017).

Ephemerality also intersects with O&M research on time. From the processual perspective, for example, organisational outcomes are nothing more than "ephemeral way stations" (Langley et al., 2013). The notion of subjective time—where the past, present, and future are experienced simultaneously—can deepen our understanding of how ephemeral moments accumulate significance over time (Shipp & Jansen, 2021). Similarly, the "long-present" perspective (Kim et al., 2019) explores how the present moment can stretch and contract, offering a more nuanced view of temporality that better captures the ephemeral dynamics in organisational contexts. O&M research also challenges temporal assumptions with concepts like "material temporality" (Hernes et al., 2021).

Finally, blurring of ephemerality and continuity is evident in the recurrence of organisational temporal complexities (Hilbolling S et al., 2022), where repetition plays a crucial role in sustaining organisational processes. For example, recurrence manifests in repeated, ephemeral routines (Hernes, 2008), repeated, ephemeral social behaviours (Farias, 2016), and repeated, ephemeral acts of subversion (Courpasson, 2017) that shape everyday organisational life. Ephemerally repetitive sensemaking in ephemeral work settings similarly contributes to relative organisational stability (Hindmarsh & Pilnick, 2007).

In sum, ephemerality in O&M studies is considered a fundamental characteristic of organisational life (Hultin & Introna, 2019). By focusing on how ephemeral phenomena shape and are shaped by organisational processes, practices, and structures, O&M research provides valuable insights into the ephemeral dynamics that characterise contemporary organisations.

4.1.5.3 Performance studies

Seminal performance theorists Schechner (1988) and Phelan (1993) establish the traditional understanding of performance ephemerality through three interrelated dimensions: liveness, disappearance, and non-reproducibility. In this view, performance happens in the moment, disappears as it happens, and resists being fully recorded, archived, or mediated. The ephemeral essence of performance lies in both its immediacy and its unmediated nature. "Due to its ephemeral presence, [performance] "disappears as soon as it is created" (Ayerbe, 2017).

Consequently, traditional definitions emphasise the bodily co-presence of actors and audience through ephemeral actions and experiences (Fischer-Lichte, 2008a, 2009). Phelan (1993, p. 146) argues that performance "becomes itself through disappearance," and that efforts to record or archive performance "perpetuate our predispositions to value the permanent over the fleeting" (Phelan, 2012). Performance ephemerality is thus tied to the opposition between the immediate and the mediated (Auslander, 2008).

More recent theorists, however, have called for revision to traditional views. Schneider (2011, p. 101) contends that "performance remains, but remains differently," pointing to forms like photography, oral testimony, film, the archive, and re-enactments as ways in which ephemeral performance "re-appears." Lepecki (2007) similarly critiques the idea of disappearance, arguing that if performance were simply "an endless series of formal dissolutions," its enduring qualities could not be accounted for. Schneider, Lepecki, and Fischer-Lichte suggest that remaining forms, though ephemeral in themselves, "create the conditions of possibility to speak about [ephemeral] past performances" (Fischer-Lichte, 2008b).

The concepts of immediacy and liveness have also evolved. Franko (2018) suggests that re-enactments challenge the ephemerality of performance by revealing the past, present, and future of performance. He argues that contemporary performance theory is "no longer mesmerised by presence." D'Amato

(2021) emphasises a practice-based understanding of "what materialises rather than what gets lost" (D'Amato, 2022), underscoring the capacity of ephemeral phenomena to move across time and space. It is suggested that re-performed performances can embody multiple temporalities—past, present, and future—simultaneously (Franko, 2018; Lepecki, 2004).

Digital contexts further complicate the understanding of performance ephemerality. For Taylor (2010), digital redefines performance ephemerality (liveness) and durability (the archive). She argues that the distinction between the ephemeral and durable is no longer clear because digital is "constantly" shifting. Digital recordings and live-streaming technologies also blur lines between live and mediatised cultural forms, leading Auslander (1999; 2008) to advocate for deconstruction of this opposition. Today, live performances often involve not only immediate co-presence but also simultaneous mediation through digital devices. In this expanded framework, ephemerality and durability are no longer oppositional but are "mutually constructed, mutually entangled, and mutually dependent" (Reason, 2006).

Thrift (2008) observes that the body of performance studies work from the late twentieth century offers "perhaps the single most important contemplation of *the time-spaces of now*" (emphasis added). The review of this work further highlights the important conceptual role of ephemerality for understanding the contextual dynamics—time, space, object, action—that emerge in performative moments.

4.1.5.4 Media studies

Ephemerality is also an important conceptual lens in media studies, broadly relevant to issues of time (duration, shortness, and speed) and transmission (circulation, storage, and value) (Grainge, 2011). Ephemerality is evident in diverse media contexts, including rapid rates of media dissemination and consumption (Kaun & Stiernstedt, 2014), the proliferation of short-form media artifacts (Pesce & Noto, 2016), fleeting audience interaction and experience (Bayer et al., 2016), the ephemeral everydayness of media (Lagerkvist, 2017), and technological degradation and obsolescence (Chun, 2008). Media ephemerality is shaped by both material and non-material attributes, with digital contexts pervasive.

Material media—such as newspapers or flyers—are ephemeral in lifespan and perceived relevance, while broadcast media, like radio or television, amplify ephemerality through their non-material, intangible nature (VanderBurgh, 2014). Digital intensifies the ephemerality of media contexts. Indeed, as audience interaction with digital media is both increasingly ephemeral (Vázquez-Herrero et al., 2019) and shaped by the ephemeral in design (Schneider & Foot, 2004), ephemerality is now "a central component of the user experience" for many media platforms (Bayer et al., 2016).

Repetition also characterises ephemerality in media studies. Uricchio (2011) notes that television is ephemeral by virtue of "being both fleeting and repeated." The ephemeral repeats not only through re-

experience but also through recontextualisations of meaning and value. The result is that the most repeated media artifacts are perceived as the most ephemeral. Digital media are additionally ephemeral because digital media must be reconstructed each time it is experienced through repetitive processes of compression, decompression, and network packet reconstruction (Schneider & Foot, 2004).

For Chun (2008), digital media uniquely embody what she terms "the enduring ephemeral," or the conflation of ephemerality and durability. Digital objects can disappear while simultaneously being archived, cached, or copied. This interplay underscores an inherent tension: while archives aim to fix ephemeral digital objects, continual rewriting is required to maintain relative digital stability (Kallinikos et al., 2013). Archiving ephemeral digital objects also enables continual recontextualisation, further illustrating the tension between fixing and facilitating ephemerality in digital environments. That technologies can capture or fix the ephemeral to create artifacts that *are* ephemeral is a key tension in media studies (Bonomo & Provencher, 2013), and relevant at least since the emergence of photographic and cinematic technologies (Doane, 2002).

Social media platforms exemplify these dynamics. Platforms like Snapchat, Telegram, and Twitch are designed for ephemerality, but their ephemerality is compromised by screenshotting, recording, and archiving of content—practices that are impossible to control (Handyside & Ringrose, 2017; Møller & Robards, 2019). Castells (2000) argues that forms of "ephemeral symbolic communication" shape the "structural ephemerality" (Castells, 2004) that characterises media-driven cultures. This constant flux gives rise to a sense of "timeless time", which, for Castells (1996), underpins the contemporary unease of "eternal ephemerality". In this sense, eternal ephemerality encompasses digital objects (forms of "ephemeral symbolic communication") that are simultaneously short-lived and durable—quickly consumed and perpetually accessible (see also Castells in the sociology overview, 4.1.5.1).

Shaped by unstable structures that produce and preserve their fleeting temporality, ephemeral media sustain and subvert their transient nature. Ephemerality is not only a characteristic *of* media but a sociocultural force that redefines the boundaries between short-lived and durable in the digital age.

4.1.5.5 Philosophy

Warnock (1994) notes that "much philosophy [is] concerned with the contrast between the ephemeral and the eternal," perhaps beginning with the opposing metaphysics of pre-Socratic philosophers Heraclitus and Parmenides. Heraclitus held that everything is constantly changing and that opposites

are “identical”, ideas known, respectively, as the “Doctrine of Flux” and the “Unity of Opposites”[12] (Graham, 2009). For Plato and Aristotle, these ideas are illogical. Plato’s view is that the Heraclitean outlook presents a reality “so ephemeral… that neither language nor knowledge [will] be possible” (Hoy, 2013). Most famous for the idea that one cannot step into the same river twice, what Heraclitus most likely said (Graham, 2023) is subtly different: “On those stepping into rivers staying the same other and other waters flow”, which allows for the interpretation that the waters are always changing but the river remains the same. Thus, Heraclitus “believes in flux, but not as destructive of constancy; rather, [flux] is, paradoxically, a necessary condition of constancy” (Graham, 2019).

Ephemerality, as a concept, focuses attention upon our most basic assumptions about time: how time can, if at all, be said to pass; the relation of time to the past and the future; the constitution of the present; how time is related to change; how time is experienced. Two common assumptions about time, at least among non-philosophers, are that the past and future are distinguishable, and that time has a direction or flow, wherein what is considered durable (for example, spaces or objects) moves into the future and what is ephemeral (for example, time or action) recedes into the past (Tooley, 2000). A third assumption is that the present moment (or “now”) seems to eternally occupy an ephemeral point or duration between the past and the future. Such assumptions, which shape our metaphysical understanding of time, have base implications for how we map moments of time to reality (Le Poidevin, 2009, p. 55).

Philosophical views on how time, temporality, and the present moment might be conceptualised are long established. At one end of the scale, time does not exist at all (McTaggart, 1908); at the other, temporal experience is the ultimate reality (Bergson, 1922, 1946). Regarding the present, Carnap (1963) writes that, for Einstein, “the experience of the Now means something special” but that Einstein also “worried” that there is “something essential about the Now which is just outside the realm of science.” To wit, for advocates of ontological presentism, only events and things in the present time exist, whereas for eternalists, events and things from the past, present, and future all exist and are equally real (Ingram & Tallant, 2022). Eternalism, latterly known as the Block Universe theory, is the more popular perspective with both philosophers and theoretical physicists today (Dainton, 2011; Falk, 2020). The point is, what constitutes the present is a dramatically contested, assumption-challenging discourse within and between the natural sciences, the social sciences, and the humanities.

[12] Graham (2009; 2023) clarifies the meaning of “identical”: “To say that opposites are the same is simply to say that they are transformationally equivalent.” Put differently, opposites are identical “by virtue of constituting a system of connections.”

Dainton (2023) usefully categorises three models of temporal consciousness, or how we subjectively perceive the present: cinematic, retentional, and extensional. Cinematic perception of the present is of static "snapshots". Just as a series of static snapshots presented at an appropriate framerate provides the illusion of continuous movement on film, so the rapid sensory representation of static snapshots allows for the experience of change and succession in objective time. The snapshot is a "moment of transition" between the past and future (Guyau, 1890), with consciousness "confined to the [present] instant" (Bachelard, 1932). This present instant is "infinitely small… born and dying at the same time" (Guyau, 1890) and can "hold no duration" (Bachelard, 1932). The cinematic present instant can hold no duration because, if it were otherwise, the present would contain parts of the past and future, undermining its status as a singular, discrete, and "present" moment.

The concept of the cinematic present as a non-durational instant resonates with a range of philosophical and cultural traditions that similarly conceive of the present as a sharply defined boundary between past and future. For Augustine, the past and the future exist only in the mind (Le Poidevin, 2013), divided by a "knife-edge" present with no temporal breadth (McKinnon, 2003). Cinematic thinking is also apparent in the Buddhist ontology of "instantaneous temporal slices" (Mortensen, 2011), where conscious experience is "a rapidly occurring sequence of moments" (Chadha, 2015). And for Kant too, whose account of perception is enriched by allowing for multiple points of view (Matherne, 2015), the present can be conceived as a "point-like instant" between the past and future (Čapek, 1974).

Before outlining the retentional and extensional models of temporal consciousness, it is useful to remember William James' highly influential concept of "the specious present" (James, 1890). For James, to understand the experience of time, we must distinguish the objective, instantaneous present from the subjective, durational present (Dainton, 2023). In this sense, James foreshadows Bergson's processual approach to distinguishing scientific time from experiential time. In contrast to the mathematical point, the knife-edge, or the "cinematic" snapshot, the specious present is visualised as a "saddle-back" with "a certain breadth" (James, 1886). Put differently, where the cinematic model proposes an instantaneous present with no duration, the specious present *has* duration, albeit ephemeral.

Le Poidevin (2019) identifies four potential interpretations of this duration: it is a span of short-term memory; it is duration experienced as an indivisible whole, without parts like instants; it is a duration directly perceived, emphasising immediacy; or it is a duration perceived as both present and extended, in alignment with James' "saddle-back" metaphor. For Dainton (2023a), specious present duration is "sufficient to accommodate the change and persistence we find in our immediate experience". Objective estimations of this duration vary and are often framed by how long, as opposed to short, a "standard" specious present might be (Dainton, 2023b). As such, Le Poidevin (2009), Strawson (2009), Hoerl

(2014), and Dainton (2023b) partially view the specious present as "the maximum duration in which change or succession can be experienced as a… single mental act" (Roselli, 2018). Objective estimations of around one second maximum duration are typical (Dainton, 2023b).

Returning to the retentional and extensional models of consciousness, both retentional and extensional theorists are influenced by the idea of the specious present. Both also agree that, in a "single" specious present, perception of change and succession is possible (Dainton, 2023a). Accounting for how this is possible is where they diverge. In the retentional view (advanced, for example, by Husserl (1964)), the specious present is composed of two phenomena[13]: a momentary, direct experience and representations (or retentions) of the recent past (Dainton, 2008a). As both experience and retention are simultaneously confined to the moment, the retentional specious present is not, in any significant way, temporally extended (Dainton, 2023a), even though it "seems to embrace a brief temporal" duration (Dainton, 2008). That this seems so is the result of the "momentary cross-section" (*ibid*.) of the direct experience and the retention. In Husserl's description, the direct experience of one moment is the retention of the next moment, so that the retention recedes ever further as a retention of a retention, and a retention of a retention of a retention, and so on (Dainton, 2000, p.152-154). What essentially distinguishes the retentional view of the specious present from the cinematic view of the instant is this concept of retention. While retentions are not to be conflated with memory (Husserl, 1964), a criticism of the retentional view is that retention and memory have not been adequately distinguished (Dainton, 2000).

By contrast, the extensional view (initially advanced by Stern (1897)) posits that every perceptual experience *is* temporally extended. The extensional specious present is not confined to the moment but can extend or unfold "over periods of (objective) time" (Dainton, 2017). Within these present periods we can experience succession directly.

By way of analogy, imagine a tennis player serving an ace: cinematic time isolates a series of discrete instants (e.g.: the serve, the ball crossing the net, first bounce, ball dead), with each instant representing a durationless present time. The retentional view also confines the present to its instant, or the ball and action to its spatiotemporal location, but each direct perception is temporally thickened by a retention of the prior direct perception (e.g.: the ball crossing the net by the serve, the first bounce by the ball crossing the net and then the serve, and so on). In the extensional view, the serve, the ball going dead, and everything in between comprises the present. The extensional present is not a location in time (like an instant) but a "phenomenal characteristic" (Dainton, 2008b). So described, the experience of

[13] Husserl (1964), in fact, describes a three-part specious present that comprises, one, what we experience (primal impressions), two, a "retention" of the past, and three, a "protention" or sense of the future (Wearden, 2016).

succession (serve, net, bounce…) "within" a specious present is logically possible. Subsequently, successive specious presents are "welded together" by direct experience into a Jamesian stream of consciousness, so that there is always "a directly experienced transition [or overlap] between any two adjacent" specious presents (Dainton, 2000, pp. 178–198).

The retentional and extensional views are most relevant in the philosophical literature today, with the cinematic view largely out of favour (Wolf, 2021)[14]. For cinematic advocates, change and succession cannot be directly perceived within the durationless present moment. It is, rather, the succession of static snapshots in objective time that accounts for the subjective experience of change. However, a challenging critique of the cinematic model (James, 1890) is that there is a fundamental difference between "a succession of experiences and an experience of succession" (Daintona, 2023a). As such, the cinematic model is fundamentally incompatible with processual thinking, to which we now turn.

Bergson and Whitehead, (the "fathers" of processual philosophy (Kreps et al., 2020)), aim to upend the traditional ordering of fixity over flux, of durability over ephemerality. Bergson's concept of *durée pure* (pure duration) describes a flux of indivisible, interpenetrating, heterogeneous moments, experienced in continuous, irreversible flow (Bergson, 1910, p.100–107).[15] Evoking Heraclitus' "Unity of Opposites", durée is "ever the same and ever changing" (*ibid*.): change is "the most… durable thing possible", while "fixity" is "ephemeral" (Bergson, 1946 p.177). For Bergson, moments are "only snapshots" (Bergson, 1922, p.348), ephemeral "arrests of our attention" (*ibid*., p.362). Time as it is lived—or temporality—cannot be created out of discrete, cinematic snapshots, each one set between the last and next. If it were so, the flow of lived time—*durée*—would come apart in a static "dust of moments", each without duration (Bergson, 1946, p.219). From Bergson's point of view, the logical consequence of this perspective is that reality would have to cease to exist and return to existence "within" every single moment (Bergson, 1911, p.192).

Instead, *durée* continually "prolongs the past into the present" (Bergson, 1946, p.211) so that present duration by present duration, *the* present duration is enrichened by that which is past. Unlike retentions, which are continuously displaced by new retentions, the past of *durée* is always continuing *into* the present, so that the past and the present form "an organic whole" (Bergson, 1910, p.100). What has been remains in what is, and what *is* is continually becoming. The present of *durée* is not a present simple "*that which is*" but a present continuous "*what is being made*" (Bergson, 1911, p.193). In a sense, the

[14] Note that "cinematic" conceptualisations of the present can be interpreted as underpinning static representations of time in IS research (see papers 3 and 4). See Chuard (2018)for a recent defense of the cinematic perspective.
[15] The closely related concept of *durée réelle* (real duration) describes *durée pure* as it is lived (Bergson, 1910). *Durée pure* can be seen as the abstraction within which *durée réelle* manifests. Here, *durée* refers to both concepts.

retentional view emphasises disappearance and trace, the extensional view emphasises persistence and continuity, while Bergson emphasises accumulation and propulsion.

Therefore, in *durée*'s "constant state of becoming" (*ibid*., p. 183) we find "a present which endures" (Bergson, 1946, p. 180): everything is ephemeral, *always*, and nothing is lost. As Wolf (2021) puts it, Bergson's specious present is "dynamically experienced as being preserved while becoming past." This ever-fluctuating, ephemeral present is both the enduring core of *durée* and, ultimately, is constitutive of reality. In other words, from the processual point of view, material objects are, at best, ephemerally unstable stabilisations of perception (Bergson, 1911, p. 137).

The concepts of the virtual and the actual, as explored by Bergson and Deleuze, illustrate the instability of the ephemeral. For Bergson, our perceptions of reality are representations that are actualised in the present when selected from "pure memory", which is the virtual totality of our past experiences.[16] Representations are unstably ephemeral (Bergson, 1911, pp.208-212) because the interplay of the virtual and the actual is continually renewing and revising our perceptions and memories. Moreover, all that we perceive is also unstable, or in states of unceasing change (Bergson, 1922, p.232-235). For Deleuze, the virtual "pure past" not only encompasses all past experiences but also all possibilities that may or may not be actualised.[17] For example, Deleuzian virtual objects are an "unstable mix" (Williams, 2011, p.111) of possibilities, of fragments, or of "shreds of pure past" (Deleuze, 1994, pp.100-102), and of the actual present. As an ephemeral instance, the virtual object can be continuous, then discontinuous, can "leap or skip" (Deleuze & Guattari, 2005, pp.94-95). Where Bergson's durée coheres the unstably ephemeral into unified, if heterogeneous, flow, Deleuze's explicit emphasis on difference depicts a more fragmented, more unstable reality.

While Deleuze foregrounds instability, Whitehead's (1929) processual philosophy suggests that, even in becoming, patterns of recurrence sustain continuity. Although the stability of entities is ephemeral, for Whitehead, the relations and patterns between those entities endure and recur (Shaviro, 2012). The world is process and "that process is the becoming of actual entities" (Whitehead, 1929, p. 26). For Bergson and Deleuze, entities *are* processes. For Whitehead, processes are "*in* nature" (Hernes, 2016)

---

[16] See Bergson (e.g.: 1911, pp.25-36 & pp.69-77) for more on the virtual, the actual, perception, and pure memory. Note also that the term "selected" can imply passive selection (e.g.: mechanical repetition (see 4.6.2)) and active selection (e.g.: creative repetition (4.6.2)). In both cases, access to pure memory is indirect because representations of virtual pure memory are always mediated by the actual present and, consequently, are unstably ephemeral.

[17] See Deleuze (1994, e.g.: pp.79-85) and Williams (2011, pp.9-16, 57-65 & 116) for more on the past, the pure past, the passing present, the actual present (also termed the "living" or "present" present), and future possibilities. For Deleuze, the past, present, and future (as dimensions or processes of time) are made up of such multiple types *of* time, the synthesis of which *is* time.

so that entities—like objects, events, perceptions, or actions—relationally emerge in "actual occasions" that are both fundamentally fleeting and inherent to the continual flow of reality (Whitehead, 1929).

Finally, three prominent philosophical theories of persistence are briefly outlined: endurance theory, perdurance theory, and stage theory. Theories of persistence aim to describe how material objects persist in time. For each persistence theory, the concept of "temporal parts" (Hawley, 2020b) is important.[18]

Temporal parts account for the existence of objects at different moments in time. Put differently, temporal parts account for the existence of a "part" of an object at a specific point in time. As such, temporal parts constitute a fourth (temporal) dimension. The perdurantist and stage theorist believe that objects have temporal parts. The endurantist does not believe that objects have temporal parts. For the endurantist, the enduring object has spatial parts only and is "wholly present whenever [it] exist[s]" (Hawley, 2020). This is to say that 'you' are wholly 'you' at age five, twenty-five, and eighty-five. Were it otherwise, endurantists would have to explain why only parts of objects are present at specific times.

Being "wholly present" at each instant of existence implies that objects are "point-like beings" without duration (Balashov, 2000). In this sense, endurance theory resonates with the presentist rejection of temporal parts (Dorato, 2012) and aligns with cinematic perspectives that depict static moments in time.

By contrast, for the perdurantist, the past, present, and future have equal status (Hawley, 2020): objects perdure "by having different temporal parts… at different times" (Lewis, 1986, p. 202). In other words, 'you' have different temporal parts at age five, twenty-five, and eighty-five. Therefore, no perduring temporal part can be *wholly* present at more than one time. Instead, the perduring object "stretch[es] out through time" (Hawley, 2020a) so that "long-lived sums" of its temporal parts account for its material identity (Hawley, 2011, p. 42). Here, 'you' are the aggregate of your temporal parts over time.

Finally, the stage theorist believes that each temporal part (or stage) is 'you'. Via stage theory, the temporal parts become, once again, "instantaneous" "time-slices" (Balashov, 2007). Any reference to a material object is not a reference to a holistic whole, but rather to these "most ephemeral" of temporal parts (Hawley, 2011, p. 48). As the retentional view of perception is distinguished from the cinematic by retention, so stage theory is distinguished from endurance theory by its temporal parts (Balashov, 2007).

Given its opposition to "substance metaphysics" (Seibt, 2022), processual philosophy seems entirely at odds with theories of persistence. Bergson maintained that the spatialisation of time (i.e.: the clock-time

[18] Lewis (1986) introduced the terms "perdurance" and "endurance" in the contexts of "temporal parts".

measurement and conceptualisation of time) limits our ontological understanding of continual, ephemeral flow (e.g.: Bergson, 1910, p.79 & 1946, p.34). Although Bergson is not denying the existence of external material objects (or that these objects change), he makes clear that the linear succession of such change (for example, as successive temporal parts) exists only in perception (Bergson, 1910, p.227; 1911, p.277-8). Instead, matter itself is confined to a present that is always "beginning again" so that the present moment is the "materiality of our existence" (Bergson, 1911, p.178).

However, persistence and processual perspectives have been considered in tandem (e.g.: Fischer, 2021; Nicholson & Dupré, 2018; Rescher, 1996; Seibt, 2013). Dupré (2018), for example, applying a processual view in biology, suggests it "is uncontroversial that processes contain temporal parts." And endurantists and perdurantists also generally agree that non-material processes (like events) do have temporal parts (Hawley, 2020b). These diverse philosophical perspectives provide a deep and rich foundation for situating ephemerality within the broader discourse of IS research. Engaging with foundational processual thinking, philosophical models of consciousness, as well as theories of persistence, provides key insights into the nature of ephemerality. These insights informed the development of paper 3 and EF2.

4.1.6 Paper 3 title: An Interdisciplinary Framework for Conceptualising Ephemeral in Everyday Digital Contexts

Subsections 4.2–4.8 comprise key paper 3 (Doyle et al., P3). Paper 3 develops the second iteration of the ephemerality framework (EF2).

4.2 Paper 3 Abstract

The adjective "ephemeral" is applied to describe important contexts in information systems research, such as the nature of digital content, human interaction with digital, and technological change. However, ephemeral is not an important IS concept. Based upon an extensive interdisciplinary review, we develop a conceptual framework for ephemeral that draws on foundational processual philosophy, as well as key perspectives on ephemerality in sociology, organisation studies, performance studies, media studies, and IS research. The framework delineates and integrates four characteristics—short-lived, repetitive, unstable, and durable—with four contexts—time, space, object, and action—that illuminate ephemeral in everyday digital contexts. This holistic conceptualisation provides IS researchers with a clear and structured framework that better captures the tensions and complexities of ephemerality in everyday digital contexts. The novel concepts of mechanical repetition and creative repetition are central to the framework. By incorporating a processual critique of fixed views of time, these concepts integrate static and dynamic views of time and show that, in everyday digital contexts, the singular

ephemeral occurrence is not merely constitutive *of* process but *is* process. We briefly illustrate the contribution of our framework in the IS context of digital trace data.

4.3 Introduction

The adjective "ephemeral" is defined as "for a short time only" (Oxford English Dictionary, 2004). This understanding of ephemeral—and increasing ephemerality—has long seemed to describe some fundamentals of everyday life[19]: how we interrelate (von Krogh, 2002), how we work (Burke & Chidambaram, 1999), how we produce, share, and consume information (Kallinikos, 2009). Given the rapidly changing contexts of information systems (IS) research (Demetis & Lee, 2018), it is not surprising that ephemerality is considered a feature of both the IS field's identity (Lim et al., 2007) and its research focus (Desouza et al., 2006).

Ephemeral also describes some fundamentals of digital technology: namely, what digital is and how it is experienced (Yoo, 2010). In terms of what digital is, the base implication is that non-material digital objects (i.e.: software, code, bitstrings) (Faulkner & Runde, 2010; 2019)), being intangible, malleable, and subject to continual change (Ekbia, 2009; Grover & Lyytinen, 2023a; Kallinikos et al., 2013), are ephemerally unstable (Lyytinen, 2022; von Briel, 2018).

In terms of how digital technology is experienced, short-lived attention spans (Susarla et al., 2012), short-form digital content (Lehrer et al., 2023), rapid flows of data (Alaimo & Kallinikos, 2020), and fleeting actions like taps, swipes, and scrolls (Møller & Robards, 2019) are just a few examples of how ephemerality characterises everyday human interaction with digital technology.

While these IS contexts are important, ephemeral has not been well developed as an IS concept. Ephemeral phenomena in IS are variously viewed as too fleeting for analysis, as short-lived only, or as merely constitutive of more durable social and temporal structures. Cultivating depth around the meaning of ephemeral is necessary because, firstly, IS concepts influence IS design (Markus & Saunders, 2007). For example, ephemerality is already a design choice (Xu et al., 2016) in social media (Lehrer et al., 2023) and Internet of Things (IoT) contexts (Huang et al., 2020), an expectation in privacy contexts and a characteristic of emergent data categories (Rai, 2022; Alaimo & Kallinikos, 2022). The technical, (Y. He et al., 2024; Zhu et al., 2023) regulatory, and social contexts that "require" ephemerality are also steadily increasing (Giallorenzo et al., 2019).[20] Developing a robust conceptual

[19] See Baudelaire, 1863; Simmel, 1903; Benjamin, 1921; de Certeau, 1984; Harvey, 1989; Thrift, 2008.
[20] Technical contexts include storage constraints in IoT systems. Regulatory contexts include concerns around data durability. Social contexts include user desire for more "authentic" forms of digital communication.

understanding of ephemerality is essential to address its growing significance for IS research.

Second, as data collection practices now "mediate almost every social interaction" (Ngwenyama et al., 2023), "nothing is too trivial or too ephemeral to be converted into data" (Alaimo, 2021). With people and data increasingly categorised together "on the basis of transient user behaviours" (Alaimo & Kallinikos, 2017), spaces, actions, and experiences that were once ephemeral (like our locations, our movements, our choices, or moods) are increasingly subject to immediate capture and analysis. Mindful of predictions of a control society (Demetis & Lee, 2018), where digital reality may progressively shape physical reality (Baskerville et al., 2020), we note that IBM has already patented technology for "managing ephemeral locations" in virtual reality (IBM, 2019). Conceptual clarity can help IS research to address both the opportunities and the challenges around ephemerality in everyday digital contexts.

Third, everyday digital contexts are challenging established conceptualisations of ephemeral. For example, digital trace data (DTD) are "records" of everyday interactions with digital technology (Howison et al., 2011), such as card swipes, "likes", or social media posts (Avital et al., 2023; Piccoli et al., 2017). DTD are durable because, for example, recorded swipes can persist in systems, "likes" in recommendations, and posts in online profiles. However, DTD are also short-lived. The singular swipe, "like", or post is typically indiscernible in aggregated structures and pattens or rapidly loses relevance in continual flows of information. As such, DTD are simultaneously "traces of disappearance" and "disappearing traces" (Clarke J. P. & Warren, 2009). Viewed as such, DTD can be understood as underpinned by both static and dynamic views of time in IS research.

Our goal is to develop a conceptual framework that better encompasses the tensions and complexities of ephemerality in everyday digital contexts. We conduct an interdisciplinary review that synthesises key insights in philosophy (e.g.: Bergson, 1910, 1911, 1922; Deleuze, 1990, 1994), sociology (e.g.: de Certeau, 1984; Lefebvre, 1961), organisation studies (Bakker et al., 2016; e.g.: Lanzara, 1983), performance studies (e.g.: Phelan, 1993; Schneider, 2011), media studies (e.g.: Chun, 2008; Grainge, 2011), and IS (Pentland et al., 2020; von Briel, 2018).

We subsequently delineate four characteristics of ephemeral (short-lived, repetitive, unstable, and durable). To illuminate these characteristics in everyday digital contexts, our framework also integrates the contexts of time, space, object, and action. The novel concepts of mechanical repetition and creative repetition are central to the framework, introduce a new perspective on ephemerality, and a structured way for IS research to conceptualise ephemerality in everyday digital contexts.

Section 2 introduces key perspectives on ephemeral in our core review disciplines. Section 3 details our review approach. We conclude our review in section 4. In section 5, we present our framework, situate

time as ephemeral for IS research, and illustrate the value of the framework in the context of digital trace data. Section 6 discusses contributions and limitations.

4.4 Key Perspectives on Ephemeral in Core Review Disciplines

As our framework has a significant basis in philosophy and is primarily intended for IS scholars, in this section we provide concise overviews of the key perspectives on ephemeral in philosophy and IS. Comparable overviews of key perspectives in the additional review disciplines are provided in section 4.1.5. The key perspectives from all six core disciplines are concisely outlined below in Table 7.

4.4.1 An Overview of Ephemeral in Processual Philosophy

Although ephemerality and permanence are a theme of much philosophical enquiry (Warnock, 1994), our focus is processual philosophy because processual philosophy explores how ephemeral phenomena relate to continual change. Two essential ideas originate with Heraclitus: that everything is continually changing and that opposites are interconnected (Graham, 2023). These ideas are developed by Bergson and Whitehead, with whom the twentieth century genesis of processual philosophy is broadly associated, and later by Deleuze. Bergson (1910, p.100-107) describes the flow of processual time as "ever the same and ever changing": all stability is "ephemeral" (Bergson, 1946, p. 177). In this sense, ephemerality is the temporal meeting point of change and stability because "nothing is less than the present moment" (Bergson, 1911, p.293).

However, terms like "less" and "point" are deceptive because, in processual philosophy, lived time—or duration—cannot be created out of discrete temporal snapshots, what Whitehead calls a "point-flash" (1920, pp. 172–174) or Dainton (2023a) terms the "cinematic" view of temporality. The composition of duration (and reality) is ephemeral, but not as a linear series of static, measurable occurrences. Instead, Bergson (1910), Whitehead (1929), and Deleuze (1994) synthesise ephemeral occurrences by interrelating the past, present, and future. This is duration as continual becoming *and* continual perishing (Bergson, 1910, p.130; Whitehead, 1929, p.349). And this interrelation of the past, present, and future opens scope for the ephemeral to endure (Bergson, 1946, p.180; Whitehead, 1929, p.384; Deleuze, 1994, p.50). To this end, forms of repetition are a key mechanism.

Repetition is fundamental to processual philosophy (Rescher, 1996; Whitehead, 1929, p. 137). Bergson distinguishes mechanical, automated repetitions and processual repetitions. Mechanical repetitions include ephemerally enacted habits and routines, fleeting impressions, and transient sensations. For Bergson, mechanical repetitions passively rationalise entities (i.e.: "things" like space or objects) rather than processes (Bergson, 1922, p.48). Conversely, processual repetition "is to decompose, and then to recompose" (Bergson, 1910, pp.130-131) so that in repetition the ephemeral actively reiterates contrasts

and creates novelty (Whitehead, 1927, p. 123, 1929, pp. 135–155). Deleuze most explicitly aims to explain the relation of occurrences in time (J. Williams, 2011, pp. 21–44) by articulating repetition *as* difference (Deleuze, 1994). It is the processual repetition of the ephemeral that interrelates past, present, and future occurrences. This perspective underpins the conceptualisation of ephemerality in this thesis.

4.4.2 An Overview of Ephemeral in Information Systems Research

Conceptualisation of the ephemeral in IS research is broadly underpinned by the two distinct views of time that are referenced in 4.4.1. The first is a static view of time, which considers ephemeral entities and phenomena as discrete and inherently short-lived. The second is a dynamic view of time, which considers ephemeral entities and phenomena as constitutive parts of more durable structures, patterns, or processes.

The static view is most evident in technical design contexts. For example, IS research on social media with ephemeral functionality (e.g.: Lehrer et al., 2023) typically views ephemerality as measurable by degree, so that static timespans or fixed numbers of views indicate "higher" or "lower" ephemerality (e.g.: Ma et al., 2021; Morlok et al., 2018; Xu et al., 2016). From this view, ephemerality is a technical innovation or function (Ma et al., 2021; Wakefield & Wakefield, 2018), an instrumental design parameter (He et al., 2021), or a user affordance (Morlok et al., 2018). Seen as such, ephemerality is controllable through use and design (Cavalcanti et al., 2017). For example, social media and ICT users can set number of view limits and automatic deletion parameters for digital content. Underpinning digital technology with static views of ephemerality enables IS researchers to frame ephemerality as a quantifiable property that can be manipulated for functional optimisation and control.

The dynamic view has deep roots in IS research. Ephemeral organisational structures (A. S. Lee, 1994; Lorin et al., 1987), for example, can be seen as "fleeting" assemblages (Orlikowski, 2007) that enact ephemeral temporalities in everyday practice (Jones et al., 2008).[21] From this view, the ephemeral is not only short-lived but partially constitutes more durable structures, like organisational events (Pentland et al., 2020), social formations (Avital et al., 2021), and work atmospheres (Endrissat & Leclercq-Vandelannoitte, 2021). Digital is considered dynamic because, in contrast to the relative stability of material artifacts, digital is "ephemeral" (Yoo, 2010). Ephemeral here implies continual change because non-material digital objects (Faulkner & Runde, 2010) are editable (Kallinikos et al., 2013) and subject to transformation (Ekbia, 2009; von Briel, 2018). In everyday digital contexts, when material and non-

[21] Explicitly ephemeral organisational forms, such as AirBnB and Uber (Bednar & Welch, 2020; Taani & Pahuja, 2022), and practices, like "algorithmic ordering" and "digital nomadism" (Prester et al., 2019; Shaikh & Vaast, 2018), are increasingly drawing the attention of IS scholars.

material are fused, meaning itself is ephemeral, "constantly shaped and reshaped" (Yoo, 2010). Underpinning digital with dynamic views of ephemerality enables IS researchers to frame ephemerality as a transformative quality that fosters adaptability and innovation in sociotechnical systems.

In Table 7, we summarise the key perspectives on ephemeral in our six core review domains.

Table 7. Key Perspectives on Ephemeral in Core Review Disciplines

Domain	Key Perspectives on Ephemeral	Key Sources
Processual Philosophy	Ephemeral as continual becoming and continual perishing. Ephemeral as interrelation of past, present, and future. Ephemeral as "mechanical" and processual repetition.	Bergson (1910/11/22) Whitehead (1920, 1929) Deleuze (1990, 1994)
Information Systems	Ephemeral as discrete, static, linear, measurable, controllable. Ephemeral as constitutive of durable structure, pattern, process. Ephemeral as dynamic change.	Lehrer et al. (2023) Yoo (2010) von Briel (2018) Lanzara (1999)
Sociology	Ephemeral as everydayness (fleeting inter/action, relation). Ephemeral and durable interrelated and co-constituting. Ephemeral as forms of everyday repetition.	Simmel (1900) de Certeau (1984) Lefebvre (2002)
Organisation / Management Studies	Ephemeral as extreme temporariness. Ephemeral as fundamental feature of everyday organising. Ephemeral as forms of repetition.	Lanzara (1983) Bakker et al. (2016) Llewellyn (2015) Hernes (2014)
Performance Studies	Ephemeral as immediacy, disappearance, non-reproducibility. Ephemeral in reenactment, remains, mediatisation, repetition. Ephemeral and durable interrelated and interdependent.	Phelan (1993) Taylor (2004) Reason (2006) Schneider (2011)
Media Studies	Ephemeral in form, content, temporality, volume, circulation, mundanity, consumption, value. Ephemeral as repetitive. Ephemeral and durable interrelated and interdependent.	Chun (2008) Grainge (2011) Uricchio (2011) Pesce & Noto (2016) Castells (1996)

4.5 Interdisciplinary Review Approach

Our interdisciplinary review is positioned as a "review/theory development paper (RTD)" (Leidner, 2018). RTD are often concept focused, not systematically conducted, and produce new frameworks (Leidner, 2018; Templier & Paré, 2015). Our review focus is ephemeral as a concept. Our review approach is structured (Webster & Watson, 2002) but not systematic, and our review outcome is a framework for ephemeral in everyday digital contexts (section 5). We detail the approach below.

Specifically, our review approach is "inductive top-down" (Leidner & Tona, 2021). An inductive top-down approach "assumes an understanding of the literature sufficient to discover tensions from which to theorise" (Shepherd & Sutcliffe, 2011). To establish our baseline understanding, we limited our initial searches to use of the term "ephemeral" (and derivatives) in the IS literature (i.e.: the AIS eLibrary and AIS "basket" journals). We noted key texts, recorded our interpretations, and organised the results into eleven thematic categories (e.g.: digital, organisation, social media, and time). These initial searches

established a baseline understanding of what ephemeral means in IS.

The inductive top-down approach is suitable when the RTD focus is "vast, dynamic, complex, and/or from disparate sources" (*ibid*.). The literature relevant to ephemeral meets all criteria. Expanding the review scope, we conducted forward and backward searches (Webster & Watson, 2002) from the initial IS review selections. Via Google Scholar, we then conducted keyword searches of phrases like "ephemeral digital" and "ephemeral information systems" and expanded the scope further by using terms synonymous with ephemeral, such as "fleeting", "evanescent", "momentary", and "transient". The six core review disciplines indicate the vast and disparate search scope of our review. Additional reading and recording of interpretations now accounted for a significant period of time. It helped that two of the authors have a background in philosophy, and all three a working interest in time and temporality. A list of key texts in each core review discipline is included as Appendix E. Against our baseline understanding of ephemeral in IS, we were subsequently in a position to describe tensions in the literature.

How we view time determines how we conceptualise ephemeral. The ephemeral characteristics "short-lived" (4.6.1) and "unstable" (4.6.3) can be underpinned by both static and dynamic views of time that reflect the common understanding of ephemeral as "short-lived" only. However, via the characteristic of "repetition" (4.6.2), our framework shows that ephemeral entities and phenomena are also "durable" (4.6.4). The understanding of these two characteristics emerged in response to tensions in the literature and require clarification.

Characterising ephemerality as repetitive may initially seem counterintuitive. How can that which is for a short time only repeat? However, many forms of repetition are relevant to ephemerality, including reproduction, recurrence, re-enacting, copying, and reposting (e.g.: Benjamin, 1936; Cooper, 1987; Dailey & Browning, 2014; Franko, 2018; Schmidt, 2009). Our delineation of "mechanical" and "creative" repetition utilises key terms that are relevant to the processual philosophical source material. Our conceptual move is to situate ephemeral entities and/or phenomena as not only constitutive *of* durability but *as* durable. It is also important to note that durability does not negate short-livedness.

Framing durable as the converse of short-lived may also seem to discount more appropriate terms. Long-lived, for example, is contrary to short-lived but long-lived is not relevant to ephemeral contexts. However, the concept of persistence is relevant (e.g.: persistence is often noted as the opposite of ephemeral in social media contexts). However, persistence implies an exclusively temporal meaning that limits a holistic conceptualisation of ephemeral. We discuss integrating space, object, and action in as contexts in our framework in 4.1.1.3 and 4.7.1. Finally, eternality is also a relevant counterpoint to ephemeral, especially in the philosophical literature. In our view, however, eternality carries overt

metaphysical connotations that are inappropriate for both our aims and an IS audience. We delineate and develop repetitive and durable not only because the concepts emerge from the literature, but because they can most fully illustrate and disentangle the complexities and contradictions inherent to ephemerality in everyday digital contexts.

In inductive top-down terms, repetitive and durable are the key intuitions that emerge from our review. The review approach is hermeneutical (Boell & Cecez-Kecmanovic, 2014) in so far as the iterative search for, and acquisition of, knowledge develops in tandem with the analysis and interpretation of the knowledge. In our review, the emergence of repetitive and durable as key characteristics necessitated further rounds of review across our core discipline bases and appropriate refining of search terms (Templier & Paré, 2015). The characteristics refocussed our attention, not only in the searches for corroborative and contradictory information but also in delineating the characteristics, contemplating the relationships between them, and ultimately establishing intuition as logical insight.

4.6 Ephemeral as Short-lived, Repetitive, Unstable and Durable

Section 4 is structured into four subsections via the four primary characteristics of ephemeral that our review identifies.

4.6.1 Ephemeral as Short-lived

Ephemeral describes short-lived entities and phenomena. *Short-lived refers to time, duration, and constraint*. *Time* is conveyed via static, quantitative measures like seconds, hours, and days (e.g.: Bayer et al., 2018; Y. Zhang et al., 2021) and qualitative terms like temporary, short-term, and brief (e.g.: Bayer et al., 2016; Handyside & Ringrose, 2017). *Duration* is dynamic, bound with consciousness and experience (Kreps & Rowe, 2024), and conveyed by terms like fleeting, transient, momentary, and evanescent (Courpasson, 2017; Massa, 2016; W. R. Smith, 2021).

Static views of time foreground ephemeral as discrete, measurable, linear occurrence: short-lived times have fixed start and end points (Han et al., 2016; Xu et al., 2016). Dynamic views of time emphasise that duration is indivisible. Short-lived durations are always passing away and becoming (Baygi et al., 2021; Holt & Johnsen, 2019). Static views of time are based on "substantialist" or "entitative-based" ontology and dynamic views are based on processual ontology (Cecez-Kecmanovic, 2016; Kreps & Rowe, 2024). These ontologies are sometimes interrelated in analysis. Process theory-based perspectives allow for the capture of constitutive, ephemeral durations, the short-lived times of which are static, discrete, and linearly sequential (e.g.: Pentland et al., 2020).

At its quantitative limit, fleetingness is the ultimate qualitative expression of short-lived.[22] For some, ephemeral phenomena are too fleeting to be precisely represented (e.g.: Phelan, 1993; Thrift, 2008). For others, fleeting times and durations can reveal small-scale interactions and serendipitous moments that often escape analysis (Hargadon & Bechky, 2006; Llewellyn, 2015) and highlight emergent phenomena that are often considered peripheral, like everyday actions, utterances, colours, and moods (Beyes, 2016; Courpasson, 2017; Lamprou, 2017; Shotter, 2005).

Constraint refers to the spatiotemporal limitations of ephemeral entities and phenomena and is conveyed by terms like disappear, perish, loss, trivial, disposable, and singular (Hawkins, 2018; Lothian, 2013; Michels & Steyaert, 2017; Phelan, 1993; Rescher, 1996). Ephemeral entities and phenomena are constrained by short-lived times *and* durations (consider the ephemerality of knowledge (Salovaara & Tuunainen, 2015; vom Brocke et al., 2020), organisational forms (Lanzara, 1983; Nissen, 2005), and digital (Grainge, 2011; Vaast & Urquhart, 2017)). As such, constraint is intertwined with spatial, material, and agential constraints (e.g.: the ephemerality of sound is bound up with material, spatial, and agential constraints (Ong, 1982, pp. 31–32)).

Finally, while constraint is manifested by short-lived times and durations, constraint also refers to short-lived perceived value (e.g.: the accumulation of mundane digital objects, like emails or photos (Barreau, 2007; Bollini, 2019)). Therefore, constraints can delineate the ephemeral as singular (e.g.: the present moment (Chia, 1999) or traditional views of performance (Phelan, 1993)), as trivial or mundane (e.g.: events shared via social media (Epstein et al., 2020)), or as everyday and unnoticed (e.g.: habitual actions (Courpasson, 2017) or gossip (Fan C. et al., 2021)).

4.6.2 Ephemeral as Repetitive

Two modes of repetition characterise ephemeral: *mechanical repetition* and *creative repetition*.

Mechanical repetition (MR) is, firstly, the acting of the past in the present (Bergson, 1911, pp. 92-99). MR is mechanical because it is passively or automatically acted (e.g.: via sensory reflex or motor habit). MR is ephemeral because in passively acting the past MR is bound in space and action to the short-lived present. As such, MR constitutes repetition of the same or similar and is devoid of novelty (Bergson, 1922, pp.32-47; Deleuze, 1994, pp.19-20). In the latter sense, MR represent a processual critique of static views of duration. However, as MR is reducible to linear measurement in static time,

[22] Consider the fleeting aspects of human experience (Dainton, 2000; Merleau-Ponty, 2012), social interactions (Giddens, 1984, pp. 71–72; Simmel, 1903, p. 155), or sociomaterial configurations (Orlikowski, 2007).

it is also a stable organising force for ephemeral phenomena.

For example, ephemeral, everyday actions and routines (e.g.: greetings, checking digital notifications) are socially structured in passive MR (Lefebvre 2008, pp.239-242; Giddens, 1984, pp.71-72). MR of ephemeral experience shapes interaction with the world (Thrift, 2008, pp.239-242), such as the ephemeral social bonds that emerge from repetitively acted ephemeral behaviours (Farias, 2017). MR of fleeting micro-movements acts identity (J. Butler, 1993; Harding et al., 2022) and language is mechanically repetitive when specific words or phrases are passively repeated (Tannen, 2007, pp. 55–56). For example, Llewellyn (2015) shows how the mechanical repetition of utterances ephemerally establishes order in a fleeting commercial transaction.

Many digital artifacts are mechanically repetitive in everyday digital contexts. Algorithmic systems utilise MR system processes that capture ephemeral phenomena like mood (Marabelli et al., 2021), emotion (Bayer et al., 2018), attention span (Paasonen, 2018), preference (Alaimo & Kallinikos, 2020) physiological activity , trading opportunities (Currie & Seddon, 2017), and other real-time events (Alaimo, 2021). And ephemeral sociotechnical interactions (Møller & Robards, 2019), such as mindlessly scrolling (Baym et al., 2020), are mechanically repetitive in nature. In sum, *mechanical repetition* is defined as *passive or automated execution, linear connection or aggregation, reducibility, and similarity*.

In contrast, *creative repetition (CR)* is defined as *active or conscious engagement, nonlinear reconnection or emergence, irreducibility, and difference*. CR is active engagement with the past as a basis for present and future action (Bergson, 1911, pp.92-99). Where MR passively immobilises and linearly connects the ephemeral, through CR individuals or systems actively engage with the past to adapt and transform (Bergson, 1922, pp.61-62). For example, identity is not only mechanically, passively repetitive but also actively "crafted" via CR of ephemeral micro-processes that continually compose identity (Fouweather & Bosma, 2021). In this sense, CR as continual becoming is performative (Hernes, 2014) and conforms with the ontological primacy afforded to process that is intrinsic to processual philosophy (Kreps & Rowe, 2024).

CR composes repetition of difference and always creates novelty (Bergson, 1922; Whitehead, 1927; Deleuze, 1994). CR is ephemeral as it is short-lived; singular as it is different to what is repeated, and creative as the difference is novel (Williams, 2011, pp.4-16)[23]. For example, CR of live performance, is

[23] See Williams (2011) for a critical introduction to Deleuze's philosophy of time (in particular, chapter 1 and pages 155-157 for a numbered series of principles and subsequent implications arising from this philosophy.)

"a matter of *againness*" (R. Schneider, 2011, p. 32), "singular and distinct by nature of being a repetition" that is different (Reason, 2006, p.20). CR composes the singular occurrence in dynamic relation to other singular occurrences (Deleuze, 1990, p.287). In ephemeral work teams, where actors and context only come together briefly, coordination is underpinned by the moment-to-moment CR of past ephemeral activities (Hindmarsh & Pilnick, 2007). As such, CR as difference is both the mechanism by which the ephemeral repeats and the principle that separates one ephemeral occurrence from another. Therefore, CR is always "partial" but also "continuously produces new possibilities" (Hultin & Introna, 2019). Lefebvre highlights "the newness that springs from repetition" (2008, p.340), noting the difference between (mechanical) repetitions of the instant and (creative) repetitions of the moment.

Consequently, in CR, the ephemeral present is not a well-ordered, discrete temporal space in a linear timeline, where only MR is passively acted, but a fragmented moment actively formed by multiple durations that interrelate as nonlinear repetitions of difference. For Bergson and Deleuze, the past does not precede the present but is always recomposing the past *and* present. That which is immediately before does not necessarily refer to the static time that just was, but rather to an ephemeral interval of duration that extends into the present (Bergson, 1922, pp.22-23). Therefore, CR of the ephemeral is not reducible to discrete, sequential, static units of time. Performance, for example, is clearly not only linear and nonrecurring (Schneider, 2011, p.141). Storytelling resists linearity through CR of the past (Cule & Robey, 2004; de Certeau, 1984). And the ephemeral, nonlinear characteristics of social media (Pousti et al., 2021) highlight that ephemeral objects like online posts compose novelty in CR (Hagen & Venturini, 2024).

Finally, the idea of "the everyday", understood as the ephemeral times, durations, spaces, objects, and actions that constitute and compose daily life (Yoo, 2010; Guillaume & Huysmans, 2019), is a common context for MR and CR of the ephemeral. In a sense, mechanical repetition is *where* we live—the passive spatialisation of time and its ephemeral things in the present. Creative repetition is *when* we live—the active experience of duration that continually recomposes novelty and interrelates the past, present, and future. We discuss the relevance of time, space, object, and action for MR and CR in ephemeral, everyday contexts in section 4.7.1.

4.6.3 Ephemeral as Unstable

In processual philosophy, the concepts of the virtual and the actual illustrate the instability of the ephemeral. Perceptions of reality are representations that are actualised in the present from the virtual totality of experience (Bergson, 1911, pp.25-36 & pp.69-77). Representations are unstably ephemeral (*ibid.*, pp.208-212) because the interplay of the virtual and the actual is continually recomposing perception and memory. Moreover, all that we perceive is unstable, composed in durational flows of

unceasing change (Bergson, 1922, p.232-235). For Deleuze, the virtual not only encompasses all past experiences but also all possibilities that may or may not be actualised.[24] Virtual objects are an "unstable mix" (Williams, 2011, p.111) of traces or "shreds of pure past" (Deleuze, 1994, pp.100-102), the actual present, and future possibilities. As occurrence, the virtual object can be continuous, then discontinuous, can "leap or skip" (Deleuze & Guattari, 2005, pp. 94–95). As such, the ephemeral repeats "with jumps, returns, [and] gaps," (Williams, 2011, p.70), shifts of disappearance and re-emergence in flux and flow.

In IS research, Lanzara (1999) suggests that "transient constructs" facilitate ephemeral stability when instability is such that sensemaking is difficult and enable the past to "travel across time". In our terms, repetitions of difference (in flux) destabilise the durable structures or processes that are constituted by MR. And repetitions of similarity (in flow) suppress and obscure the emergence of novelty in CR. Each form of repetition is destabilised by its opposing force.

Across our review disciplines, instability is widely discussed in terms of digital ephemerality (R. Rogers, 2013). The ephemeral instability of digital is both an ontological state and an issue of preservation. The digital profile, for example, as dynamic rather than static, is an unstable site for the actualisation of events and possibilities (Ekbia, 2009; Handyside & Ringrose, 2017). Connections between events and digital data are also unstable because the stability of events and data is ephemeral, always subject to repurposing, recontextualisation, and short-lived constraint (Alaimo, 2021; Vaast & Urquhart, 2018). Similarly, connections and configurations of information systems are unstably ephemeral (Baskerville & Lee, 2013). And via IS research that draws on Deleuze, sociotechnical events of connection and disconnection are described as unstably ephemeral actualisations of virtual possibilities (Vuorinen & Tetri, 2012).

Even entities perceived as relatively stable can be viewed as "temporary stabilisations" and "ephemeral abstractions" (Bergson, 1922, p.235)(Hardy & Thomas, 2016), or "stable views of… instability" (Bergson, 1922, p.235) in durational flows of process (Langley et al., 2013).[25] The objects of a digital search, for example, as well as the search algorithms and the search results are all "inherently unstable", no more or less than "a transient achievement" (Kallinikos et al., 2013).

In sum, ephemeral instability is about more than preservation when faced with short-lived constraint:

[24] See Deleuze (1994, e.g.: pp.79-85) and Williams (2011, pp.9-16, 57-65 & 116) for more on multiple dimensions of the past, on the passing present and the actual, "living present", and on future possibilities.
[25] In organisation studies, see Järventie-Thesleff and Tienari (2015) on the instability of ephemeral organisational roles; Michels and Steyaert (2017) on the organisation and unstable emergence of ephemeral atmospheres, and Lortie et al. (2023) on moment-to-moment collaborative leadership in unstable organisational contexts.

instability refers us to the nature of ephemeral stabilisation, no matter how short-lived, and to the unpredictable ways that the ephemeral can re-emerge, travel across time, and endure.

4.6.4 Ephemeral as Durable

Across all review disciplines (see 4.1.5) the interrelation of short-lived and durable is well established.[26] However, how ephemeral entities and phenomena give rise to more durable structures is a longstanding question (Ocasio et al., 2015). In broad terms, this question is often addressed via the well-known concept of reproduction. Through reproduction, however, the ephemeral only gains durability when subsumed by structures that are not perceived as ephemeral.

For example, structuration describes the reproduction and stabilisation of social structures via the interconnection of everyday ephemerality and the institutional (Giddens, 1984, pp.363-364). However, the ephemeral is subsumed and obscured by structure when solely reduced to aggregated mechanical repetitions (e.g.: *ibid*., p.72 & p.141). The ephemeral is similarly lost in organisational reproduction of roles and agency (Bechky, 2006) and practice-based patterns of routinised behaviour (Fortwengel et al., 2017). Even "strong" processual views tend to obscure ephemeral durability when processual dynamism is seen to imply that everything is ephemeral (Garud et al., 2014) or, equally, that nothing is ephemeral (Holt & Johnsen, 2019). In other words, as a research focus, the ephemeral is lost in reproduction and becoming and, as a result, the ephemeral is not conceptualised on its own terms.

IS research makes clear that digital contexts also typify these tensions.[27] For example, a common view—and one well illustrated by the concept of "digital rubbish" (Gabrys, 2011)—is that the ephemerality of everyday digital objects and contexts is intensified by the sheer volume of persisting digital data (Barreau, 2007; Grainge, 2011; Kallinikos, 2009; S. M. Schneider & Foot, 2004).

The onus here is not upon explicating the interrelation *of* the durable and the ephemeral, but rather upon coherently describing how ephemeral entities and phenomena *can be* short-lived and durable. As such, *durability refers to the latent and manifested capacity of the ephemeral to endure over time, or resist*

---

[26] See also, for example, Cairns et al. (2003); Taylor, 2010; Skågeby (2010); von Briel, 2018; Hawkins, 2018; Korica & Bazin (2019); Bainotti et al. (2020); A. Chen et al. (2022), as well as concepts like "the enduring ephemeral" (Chun, 2008), "eternal ephemerality" (Castells, 1996), the "archive of impermanence" (Gabrys, 2011), "persistent transience" (de Ville, 2015), "part-ephemeral, part-permanent" social media (Handyside & Ringrose, 2017), and "long-present" perspectives of time (Kim et al., 2019).

[27] See, for example, Lanzara (1999); Jones et al. (2008); Skågeby (2010); Clarke (2013); Kallinikos & Tempini (2014); A. S. Lee et al. (2015); Cavusoglu et al. (2016); Jones (2018); von Briel (2018), and Kishore et al. (2022).

the short-livedness typically associated with the ephemeral. To account for durability of the ephemeral, we return to Bergson and Deleuze.

For Bergson, the ephemeral is preserved and integrated into the accumulative nature of duration. Moreover, cognitive processes of selection (i.e.: through MR) are such that only ephemeral durations most relevant to the ephemeral present inform any present time (Bergson, 1922, pp. 7-11). Were it otherwise—if we truly perceived flow—we could not assign completion to any duration (*ibid*., pp.232-235). As such, duration is "a hyphen, a connecting link" (*ibid*., pp.22-23) that composes, relates, transforms, and endures in the ephemeral times that we perceive.

Deleuze (1994, p.90) writes: "We produce something new only on condition that we repeat—once in the mode which constitutes the past, and once more in the present of metamorphosis." Repetitions constitute a "horizontal line" over time (MR) and compose a "vertical line" in time (CR) that preserve the ephemeral in similarity and transform the ephemeral in difference (*ibid*., pp.201-202). Deleuzian virtual objects, for example, are ephemeral in presence, durable as traces of the past, and transformative on reintegration into the actual present (*ibid*., p.102).

This is why repetition in processual contexts is always "partial, fragmented, and unstable" (Hultin & Introna, 2019). The "part" that is missing (the absence in presence) was—and is—ephemeral. What recomposes the fragmented present is the difference "between" then and now, the transformative novelty of every moment, which is also ephemeral and borne over time. As such, the ephemeral is short-lived *sui generis*, and the repetitions that simultaneously constitute and compose the durability of the ephemeral are necessarily short-lived also. Put differently, the short-lived ephemeral is *always* durable.

This logic resonates with Reason's (2006, p.20) observation that performance is ephemeral not only in how it disappears, "but also in how it endures—in how it is repeated, re-presented, re-performed" (see also Schneider, 2011; Franko, 2018). As such, the durability of that which is ephemeral is always either latent as virtual possibility or manifest in the actual present. Cooper (2005)of everyday objects and meanings… are translations and realisations" or manifestations of latency (Cooper, 2005) in the present. This interplay of latency and manifestation highlights the nature of durability, where potential and realisation coexist in shaping the temporality of ephemerality.

We discuss the implications of these perspectives for views of time in IS research in 4.7.2.

4.7 Contextualising, Conceptualising, Situating, and Illustrating a Framework for Ephemeral in Everyday Digital Contexts

In section 4.7, we contextualise and conceptualise our framework for ephemeral (4.7.1). We then situate

the primary characteristics of ephemeral with views of time in IS research (4.7.2). We finally illustrate the potential value of the framework in the IS research context of digital trace data (4.7.3).

4.7.1 Contextualising and Conceptualising a Framework for Ephemeral

Our framework for ephemeral delineates four primary characteristics: three states (short-lived, unstable, and durable) that are intertwined with one repetitive process (mechanical repetition *and* creative repetition). Adapting Yoo's (2010) schematic for experiential computing, we conceptualise these characteristics across four dimensions: time, space, object, and action. As detailed below, we view the dimensions of *time, space, object, and action as contexts that permeate our conceptualisation of ephemeral* in everyday digital contexts.

In IS research where focal phenomena are considered stable and bounded, context is typically understood as external and must be controlled by being added or taken away (Avgerou, 2019; Pentland et al., 2020). We hold the view that IS phenomena are "ephemeral and transient and do not give rise to stable and long-lasting boundaries" (Avgerou, 2019). Drawing on Pentland et al. (2020), context here is understood as "permeating processual phenomena" so that context happens "inside processes" and "can change as fast as the process itself." We also refer to Hayes and Westrup's (2012) relational understanding of context as "processes of connection and disconnection" (albeit our framework further suggests processes of *reconnection*).

To our purpose, time, space, object, and action are illuminated in *everyday digital contexts* (EDC). "Digital contexts" refer to diverse IS research focal phenomena (e.g.: innovation, AI, social media, IoT, mobile data, HCI, trace data, etc.). "Everyday" refers to the near ubiquity of digital contexts in daily activity and experience (Yoo, 2010). IS, as a discipline, "is premised on the centrality of information technology in everyday life" (Orlikowski & Iacono, 2001). And as we have seen, the everyday is also a suitable context through which to conceptualise the ephemeral (e.g.: de Certeau, 1984; Giddens, 1984; Lefebvre, 1961; Courpasson, 2017; Guillaume & Huysmans, 2019). In our framework, the contexts of time, space, object, and action permeate processes in ephemeral EDC.

From "substantialist" or "entitative-based" to processual views of **TIME** (Cecez-Kecmanovic, 2016; Kreps & Rowe, 2024), temporal contexts in ephemeral EDC are always short-lived. We discuss and situate time as ephemeral in broad relation to established views of time in IS in 4.7.2. **SPACE**, for Bergson, allows for the material structuring and organisation of events and objects but is not merely reducible to subjective perception and static relations. Space is also dynamic and elusive, continually unfolding in relational, qualitative flow. Parallels can be drawn with the distinction of place and space, where place is the bounded immediacy out of which the social is formed and space the active medium

where formation occurs (Haj-Bolouri et al., 2024). Similarly, for Lefebvre (2008), space is a contradiction of limits, partitions, objects, and units and a dynamic phenomenon where "something is always happening." Where space is "ephemeral", "everydayness [is] absorbed" and "place becomes multifunctional, polyvalent, transfunctional, with an incessant turnover of functions" (*ibid*., pp.130-131). For example, ephemeral EDC occur "in a place with the urgency of now", with digital "pulled down" and experienced in the "immediate activities in the material world" (Yoo, 2010). However, where place is *co-constitutive* of bounded immediacy, or of the here and now, space *flows* and *unfolds through* static barriers.

OBJECT can signify tangible and intangible, durable and ephemeral (Preston, 2022). Objects can be "durable as a rock or as fleeting as a feeling" (Smith, 2021). Objects can also incorporate these tensions, as durable *and* ephemeral, tangible *and* intangible. The material properties of digitised artifacts (Yoo, 2010) exemplify this duality as, for example, coupling of "perpetual" (e.g.: hardware) and "ephemeral" (e.g.: software) digital components (von Briel, 2018) and as "*nonmaterial objects*" (Faulkner & Runde, 2010; 2019) (emphasis added). Objects are not only discrete, bounded entities but relational "markers" that are "continually subject to… multiple and changing circumstances" (Cooper, 2005). As such, objects are "carriers and transmitters of human agency in space and time" (*ibid.*), analogous to how, in ephemeral EDC, material objects can be seen as "bearers" of nonmaterial objects (e.g.: hardware "bearing" software) (Faulkner & Runde, 2019). **ACTION** embodies comparable tension and duality (Czarniawska, 2009; Orlikowski & Scott, 2008; Poole & van de Ven, 1989; W. R. Smith, 2021). For Bergson, for instance, "the activity of perception is as physical as the object being perceived" (Kreps & Rowe, 2024). In ephemeral EDC, action is both bound to the here and now and distributed in material and virtual space. Central to our framework is a process that is embodied, enacted, and performed both passively (mechanical repetition) and actively (creative repetition) in everyday digital contexts.

In sum, in ephemeral EDC, the contexts of time, space, object, and action can change as fast as the repetitive process of mechanical and creative repetition. Ephemeral states in EDC are short-lived, unstable, and durable. We conceptualise contexts, states, and process in Table 8.

Table 8. A Framework for Ephemeral in Time, Space, Object, and Action (EF2)

Context	*Characteristic States & Process of Ephemeral Entities and/or Phenomena*			
	Short-lived (state)	**Repetitive** (process)	**Unstable** (state)	**Durable** (state)
	Time, Duration Constraint	Mechanical repetition (= MR) (CR =) Creative repetition	Flow Flux	Latent Manifest
Time	Discrete instant; entitative-based, clock-oriented	MR: linear, reducible, process-based	Unstable stability (flux); discontinuous; disruptive	Connection (aggregation and/or accumulation); reveals the ephemeral

	Singular moment; flow-based, duration-oriented	CR: nonlinear; irreducible, flow-based	Stable instability (flow); fragmentary; (trans)formational	Reconnection (latent possibility manifested); recomposes the ephemeral
Space	Bounded place (container) co-constitutes present	MR: as similarity (aggregation and/or accumulation)	Fixed spatial configurations are disrupted (flux)	Connection (durable spatial configurations are aggregated/accumulated)
	Distributed space (medium) of dynamic unfolding	CR: as difference (novelty, innovation, transformation)	Fluid spatial configurations are transformed (flow)	Reconnection (latent spatial configurations are manifested)
Object	Fixed, static, tangible entities	MR: as similarity (aggregation and/or accumulation)	In discontinuous form and function (flux)	Connections *between* discrete, fixed, static entities
	Transient, dynamic, intangible markers	CR: as difference (novelty, innovation, transformation)	In fragmentary emergence (flow)	Reconnections *of* singular, transient, dynamic markers
Action	Bounded enactment	MR: as similarity (aggregation and/or accumulation) and passive enactment	Disrupted enactment (flux)	Connection (e.g.: passive aggregation of habitual, routine; accumulation of pattern and/or process)
	Flow/s of performance	*C.R.*: as difference (novelty, innovation, transformation) and active performance	Fragmentary performance (flow)	Reconnection (e.g.: active manifestation of latent possibility; reconnection of novelty)

4.7.2 Situating Time as Ephemeral with Three Views of Time in IS Research

Firstly, via *static* or *fixed* views of time, the ephemeral is a short-lived temporal snapshot, has no relevance beyond its discrete entitative instantiation, and is always lost to the past. Ephemeral timespans are discrete (i.e.: have fixed start and end points), do not repeat, and do not endure. Entitative-based, static views of time predominate in IS research (Kreps & Rowe, 2024).

Secondly, via dynamic *process prioritised* views of time (as developed, for example, through process theory, practice-based, and sociomaterial perspectives), ephemeral entities and processes are discretely interconnected and endure as constitutive elements of more durable structures over time (e.g.: practice, routine, reproduction, or process). Here, the discrete, ephemeral timespan endures in—but is obscured by—the structure that it constitutes. And thirdly, via dynamic *process primacy* views (i.e.: processual), entities are no more than "ephemeral way stations" (Langley et al., 2013) and time is multiple, interconnected duration, intuitively apprehended and perceived in relation (Kreps & Rowe, 2024). The ephemeral duration is not discrete, with no fixed start and end points. As continually emergent, however, the ephemeral duration is similarly obscured, enduring only as temporally minimal, fleeting, and partially compositional elements of durational flows in time.

Our framework (Table 8) supports a view of *time as ephemeral* (Table 9), when ephemeral means short-lived and durable. Through a view of time as ephemeral, the interplay of short-livedness and durability constitutes and composes ephemeral entities, phenomena, and/or durations. This unstable interplay of

discontinuity (flux over time) and emergence (flow in time) is conditioned by the process of mechanical and creative repetition. Time is intrinsic to our *understanding of process* in ephemeral EDC, serving as both quantitative measure and qualitative duration.

In mechanical repetition, process is both the presence of similarity (manifest connection) and the absence of difference (latent connection), fostering stability, structure, and/or process. In other words, quantitative ephemeral timespans are constituted by connections of similarity that reveal the ephemeral in flux over time. In creative repetition, process is both the presence of difference (manifest reconnection) and the absence of similarity (latent reconnection), creating novelty, change, transformation, and/or innovation. In other words, ephemeral durations are composed by reconnections of difference that recompose the ephemeral in flows in time.

Taking the view that mechanical and creative repetition are inseparable, any ephemeral EDC must show sufficient connection of similarity for reconnection of difference to be discernible. In this way, ephemeral temporalities can be revealed, connected, and recomposed, both as static connections of similarity over time and as dynamic reconnections of difference in time. These diverse views of time in relation to—and *as*—ephemeral are presented in Table 9.

Table 9. Three Views of Time in IS Research and Time as Ephemeral

View of time*	**Static / fixed**	**Process prioritised**	**Process primacy**	**Time as ephemeral**
Supporting theoretical perspectives	Substantialist; entity-based	Process theory; Practice-based; Sociomateriality	Processual. Time as duration.	Entity-based; Processual
Overview and/or relevance	Static/fixed view of time is dominant in IS research	Process prioritised but entities/structures co-shape process, practice, and routine	Entities/structures *are* processes: relational, emergent, multiple, perceived	Ephemeral *as* process: short-lived and durable inseparable
View of Time as Ephemeral				
Short-lived	Discrete temporal snapshots have fixed start and end points and are lost to past	Discrete entities/structures and processes are interconnected, discontinuous, have fixed start/end points	Emergent, fleeting processes; no fixed start/end points; continual becoming and perishing (i.e.: flux)	Discrete entities, have fixed start and end points (flux); Emergent process; no start/end points (flow)
Repetitive	Repetition does not apply in substantialist / entitative view	Non-representational constitutive elements of practice, routine, structure, process	Non-representational compositional elements of process (i.e.: continual flow)	Mechanical (discrete; flux) and creative (emergent; flow) occur simultaneously
Unstable	Discrete as anomalies, aberrations, disruptions	Discrete as lacking inherent durability	Continual becoming and perishing (in flux)	Interplay of short-livedness (flux) and durability (flow)
Durable	Durability does not apply in substantialist / entitative view	Discrete ephemeral subsumed in enduring practice, routine, structure, process	Ephemeral endures as the past in the present but is indiscernible (in continual flow)	Discernible durability through interplay of mechanical and creative repetition

We adapt "Static / fixed", "Process prioritised", and "Process Primacy" from Kreps and Rowe (2024)

The framework for ephemeral (Table 8) is novel in several ways. First, the framework presents ephemeral EDC not only as constitutive *of* process but *as* process. To do so, the framework incorporates a processual critique of fixed or static time to establish a processual framework for *time as ephemeral*. In so doing, the framework delineates mechanical and creative repetition as one cohesive process that allows for repetition in ephemeral EDC. By allowing for this process, the instabilities that constitute and compose the durability of the ephemeral can be revealed and rediscovered, connected and recomposed. As a result, the ephemeral is not merely obscured by more durable structures and/or processes but is made discernible, representational, and meaningful in singular short-livedness, instability, *and* durability. Finally, the integration of time, space, object, and action in ephemeral EDC makes centrally relevant salient contexts that are rarely articulated in processual research (Sandberg et al., 2015).

4.7.3 A Brief Illustration of Everyday Digital Trace Data as Ephemeral

Digital trace data (DTD), produced in browsing and mobile activity, location and sensor data, and system and app use, provide "rich and fine-grained data about processes mediated or enabled by digital technologies" (Pentland et al., 2020). As such, DTD "capture naturally occurring interactions" (Grover et al., 2020) that illuminate the ephemeral in EDC (i.e.: time, space, object, and action). Our aim here is to briefly illustrate the ephemeral nature of DTD as short-lived, repetitive, unstable, and durable in everyday digital contexts. To do so, we describe a single social media post as an occurrence of DTD (Ohme et al., 2024; Sultan et al., 2023).

Static and process prioritised views of time (Table 9) underpin views of DTD as "specific points in time" (Grisold et al., 2023) or "occurrences" (Pentland et al., 2020). The specific occurrence is a "constituent element" of process (*ibid.*), discrete, sequential, quantifiable. When the DTD occurrence is fixed, the unstable event, structure, and/or process that it partially constitutes can be stabilised (e.g.: Avital et al., 2023; Pentland et al., 2021)).

However, from the view of time as ephemeral, the process priority view—which correlates with mechanical repetition—can only be processual to a degree that is not quantifiable (i.e.: creative repetition). For example, structure constituted by occurrences in mechanical repetition cannot reveal occurrences within the occurrence or beyond the temporal bounds of the structure. The DTD occurrence is subsumed and obscured by the stabilised structure much like the picture incorporates the pixel (e.g.: Piccoli et al., 2017). An implication of the process priority view is that the ephemeral occurrences that constitute process are themselves not considered process.

Via the process primacy view of time, the occurrence is not discrete but interrelated (Kreps & Rowe,

2024). Instead of linearly relating fixed points to prior fixed points, processual research should build around "timely (kairotic) moments" by focussing on the "temporal qualities" that coalesce in "a notable occurrence" (Baygi et al., 2021). From this view, for example, an occurrence of social media DTD can be seen as composed of relational flows in time, such as "past" posts, reposts, updates, comments, and shares.

However, from the view of time as ephemeral, the processual view—which correlates with creative repetition—is inherently limited by the impossibility of comprehensively representing processual reality. As the ephemeral occurrence is indiscernible in "heterogenous multiplicity" (Kreps & Rowe, 2024) and "flows of action" (Baygi et al., 2021), it is challenging to identify and empirically justify which notable occurrence of DTD to focus upon, as well as which interrelated flows of action to retrace.

From the view of time as ephemeral, DTD occur over time (as MR) and, simultaneously, occur in time (as CR). A social media post constitutes a discrete, time-stamped occurrence of DTD, subject to short-lived constraint. However, the discrete timespan of the post is—*in the same time*—composed of "other" short-lived durations. For example, the post is a multiplicity of latent possibilities (e.g.: reposts in "future" time) and a manifested actualisation of relational past occurrences (e.g.: posts in "past" time).

As quantitative measure, the post constitutes ephemeral time (e.g.: as a marker of identity that connects similarity over time). As qualitative duration, ephemeral time composes the post (e.g.: as emergence of identity that recomposes difference in time). When the quantitative—over time as mechanical repetition—and the qualitative—in time as creative repetition—are integrated, ephemeral process is short-lived and durable, and ephemeral time is inseparable from the elements that constitute and compose ephemeral process. As such, our framework reveals, connects, and integrates occurrences within and beyond (over) the structural bounds of mechanical repetition by recomposing discrete DTD timespans, like social media posts, with their past and future durations. In other words, the ephemeral timespans of a post, relational "past" posts, and of "future" reposts can be conceptualised as a singular, ephemeral duration that is constituted by repetition of similarity over time and composed of repetition of difference in time.

Similarity and difference in DTD are revealed and contextualised by space, object, and action in EDC. For example, a social media platform is a structured and relatively stable digital space, wherein the spatial characteristics of DTD are reduced to static points (e.g.: geolocation data) that are repeatedly organised in real time (Flyverbom & Murray, 2018). Mechanical repetition of static DTD spatial points reveals spaces repeated over time that constitute structure (Ekström, 2022; Z. Zhang et al., 2022)(2015) shows how the mechanical repetition of utterances ephemerally establishes, such as repeat visits to specific platforms or repeat posts from specific locations. However, digital space is also an emergent

"sociomaterial entanglement" that is continually open to reconfiguration (Flyverbom & Murray, 2018). In creative repetition, a single social media post can compose novel spatial pathways and reconnections of difference that alter networked spatial configurations and reveal digital space in dynamic unfolding.

As such, DTD provide spatial coordinates for ephemeral actions and objects both over and in time. For example, short-lived actions in EDC mechanically repeat in habitual processes of social media data generation (e.g.: taps, likes, or reposts) that constitute sequences of similarity in action (Ohme et al., 2024). However, the same short-lived, constitutive actions also compose difference in creative repetition, as when a tap or like triggers algorithmic promotion of a post or a repost recontextualises original post content. As emergence of difference fostering change, transformation, and/or novelty, creative repetition can therefore account for the short-lived "differences that matter" in (Østerlund et al., 2020), such as highly granular differences in mouse-cursor movements that reveal fraudulent behaviour online (Weinmann et al., 2021).

Finally, "object" adds further contextual depth to DTD in EDC. For example, as "novel logics and routines" are "inscribed into [DTD] artifacts" (Hedman et al., 2013), applying "a concrete notion of time" (i.e.: mechanical repetition) to constitutive DTD objects, such as characters in a text string, can reveal linear repetitive patterns (Z. Zhang et al., 2022). However, ephemerality (Table 8) reveals DTD objects as tangible and intangible, static and dynamic, short-lived and durable by drawing together ephemeral objects with ephemeral actions in ephemeral time and space. For example, the elements constituting a single social media post, like text characters, images, or hashtags are, on the one hand, static snapshots or "records of activity" (Howison et al., 2011), produced and accessed via tangible, ephemeral interaction (e.g.: touch, type, etc.) with tangible digital devices. The static DTD object is durable in digital space. On the other hand, as intangible objects, the elements that compose a social media post are non-material and malleable, always subject to evolving, dynamic change through interaction. As such, in EDC, a single social media post typically has short-lived relevance in digital space.

In sum, while static views of time see DTD occurrences as fixed and discrete, processual views consider them compositional of flow. Mechanical and creative repetition integrate these views to capture how the DTD occurrence not only constitutes stability and structure but continually composes novelty and/or transformation. As such, via the framework for ephemeral (Table 8), singular DTD can be viewed as both discrete occurrence and emergent process. Therefore, as a specific illustration of a DTD occurrence, a single social media post in time, space, object, and action is subject to short-lived constraint and endures as process. This perspective provides a more comprehensive view of ephemeral entities and phenomena in everyday digital contexts.

4.8 Contributions, Limitations, Conclusions

4.8.1 Contributions to IS Research

Our contribution is an interdisciplinary conceptual tool that can help IS researchers to generate valuable insights in many IS contexts. First, by delineating the four primary characteristics of ephemeral—short-lived, repetitive, unstable, and durable—our framework provides a **clear and structured** way for IS researchers to conceptualise ephemeral entities and phenomena. Second, integrating the contexts of time, space, object, and action ensures **a multidimensional research approach** that better captures the complexities of ephemerality in everyday digital contexts. Third, the framework introduces **a novel perspective** on ephemeral by defining the process of mechanical and creative repetition. This process accounts for ephemeral entities and phenomena as short-lived and durable, rather than merely marginal, fleeting, or constitutive. Fourth, this process contributes to **a deeper understanding** of the ephemeral interplay of stability and change in diverse IS contexts, like innovation, sociotechnical change, and DTD. Fifth, synthesising "static/process priority" with processual views on ephemerality addresses limitations of both perspectives, centres temporal dynamics, and can **advance IS theory** by positioning singular ephemeral entities and phenomena as both constitutive of process and as process. A key innovation of our framework is that it allows for discrete, "disconnected" ephemeral timespans to be recomposed in analysis as singular ephemeral durations.

4.8.2 Contributions to IS Practice

While our contribution is conceptual, the framework has practical value. First, IS professionals can utilise the framework to develop more nuanced **analytical models** for ephemeral data. Viewing ephemeral data as short-lived and durable may be particularly useful for social media analytics, mobile tracking, and IoT applications. Second, the integration of time, space, object, and action broadens **contextual awareness** and can inform practitioner understanding of dynamic digital contexts. IS professionals can leverage our framework to better understand and manage ephemeral digital interaction and everyday user experience. Third, by recognising the process of mechanical and creative repetition, developers can integrate **design interventions** that more effectively balance routine operation and capacity for change. Understanding how users engage in routine and novel ephemeral interaction can enhance mobile app development. Fourth, identifying the ephemeral moments where routine yields to novelty can guide **planning and decision-making** and aid the development of more responsive, dynamic IS strategies that better account for stability and transformation in ephemeral everyday digital contexts.

4.8.3 Limitations

First, while we provide an illustration of the value of our framework in the context of digital trace data, our contribution is primarily conceptual. **Empirical validation and practical implementation** are necessary to fully establish the utility of the framework and extend its applicability. Second, **sophisticated methodological approaches** may be required to capture and analyse the central process of mechanical and creative repetition. As the structured, measurable aspects of mechanical repetition are associated with quantitative approaches, and the nonlinear, emergent elements of creative repetition with qualitative, mixed-method approaches may be particularly useful for applying this framework. Third, integrating time, space, object, and action adds **contextual complexity** to research design. We suggest that the empirical value of each context is considered on a study-by-study basis. While all contexts will be relevant to any particular study, it is unlikely that all contexts will be equally revealing.

Fourth, the **philosophical foundations** upon which our framework is constructed may not be readily accessible or acceptable to all IS researchers. Advocates of "static/process priority" views may consider the nonlinear, irreducible aspects of creative repetition too abstract to precisely apply. Processual advocates may feel that mechanical repetition oversimplifies and undermines the ontological commitment to viewing phenomena as emergent and relational. Our framework intentionally integrates key elements from both perspectives because holistic conceptualisation of specifically ephemeral phenomena in everyday digital contexts necessities this approach.

4.9 Conclusion

Ephemeral is descriptive of digital technology, human interaction with digital technology, and the traces of human behaviour that are captured by digital technology. As the interactions that constitute and compose digital traces in everyday digital contexts are ephemeral, the traces themselves should be considered ephemeral, when ephemeral means short-lived and durable. The nature of reality as ceaseless change will never be precisely representable, so the tools at our disposal—be they conceptual, theoretical, textual, numeric, or otherwise—will always be more stable than the ephemeral phenomena that they describe. The concepts of mechanical and creative repetition, understood as a single cohesive process, illuminate the short-livedness and durability, the stability and transformation, that is inherent to ephemerality in everyday digital contexts.

5 Paper 4: Ephemerality Framework and Digital Trace Data Temporality (EF3)

5.1 Paper 4 Introductory Remarks

5.1.1 Key Features of Paper 3 and Ephemerality Framework Iteration 2 (EF2)

5.1.1.1 Framework characteristics

EF2 delineates four characteristics of ephemeral: short-lived, repetitive, unstable, and durable (Table 8).

1. **Short-lived:** the move from "short-lived" as "speed", "compression", and "limitation" (EF1) to "time", "duration", and "limitation" (EF2) reflects a shift from a first review emphasis of the generalised qualities of ephemerality (4.1.2.5) to a more processual, relational understanding. For example, where "limitation" highlights the static boundedness and finitude of ephemeral phenomena, "constraint" is more illustrative of dynamic external forces (e.g.: algorithmic visibility on social media) as well as internal dynamics (e.g.: the perishability of a digital trace).

2. **Repetitive:** the key development of EF2 is the introduction of "mechanical repetition" (MR) and "creative repetition" (CR). Where the EF1 characterisation of "repetitive" as "repetitive", "anticipated", and "varied" faces issues of circularity, lack of clarity, and overlap, EF2 develops a more precise and clearly differentiated characterisation. MR is defined as *passive or automated execution, linear connection or aggregation, reducibility, and similarity*. CR is defined as *active or conscious engagement, nonlinear reconnection or emergence, irreducibility, and difference*. This development marks a key step toward a more nuanced, parsimonious, and robust conceptualisation of ephemerality. In terms of iterative development, it is also important to note that the "anticipated" characteristic (EF1) is integrated with MR and the "varied" characteristic (EF1) is integrated with CR.

3. **Unstable:** "unstable" is characterised via the concepts of "flux" and "flow". Flux is associated with CR, reflecting emergent, transformative difference. Flow is associated with MR, reflecting linear, stabilising similarity. Repetitions of difference in flux (CR) destabilise the durable structures or processes that are constituted by MR in flow, introducing novelty and transformation. Repetitions of similarity in flow (MR) suppress and obscure the emergence of novelty and transformation that is composed by CR in flux, introducing stability.

4. **Durable:** durability is characterised by MR processes of "connection" and by CR processes of "reconnection". Durability is always either "latent" or "manifest". In relation to durability, MR is described as the presence of similarity (manifest connection) and the absence of difference (latent reconnection). CR is described as the presence of difference (manifest reconnection) and the absence of similarity (latent connection).

5.1.1.2 Framework contexts

Paper 3 establishes EF2 as a temporal framework that incorporates the contexts of "time", "space", "object", and "action". In so doing, EF2 moves toward providing a specific way of not only analysing time but also the temporalities inherent in space, objects, and actions—that is, how these contexts are manifested, experienced, stabilised, and transformed through their relation to time, or time as ephemeral (see 5.1.1.3).

The framework contexts are mutually implicated, meaning they interact to constitute and compose ephemeral phenomena. This reinforces the relational ontology of the framework, so that ephemeral phenomena are not reducible to any single context but always emerge from their interaction.

As the framework contexts are mutually implicated, so too are the contexts and characteristics. While the characteristic states of short-lived and durable are conditioned by mechanical and creative repetition, MR and CR can only be made discernible and meaningful through the contexts. In key paper 3, those contexts are collectively described as "everyday digital contexts".

In EF2, each context is described as both static and dynamic.

5.1.1.3 Review scope

The review scope remains broad in paper 3, but the re-reviews of core disciplines facilitate an improved and more focussed synthesis of interdisciplinary perspectives on ephemerality (Table 8). This synthesis also enhances author understanding of the broad views of time in IS that are described in paper 3 (Table 9) and are noted in the next subsection. However, the broad review scope means that accessibility issues persist, as outlined in 5.1.2.2.

5.1.1.4 Three views of time in IS and time as ephemeral

Adapted primarily from Kreps and Rowe (2024), key paper 3 describes three broad views of time in IS research: static (or fixed), process prioritised, and process primacy (Table 9). This facilitates EF2 being situated within the extant IS literature, and better ensures that its contributions can be relevant to IS research. In paper 3, EF2 is presented as time as ephemeral and a fourth view of time for IS research.

5.1.2 Issues Arising from Key Paper 3 and EF2

5.1.2.1 Logical ambiguity

1. **Short-lived:** description of short-lived as "time", "duration", and "constraint" is insufficient. The terms "time" and "duration" highlight the relevance of contrasting views of time for EF2 but remain too broad to explicitly capture these contrasts or to contribute to understanding the interplay of short-lived and durable. Where EF1 description of "short-lived" leans too heavily toward generalised, measurable short-lived qualities, EF2 may place too much emphasis on processual features. "Constraint" remains underexplored and similarly somewhat redundant.

2. **Repetitive:** the characterisation of "repetitive" as "mechanical" and "creative" is a logical advancement but also remains underdeveloped in EF2. The associated terms of "constitute" and "compose" are introduced but are used inconsistently. Moreover, the interplay of MR and CR is insufficiently articulated. For example, EF2 does not fully explain how the stabilising effects of MR condition or coexist with the transformational effects of CR. This ambiguity contributes to broader issues around durability and temporal interplay (see 5.1.2.1 (4) below).

3. **Unstable:** the terms "flux" and "flow" are poorly defined throughout paper 3 and EF2. The deliberatively counterintuitive association of flux with CR (emergence and transformation) and flow with MR (stabilisation and continuity) is not clearly articulated. Furthermore, isolating "unstable" as a distinct framework characteristic reintroduces the conflation and circularity of EF1: in relation to CR (i.e.: flux), instability refers us to stability (flow), whereas in the contexts of MR (i.e.: flow), stability refers us to instability (flux). Without more precise definitions and clearly developed rationale, the "unstable" characteristic and the concepts of "flux" and "flow" introduce unnecessary complexity, cannot be interpreted consistently, and will not capture the interplay of both stability and instability that is inherent to the framework.

4. **Durable:** the EF2 ideas of "connection" and "reconnection" are insufficiently grounded in the review (4.6) to serve as explanatory concepts for the "durable" characteristic. Four references to variations of "connection" in the unstable section (4.6.3) and none in the durable section (4.6.4) are an additional red flag. Both connection and reconnection are also more suggestive of these actions between discrete instants (MR) than indivisible temporality (CR). Finally, in relation to the Deleuzian metaphors of horizontal and vertical temporal lines, the logic that MR constitutes a horizontal line over time while CR composes a vertical line in time is only partially accurate (see 5.1.3.1 (3) below, paper 4, and EF3). Whether this point should be included in the "repetitive" or "durable" section of paper 3 is also debatable (see (2) above).

5.1.2.2 Interdisciplinary accessibility

As noted in 5.1.1.3, the paper 3 review scope remains necessarily broad. While this scope shapes each of the perceived improvements described in 5.1.1, it also continues to contribute to accessibility issues (see also 4.1.2.3). In particular, the more focussed, detail-oriented philosophical logic upon which EF2 is primarily based may be challenging for IS researchers with no grounding in philosophy. In terms of explication, striking the appropriate balance between the depth of the expanded reviews (4.1.5) and the relative brevity of the paper 3 review (4.6) is both an issue and a challenge.

5.1.2.3 Operational challenges

The complexity of EF2, as well as the outlined issues of ambiguity (5.1.2.1), mean that the practical application of the framework also remains a significant issue (4.1.2.4). As just one illustrative example, EF2 does not make clear how an IS researcher might empirically observe "latent connection" (or the absence of difference) in ephemeral phenomena.

5.1.2.4 Terminology issues

From the standpoint of completed paper 4, several paper 3 phrasing issues significantly impact the precision and clarity of EF2. As noted above, for example, the use of "constitute" and "compose" is inconsistent, which complicates differentiation of MR and CR. From paper 2 through paper 3, basic inconsistencies around reference to the focal review concept are also evident—are these reviews of "ephemeral", "the ephemeral", or "ephemerality"?[28]

While some terminology issues are retrospectively addressed for thesis write-up clarity, most remain to illustrate both the PhD learning curve (1.8) and iterative framework development (3.1.4). Beyond those issues directly related to EF2 (5.1.2.1), similar issues appear throughout paper 3. For instance, the labelling of the three broad views of time in IS research as "fixed/static," "process prioritised," and "process primacy" is unnecessarily awkward and could be simplified as "static," "process," and "processual." Such fine-tuning would enhance readability without altering meaning. Key paper 4 is naturally not free of such issues, but a feature of this thesis from paper 1 through paper 4 is the progressive refinement of conceptual language and closer attention to detail in writing.

[28] This inconsistency related to uncertainty around the implications of referring to the focal concept in its noun or adjectival form. Paper 4 settles on the preferred "ephemerality".

5.1.3 Signposting Developments in Key Paper 4 and EF3

5.1.3.1 Addressing the issue of logical ambiguity

1. **"Occurrence" and "Moment:** to address the "short-lived" and "durable" EF2 issues (5.1.2), EF3 develops the concepts of the "occurrence" and the "moment". The occurrence is associated with MR, while the moment is associated with CR. These concepts enhance clarity by enabling description of MR and CR as a duality that conditions the short-lived and durable states. The short-lived sub-characteristic of "constraint" is considered redundant and is removed, further simplifying the framework.

2. **No "unstable" characteristic:** in response to the EF2 issues with "unstable" (5.1.2), EF3 integrates instability as an inherent yet implicit quality of the framework that emerges through MR and CR. Isolating "unstable" as a distinct characteristic is not only unnecessary but also overemphasises instability, which downgrades the stabilising role of MR. Instability is not a distinct framework characteristic but rather a holistic quality that emerges—*with* stability—through repetition, reflecting the logic of ephemeral phenomena as simultaneously short-lived and durable. In EF3, "unstable" is no longer presented as a standalone characteristic.

3. **"In time" and "Over time":** to further address EF2 ambiguities surrounding the interplay of the short-lived and durable states (see also (1) above), EF3 develops "in time" and "over time" as distinct but interconnected temporal perspectives. "In time" helps to describe the immediate nature of ephemerality as phenomena that are *constituted* and *composed* through MR and CR. "Over time" helps to describe how the same phenomena are *reconstituted* and *recomposed* through MR and CR. This dual temporal lens also helps to highlight the simultaneity of MR and CR as stabilising and transformational. Consequently, short-lived and durable are more clearly perceived as a relational duality rather than opposing states.

5.1.3.2 Addressing the issue of interdisciplinary accessibility

Given the scope and depth of the ephemerality review (4.1.2.5 & 5.1.1.3), accessibility will remain an issue. To address this, paper 4 shifts focus from a broad review of ephemerality to a targeted review of high-quality IS digital trace data literature (see also 5.1.33 & 5.1.4 below). This move foregrounds the IS domain and aligns the paper 3 theme of "everyday digital contexts" (4.1.6) with more familiar and practical IS research concerns. While EF3 will represent the most refined iteration of the ephemerality framework to date, the primary paper 4 aim is to illustrate its application for IS researchers in the context of trace data. In so doing, paper 4 will go some way toward alleviating outstanding accessibility issues.

5.1.3.3 Addressing the issue of operational challenges

Illustrating the application of EF3 also alleviates operational issues. The brief paper 3 application of EF2 to digital trace data (4.7.3) establishes insights that are developed through a more comprehensive application of EF3: paper 4 applies EF3 to a social media fake news case study. Specifically, EF3 reframes the EF2 conceptualisation of a single social media post as an occurrence to encompass both occurrence and moment, emphasising the interplay of MR and CR. Additionally, adopting "narrative repetition" (Dailey & Browning, 2014) as a methodological device enhances operational clarity by illustrating one way that the framework can be practically employed. To support application of EF3 across diverse IS contexts, paper 4 also includes a set of guiding research questions.

5.1.4 Paper 4 IS Focus: the Temporality of Digital Trace Data

The foregrounded focus of paper 4 is the temporality of digital trace data. The three broad views of time in IS research that paper 3 describes—hereafter "static", "process", and "processual-based" views—now facilitate the delineation of three distinct approaches to conceptualising the temporality of digital trace data in IS research: "structural", "performative", and "flow-based". That the three broad views do not neatly correspond to the three approaches is discussed in paper 4. Through paper 4 and EF3, limitations in the extant approaches to conceptualising the temporality of digital trace data are revealed.

5.1.5 Paper 4 title: The Ephemerality of Digital Trace Data: Conceptualising Temporality as Short-lived and Durable through Mechanical and Creative Repetition

Subsections 5.2–5.8 comprise key paper 4 (Doyle et al., P4). Paper 4 develops the third iteration of the ephemerality framework (EF3).

5.2 Paper 4 abstract

This article introduces a novel conceptual framework for ephemerality to advance conceptualisation of digital trace data (DTD) in information systems (IS) research. By integrating two forms of repetition—mechanical and creative—the framework presents DTD as a duality of short-lived and durable ephemerality. To illustrate the value of the framework, we first identify three broad approaches to conceptualising the temporality of DTD in IS: structural, performative, and flow-based. Using narrative repetition as a methodological device, we then apply our framework to a case study of the viral spread of a Covid-19 conspiracy theory. Our retelling of this case study shows how mechanical repetition stabilises the digital trace as discrete, static occurrence, while creative repetition simultaneously transforms the trace as open-ended, durational moment. This integrative temporal perspective supports a holistic conceptualisation of DTD not only *over* time but *in* time. We detail how the framework advances the three IS approaches for conceptualising DTD and establishes a novel temporal perspective

for IS. Positioned as a comprehensive conceptual tool, the framework can enhance the development of core IS concepts and support methodologies for analysing complex IS phenomena, like trace data.

5.3 Introduction

Digital trace data (DTD) are increasingly considered a key focal area for information systems (IS) research (Grover et al., 2020; Yoo, 2015). As DTD are different from other kinds of social science data (Berente et al., 2019; Howison et al., 2011; Lindberg, 2020), the opportunities and challenges that DTD present IS research are new (Grover & Lyytinen, 2023b; Johnson et al., 2019). One opportunity DTD present, with associated challenges, is the richer integration of time and temporality into IS research (Kishore et al., 2024). In this article, we develop ephemerality as a temporal concept for DTD research.

Because DTD are different, IS scholars are already providing new principles, methods, and theoretical guidance for the analysis and interpretation of DTD (Berente et al., 2019; Grisold et al., 2024; Østerlund et al., 2020), including a framework for integrating temporality into DTD research (Kishore et al., 2024). However, a search of the IS "basket" journals reveals no consideration of the concept of ephemerality in DTD research.

This is surprising because IS research already broadly notes the ephemerality of digital in general (Yoo, 2010; Vaast & Urquhart, 2018; Lyytinen, 2021). Like all digital objects (Kallinikos et al., 2013), DTD are editable and mutable (Lindberg, 2020), subject to deletion and reappropriation that can render their ontological state ephemeral (Milan, 2017; von Briel, 2018). Ephemerality is also descriptive of the everyday sociotechnical interactions and so-called real-time contexts that typically produce DTD, such as workplace check-ins (Pentland et al., 2021), spatial locations (Pieper et al., 2024), social media "likes" or nudges (Babar et al., 2023), mouse-cursor movements (Weinmann et al., 2022), and bodily movements (Grisold et al., 2024). Seen as representative of a world in continual, open-ended flux (Kreps & Rowe, 2024), some IS scholars consider DTD "inherently processual" (Pentland et al., 2020).

However, framing DTD as ephemeral also challenges the common IS conceptualisation of DTD as "records of activity" (Howison et al., 2011) that "capture" sociotechnical interactions (Grover et al., 2020). To reveal tensions implicit in this conceptualisation, this article identifies and describes three IS approaches to conceptualising the temporality of DTD: "structural", "performative", and "flow-based". Each approach is temporally characterised by its temporal relation—or *non*-relation—to the conceptualisation of DTD as "record". Our framework for ephemerality (11) reveals fundamental tensions in the view of DTD as both processual *and* record: record emphasises durability over short-livedness, immutability over mutability, and discrete over open-ended.

In structural approaches, for example, which are underpinned by process theory perspectives,

processual DTD as records are implicitly described as discrete, static, non-processual occurrences (e.g.: Pentland et al., 2020; Zhang et al., 2022; Kishore et al., 2024). In contrast, "flow-based" approaches background DTD as record to highlight processual flows. As continual becoming is a flow-based focus (e.g.: Baygi et al., 2021), describing ephemerality—and entities like "records"—is not straightforward in the processual approach. Finally, "performative" approaches, primarily underpinned by sociomaterial perspectives, view DTD as socially and materially co-constituted from ephemeral context to context (Aaltonen & Stelmaszak, 2024; Avital et al., 2023). Performative approaches are subject to both the structural and flow-based issues briefly introduced because performative approaches typically lean toward structural (Lindberg, 2020) or flow-based (Østerlund et al., 2020) analyses *of* DTD.

The three approaches outlined also highlight important differences between process theory (Langley et al., 2013; Pentland et al, 2020) and processual philosophy (Bergson, 1911, 1922; Whitehead, 1920; 1929; Deleuze, 1990, 1994). These differences are rarely acknowledged in IS research (Kreps & Rowe, 2024). Specifically, the differences centre the philosophical problem of defining process with elements that constitute process (Langley, 1999). While the uniqueness of DTD present IS with an opportunity to address this problem, conflating "process" with "processual" obscures this opportunity.

Our understanding of ephemerality is informed by a framework that characterises ephemerality as *short-lived, repetitive,* and *durable* (Table 11). In our framework, the two states of ephemerality (short-lived and durable) are conditioned by two forms of repetition, which we call "mechanical repetition" and "creative repetition". Mechanical repetition and creative repetition effectively integrate the structural, performative, and flow-based approaches to conceptualising the temporality of DTD. The framework also integrates the contexts of time, space, object, and action.

By positioning ephemerality as a "type of time" (Ancona et al., 2001), we respond to several IS calls: to challenge temporal assumptions in IS with new concepts (Venkatesh et al., 2021); to holistically incorporate temporality into DTD research (Kishore et al., 2024), and to address temporal ambiguities associated with the "fluidity of [IS] phenomena" (Grover & Lyytinen, 2023) and DTD in particular (Berente et al., 2019). With repetitions seen as key to identifying "processual patterns" in DTD research (Grisold et al., 2024), delineating "mechanical" and "creative" repetition also provides a more holistic conceptualisation of repetition in ephemeral contexts.

Ephemerality underscores that richer conceptualisation of DTD as a "point in time" (Hedman et al., 2013; Grisold et al., 2024) should shape the IS conceptualisation of DTD. However, we will show that extant approaches to conceptualising the temporality of DTD typically take us further from the temporal convergence of stability and transformation that ephemerality describes. To reveal specific distinctions between, and limitations of, the structural, performative, and flow-based approaches to conceptualising

the temporality of DTD, we ask: *How can ephemerality advance approaches to conceptualising the temporality of digital trace data in IS research?*

In section 5.4, we detail the three approaches for conceptualising the temporality of DTD in IS research. In section 5.5, we outline our research methods. In section 5.6, we outline our ephemerality framework. In section 5.7, we illustrate the potential value of the framework by analysing a case study of a social media-based Covid-19 conspiracy theory. In section 5.8, we discuss contributions and limitations.

5.4 Overview of IS Approaches to Conceptualising Temporality of DTD

Our overview describes three approaches to conceptualising the temporality of DTD in IS research: *structural*, *performative*, and *flow-based*. While the dominant perspectives that underpin the three approaches—process theory, sociomateriality, and processual philosophy—are mutually influential, the differences between the three approaches warrant their delineation (see Table 10).

Table 10. Three Approaches to Conceptualising the Temporality of Digital Trace Data in IS Research

Approach	**Structural**	**Performative**	**Flow-based**
Perspective	Process theory	Sociomateriality, performativity, emergence	Processual theory
DTD conceptual assumptions	DTD as record of activity. Naturally occurring, stable. Event-based data; found. Entity represents reality. Singular as occurrence. Singular occurrence aggregated as event; events sequenced as process that can be reproducible.	DTD as trace of relation. Actively produced, mutable. Behavioural data; produced. Entity co-constitutes reality. Singular as relation. Singular relation constitutes immediate context; context can be reproducible activity, interaction, process.	DTD as durational moment. Coalescence of flows. Flow-based data. Entity backgrounded. Singular as multiplicity. Moment creates new possibilities for action; moment processually repeated in present.
DTD temporal assumptions	Occurrence as pregiven, entitative-based point in time. Occurrence is discrete, static, and located in past. Structure unfolds over time. Structure is linear, nonlinear, sequenced, dynamic, emergent.	Relation as emergent, dynamic interaction in time. Relation is mutable**,** dynamic**,** emergent. Relation unfolds over time. Relation is linear, nonlinear, sequenced, dynamic, emergent.	Moment as multiplicity of flows of action. Moment is timely**,** heterogeneous**,** durational. Moment dispersed over time. Moment as continual (trans)formation.

Illustrative IS research	Howison et al., 2011; Kishore et al., 2024; Pentland et al., 2020, 2021; Weinmann et al., 2022; Zhang et al., 2022	Aaltonen & Stelmaszak, 2023; Avital et al., 2021; Hedman et al., 2013; Lindberg, 2020; Østerlund et al., 2020; Vaast et al., 2017	Baygi et al., 2021

5.4.1 The Structural Conceptualisation of DTD Temporality in IS Research

The terms *discrete*, *occurrence*, *event*, *process*, and *sequence* are key to understanding the structural approach. DTD are "event-based" records of activity (Berente et al., 2019) that can describe the "who", "what", "when", and "where" of events (Pentland et al., 2020). How events are defined is critical in structural conceptualisation (Zhang et al., 2022). Event definitions are not predetermined because the inclusion of event context is both arbitrary (Pentland et al., 2020) and complex (Kishore et al., 2024).

Pentland et al. (2020) distinguish event and occurrence: "Events are abstract categories formed from instantaneous observations or occurrences… we observe occurrences, but we theorise about events." This distinction is important because it helps to shape the structural view of singular DTD as representative of naturally occurring interactions that can be as fine-grained as computationally observable. For example, records of minute deviations in mouse-cursor movement can be seen as occurrences of DTD (Weinmann et al., 2022). The distinction also helps to establish DTD occurrences as "constituent elements" of events (Pentland et al., 2020) and, subsequently, events as constituent elements of unfolding processes (Zhang et al., 2022). In other words, via the structural view, events are formed from occurrences, and processes are formed from events. A conceptual effect is to distance the occurrence of DTD from the process, pattern, or structure that it constitutes.

For example, checking in at a clinic is an event formed of many occurrences that can be captured as DTD (Pentland et., 2021). The aggregation and sequencing of occurrences (DTD) reveals events, and the aggregation and sequencing of events reveals the process of checking in. Similarly, aggregated mouse-cursor movements can be seen as events that reveal online fraud patterns (Weinmann et al., 2022) and occurrences of online editing are sequenced as events that reveal Wikipedia collaboration processes (Zhang et al., 2022). As the "structure of a process" (Pentland et al., 2020) is only revealed over time (Kishore et al., 2024), a second conceptual effect of the structural approach is to invest DTD with meaning in aggregation (or structure), and to divest DTD of meaning in singularity (or occurrence).

In singularity, the occurrence is further distinct from both events and process by virtue of being discrete. Discrete means that the DTD occurrence has a definitive start and end-point. Log data, clickstreams, and social media updates are examples of discrete, measurable, "time-stamped" units of DTD (Berente

et al., 2019). Timestamps can signify not only "when an event occurred [but also] which occurrences form part of that event" (Pentland et al., 2021). However, being discrete also renders the DTD occurrence temporally static: it is a "slice" of activity (Zhang et al., 2022), a "snapshot" (Howison et al., 2011), a "time-slice" (Pentland et al., 2021), a "pixel" (Pentland et al., 2020), or an entitative "mark left as a sign of passage" (Howison et al., 2011). As such, the events that reveal unfolding process are formed and sequenced "using a concrete notion of time" (Zhang et al., 2022). In the contexts of repetition, this distanced relation of discrete occurrence and unfolding process can "illuminate how systems [and structures] get reproduced over time" (Pentland et al., 2021).

5.4.2 The Performative Conceptualisation of DTD Temporality in IS Research

Performative DTD are *produced, co-constituted traces of social and material relation.* Distinct from the "naturally occurring" generation of structural DTD, performative DTD are produced (Hedman et al., 2013). In sociomaterial terms, DTD are "produced and reproduced through organisational practices" that actively shape the activities of people, technologies, and DTD (Østerlund et al., 2020). For example, Aaltonen and Stelmaszak (2023) show that as workers become more aware of DTD acquisition, they actively shape the production of DTD by modifying their actions. The performative nature of DTD (Yoo, 2015) gives new meaning to the idea that DTD is "not given but created" (Lindberg, 2020).

In the performative approach, the DTD occurrence is a trace of relation (Avital et al., 2021; Østerlund et al., 2020). In contrast to the structural approach, there is no conceptual distance between the trace and the relation that the trace performs. DTD traces *are* the evolving relation. For example, Østerlund et al. (2020) illustrate how digital traces on a citizen science platform not only "capture" interactions but actively perform the platform. Similarly, traces of relation on platforms like Instagram or Wikipedia co-constitute the platforms. And DTD like social media "comments", "likes", and "shares" perform evolving relations, such as disagreements, which reveal how traces of relation co-constitute emergent organisational structures (Avital et al., 2021). As there is no distance between trace and relation, traces are co-constituted through activity, interaction, or process (Østerlund et al., 2020). The trace is co-constituted in the sense that the trace is formed as the relation of social and material emerges. The performative trace is social and material (Orlikowski & Scott, 2015).

Being co-constituted allows for more dynamic framing of the trace. In Vaast et al. (2017), the analysis of more than 23,000 "tweets" reveals interdependencies between social media actors. A single retweet, for example, depends on the existence of a prior tweet, which illustrates how DTD are both relational as social interaction and interdependent as material trace. DTD production is not only relationally performed in the time-stamped interaction that DTD records but in the latent capacity for future performance that is inherent in the digital trace. Performative traces can "ripple through" space and

time, shaping other traces and reshaping themselves (Østerlund et al., 2020). Original tweets, for example, often rely on retweets to gain social momentum (Vaast et al., 2017).

As such, the trace of relation is not statically bound to the occurrence of capture. Traces "can be manipulated, transformed" (Lindberg, 2020), and "transported in time and space" (Hedman et al., 2013). Therefore, using analytical techniques like cluster or motif analysis, DTD like retweets, hashtags, or texts can be tracked and regrouped in ways that highlight the nonlinear sequencing and mutual interdependencies *of* DTD (Vaast et al., 2017; Østerlund et al., 2020).

However, these techniques highlight that performative conceptualisation of DTD can rely on structural analytical approaches. Lindberg (2020), for example, argues that time-stamped structuring of DTD maximises their analytical richness. This view suggests that performative traces, though relational and emergent, can be discretely identifiable (Hedman et al., 2013). Østerlund et al. (2020) note that "even practice-oriented scholars taking a relational view of reality often fall into a reflective view of the world," thereby interpreting DTD as discrete, pre-given representations of reality. Avital et al. (2021) caution that "surgically identify[ing] discrete instances… falls short of describing the interrelationships among these instances" (Avital et al, 2021).

Other scholars emphasise performative traces as part of *flows* that actively reshape reality (Østerlund et al., 2020). Flows are discussed in the next section. In performative approaches, this emphasis highlights how trace data emerge in dynamic assemblages of entity and activity. These analytical tensions also highlight that performative traces, although conceptually framed as emergent, are typically treated in ways that align with structural and flow-based approaches to conceptualising the temporality of DTD.

5.4.3 The Flow-based Conceptualisation of DTD Temporality in IS Research

In the flow-based approach, which is developed from processual ontology, DTD as entitative record is backgrounded. DTD are not discrete, static, pre-existing occurrences that constitute sequentially related events to form process (structural) or actively produced, co-constituted traces of relation (performative). By contrast, flow-based DTD can be seen as timely heterogeneous moments of duration along multiple coalescing flows of action (Baygi et al., 2021).

The flow-based moment is heterogeneous because it is the coalescence of a multiplicity of flows. For example, in their analysis of 15,000 tweets related to a single hashtag, Baygi et al. (2021) show that the hashtag is conditioned by flows of sensemaking, reciprocal following, and algorithmic promotion, as well as latent possibilities for new flows of action. DTD (the tweets) come into being *along* these flows of action. As such, DTD are moments of "(trans)formation" (*ibid.*), where *trans* refers to change, and *formation* to the continual becoming of change. In Bergsonian terms, flow-based DTD are moments of

duration.

Flow-based DTD are "timely" because "not all moments are equal for action" (*ibid.*) For Baygi et al., a "timely moment arises when different flowing lines of action… converge and flow co-responsively along a shared path." The analytical challenge is to retrace the flows of action along which DTD come into being. Retracing the flows describes DTD through duration.

Flows are not "composed of a sequence of activities" and do not "connect already existing entities" (Baygi et al., 2021). The flow-based moment is not a discrete snapshot. Neither are flows relational in the sense of context-based co-constitution with materials. Instead, the flow-based approach requires viewing IS "phenomena, artifacts, systems, practices, affordances, users, and other subject/object positions as *spread out over time*" (*ibid.*; *emphasis added*). Viewed as flow-based, DTD are open-ended.

As such, chronological timelines, linear phases, and simple relations of moment to prior moment should not be imposed as standard practice in the flow-based approach. When DTD are conceptualised as a multiplicity of flows, as a "meshwork", or as a timely *coming into being* along coalescing flows of action, the seemingly insignificant (i.e.: that which may escape description in structure and relation) can be revealed and described as significant (*ibid.*).

Therefore, continual change is the only constant in the flow-based approach to conceptualising DTD. Any discontinuities or disruptions (i.e.: that which might render an occurrence or a trace discrete) are consequently explained as less dominant flows being subsumed by more dominant flows (*ibid.*).

5.5 Overarching Paper Structure and Methodological Approaches

Our review methods for delineating the framework for ephemerality are detailed in Doyle et al. (P3). Here, in sub-section 5.5.1, we first describe our approach to reviewing the IS DTD literature in section 5.4. We then describe (5.5.2) our methodological approach for applying the ephemerality framework to a social media case study in section 5.7.

In relation to method, the structure of this paper is as follows. Section 5.4 identifies three IS approaches to conceptualising the temporality of DTD. The delineation of the three approaches establishes a foundation to discuss the broader contributions of the ephemerality framework in relation to temporality in section 5.8. Section 5.6 outlines the ephemerality framework. Section 5.7 applies the framework. The application similarly supports the discussion in section 5.8. Therefore, the discussion section (5.8) is developed through the contexts that are established in sections 5.4, 5.6, and 5.7.

5.5.1 Methodological Approach for Overview of IS DTD Literature (Section 5.4)

Although digital trace data have ostensibly been an IS research focus for decades (Berente et al., 2019), DTD as a defined sub-field of IS enquiry is still only emerging. Therefore, our overview of IS approaches for conceptualising the temporality of DTD relies upon a relatively small review selection of 29 IS DTD articles. The articles are listed in Appendix F.

Of the 29 articles, 28 are published in IS "basket" journals, with the exception (Hedman et al., 2013) published in the proceedings of the flagship IS conference. Twenty-one of the 29 articles have been published since 2020. The earliest referenced article (Howison et al., 2011) provides an IS definition for DTD that is well cited across multiple disciplines. All articles provide important IS research insights, commentary, and/or conceptual, theoretical, or methodological guidance around DTD.

While not comprehensive, our review is sufficiently representative to identify the three broad approaches to conceptualising DTD. Fifteen of the selected articles are directly referenced in the overview. Eleven of the remaining 14 articles are referenced elsewhere in the main text of paper 4.

Of the 6 papers we label "structural", 5 explicate and/or apply process theory-based approaches for conceptualising DTD. The remaining paper analyses "real-time" mouse-cursor movement through a behavioural-cognitive lens (Weinmann et al., 2022). In our view, the process-based, structural approach for conceptualising DTD is partially implicit in the latter paper.

Of the 6 papers we label "performative", 5 are explicitly concerned with the performative nature of DTD. The performative approach is, in our view, also partially implicit in the mixed methods analyses of social media DTD in the remaining paper (Vaast et al., 2017).

Finally, while the terms "flow" and/or "processual" are used in 5 papers that we consider "structural" and in 4 of the "performative" papers, strictly "flow-based" IS analyses of DTD are uncommon. Kreps and Rowe (2024) briefly discuss DTD when describing their framework of flow-based principles. An additional paper details the importance of "processual patterns" for DTD analysis (Grisold et al., 2024). However, our review finds that just one IS paper (Baygi et al., 2021) analyses DTD strictly from a flow-based perspective. This paper alone is included in Table 10 as an example of the flow-based approach to conceptualising DTD.

5.5.2 Methodological Approach for Ephemerality Framework Illustration (Section 5.7)

In section 5.7, we analyse a specific case study (Gruzd & Mai, 2020) to retell the story of the *#FilmYourHospital* (*#FYH*) Covid-19 conspiracy theory. To conduct this retelling, we use "narrative repetition" as a methodological device (Dailey & Browning, 2014). The detailed operationalisation of

narrative repetition is deferred to section 5.7.1. This approach facilitates coherence between method and framework, allowing the methodological role of narrative repetition and the explanatory novelty of the ephemerality framework to emerge in the application contexts of *#FilmYourHospital* rather than purely abstractly.

The *#FilmYourHospital* conspiracy theory and the case study by Gruzd and Mai (2020) align with our methods and aims for several reasons. Although Dailey and Browning (2014) discuss the relevance of narrative repetition for organisations, they encourage scholars to explore its implications for social media, noting that Twitter "enables narrative repetition." As a narrative, *#FilmYourHospital* unfolds on Twitter (now X)[29]. The viral impact of *#FYH* is relatively brief, illustrating the short-lived temporalities of everyday sociotechnical contexts. DTD (99,039 tweets) are the data source for the case study. And selection of specific DTD enables illustration of the forms of repetition relevant to our framework.

Our interest in this particular case study was initially sparked by its title, and its emphasis on "a single tweet"—"Going viral: How a single tweet spawned a COVID-19 conspiracy theory on Twitter." Gruzd and Mai use social network analysis to position singular tweeters as nodes from which a communication network evolves. In contrast, our analytical approach reexamines the key instances of trace data (i.e.: tweets, retweets) to reveal the repetitions (mechanical and creative) that shape both singular tweets and the *#FYH* narrative. Our approach enables us to reconceptualise the ephemeral dynamics of digital traces beyond static causality, supporting a novel view of how even singular tweets hold short-lived and durable significance (see 5.7.5 and Table 12).

Narrative repetition serves as the methodological scaffolding for our approach—it provides a way to retell the *#FYH* story through the lens of the ephemerality framework (Table 11). In retelling the story, the key characteristics of narrative repetition (three dualities that are detailed in 5.7.1 and applied in 5.7.4) emerge as illustrative dimensions of ephemerality. The characteristics emerge through the forms of repetition—mechanical and creative—at the core of the ephemerality framework (see next section).

5.6 A Conceptual Framework for Ephemerality

We now outline our framework for ephemerality (Table 11).

[29] For ease of reference, we refer to Twitter, tweets, and retweets (rather than "X") throughout key paper 4.

The framework delineates three characteristics of ephemerality: two states (short-lived and durable) conditioned by two forms of repetition: "mechanical repetition" and "creative repetition". We consider the forms of repetition a duality. The framework integrates time, space, object, and action as contexts.

While the characteristics and contexts structure the framework, the framework logic relies upon the core duality of mechanical repetition and creative repetition, the distinctions of the "occurrence" and the "moment", the distinction of "in time" and "over time", and of associated conceptual vocabulary.

In this framework, the temporal occurrence is discrete, static, and entitative-based. The moment is open-ended, durational, and flow-based.

The short-lived occurrence *constitutes* (or forms or stabilises) the framework contexts of time, space, object, and action *in time*. The short-lived moment *composes* (or transforms) the framework contexts *in time*. Moment and occurrence are two sides of the same coin. Short-lived ephemerality is the duality of the occurrence and moment *in time*.

The durable occurrence *reconstitutes* (or reforms, restabilises) the contexts of time, space, object, and action *over time*. The durable moment *recomposes* (or retransforms) contexts over time. Without *re-*stabilisation, there can be no stabilisation, just as without re-transformation, there can be no transformation. Durable ephemerality is the duality of the occurrence and moment *over time*.

Mechanical repetition and creative repetition simultaneously condition the occurrence and moment as both short-lived and durable in time and over time.

We define mechanical repetition (MR) *as occurrences constituted and reconstituted through passive or automated execution, linear processes of connection or aggregation, reducibility (to discrete parts), and stabilising similarity*.

We define creative repetition (CR) *as moments composed and recomposed through active or intentional engagement, nonlinear durations of reconnection or emergence, irreducibility (to discrete parts), and transformational difference.*

Foundational processual texts (especially Bergson (1910; 1911; 1922) and Deleuze (1990; 1994)), as well as key texts in a broad range of other disciplines (Doyle et al., P3), provide the philosophical foundations for this conceptual framework. The framework integrates a structural, process-based view of time and reproduction (MR) with a flow-based, processual view of duration and becoming (CR). As such, the framework supports a novel view of ephemerality as both discretely identifiable (occurrences) and, simultaneously, as processually open-ended (moments). It can be argued that this integration is

logical only at the temporal convergence of stability and transformation that ephemerality describes. This is because without the immediate presence of stability and transformation, the defining paradox of ephemerality collapses into pure impermanence (short-livedness) or into pure persistence (durability).

The contexts of time, space, object, and action facilitate description of ephemerality. Time, space, object, and action are constituted in time and reconstituted over time through mechanical repetition. Simultaneously, ephemeral contexts are composed in time and recomposed over time through creative repetition. Ephemerality is that which constitutes and reconstitutes relative stability while composing and recomposing transformation. This is the philosophical foundation for a view of time as ephemeral, when ephemeral simultaneously means short-lived and durable.

One implication of this view of time as ephemeral is that ephemerality can be "opened up", allowing for deeper, richer description of ephemeral entities and/or phenomena, like digital trace data. In 5.7.5, we describe a single tweet through the lens of the ephemerality framework.

Table 11. A Framework for Ephemerality Across Time, Space, Object, and Action (EF3)

Context	*Ephemerality: Key Characteristics, Concepts, and Vocabulary*		
	Short-lived (state)	**Repetitive**	**Durable** (state)
	Occurrence and Moment In Time	Mechanical Repetition (MR) Creative repetition (CR)	Occurrence and Moment Over Time
Time	Discrete, static, entitative-based occurrence constitutes in time	MR: occurrence is constituted (forms) and reconstituted (reforms) in and over time (linear) through repetitions of similarity	Discrete, static, entitative-based occurrence reconstitutes over time
	Open-ended, durational, flow-based moment composes in time	CR: moment is composed (transforms) and recomposed (retransforms) in and over time (nonlinear) through repetitions of difference	Open-ended, durational, flow-based moment recomposes over time
Space	Occurrence constitutes discrete, static space in time	MR: through occurrence in and over time of similar, structural spatial characteristics	Occurrence reconstitutes discrete, static space over time
	Moment composes open-ended, flow-based space in time	CR: through moment in and over time of different, emergent spatial characteristics	Moment recomposes open-ended, flow-based space over time
Object	Occurrence constitutes discrete, static object in time	MR: through occurrence in and over time of similar, structural object characteristics	Occurrence reconstitutes discrete, static object over time
	Moment composes open-ended, flow-based object in time	CR: through moment in and over time of different, emergent object characteristics	Moment recomposes open-ended, flow-based object over time
Action	Occurrence constitutes discrete enactment in time	MR: through occurrence in and over time of similar, structural action characteristics	Occurrence reconstitutes discrete enactment over time
	Moment composes open-ended performance in time	CR: through moment in and over time of different, emergent action characteristics	Moment recomposes open-ended performance over time

5.7 Illustrating Repetitions of Ephemerality through Digital Trace Data

To illustrate our framework, we turn to research around a Covid-19-related conspiracy theory that briefly went viral on Twitter during the pandemic. Known as the "*#FilmYourHospital*" conspiracy theory, tweeters used *#FYH* to circulate digital content to support the view that the Covid-19 pandemic was a hoax. Text content was typically supplemented with video and/or images that showed empty hospital carparks, corridors, and Accident and Emergency waiting rooms.

Researchers have studied the *#FYH* conspiracy theory (Gruzd & Mai (2020) (*246 citations* (*cs*.); W. Ahmed, López Seguí, et al. (2020) (*112 cs.*); Nazar & Pieters (2021) (*69 cs*.); Erokhin et al. (2022) (*42 cs*.)) and other Covid-19-related conspiracy theories (W. Ahmed, Vidal-Alaball, et al. (2020) (*861cs.*); Ferrara (2020) (299 cs.); Shahi et al. (2021) (*431 cs*.)) with the general aims of understanding how (mis)information propagates online, as well as what and/or who drives such propagation. Social media trace data (SMTD) (Kishore et al., 2024) are a key data source in these studies.

We will analyse the *#FYH* conspiracy theory through the lens of our ephemerality framework. The anchor for this analysis is the *#FYH* case study by Gruzd and Mai (2020). To conduct our analysis, we use "narrative repetition" as a methodology (Dailey & Browning, 2014).

The remainder of section 5 is structured as follows. In 5.7.1, we detail narrative repetition as our methodological approach for analysing the *#FYH* conspiracy theory (see also 5.5.2). In 5.7.2, we provide an overview of the Gruzd and Mai (2020) *#FYH* case study. In 5.7.3 and 5.7.4, we reexamine key elements from the case study through the lens of our ephemerality framework. Finally, in 5.7.5, we develop a novel conceptualisation of a single *#FYH* tweet as ephemeral.

5.7.1 Narrative Repetition as Methodological Approach

Developed in management studies, narrative repetition is defined simply as "the recurrence of a story". Dailey and Browning (2014) develop the concept under the overarching theme of "sameness and difference". To delineate this theme, the authors distinguish three dualities as functions that are simultaneously produced through narrative repetition: control/resistance, differentiation/integration, and stability/change. Dualities "draw attention to the power of anomalies and contradictions" (*ibid*.) and can more adequately describe the complexity of phenomena that cannot be captured in singular concepts (Cooper & Burrell, 1988; Farjoun, 2010). Function refers to the purposes of narrative repetition, which are shaped by the tensions inherent in the dualities. The dualities of narrative repetition describe sameness and difference.

Narrative repetition "may be used as a way to conduct" research (Dailey & Browning, 2014) and

provides an appropriately aligned, structured, and empirically grounded methodological approach to showcase the characteristics and contexts of our ephemerality framework (Table 11). First, as with narrative repetition, our framework describes dualities. In our framework, the core conceptual duality of mechanical repetition and creative repetition gives rise to ephemerality as short-lived and durable. Second, our core duality also describes sameness and difference: we partially define mechanical repetition as repetition of similarity and creative repetition as repetition of difference (see 5.6). And third, Dailey & Browning (2014) note that "[i]n narrative methodology… the recurrence of a story and of "instances of repetition" becomes "a starting point for inquiry". Our framework describes how ephemeral occurrences and moments repeat. Narrative repetition is highly adaptable to our framework.

Our aim is to describe the mechanical and creative repetition of occurrences/moments in the *#FYH* narrative through the ephemerality framework contexts of time, space, object, and action (Table 11). We do so by re-examining key *#FilmYourHospital* tweets as identified by Gruzd and Mai (2020). This analytical approach also highlights the three dualities of narrative repetition: stability and change, control and resistance, and differentiation and integration.

We use narrative repetition to structure our illustration as follows. In 5.7.2, we present a summary of the Gruzd and Mai (2020) *#FYH* case study. The summary grounds the subsequent analysis by identifying the key *#FilmYourHospital* tweets and describing the case study findings. In 5.7.3, we describe the key *#FYH* tweets as ephemeral occurrences/moments that repeat in the FilmYourHospital narrative. In 5.7.4 we describe the three dualities of narrative repetition as ephemeral. This method of analysing the *#FYH* narrative provides a structured basis from which to illustrate the novelty of our ephemerality framework. We conclude section 5.7 by describing a single *#FYH* tweet as ephemeral (5.7.5).

5.7.2 Summary of a Case Study Analysis of *#FilmYourHospital*

The objectives of the Gruzd and Mai case study (2020) are to examine how *#FYH* propagates over time on Twitter, with the overarching aim of discovering the extent to which hashtag virality is caused by coordination (among Twitter users) and/or automation (of bots).

The key data for the case study are 99,039 FilmYourHospital tweets contributed by 43,461 tweeters. All *#FYH* tweets were posted between 28 March and 9 April 2020. As is typical of Twitter-driven events, the majority of *#FYH* "interactions" were retweets (83%).

The authors use the social media analysis tool Netlytic to collect tweets. Via social network analysis, the *#FYH* tweets represent a network, nodes are Twitter users, and connections between nodes (i.e.: ties) are interactions among users (e.g.: replies, retweets, mentions). In using social network analysis,

their aim is to provide visualisations of "the evolution of [the] #FilmYourHospital network over time".

The *#FYH* "campaign" is "launched on 28 March" with a tweet that asks a simple question: *"#FilmYourHospital Can this become a thing?"* The tweet is posted by an account—@22CenturyAssets—with a small number of followers and attracts approximately 30 retweets and 100 "likes". In their case study, Gruzd and Mai do not name the account and refer just once to "the anonymous poster who started the hashtag". Note also that @22CenturyAssets is no longer active[30] but the tweet is archived and multiple references to, and screenshots of, the original tweet remain online.[31]

The following day, 29 March 2020, user @DeAnna4Congress retweets the FilmYourHospital hashtag with video of a largely empty hospital carpark and entrance area, as well as text that reads: *"Let's get #FilmYourHospital trending. We ARE the news now. We can't trust the news. Post pics of ur hospital here!"*[32] @DeAnna4Congress is the verified account for DeAnna Lorraine, a former US Congressional candidate who, on this date, had approximately 150,000 Twitter followers. The account remains active as of writing, has approximately 300,000 followers, and the tweet is viewable.[33]

Gruzd and Mai find that DeAnna Lorraine is "one of the most influential users who triggered the viral spread" of *#FYH*. *"Let's get #FilmYourHospital trending"* attracts around 634k views and generates around 25,000 likes and 16,000 retweets. Over the next two days, the hashtag is "used" by other "prominent" U.S.-based Twitter users who are sympathetic to the *#FYH* perspective. The hashtag "gets most attention" on 31 March 2020.

Although "interactions" decline from 31 March, "a secondary wave of propagation" follows on 3 April, one week after "the initial *#FilmYourHospital* tweet". Twitter users propagating the second wave are primarily residents in Brazil. However, *#FYH* tweets emerge in 34 different languages, with English, Portuguese, Arabic, and Japanese making up the top four. The authors show the evolution of this network by visualising user interactions at scale. They present various visualisations in a series of 8 figures. An open access link to the figures is included below (p.132) and in Appendix G.

Finally, via machine learning analysis, the authors determine that "a small number of accounts" were "likely bots" but that "most of" the Twitter accounts "were not automated." Gruzd and Mai also find

---

[30] See https://x.com/22CenturyAssets

[31] See, for example, https://archive.is/bzjon, https://newslit.org/updates/classroom-connection-covid-19-conspiracy-theory-outbreak/, and https://knowyourmeme.com/memes/filmyourhospitals.

[32] See https://archive.fo/ozUpx for this tweet and https://archive.fo/k03nl for a more comprehensive archive of #FilmYourHospital.

[33] See https://x.com/DeAnna4Congress?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Eauthor

that while "much of the [*#FilmYourHospital*] content came from users with limited reach", the campaign was "fuelled and expanded" by a small number of influential users.

In sum, via social network analysis of Twitter data, the *#FilmYourHospital* case study by Gruzd and Mai (2020) presents visualisations of the evolution of a network over time. The analysis highlights the major role of influential users and the minor role of bots in the viral spread from a single, low-impact tweet of a specific hashtag across different times, languages, and spaces.

We now analyse FilmYourHospital through the lens of our ephemerality framework.

5.7.3 Repetitions of Ephemerality in the *#FilmYourHospital* Narrative

Ephemeral occurrences and ephemeral moments repeat in the *#FilmYourHospital* narrative.

We begin by describing the mechanical repetition of occurrences, which repeatedly constitute and reconstitute the FilmYourHospital narrative. We then describe the creative repetition of moments, which continually transform and retransform the FilmYourHospital narrative. We finally describe both forms of repetition as a duality that describes ephemerality.

Through mechanical repetition, each *#FYH* tweet is an occurrence that constitutes and reconstitutes the short-lived and durable contexts of *#FilmYourHospital*. Constitute and reconstitute refer to how occurrences passively form and reform the FilmYourHospital hashtag. Context in our framework refers to time, space, object, and action (Table 11). For example, as object and action in time and space, the hashtag is the organisation of the FilmYourHospital narrative.

The FilmYourHospital hashtag is *constituted* by 99,039 tweets. Each tweet is a discrete occurrence, associated with specific times, spaces, objects, and actions. Whether perceived as entitative or relational, the tweets (or occurrences) are constituted and reconstituted by similarity through mechanical repetition. Elements of past short-lived contexts are brought forward to the present occurrence through mechanical repetition (MR). The occurrence brought forward—a timestamp, for example, a platform, tweet content, a scroll action—constitutes the hashtag in similarity *in time* and reconstitutes the hashtag in similarity *over time*.

Retweets, which constitute 83% of the FilmYourHospital hashtag, bring short-lived past contexts forward into the present occurrence. Each of the 16,000 retweets (and each of the 25,000 "likes") for *"Let's get #FilmYourHospital trending"*) constitute and reconstitute the FilmYourHospital hashtag through repetitions of similarity both in time and over time.

Therefore, while each tweet (as occurrence) is formed of short-lived contexts at a discrete time, the

occurrence is reformed and made durable through mechanical repetition over time. Durability, however, is inherently unstable and dependent upon the continued repetition of occurrences. The rate of MR in the FilmYourHospital narrative depends upon specific tweeters (e.g.: @DeAnna4Congress) and begins to decline four days after the initial hashtag is launched.

Through creative repetition (CR), the same tweets, retweets, and "likes" are open-ended, durational moments that compose and recompose the contexts of the FilmYourHospital hashtag. Compose and recompose refer to moments that transform and retransform *#FYH*. For example, 33 non-English languages clearly recompose the narrative contexts of the FilmYourHospital hashtag.

Moments are composed and recomposed by difference through creative repetition. As such, a tweet, retweet, or "like" is simultaneously a discrete occurrence that constitutes and reconstitutes *#FYH* through repetitions of similarity (MR) and an open-ended moment that composes and recomposes *#FYH* through repetitions of difference (CR).

The @DeAnna4Congress tweet, for example, is a call to action (*"Let's get #FilmYourHospital trending"*) that actively encourages participation (*"Post pics of ur hospital here!"*), frames the hashtag narrative as a campaign (*"We ARE the news now"*), and introduces significant difference. Difference, however, is not brought forward in relative linear stability like similarity: through CR, difference is heterogeneous and dispersed. In other words, difference repeats in all "past" and "future" moments that compose and recompose the FilmYourHospital narrative.

For example, the moment that composed *#FilmYourHospital—"Can this become a thing?"*—is recomposed by *"Let's get #FilmYourHospital trending"*. Through the @DeAnna4Congress tweet, the contexts of the initial, low-visibility tweet are recomposed as compositional of the narrative that *#FYH* now makes visible. The difference of *"Let's get #FilmYourHospital trending"* also repeats in every other FilmYourHospital moment. The same is true of the difference in every other FilmYourHospital moment (or every other tweet, retweet, and "like"). To varying qualitative degrees, difference is always more or less significant in any given moment.

Moments, therefore, are not reducible like occurrences. Moments are not discrete but open-ended, compositional and recompositional of duration. We cannot say that *#FYH* is *composed of* 83% retweets or 99,039 *moments*. Any given moment is continually composed and recomposed so that *a* moment must be traced backward and forward, described in loops and erratic shifts, in discontinuities and continuities. For example, because difference "loops back" to recompose the "initial" moment of *#FilmYourHospital*, description and understanding of *"Can this become a thing?"* must also "jump forward" to *"Let's get #FilmYourHospital trending"*. Moments are not composed in isolation. Where

repetition of similarity stabilises (i.e.: constitutes and reconstitutes), repetition of difference transforms and retransforms.

Therefore, in the context of the FilmYourHospital narrative going viral, creative repetition is "just as" contingent upon the "initial" moment (*"Can this become a thing?"*) as it is upon the "later" moment (*"Let's get #FilmYourHospital trending"*).[34] As an occurrence, the tweet that "spawned" the FilmYourHospital narrative has a small role in its propagation (Gruzd & Mai, 2020) but, as a moment, it is essential. Virality of the hashtag is not only a linear result of repeated similarities dependent on specific occurrences, but an open-ended moment that is composed and recomposed of repetitions of difference.

In other words, the tweets, retweets, and "likes"—the moments—that compose the FilmYourHospital narrative can always recompose new contexts. In creative repetition, and to varying qualitative degrees, moments are always active through repetitions of difference that retransform and extend the durability of the moments that compose *#FYH*. However, while CR helps us describe the durability of moments through the contexts of time, space, object, and action, the moments cannot be fixed or stabilised.

This retelling of the *#FilmYourHospital* narrative supports a view of digital trace data as short-lived and durable. Through MR and CR, the (re)constitutive and (re)compositional elements of the hashtag and narrative (re)stabilise and (re)transform simultaneously. Again, without re-stabilisation, there can be no stabilisation, just as without re(trans)formation there can be no transformation. This is ephemerality as the temporal convergence of stability and transformation—and of sameness and difference.

Therefore, through MR and CR, ephemerality supports a holistic temporal view of digital trace data as both static occurrence and open-ended moment. MR stabilises and restabilises the *#FilmYourHospital* narrative through repetitions of similarity in occurrences that constitute and reconstitute *#FYH* in and over time. CR transforms and retransforms the narrative through repetitions of difference in moments that compose and recompose *#FYH* in and over time. The framework contexts of time, space, object, and action enable description of the repetitions of occurrences and moments.

5.7.4 The Ephemeral Dualities of Narrative Repetition in *#FilmYourHospital*

We now describe ephemerality as short-lived and durable in relation to each duality of narrative repetition in *#FilmYourHospital*. To a degree, each duality is a matter of perspective. This is because

[34] While terms like "past", "future" "loop back", "jump forward", "just as", "initial", and "later" are ontologically inappropriate to the irreducible, nonlinear nature of creative repetition they help us to adequately describe the contexts of the flows upon which moments are composed and recomposed through creative repetition.

narratives are recursive and interpretative. The dualities of narrative repetition can also overlap, perform contradictory functions at the same time, and "be present or absent" (Dailey & Browning, 2014). Our descriptions present a perspective (ephemerality) and are concisely illustrative rather than comprehensive of the (ephemeral) dualities of narrative repetition in *#FilmYourHospital*.

Control/resistance: the mechanical repetition of each *#FYH* tweet, retweet, and "like" reinforces "the essence" (Dailey & Browning, 2014) of the FilmYourHospital narrative. From this perspective, the narrative is organised through the hashtag, occurrences constitute and reconstitute the hashtag, and narrative control is the repetition of occurrences. For example, retweets or "likes" can passively frame events, encourage behaviours, and persuade. Repetition of similarity is a function of control. At the same time, the narrative functions and repeats as resistance against the essence of institutional Covid-19 narratives. From this perspective, moments compose and recompose the hashtag as an instrument of resistance *against* control. In this sense, repetition of difference is a function of resistance. The integration of MR and CR highlights that control and resistance are simultaneously constituted and reconstituted, composed and recomposed by the occurrence and the moment. The duality of control and resistance, and its narrative repetition, can be identified and richly described in cases like *"Let's get #FilmYourHospital trending"* through the lens of ephemerality.

Differentiation/integration: via narrative repetition, constructs like identity are "fluid and fragmented", continually constructed as unique and differentiated (Dailey & Browning, 2014). For example, a single social media post using *#FYH* aligns the user with a specific narrative that differentiates identity. The identity of the hashtag is similarly differentiated. Integration is mutually enabled "because when there is a "they," there is a "we"" (*ibid.*). Repetitions of "We ARE the news now", for example, not only differentiate the tweeter, retweeters, and those who "like" the post, but also integrates them as part of a collective campaign of action. Viewed as ephemeral, MR and CR render the short-lived sociotechnical contexts of differentiation and integration durable through *#FYH*. As occurrence and moment, even a single digital trace in context can be a rich instance of differentiation and integration. In the FilmYourHospital narrative, the post that differentiates the hashtag in time (*"Can this become a thing?"*) also creates the conditions for its integration over time.

Stability/change: Ephemerality describes the temporal convergence of stability and transformation. In repetitions of similarity (MR), the *#FYH* narrative is stabilised and restabilised. In repetitions of difference (CR), the *#FYH* narrative is transformed and retransformed. For example, as a non-material object, the FilmYourHospital hashtag is stable. Neither its text, timestamp usage, nor constitutive content can be changed in time or over time. As such, through MR, the hashtag is a stabilising occurrence that binds the FilmYourHospital narrative to its past and future. However, as an object that

can be interpreted, the hashtag is subject to continual change. The times, uses, and content of the hashtag are composed and recomposed in ephemeral contexts in time and over time. Through CR, the hashtag is a transformational moment. The perspective that transformation cannot emerge without stability, and that stability cannot be identified without transformation has deep philosophical roots. Ephemerality emphasises that stability is always unstable, and that instability is always stable. In *"Let's get #FilmYourHospital trending"*, for example, all elements of the FilmYourHospital hashtag are constituted and reconstituted, composed and recomposed. Being short-lived and durable, ephemerality is the convergence of stability and transformation as both occurrence and moment. Again, through our framework, a single trace of social media trace data (SMTD) can be revealing and descriptive of its dual nature as discrete, static, stabilising occurrence and open, durational, transformative moment. In the next subsection, we describe a single #FYH tweet through the framework.

5.7.5 Describing a Single *#FYH* Tweet through the Ephemerality Framework

When a single digital trace is viewed as occurrence and moment, descriptions of "how a single tweet spawned a Covid-19 conspiracy theory on Twitter" (Gruzd & Mai, 2020) are made more holistic and comprehensive (see Table 12). Our illustration in 5.7.3 focussed on the FilmYourHospital hashtag and two key *#FYH* tweets: *"Can this become a thing?"* (*"CBT?"*) and *"Let's get FilmYourHospital trending!"* In 5.4, we focus solely upon the tweet that "started the [FilmYourHospital] hashtag" (*ibid*.).

While *"Can this become a thing?"* is referenced in the Gruzd and Mai case study title, the tweet receives little attention thereafter. The significance of *"CBT?"* for *#FYH* virality is not explored because it "[attracts] only around 30 retweets".

Hashtag virality is instead "triggered" by a small number of relatively influential Twitter users (e.g.: @DeAnna4Congress) and is associated with structural, quantifiable metrics like follower numbers and retweet counts. In the resultant description of the "communication network", the significance of *"CBT?"* is obscured. In fact, *"CBT?"* is not clearly visible in any of the 8 Figures that visualise "the evolution of [the] *#FilmYourHospital* network over time" (Gruzd & Mai, 2020) (please see https://journals.sagepub.com/doi/10.1177/2053951720938405). This includes Figure 7 (the *#FYH* full dataset), Figure 4 (days 1–3), and Figure 3 (Twitter usernames for accounts with 100k+ followers only).

This is because the network structures that social network analysis (SNA) traditionally describe are constructed from temporally static stable nodes and ties that cannot comprehensively illustrate ephemeral dynamics. Ephemeral complexity cannot be reduced to fixed relational clusters and patterns. As such, SNA visualisations obscure comprehensive conceptualisation of singular, ephemeral DTD contexts, such as a time, a tweet, or tweeting.

Ephemerality can reveal the relevance of low-visibility and/or low-impact digital traces in ways that are typically obscured via extant conceptual and analytical approaches. In Table 12, we describe *"CBT?"* as short-lived, repetitive, and durable by highlighting the contexts of time, space, object, and action. The framework contexts and characteristics structure Table 12, but robust description of *"CBT?"* as ephemeral depends upon mechanical and creative repetition, the distinction of the occurrence and the moment, and the distinction of *in time* and *over time*.

The objective of Table 12 is to provide a detailed, context-rich analysis of a single digital trace ("Can this become a thing?") as ephemeral, illustrating its simultaneity as both occurrence and moment. The short-lived temporality of *"CBT?"* is the simultaneity of the tweet as occurrence and moment *in time*. *"CBT?"* as occurrence and moment in time constitutes (forms) and composes (transforms) the short-lived temporalities of *#FYH*. The durable temporality of *"CBT?"* is the simultaneity of the tweet as occurrence and moment *over time*. "CBT?" as occurrence and moment reconstitutes (reforms) and recomposes (retransforms) the durable temporalities of *#FYH*. Mechanical repetition and creative repetition condition the occurrence/moment as short-lived and durable both in time and over time.

Two points of note: the status of *"CBT?"* as the initiating *#FYH* tweet is interesting because the notion of "first"—or indeed "last"—is not straightforward when viewed through the ephemerality framework. By integrating structural and flow-based approaches to conceptualising temporality, the framework challenges the primacy of linear, fixed views of sequence. Describing *"CBT?"* as ephemeral highlights how, to greater or lesser degrees of significance, moments are *always* transformed and retransformed by nonlinear repetition in "other" moments, just as occurrences are *always* stabilised and restabilised by linear repetition in "prior" and "subsequent" occurrences.

It is notable too that the original *"CBT?"* post is no longer directly retrievable (inactive account). As discussed in 5.7.3, moments trace backward and forward, composing and recomposing in discontinuity as well as continuity. Repetition in processual contexts is "partial, fragmented, and unstable" (Hultin & Introna, 2019) because what is "missing" (the absence in presence) was—and *is*—ephemeral. Ephemerality is constituted and composed by similarities and differences "between" then and now (Doyle et al., P3). Where MR is the absence of difference, CR is the absence of similarity. Beyond the social media concerns of archiving and screenshotting, ephemerality gives new meaning to the idea that absence highlights presence (Pentland et al., 2020).

Table 12. A Single #FilmYourHospital (#FYH) Tweet as Ephemeral

#FYH tweet:	*Ephemerality Framework Core Characteristics, Concepts, and Vocabulary*		
	Short-lived	**Repetitive**	**Durable**

"Can this become a thing?" (*"CBT?"*)	A single tweet as Occurrence & Moment In Time	Mechanical Repetition (MR) Creative repetition (CR)	A single tweet as Occurrence & Moment Over Time
Time	As a discrete occurrence in time, a single tweet constitutes (i.e.: forms; structural). *"CBT?"* constitutes #FYH: i.e.: 6:36 AM, 28 March 2020 *"CBT?"* occurrence forms/stabilises short-lived contexts in time (see space, object, and action)	**MR** constitutes **short-lived** stability through repetition of **similarity** in occurrences **in time**. **MR** reconstitutes **durable** stability through repetition of **similarity** in occurrences **over time**. Occurrences reveal similarities. *"CBT?"* constitutes short-lived stability through repetition of similar contexts in time: e.g.: the discrete timestamp of the occurrence constitutes a specific temporal context for *"CBT?"* that passively repeats social media norms in time (see space, object, action). *"CBT?"* reconstitutes durable stability through repetition of similar contexts over time: e.g.: the discrete timestamp of the occurrence reconstitutes specific temporal contexts for *"CBT?"* that passively repeat social media norms over time (see space, object, action).	As a discrete occurrence over time, a single tweet reconstitutes (i.e.: reforms; structural) *"CBT?"* reconstitutes #FYH: i.e.: discrete occurrence reformed *"CBT?"* occurrence reforms/restabilises durable contexts over time (see space, object, and action)
	As an open-ended moment in time, a tweet composes (i.e.: transforms; flow-based). Open-ended *"CBT?"* composes #FYH: i.e.: latent capacity for moment to re-emerge *"CBT?"* moment transforms short-lived contexts in time (see space, object, and action)	**CR** composes short-lived transformation through repetition of difference in moments in time. **CR** recomposes durable transformation through repetition of difference in moments over time. Moments reveal differences. *"CBT?"* composes short-lived transformation through repetition of different contexts in time: e.g.: the open-ended time of the moment composes temporal contexts for "*CBT*?" that actively repeat social media norms in time (see space, object, action). *"CBT?"* recomposes durable transformation through repetition of different contexts over time: e.g.: the open-ended time of the moment recomposes temporal contexts for *"CBT?"* that actively repeat social media norms over time (see space, object, action).	As an open-ended moment over time, a tweet recomposes (i.e.: retransforms; flow-based). Open-ended *"CBT?"* recomposes #FYH i.e.: actual re-emergence of moment *"CBT?"* moment retransforms durable contexts over time (see space, object, and action)
Space	*"CBT?"* constitutes #FYH spatial context: e.g.: forms/stabilises bounded digital space	**MR** in time of similar, recognisable, structural Twitter spatial characteristics through "*CBT*?" **MR** over time of similar, recognisable, structural Twitter spatial characteristics through "*CBT*?"	*"CBT?"* reconstitutes #FYH spatial context: e.g.: reforms bounded digital space
	"CBT?" composes #FYH spatial context: e.g.: transforms open-ended digital space in time.	**CR** in time of different digital spatial contexts (e.g.: *"CBT?"* as a novel digital spatial context) **CR** over time of different digital spatial contexts (open-ended dissemination (e.g.: "*CBT*?" at https://archive.is or https://knowyourmeme.com))	*"CBT?"* recomposes #FYH spatial context: e.g.: retransforms open-ended digital space over time.

Object	*"CBT?"* constitutes #FYH as object: e.g.: forms content, hashtag	**MR** in time of similar, recognisable, structural Twitter object characteristics (e.g.: text and hashtag use stabilise "*CBT*?" object in time) **MR** over time of similar, structural Twitter object characteristics (e.g.: specific text characters and hashtag restabilise "*CBT*?" object over time)	*"CBT?"* reconstitutes #FYH as object: e.g.: reforms content, hashtag
	"CBT?" composes #FYH as object: e.g.: open-ended potential for interpretation	**CR** in time of different digital object contexts (e.g.: novel text characters and hashtag transform *"CBT?"* object in time) **CR** over time of different digital object contexts (e.g.: "Likes", comments, retweets retransform *"CBT?"* object over time)	*"CBT?"* recomposes #FYH as object: e.g.: actual emergence of interpretation
Action	*"CBT?"* constitutes #FYH action: e.g.: forms posting of tweet	**MR** in time of similar, recognisable, structural Twitter actions through "*CBT*?" (e.g.: taps, scrolls, posting stabilise "*CBT*?*"* action in time) **MR** over time of similar, structural Twitter actions through "*CBT*?" (e.g.: "liking", commenting, retweeting restabilise "*CBT*?*"* action over time)	*"CBT?"* reconstitutes #FYH action: e.g.: reforms posting of tweet
	"CBT?" composes #FYH action e.g.: open-ended potential for interaction	**CR** in time of different action contexts (e.g.: novel taps, scrolls, posting transform "*CBT*?*"* action in time) **CR** over time of different action contexts (e.g.: "Liking", commenting, retweeting retransforms *"CBT?"* action over time)	*"CBT?"* recomposes #FYH action e.g.: actual emergence of interaction

Our analysis of the single tweet in Table 12 highlights the ephemeral nature of "CBT?" as both an occurrence and a moment that is shaped by the interplay of mechanical and creative repetition. This application of the framework offers a novel perspective of SMTD, emphasising how digital traces can be simultaneously short-lived and durable. This simultaneity reflects the real-world dynamics of SMTD: a tweet can be both discrete, stabilising occurrence and open-ended, transformational moment.

By illustrating how mechanical and creative repetition integrate discrete occurrences and open-ended moments in and over time, the framework provides a dual lens for understanding DTD temporality. This perspective enriches existing approaches to conceptualising the temporality of DTD by capturing the short-lived yet durable qualities of ephemeral data. We discuss the contributions and limitations of the ephemerality framework further in 5.8.

5.8 Contributions, Future Research, and Limitations

We first discuss the framework in relation to the structural, performative, and flow-based approaches to conceptualising DTD temporality in IS (5.8.1). Next, we discuss the framework as a comprehensive conceptual tool for IS (5.8.2). We then present a set of research questions to prompt future application

of the framework (5.8.3). Finally, we consider a selection of potential objections and limitations (5.8.4).

5.8.1 The Ephemerality Framework and IS Approaches to Conceptualising DTD Temporality

The ephemerality framework contributes to IS research by highlighting and addressing tensions in the structural, performative, and flow-based approaches to conceptualising the temporality of digital trace data. By integrating mechanical and creative repetition, the framework foregrounds ephemeral phenomena as a duality of short-lived and durable. This integrative perspective can enhance existing research approaches, enabling rich and holistic conceptualisations of DTD as simultaneously discrete and durational, stabilising and transformational, in and over time, space, object, and action.

5.8.1.1 The Structural Approach and Ephemerality

The structural approach prioritises sequential relating of events or patterns to reveal dynamic, unfolding processes. The events or patterns are constituted of aggregated occurrences of DTD. A singular occurrence is a record of activity, entitatively representative of naturally occurring interactions. Temporally, the occurrence is discrete, static, and situated in the past.

In the structural approach, the problem of defining process with the elements that constitute process (Langley, 1999) is explicit: dynamic and unfolding processes are constituted of discrete and static occurrences. For example, establishing "minimum temporal granularity" in DTD research design makes discrete occurrences observable (Pentland et al., 2021) but also clarifies a durational cut-off point for what can—and *cannot*—be process. By aggregating occurrences into events, and events into processes, the structural approach also implicitly emphasises stability. For example, *"Let's get #FilmYourHospital trending…"*, via the structural approach, is a time-stamped occurrence, the impact of which is reduced to relatively stable metrics such as retweet or "like" counts that demarcate the scope of analysis but limit our view to repetitions of similarity—sharing or "liking—that reinforce structural patterns.

The structural approach—correlating with mechanical repetition—can only be processual to a degree that is not quantifiable (i.e.: creative repetition). As occurrences aggregated as events unfold *over* time (Grisold et al., 2022; Zhang et al., 2022), processual duration is distanced from the DTD occurrence *in* time. The occurrence is fixed so that the unstable structure that it constitutes (e.g.: the FilmYourHospital narrative) can be rendered relatively stable. However, discrete, linearly sequenced occurrences of DTD repeat only in aggregations of similarity that strip the occurrence of its rich processual momentariness.

Mechanical and creative repetition extend the structural approach by integrating the occurrence and the moment, framing them as both stabilising *and* transformative. Through MR and CR, structural elements are simultaneously discrete occurrence (stabilising) and open-ended moment (transformational). This

duality reframes the view that process emerges from aggregated occurrences by highlighting the ephemeral interplay of short-livedness and durability in and over time. By emphasising the temporal richness of structural occurrences, the framework addresses IS calls to make process design "more fine-grained and more continuous" (Mendling et al., 2020) and offers a complementary lens for analysing temporality in structural contexts. At its limit, making process design more fine-grained and more continuous means process must better account for occurrences that are short-lived and durable.

5.8.1.2 The Performative Approach and Ephemerality

Performative DTD are produced, co-constituted traces of social and material relation. Relation refers to activity, interaction, or process. DTD are temporally co-constituted by the social and the material through activity, interaction, and process. Performative DTD are produced because there is no temporal gap between relation and trace: the trace is formed as the relation of the social and the material emerges. As such, the performative "trace" is emergent and evolving. Produced from context to context—or from now to now—the performative trace is inherently short-lived.

However, performative conceptualisation typically relies upon either structural or flow-based analysis. The performative trace is temporally analysed as either a structurally discrete record (Hedman et al., 2013; Avital et al., 2021), a "residue left behind" (Lindberg, 2020) or as a flow-oriented assemblage of the social and material (Østerlund et al., 2020). Therefore, performative approaches are typically subject to either structural or flow-based tensions: the *emergent* performative trace is either structurally static, or its "now" cannot be described without compromising the flow-based perspective (see next section).

Framing performative traces as inherently ephemeral addresses these tensions. Mechanical repetition stabilises the performative trace while creative repetition simultaneously produces transformation. This duality of short-lived and durable explicitly highlights the performative capacity of the short-lived trace to co-constitute relations in ways that endure both *in* and *over* contexts. In *#FilmYourHospital*, MR and CR of singular tweets, retweets, and/or "likes" co-constitute relational dynamics that stabilise and transform both the immediate context ("now" in time) and dispersed contexts ("now" over time).

This framing enables a richer description of performative DTD in the immediate context *and* over contexts. MR and CR ground the idea of performative traces "rippling through" relations (Østerlund et al., 2020). As such, the ephemerality framework can extend the analytical scope of the performative approach while maintaining its central emphasis on social-material relations.

5.8.1.3 The Flow-based Approach and Ephemerality

Temporally, flow-based DTD are timely heterogeneous moments of duration along coalescing flows of

action. Flow-based approaches background entities to describe flows of action. From the flow-based perspective, describing that which is short-lived is a challenge because, when reality is flow-based, no *thing* is discrete or static, and every *thing* is in continual, fleeting becoming. Consequently, in the flow-based approach, the present state of an entity is less meaningful than its past and future trajectories.

This is why flow-based "vocabulary backgrounds the apparent stability of the local here-and-now situations in daily life [and] the dynamics of boundary making in recurrent patterns of action" (Baygi et al., 2021). However, recurrent interactions in the here-and-now of everyday life are characteristic of DTD contexts, as the structural and performative approaches make clear. In sum, the scope to describe immediate, short-lived, everyday contexts is limited through the flow-based approach.

As such, a challenge for the flow-based approach is to describe forms of everyday recurrence as appropriate to the processual flow-based view. Grisold et al. (2024) define a "processual pattern" as "a representation of one or multiple sequences of actions and events that captures their recurrent aspects in a recognisable form as the phenomenon of interest changes over time." They note by analogy that "while static patterns are pictures, processual patterns are movies." Similarly, in Pentland et al. (2021), occurrences are likened to pixels, which, when sequenced, "form the duration of each frame in the movie." These descriptions are process-based and structural—but not processual. The movie analogy, and the illusion of flow that it describes, is not applicable to flow-based analysis because, as we have seen, this conceptualisation renders processual duration discrete and static.

The ephemerality framework addresses these tensions by supporting the integration of entities into the here-and-now without ontologically downgrading the flow-based perspective. As short-lived and durable, the duality of MR and CR shows that *the ephemeral presence of an entity is discernible and meaningful*. In fact, without some *thing* to describe (e.g.: a timestamp, a platform, a retweet), flows cannot be described. Baygi et al.'s (2021) description of flows is contextualised by 15,000 tweets.

Furthermore, while Baygi and colleagues suggest that "attention can be "caught or captivated, pulled in one direction or another by the directionalities of flows," the term directionality itself implies *some* reliance upon contextual entities, no matter how ephemeral. Flows are not isolated phenomena: again, their directionalities are made meaningful by the *ephemeral presence* of the times, spaces, objects, and actions that contextualise them. In the *#FilmYourHospital* narrative, ephemeral entities help us to make sense of flows, just as flows can describe how ephemeral entities emerge, disappear, and endure.

Our framework complements the flow-based approach by explicitly highlighting the ephemerality of entities. As simultaneously short-lived and durable, ephemeral entities (re)stabilise and (re)transform flows through mechanical repetition and creative repetition, both in and over time. Foregrounding this

duality enriches the analytic capacity of the flow-based approach, offering a more holistic way to conceptualise the temporalities of digital trace data.

5.8.2 A Comprehensive Conceptual Tool for IS Research

It is important to note that IS research around "processual phenomena" is "just getting started" (Pentland et al., 2021). Rich description of processual dynamics is therefore required (Kishore et al., 2024; Kreps & Rowe, 2024). The ephemerality framework addresses this need. In this section, we discuss how the framework establishes a distinct temporal perspective for IS research, can facilitate the development of core IS concepts, and can be used alongside methods for investigating diverse IS phenomena.

5.8.2.1 Ephemerality as a Distinct Temporal Perspective

Conceptualisations of time can provide unique insights into IS phenomena (Kishore et al., 2024). While structure and flow underpin foundational temporal perspectives, their exclusive application obscures the conceptualisation of ephemerality as the temporal convergence of stability and transformation. Integrating these perspectives enriches both approaches without privileging one over the other. This synthesis also positions ephemerality as a distinct temporal perspective that holistically describes the here and now of ephemeral phenomena in time, and the durability of ephemeral phenomena over time.

Via this perspective, ephemeral phenomena are not merely either fleeting or constitutive/compositional elements of more durable structures/flows. Ephemeral phenomena can be richly described in immediacy and durability. The introduction and integration of two forms of repetition establish this perspective: mechanical repetition is structural and process-based; creative repetition is processual and flow-based.

Mechanical repetition (MR) and creative repetition (CR) provide conceptual vocabulary specific to each form of repetition. "Constitute" and "reconstitute" are specific to the linear, stabilising repetitions of similarity that characterise MR. "Compose" and "recompose" are specific to the nonlinear, durational repetitions of difference that characterise CR. The framework relates MR to discrete, static "occurrences" and CR to open-ended, durational "moments". The occurrence and moment are two sides of the same ephemeral duration. We also distinguish "in time" and "over time". Repetitions that stabilise (MR) and transform (CR) short-lived contexts constitute and compose occurrences/moments *in time*. Repetitions that restabilise (MR) and retransform (CR) durable contexts reconstitute and recompose occurrences/moments *over time*. All ephemeral contexts are short-lived and durable. Finally, the contexts of time, space, object, and action reveal and enable description of occurrences and moments. Integrating MR of the occurrence and CR of the moment characterises ephemeral duration as "short-lived" and "durable" in and over time, space, object, and action. This integration differentiates ephemerality from structural, performative, and flow-based conceptualisations.

These forms of repetition can support rich and novel conceptualisation of IS phenomena. Digital trace data, for example, when viewed as ephemeral, are simultaneously discrete, static records as occurrences and open-ended, flow-based durations as moments. Seen as merely one or the other limits the holistic conceptualisation of DTD. As such, ephemerality complements extant approaches to conceptualising the temporality of DTD (see 5.8.1) but also provides IS scholars with a distinct temporal perspective for investigating both the immediate and enduring stability and transformation of diverse IS contexts.

5.8.2.2 Core IS Concepts, Everyday Digital Contexts, Scale, and Theory Development

Our framework can support development of core IS concepts, like system and transformation, as well as the sociotechnical interactions that shape everyday digital contexts. For example, Yoo (2015) argues that evolutionary systems biology provides powerful models for studying IS phenomena, like DTD:

> "Activities and processes that used to be separated in time and space in the past are… increasingly connected through large-scale digital infrastructure… As the connectivity among different activities rise, it also increases *the potential heterogeneity in the system* through the participation of *new types of social objects*…
>
> In contemporary evolutionary biology, a population is understood through the lens of *multiplicity*, as variety within and between species are expected to exist spontaneously. Therefore, *differences* among species and subspecies *are not understood by measuring the deviation from the unobservable ideal form* (i.e.: through means and standard deviation), *but through the rate of evolution from a common ancestor existing in the past*. Thus, mathematically speaking, *multiplicity in a population represents a state space, with any particular individual at any given point in time being a particular state in the space*" (emphasis added).

Evolutionary models suggest that systems evolve through state transitions, wherein any particular state is both fleeting and connected to broader evolutionary processes. This resonates with the concept of ephemerality, which frames "a given point in time" as both short-lived and durable. The "state space" underscores the nature of systems as interconnected and evolving, with multiplicity within and between states capturing stability and transformation. Through the lens of our framework, mechanical repetition (re)constitutes system stability by reinforcing recurring patterns of similarity, while creative repetition (re)composes system transformation by introducing difference. This duality highlights the ephemeral interplay of stability and transformation, offering IS researchers a nuanced lens for investigating system evolution, where immediate states are both transient and enduring within broader processes of change.

Our ephemerality framework supports rich analysis of diverse sociotechnical interactions that shape everyday digital contexts. The framework extends social media research, for example, by providing a

novel temporal lens for analysing how a single social media "like" can "reveal as much about… intention as hundreds of heterogeneous likes" (Kristensen et al., 2017). Similarly, the framework offers a unique perspective for examining "real-time" sociotechnical interactions, like mouse-cursor movements (Weinmann et al., 2022).

Barrett and Orlikowski (2021) note that IS research typically treats scale as a pregiven category with measurable properties, such as number of "likes" or mouse-cursor movements. They argue, however, that analysis of phenomena *at scale* (e.g.: DTD) "does not help us understand phenomena *with scale*" and, as a result, fails to "capture the lived experience *of* scale." The integration of mechanical and creative repetition supports analysis of ephemeral phenomena *with* scale (such as a single "like" or mouse-cursor movement) and can advance IS understanding of scale as a lived experience.

Finally, IS DTD research often assumes that theory emerges inductively from large datasets (Tremblay et al., 2021; Grisold et al., 2024). However, new concepts and abstract theorising remain essential for IS (Grover & Lyytinen, 2023). The ephemerality framework provides IS with a conceptual tool that can help IS researchers to *look for* patterns in digital trace data and to develop subsequent theory.

5.8.2.3 Ephemerality Framework and Methodology

Our framework can also help advance IS methodology around DTD (Kreps & Rowe, 2024; S. Miranda et al., 2022; Z. Zhang et al., 2022). For example, Østerlund et al.'s (2020) diffractive methodology highlights how DTD acquire significance through emergent "differences that matter". Building on this perspective, our framework integrates creative repetition, which highlights difference, with mechanical repetition, which highlights stability, providing a dual lens that can address the recurrence of temporal phenomena in trace data. By treating occurrences as quantifiable instances of stability and moments as qualitative, transformational durations, the framework can also complement computationally intensive and mixed-methods approaches to analysing DTD (Miranda et al., 2022), enabling rich analysis of both structural (synchronic) and processual (diachronic) DTD dynamics (Berente et al., 2019).

5.8.3 Future Research Directions

In Table 13, we present research questions to inspire future applications of the ephemerality framework. The first three table sections are structured in relation to the primary characteristics of ephemerality—short-lived, unstable, durable—in the contexts of the social media trace data illustration in section 5.7. The subset of questions in the final section of Table 13 extends the ephemerality framework into a selection of diverse IS domains.

Table 13. Questions to Inspire Future IS Applications of the Ephemerality Framework

1. Questions in relation to "short-lived" characteristic:
1) How does a single tweet, as an occurrence, constitute short-lived stability in time? Describe the contexts (time, space, object, action) that constitute short-lived stabilisation of a tweet as an occurrence in time.
2) How do platform-specific mechanisms (e.g.: algorithmic prioritisation) and affordances (e.g.: of ephemerality-based platforms) stabilise the short-lived occurrence of a tweet in time?
3) How does a single tweet, as a moment, compose short-lived transformation in time? Describe the contexts (time, space, object, action) that compose short-lived transformation of a single tweet as a moment in time.
4) How do rapidly changing sociotechnical factors like viral engagement or trending hashtags shape short-lived transformations of a single tweet as a moment in time?
2. Questions in relation to "repetitive" characteristic:
5) How is a tweet as an occurrence reconstituted over time, particularly through repetitive use of hashtags, platform-specific features, or user engagement patterns?
6) What contextual similarities in social media trace data describe mechanical repetition in time, and how do these similarities emerge in time on social media platforms?
7) How is a tweet as a moment recomposed over time through creative repetition, and what qualitative degrees of difference ensure its continued emergence?
8) What contextual differences in social media trace data describe creative repetition in time, and how do these differences emerge in time on social media platforms?
9) What platform constraints (e.g.: character limits) shape the mechanical repetition of a tweet in and over time, and how do these constraints differ between platforms?
10) Do platform affordances (e.g.: retweeting) and user behaviour (e.g.: retweeting) influence the interplay of mechanical and creative repetition?
11) How does the mechanical and creative repetition of social media posts compare and contrast across platforms, and what implications do the similarities and differences have for their durability?
12) What contextual factors influence mechanical repetition of social media as opposed to creative repetition and vice versa?
3. Questions in relation to "durable" characteristic:
13) How does a single tweet, as an occurrence, reconstitute stability over time? Describe the contexts (time, space, object, action) that reconstitute the stabilisation of a tweet as an occurrence over time?
14) How do platform affordances (e.g.: archival tools) and user behaviours (e.g.: archiving) influence the recomposition of a social media post as a moment over time?
15) How does a single tweet, as a moment, recompose transformation over time? Describe the contexts (time, space, object, action) that recompose a tweet as a moment over time?
16) How do sociotechnical dynamics, such as platform obsolescence or evolving norms, shape the recomposition of a tweet as a durable moment over time?
4. Questions in relation to diverse IS contexts
17) **Ethics:** What ethical considerations arise from the ephemeral nature of DTD, particularly in the areas of data collection, privacy, surveillance, archival practice, and user consent?
18) Does the ephemerality framework give rise to ethical concerns around issues of accountability?
19) **Artificial Intelligence:** How can recommender systems leverage the interplay of short-lived and durable digital traces to personalise user experiences without compromising ethical principles like privacy and autonomy?
20) In algorithmic decision-making, how can ephemeral dynamics (e.g.: the tension of short-lived data signals and historical user logs) improve and/or challenge predictive accuracy, fairness, and accountability?

21) **Organisation:** How can organisations leverage the short-lived and durable nature of ephemerality to enhance decision-making processes that depend on rapidly evolving digital environments?
22) How can organisations adapt knowledge-sharing practices to incorporate insights from ephemeral digital traces, ensuring both agility and longer-term relevance?
23) **Design:** How can IS design leverage the interplay of short-lived and durable ephemeral states to optimise user interaction and engagement with digital platforms? For example, in online gaming and virtual reality contexts?
24) How can IS design integrate ephemeral states to support adaptive, context-aware systems, such as those used in crisis response or live event monitoring?
25) **Misinformation:** How might the nature of occurrences/moments as short-lived and durable be intentionally leveraged in misinformation campaigns?
26) How can IS researchers use the ephemerality framework to better understand contexts where DTD are fundamentally unstable, ambiguous, or contested, such as misinformation or socio-political narratives?
27) **Collective Action:** How can the ephemerality framework illuminate the formation and evolution of collective action narratives, such as misinformation or social movements, in digital spaces?
28) How does mechanical and creative repetition sustain and transform collective action in and over time?
29) **IS & Education:** How can the interplay of short-lived and durable traces in online learning environments enhance student engagement, feedback loops, and knowledge retention?
30) How can digital learning platforms leverage creative and mechanical repetition to improve the personalisation and effectiveness of educational content over time?

5.8.4 A Selection of Limitations

Several limitations must be acknowledged. First, given the limited, though targeted, scope of our DTD review (see 5.4 and 5.5), a more comprehensive review may reveal additional nuances in the structural, performative, and flow-based approaches to conceptualising the temporality of DTD in IS research.

Second, while section 5.7 illustrates how our framework can advance the conceptualisation of DTD, empirical validation beyond application to a single case study, as well as in other IS contexts, is required. Until such validation, the framework contribution will remain primarily conceptual.

Third, managing the framework contexts of time, space, object, and action adds significant complexity to research design. Each context should be considered on a study-by-study basis as, in any given study, it is unlikely that all contexts will be equally relevant. As previously noted, mixed-methods approaches (Berente et al., 2019), diffractive approaches (Østerlund et al., 2020), and methodologies that specifically integrate temporality (Kishore et al., 2024) may be particularly useful for handling the complexity that the ephemeral framework makes explicit.

Finally, ephemeral complexity is most explicit in the core framework duality of mechanical repetition and creative repetition. From a structural, performative, or flow-based perspective, the question might be asked: how can we identify what is similar and different in any given occurrence or moment without comparing and contrasting with other occurrences and moments? And if we *must* compare and contrast,

are we not simply engaging a structural, performative, or flow-based approach?

The logic and novelty of the framework lies in its conceptualisation of repetition, and its integration of occurrence/moment in and over time. Structural approaches move from occurrence to process, performative move from context to practice, and flow-based from becoming to flow. Through each approach, ephemerality is subsumed. Our framework reverses the point of focus to establish the short-lived occurrence (context or becoming) as significantly durable. Taking the view that MR and CR are inseparable, any application of the framework must establish sufficient repetition of similarity through ephemeral contexts for repetition of meaningful difference to emerge. Comparing and contrasting are necessary not only to discern and describe process, practice, or flow over time but to more fully reveal the here and now of the ephemeral occurrence and moment in time.

5.9 Conclusion

Paper 4 introduces a framework for ephemerality that advances temporal conceptualisation of digital trace data. Mechanical repetition and creative repetition are central to the framework, highlighting how ephemeral phenomena simultaneously stabilise and transform in and over the contexts of time, space, object, and action.

By accounting for short-lived and durable contexts through the duality of MR and CR, the framework provides a unified temporal model that better reflects the complexity and lived experience of digital phenomena. A single tweet, for example, is both a discrete, reproducible occurrence and an open-ended, transformational moment. A single tweet is formed of repetitions, both mechanical and creative. This dual-aspect conceptualisation bridges structural and flow-based temporal approaches in ephemeral contexts, enabling new IS insights.

In conclusion, we note that our framework supports a simple premise: if the contexts through which digital trace data emerge are ephemeral, then digital trace data itself should be considered ephemeral—when ephemerality means short-lived and durable.

6 Thesis Conclusions

6.1 Key Features of Paper 4 and Ephemerality Framework Iteration 3

6.1.1 Framework Characteristics

The third iteration of the framework (EF3) delineates three primary characteristics of ephemeral phenomena: short-lived, repetitive, and durable. The short-lived characteristic is described through occurrences/moments that are constituted/composed *in time*. The durable characteristic is described through occurrences/moments that are *re*constituted/*re*composed *over time*. The repetitive characteristic allows for the mechanical and creative repetition of occurrences/moments in *and* over time. Definitions of the key framework concepts are provided in Table 14 (see 6.1.3). The concepts and their interrelations are also described through the principles of Table 3 (Chapter 1, p.19).

6.1.2 Framework Contexts

EF3 integrates four contexts: time, space, object, and action. The contexts reveal and support the description of ephemeral occurrences/moments. Contexts described as short-lived and durable through mechanical repetition are temporally discrete, static, and/or entitative-based in and over time. Contexts described as short-lived and durable through creative repetition are temporally open-ended, durational, and/or flow-based in and over time.

6.1.3 Overview of Key Ephemerality Framework (EF3) Concepts

Table 14. Overview of Key Ephemerality Framework (EF3) Concepts

Concept	**Description**
Core characteristics	
Short-lived	Characterises the durational state of ephemeral contexts *in* time.
Durable	Characterises the durational state of ephemeral contexts *over* time.
Repetitive	A duality of mechanical repetition and creative repetition.
Forms of repetition	

Mechanical repetition (MR)	Repetition of occurrences that are constituted and reconstituted through passive or automated execution, linear processes of connection or aggregation, reducibility to discrete parts, and stabilising similarity.
Creative repetition (CR)	Repetition of moments that are composed and recomposed through active or intentional engagement, nonlinear durations of reconnection or emergence, irreducibility to discrete parts, and transformational difference.
Constitute	To form or stabilise an occurrence in time.
Compose	To transform or create a moment in time.
Reconstitute	To reform or restabilise an occurrence over time.
Recompose	To retransform or recreate a moment over time.
Temporal dimensions	
Occurrence	A discrete and entitative-based ephemeral duration that manifests through mechanical repetition both in time (short-lived) and over time (durable).
Moment	An open-ended and flow-based ephemeral duration that manifests through creative repetition both in time (short-lived) and over time (durable).
In time	Refers to stabilisation (MR) and transformation (CR) in immediate ephemeral contexts.
Over time	Refers to restabilisation (MR) and retransformation (CR) over immediate ephemeral contexts.
Descriptive contexts	
Time	Discrete, static, entitative-based *and* open-ended, durational, flow-based.
Space	Temporally discrete, static, entitative-based *and* temporally open-ended, durational, flow-based.
Object	Temporally discrete, static, entitative-based *and* temporally open-ended, durational, flow-based.
Action	Temporally discrete enactment *and* temporally open-ended performance.

6.1.4 Paper 4 IS Context: Digital Trace Data

Paper 4 establishes digital trace data as the primary IS focus of this thesis. In retrospect, the seeds of this focus were sown much earlier, in tandem with the key paper 2 focus upon ephemerality and its relation to conceptualisation of the present. Paper 2 notes, for example, that the objective present does not disappear without a trace (Husserl, 1964, p.122) and that ephemerality *follows* traces (Muñoz, 1996) (see 3.6.4). EF1 (Table 4) also partially describes the "Unstable, Durable" characteristic as "fragmented, fleeting temporal traces".

The "everyday digital contexts" of key paper 3 subsequently make ephemerality and digital trace data the explicit research focus. Paper 3 highlights the common IS conceptualisation of DTD as records of "naturally occurring interactions" (Grover et al., 2020) at "specific points in time" (Hedman et al., 2013; Grisold et al., 2022). Paper 3 then introduces the idea that DTD are ephemeral—or simultaneously short-lived and durable (4.3)—before discussing social media DTD as the potential IS application area for the ephemerality framework in this thesis.

Building on these ideas, paper 4 is motivated by the idea that IS requires richer description of DTD as

a point in time. In other words, should IS scholars consider DTD—as a point in time—a discrete snapshot or an open-ended duration? Applied as a distinct temporal perspective (Table 9 and 5.8.2.1), EF3 (5.6; Table 11) reveals and supports the view that DTD are simultaneously both (5.7; Table 12). This view is illustrated by applying EF3 to a case study of the Covid-19-related *#FilmYourHospital* conspiracy theory. The illustration shows how the FilmYourHospital hashtag can be conceptualised as ephemeral, before highlighting the ephemerality of a single *#FilmYourHospital* tweet.

Conceptualising DTD as ephemeral reveals tensions in extant IS temporal approaches (5.8.1) and opens new pathways for theorising the temporality of IS phenomena (5.8.2).

6.2 Issues Arising from Key Paper 4 and EF3

6.2.1 Logical Ambiguity

6.2.1.1 Explicating duality

EF3 conceptualises ephemerality via three distinct but interlocked dualities. At its highest level, EF3 describes the temporal states of ephemerality as simultaneously short-lived and durable (duality 1).

At the core of the framework are the forms of repetition that simultaneously condition ephemerality as short-lived (in time) and durable (over time): mechanical repetition and creative repetition (duality 2).

Finally, the occurrence and moment (duality 3), as manifestations of mechanical and creative repetition, enable description of ephemeral contexts in and over time, space, object, and action.

As such, the three dualities as described work *side to side* and *up and down* through the framework (see Figure 2 (Chapter 1, p.20).

Although the concept of duality is introduced as early as key paper 2 (Section 3.6.4) and through EF1 (Table 5)—and is retrospectively addressed in Chapter 1—given its prominent positioning in paper 4, the concept itself is not sufficiently explicated across this thesis.

6.2.1.2 Absence of "latent" and "manifest" in Paper 4 and EF3

The "latent" and "manifest" qualities of ephemerality help explicate the durability of ephemeral phenomena in paper 3 and EF2 (4.6.4 and Table 8). These concepts are absent from paper 4 and EF3.

6.2.2 Interdisciplinary Accessibility

Given the complex nature of the interdisciplinary perspectives upon which the logic of EF3 relies, accessibility remains a significant issue (see also 4.1.2.3 and 5.1.2.2). Foregrounding digital trace data

as the research focus of key paper 4 makes the work more accessible to an IS audience. However, any perceived accessibility improvements come at the expense of explicating EF3 in paper 4. As a result, familiarity with paper 3 and EF2 is a prerequisite for sufficient understanding of paper 4 and EF3.

6.2.3 Methodological Clarity

Of the three key papers through which the ephemerality framework is developed (papers 2, 3, and 4), paper 3 provides the most detailed account of the review processes that guided the iterative development of the ephemerality framework (see Section 4.5). Using narrative repetition as a methodological device also anchors the most substantial application of the framework in key paper 4 (see 5.5.2 and 5.7.1). However, an IS audience will require greater methodological clarity around both review and application processes. See also Section 6.3.3 below.

6.2.4 Operational Challenges

EF3 develops the most refined and clearly applicable iteration of the ephemerality framework to date for IS researchers. Accordingly, for this thesis, key paper 4 develops the most substantial and replicable application of the framework in the IS contexts of digital trace data. However, the application of EF3 to the *#FilmYourHospital* case study remains illustrative rather than empirical, relies on second-hand data, and does not fully demonstrate the novel descriptive and explanatory capacity of the framework. In fact, it may be that the identification of the three IS approaches to conceptualising the temporality of digital trace data in relation to a view of DTD temporality as ephemeral is more revealing and instructive for IS research than the application of EF3 to the *#FilmYourHospital* case study.

6.3 Signposting Framework Development and Future Research

6.3.1 Logical Ambiguity

Enhanced clarity around the meaning of duality will reduce logical ambiguity in relation to its ultimate conceptual role in EF3. Noting that duality has no official definition, Farjoun (2010), following Jackson (1999), describes a duality as "the twofold character of an object of study without separation." Like a dualism, the object of study has two essential elements (e.g.: ephemerality as "short-lived" and "durable"). However, a duality differs by viewing these elements "as interdependent, rather than separate and opposed." Farjoun notes that while these elements are "conceptually distinct" they are also "mutually enabling and a constituent of one another." This is important because it means that dualities "can maintain conceptual distinctions without being committed to a rigid antagonism or separation." Farjoun's understanding is consistent with the description of the three "interlocked" dualities of EF3 (see 6.2.1.1 and Section 1.8.6 (Figure 2)). The concept has additional EF3 basis in the Heraclitean

"Unity of Opposites" (see Section 4.1.5.5), whereby opposites—i.e.: stability and transformation—are mutually sustaining (Graham, 2019).

Future research might explore EF3 by considering what would be lost and gained by framing ephemeral short-livedness and durability as a dualism rather than a duality. In that case, EF3 would be modelled along a continuum—from more short-lived to more durable—with mechanical and creative repetition likewise reduced to a linear spectrum. Such a framing would more easily allow for fine-grained gradations of ephemerality, which, in turn, would enable distinctions between types of ephemerality. In other words, a dualism framing would primarily support the temporally static, reducible, linear qualities of mechanical repetition only. A dualism would effectively erase the processual richness enabled by creative repetition and undercut the mutual "together-and-apart" logic that dualities sustain.

Finally, it must also be noted that future developments and iterations of the ephemerality framework should reintroduce the concepts of "latent" and "manifest", which remain highly relevant to its logic.

6.3.2 Interdisciplinary Accessibility and Operational Challenges

Moving forward, balancing framework explication, clarity, and accessibility with robust IS application will be the central research motivation. Digital trace data is a timely, compelling, and significant IS research focus. Future development of this research will aim to apply its framework in the contexts of digital trace data in ways that more robustly illuminate the novelty of its logic.

Finally, while the separation of papers 3 and 4 is essential for this thesis—reflecting both the natural learning curve of the PhD as well as the iterative emergence of the framework—it may be that papers 3 and 4 will form a single paper in future development of the research.

6.3.3 Methodological Clarity

Although the emergence of the ephemerality framework can be described from key paper 1 (see next subsection), iterative development most clearly occurs through the reviews of papers 2, 3, and 4. This research is positioned as "review/theory development (RTD)" work (Leidner, 2018) (see also 4.5). As with Templier and Paré's (2015) comparable account of "developmental reviews", an objective of RTD work is to provide new concepts, frameworks, and/or theories. Such work is typically concept-centric and/or and phenomenon focussed. The primary focus of the reviews is ephemerality as both concept and phenomenon, and the primary contribution of the thesis is a conceptual framework for ephemerality.

The ephemerality review approaches in papers 2 and 3 are not systematically documented. However, given the subject matter, the review scope and depth are appropriately extensive, progressively targeted, and sufficiently complex. Given the scope and depth, the RTD review approach is "inductive top-down"

(Shepherd & Sutcliffe, 2011) in the sense that, to produce EF3, understanding of tensions in the relevant extant literature can be assumed. In fact, mechanistic review approaches are not advised for RTD work. For Leidner (2018), "reproducibility is neither necessary nor sensible" for developing RTD papers because overt systematicity can stifle creativity. Templier & Paré (2015) also note that the methods of such papers are "rarely explain[ed]" but, instead, are "validated against criteria of logical reasoning and the value of the theoretical contribution." While sections 1.8.3 and 1.8.6 retrospectively lay out the recursive, hermeneutic methods of the review process, the methods ultimately centre on the coherence of EF3—an emergent framework developed through iterative engagements with the literature.

6.4 Liquid Modernity and the Ephemerality Framework (EF3)

Paper 1 of this thesis outlined a selection of liquid-modern principles (Table 4). Developed through the contrasting metaphors of solidity and liquidity, the liquid-modern perspective devalues durability (R. L. M. Lee, 2005) and emphasises the fluid ephemerality of contemporary conditions (Bardhi & Eckhardt, 2017; Binkley, 2008; Hewer, 2022; Law & Urry, 2004; Lekakis, 2013; R. L. M. Lee, 2006) (see also 2.1.2 & 3.1.4).

In the contexts of this thesis, liquid modernity served as a departure point for the analysis and conceptual framing of ephemerality. The principles describe liquid-modern conditions as ephemeral (principle 3), oriented to the present (principle 4), and characterised by continual change (principles 2, 7, and 9). In attempting to refine and operationalise these principles, their general themes—through the concept of ephemerality—became the primary PhD research focus (see 3.1.3 and 3.1.4).

Perhaps the most illuminating passage of *Liquid Modernity* (Bauman, 2000) in relation to time is not in its central chapter ("Time/Space") but on the second page of its foreword:

> "Liquids, unlike solids, cannot easily hold their shape. Fluids, so to speak, neither fix space nor bind time. While solids have clear spatial dimensions but neutralise the impact, and thus downgrade the significance, of time (effectively resist its flow or render it irrelevant), fluids do not keep to any shape for long and are constantly ready (and prone) to change it; and so for them it is the flow of time that counts, more than the space they happen to occupy: that space, after all, they fill but 'for a moment'. In a sense, solids cancel time; for liquids, on the contrary, it is mostly time that matters. When describing solids, one may ignore time altogether; in describing fluids, to leave time out of account would be a grievous mistake. Descriptions of fluids are all snapshots, and they need a date at the bottom of the picture."

The passage is quintessential Bauman: enlightening, prolix, appropriating, and evocative. For Bauman, "solids" cancelled time because solid phenomena, such as traditions, institutions, rigid classifications,

or long-term objectives, were relatively stable and structured and could resist the flow of time. By contrast, in a liquid-modern world of "fluids" where spatial boundaries are increasingly permeable and nothing remains fixed for long, the flow of time is an essential analytical dimension.

In that central chapter ("Time/Space"), Bauman writes that in *solid modernity* "the relation between time and space was to be from now on processual, mutable, and dynamic, not preordained and stagnant" (*ibid*., pp. 112-113). Dominating and controlling space, however, demanded that time be tamed and controlled. This was achieved through the routinisation and organisation of "pliant and malleable" time into evermore uniform, "shrinkable" units (*ibid*. p.115). At the height of solid modernity, Bergson was developing his processual philosophy around a critique of the spatialisation of time into evermore "shrinkable" units. Bauman, however, approached time from a sociological rather than a metaphysical perspective, and did not draw much from processual philosophy.

Later in that central chapter (pp. 118-119), and in relation to what he deems the oxymoronic notion of "moment of time", Bauman remarks: "Perhaps, having killed space as value, time has committed suicide? Was not space merely the first casualty in time's frenzied rush to self-annihilation?" For Bauman, the "moment of time" seems oxymoronic because in liquid modernity time itself is "sliced" and fragmented (Bauman, 2010), an "arbitrary sequence of present moments; a continuous present" (Bauman, 2012). The language evokes Chun's (2008) "enduring ephemeral", the "eternal ephemerality" of Castells (1996), and even "cinematic" models of temporality (Dainton, 2023a). "Instantaneity," Bauman writes (2000, p. 125), "makes every moment seem infinitely capacious; and infinite capacity means that there are no limits to what can be squeezed out of any moment—however brief and fleeting."

Bauman's critique of liquid modernity is, in fact, an implicit critique of the specific kind of processuality that liquid-modern conditions generate—temporal conditions characterised by rapid change, instability, and fragmentation. However, Bauman does not account for the durability inherent to ephemerality. His focus is on dissolution rather than repetition, or ephemerality at the expense of durability. The focus of EF3 is upon the present-oriented, seemingly pointilist moments (and occurrences) that characterise liquid-modern temporality. Although the ephemerality framework supports the view that time is a critical dimension in a fluid world and that liquid-modern stability is ephemeral, the framework also extends these perspectives by highlighting that ephemerality does not simply imply impermanence. Instead, ephemeral occurrences and moments—through mechanical and creative repetition—simultaneously condition stabilisation and transformation in a liquid-modern world.

While technology was not a significant feature of Bauman's research, leading scholars of his work have applied his ideas in everyday digital contexts, including social media (Davis, 2020), surveillance (Lyon, 2010), and digital trace data (R. L. M. Lee, 2022). Raymond Lee's (2022) research is notable for

suggesting that Bauman may have reassessed the relationship between solidity and liquidity, given how digital trace data is now surreptitiously reinforcing solid forms of control in liquid modernity. Through the lens of EF3, and contrary to Bauman's observation (2000, p.2), "descriptions of fluids" are not "all snapshots"—the "date at the bottom of the picture" of trace data only reveals part of their contexts.

In Section 3.1.4, it was suggested that this thesis might provide a basis from which to assess Bauman's claim (2012) that "time is no longer a river, but a collection of ponds and pools… an arbitrary sequence of present moments; a continuous present." No temporality—liquid-modern, ephemeral, or otherwise—is merely short-lived. Temporality always involves forms of repetition, stabilisation, and transformation both in and over time. The world may *appear* as fleeting and permeable, time may *feel* discontinuous, and present-oriented values may govern. But time in liquid modernity is not simply fragmented *or* just continuous—it is *processually structured* through repetition. The ephemerality framework (EF3) provides a more comprehensive and holistic way to think about the nature of time in liquid modernity.

6.5 Concluding Remarks

> A digital universe—whether 5 kilobytes or the entire Internet—consists of two species of bits: differences in space, and differences in time. Digital computers translate between these two forms of information—structure and sequence—according to definite rules. Bits that are embodied as structure (varying in space, invariant across time) we perceive as memory, and bits that are embodied as sequence (varying in time, invariant across space) we perceive as code. Gates are the intersections where bits span both worlds at the moments of transition from one instant to the next.
>
> —George Dyson, *Turing's Cathedral*

The information systems field has a rich lineage of research engaging with philosophical perspectives to reveal the ontological, epistemological, and methodological assumptions that have shaped and shape the field (e.g.: Gregor, 2006; Hirschheim & Klein, 1989; H. K. Klein & Myers, 1999; A. S. Lee, 1994; Mingers, 2001; Orlikowski & Baroudi, 1991; Weber, 2012). The need for such engagement will persist (Baskerville & Myers, 2002; A. S. Lee, 2004; Walsham, 1995, 2012) as long as the field is shaped by complex, entangled, and dynamic sociotechnical contexts (Hassan et al., 2018; Rowe, 2018).

There is also a rich lineage of research that aims to synthesise, integrate, and/or reconcile divergent or oppositional perspectives, with significant contributions from IS and related disciplines (e.g.: Feldman, 2000; Leonardi, 2011; Markus & Robey, 1988; Mingers, 2001; Orlikowski & Robey, 1991; Pentland, 1999). At the heart of Giddens' (1984) structuration theory, for example, is the "duality of structure", from which Orlikowski (1992) develops her seminal contribution on the duality of technology as both objectively and socially constructed. For Barley (1986), technologies are understood as both context-

dependent process and relatively fixed and stable form. Many IS studies have sought to bridge structural and variance-based perspectives with process approaches (e.g.: Lyytinen & Newman, 2008; Sabherwal & Robey, 1995). And Luhmann's (1996) sociological theory of social systems integrates key perspectives on structure and process. "Structuring is a process," Luhmann writes (pp. 45-46), "and processes have structure. They differ through their relation to time."

However, all forms of social and sociotechnical reproduction ultimately background the ephemeral temporalities that form and reform structures and processes. In this context, the aim of this thesis is to open up the "moments" that simultaneously produce and reproduce (Giddens, 1984, p.26), to illuminate the interdependent but conflicting temporalities of "occasions of structuring" (Barley, 1986).

Time is a concept, as malleable and subject to change as any other. Challenging temporal assumptions involves developing new temporal concepts (Venkatesh et al., 2021). EF3 advances conceptualisation of time in IS by integrating structural, performative, and flow-based views of temporality.

Almost a quarter of a century ago, Orlikowski and Iacono (2001) described digital technologies as "complex and changing technosocial processes existing *in time and over time*" (*emphasis added*). The evolving challenge was how to make sense of these processes. Mechanical and creative repetition of ephemeral phenomena offers one way of sensemaking. Ephemerality, as temporal convergence of stability and transformation, highlights specific limitations of the process, performative, and processual-based views of time, and provides actionable conceptual approaches to addressing those limitations.

The epigraph that opens this concluding section describes a technical view of time. In some respects, the focus of this thesis has been the "definite rules" that govern the "moments of transition" or the "intersections" from "one moment to the next". But of course, as Heidegger explained in the middle of the last century, the meaning of technology is not technological. The meaning of technology is stabilised and transformed through use and experience, through absence and presence, through the entangled nature of the social, technical, material, and temporal. Time and temporality will not be governed by definite technical rules for structure and sequence. In a lecture in 1949, John von Neumann remarked "that our predilection for linear codes, which have a simple, almost temporal sequence, is chiefly a literary habit, corresponding to our not particularly high level of combinatorial cleverness… a very efficient language would probably depart from linearity." Through its framework for ephemerality, which partially relies upon—but will not be governed by—structure and sequence, this thesis aims to contribute to the ongoing development of such a language. It should be the case that IS, as a field, aims to develop novel temporal concepts that enrich the understanding of time in everyday digital contexts.

Future development and application of EF3 will depend on how individual studies define the boundaries of "occurrence" and "moment." To stipulate those boundaries here would not only contradict the holistic logic of the framework but also unnecessarily constrain its application. While mechanical repetition provides a structural mechanism for identifying, temporally bracketing, and quantitatively defining discrete ephemeral occurrences, the ephemerality framework posits that open-ended ephemeral moments will always, necessarily, qualitatively destabilise those parameters. Conversely, the transformational effects of creative repetition will always, necessarily, be destabilised by repetition of ephemeral occurrences. This dialectical tension is precisely where the novelty of the framework lies: ephemerality as the short-lived and durable temporal convergence of stability and transformation.

7 Bibliography

Aaltonen, A., & Stelmaszak, M. (2024). The Performative Production of Trace Data in Knowledge Work. *Information Systems Research*, *35*(3), 1448–1462. https://doi.org/10.1287/isre.2019.0357

Abbasi, A., Sarker, S., & Chiang, R. H. L. (2016). Big data research in information systems: Toward an inclusive research agenda. *Journal of the Association for Information Systems*, *17*(2), 1–32. https://doi.org/10.17705/1JAIS.00423

Agarwal, R., & Dhar, V. (2014). Big data, data science, and analytics: The opportunity and challenge for IS research. *Information Systems Research*, *25*(3), 443–448. https://doi.org/10.1287/ISRE.2014.0546

Ahmed, F., Ahmed, N., Pissarides, C., & Stiglitz, J. (2020). Why inequality could spread COVID-19. *The Lancet Public Health*, *5*(5), e240. https://doi.org/10.1016/S2468-2667(20)30085-2

Ahmed, W., López Seguí, F., Vidal-Alaball, J., & Katz, M. S. (2020). COVID-19 and the 'Film Your Hospital' Conspiracy Theory: Social Network Analysis of Twitter Data. *Journal of Medical Internet Research*, *22*(10), e22374–e22374. https://doi.org/10.2196/22374

Ahmed, W., Vidal-Alaball, J., Downing, J., & López Seguí, F. (2020). COVID-19 and the 5G Conspiracy Theory: Social Network Analysis of Twitter Data. *Journal of Medical Internet Research*, *22*(5), e19458–e19458. https://doi.org/10.2196/19458

Aho, K. (2007). Simmel on acceleration, boredom, and extreme aesthesia. *Journal for the Theory of Social Behaviour*, *37*(4). https://doi.org/10.1111/j.1468-5914.2007.00345.x

Alaimo, C. (2021). From People to Objects: The digital transformation of fields. *Organization Studies*, *43*(7), 1091–1114. https://doi.org/10.1177/01708406211030654

Alaimo, C., & Kallinikos, J. (2017). Computing the everyday: Social media as data platforms. *The Information Society*, *33*(4), 175–191. https://doi.org/10.1080/01972243.2017.1318327

Alaimo, C., & Kallinikos, J. (2020). Managing by Data: Algorithmic Categories and Organizing. *Organization Studies*, *42*(9), 1385–1407. https://doi.org/10.1177/0170840620934062

Alavi, M., & Leidner, D. E. (2002). Review: knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*, *25*(1), 107–136.

Alimadadi, A., Aryal, S., Manandhar, I., Munroe, P. B., Joe, B., & Cheng, X. (2020). Artificial intelligence and machine learning to fight covid-19. *Physiological Genomics*, *52*(4), 200–202. https://doi.org/10.1152/PHYSIOLGENOMICS.00029.2020

Alter, S. (2012). Exploring the temporal nature of sociomateriality from a work system perspective. *18th Americas Conference on Information Systems 2012, AMCIS 2012*, *5*.

Americans for Tax Fairness. (2020). *Tale of two crises: billionaires gain as workers feel pandemic pain*. https://americansfortaxfairness.org/wp-content/uploads/2020-5-21-Billionaires-Press-Release-at-Two-month-Covid-Pandemic-FINAL.pdf

Ancona, D. G., Bresman, H., & Mortensen, M. (2021). Shifting Team Research after COVID-19: Evolutionary and Revolutionary Change. *Journal of Management Studies*, *58*(1), 289–293. https://doi.org/10.1111/JOMS.12651

Ancona, D. G., Okhuysen, G. A., & Perlow, L. A. (2001). Taking Time to Integrate Temporal Research. *The Academy of Management Review*, *26*(4), 512. https://doi.org/10.2307/3560239

Anderson, C. (2008). The end of theory: The data deluge makes the scientific method obsolete. *WIRED Magazine*. http://statlit.org/pdf/2008EndOfTheory-DataDelugeMakesScientificMethodObsolete-WiredMagazine.pdf

Andrade, A. D., & Urquhart, C. (2012). Unveiling the modernity bias: A critical examination of the politics of ICT4D. *Information Technology for Development*, *18*(4), 281–292. https://doi.org/10.1080/02681102.2011.643204

Arda, B. (2021). Ephemeral social media visuals and their picturesque design: interaction and user experience in instagram stories. *Sapientiae, Film And Media Studies*, *19*, 156–175. https://doi.org/10.2478/ausfm-2021-0010

Armada, J. (2012). Sustainable Ephemeral: Temporary Spaces with Lasting Impact. In *Syracuse University Honors Program Capstone Projects*. https://surface.syr.edu/honors_capstone/111

Arner, D. W., Barberis, J. N., & Walker, J. (2020). Digital finance & the COVID-19 crisis. *University of Hong Kong Faculty of Law Research Paper*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3565159

Artaud, A. (1958). Theatre and its Double. In M. C. Richards (Ed.), *Trans.* Grove Press, New York (1958.

Artieri, G., Brilli, S., & Zurovac, E. (2021). Below the Radar: Private Groups, Locked Platforms, and Ephemeral Content—Introduction to the Special Issue. *Social Media and Society, , Sage*.

Atkinson, W. (2008). Not all that was solid has melted into air (or liquid): A critique of Bauman on individualization and class in liquid modernity. *Sociological Review*, *56*(1). https://doi.org/10.1111/j.1467-954X.2008.00774.x

Auge, M. (2009). *Non-places: Introduction to an Anthropology of Supermodernity* (Vol. 2009). Verso.

Auslander, P. (1999). Liveness: Performance in a Mediatized Culture. In *Organization Studies* (Vols 1–17). https://doi.org/10.1177/0170840616655982

Auslander, P. (2008). Live and technologically mediated performance. In *The Cambridge Companion to: Performance Studies* (pp. 107–119). Cambridge University Press. https://doi.org/10.1017/CCOL9780521874014.008

Avgerou, C. (2019). Contextual explanation: Alternative approaches and persistent challenges. *MIS Quarterly: Management Information Systems*, *43*(3), 977. https://doi.org/10.25300/MISQ/2019/13990

Avital, M., Jensen, T. B., & Dyrby, S. (2023). The social fabric framework: steps to eliciting the social making of organisations in the digital age. *European Journal of Information Systems*, *32*(2), 127–153. https://doi.org/10.1080/0960085X.2021.1907236

Babar, Y., Curley, S., Ke, Z., Liu, D., & Sheffler, Z. (2023). The Effects of Digitally Delivered Nudges in a Corporate Wellness Program. *Journal of the Association for Information Systems*, *24*(1), 136–160. https://doi.org/10.17705/1jais.00783

Bachelard, G. (1932). *Intuition of the Instant* (E. Rizo-Patron, Ed.). Northwestern University Press, 2013. https://nupress.northwestern.edu/9780810129054/intuition-of-the-instant/

Bachmann, P. (2019). Public relations in liquid modernity: How big data and automation cause moral blindness. *Public Relations Inquiry*, *8*(3). https://doi.org/10.1177/2046147X19863833

Bainotti, L., Caliandro, A., & Gandini, A. (2020). From archive cultures to ephemeral content, and back: Studying Instagram Stories with digital methods. *New Media & Society*, *23*(12), 3656–3676. https://doi.org/10.1177/1461444820960071

Bakker, R. M., DeFillippi, R. J., Schwab, A., & Sydow, J. (2016). Temporary Organizing: Promises, Processes, Problems. *Organization Studies*, *37*(12), 1703–1719. https://doi.org/10.1177/0170840616655982

Bakshy, E., Messing, S., & Adamic, L. A. (2015). Exposure to ideologically diverse news and opinion on Facebook. *Science*, *348*(6239), 1130–1132. https://doi.org/10.1126/science.aaa1160

Balashov, Y. (2000). Enduring and perduring objects in minkowski space-time. *Philosophical Studies*, *99*(2). https://doi.org/10.1023/A:1018684803885

Balashov, Y. (2007). Defining 'exdurance'. *Philosophical Studies*, *133*(1). https://doi.org/10.1007/s11098-006-9011-x

Baldwin, C., & von Hippel, E. (2011). Modeling a paradigm shift: From producer innovation to user and open collaborative innovation. *Organization Science*, *22*(6), 1399–1417. https://doi.org/10.1287/ORSC.1100.0618

Barba, E. (1992). Efermaele: That Which Will Be Said Afterwards. *Drama Review*, *36*(2), 77–80.

Barbieri, C., & Darnis, J. P. (2020). Technology: An exit strategy for COVID-19. *Commentaries Istituto Affari Internazionali, Commentaries*, *1*(4). https://www.iai.it/sites/default/files/iaicom2011.pdf

Bardhi, F., & Eckhardt, G. M. (2017). Liquid consumption. *Journal of Consumer Research*, *44*(3), 582–597. https://doi.org/https://doi.org/10.1093/jcr/ucx050

Barley, S. R. (1986). Technology as an occasion for structuring: Evidence from observations of CT scanners and the social order of radiology departments. *Administrative Science Quarterly*, *31*(1). https://doi.org/10.2307/2392767

Barreau, D. (2007). The Persistence of Behavior and Form in the Organization of Personal Information. *Journal of the American Society for Information Science and Technology*, *59*(2), 307–317.

Barrett, M., & Orlikowski, W. J. (2021). Scale Matters: Doing Practice-Based Studies of Contemporary Digital Phenomena. *MIS Quarterly* , *45*(1), 467–472.

Barro, R., Ursúa, J., & Weng, J. (2020). *The Coronavirus and the Great Influenza Pandemic: Lessons from the "Spanish Flu" for the Coronavirus's Potential Effects on Mortality and Economic Activity*. https://doi.org/10.3386/W26866

Baskerville, R. L., & Lee, A. (2013). Individual - Organizational bindpoints: A design theory for bring-your-own-system. *Proceedings - Pacific Asia Conference on Information Systems, PACIS 2013*.

Baskerville, R. L., & Myers, M. D. (2002). Information systems as a reference discipline. In *MIS Quarterly: Management Information Systems* (Vol. 26, Issue 1). https://doi.org/10.2307/4132338

Baskerville, R. L., Myers, M. D., & Yoo, Y. (2020). Digital first: the ontological reversal and new challenges for information systems research. *MIS Quarterly*, *44*(2), 509–523. https://doi.org/10.25300/MISQ/2020/14418

Baudelaire, C. (1964). The Painter of Modern Life and Other Essays. In J. P. Mayne & London (Eds.), *Inf. Commun. Soc* (Vol. 19, Issue 7, pp. 956–977). Phaidon.

Bauman, Z. (1978). Hermeneutics and social science: Approaches to understanding. In *Hermeneutics and Social Science: Approaches to Understanding*. Taylor and Francis. https://doi.org/10.4324/9780203849460/HERMENEUTICS-SOCIAL-SCIENCE-ROUTLEDGE-REVIVALS-ZYGMUNT-BAUMAN

Bauman, Z. (1987). *Legislators and interpreters: On modernity, post-modernity and intellectuals*. Polity.

Bauman, Z. (1989). Modernity and the Holocaust. In *Contemporary Sociology* (Issue 2). Polity Press. https://doi.org/10.2307/2072918

Bauman, Z. (1992). *Mortality, Immortality, and Other Life Strategies*. Stanford University Press.

Bauman, Z. (2000). *Liquid modernity*. Polity Press.

Bauman, Z. (2004). *Wasted lives: Modernity and its outcasts*. Polity Press.

Bauman, Z. (2005). *Liquid Life*. Polity Press.

Bauman, Z. (2007). *Liquid times: Living in an age of uncertainty*. Polity.

Bauman, Z. (2010). Privacy, secrecy, intimacy, human bonds, utopia-and other collateral casualties of liquid modernity. In *Modern Privacy: Shifting Boundaries, New Forms*. https://doi.org/10.1057/9780230290679_2

Bauman, Z. (2011a). *Collateral damage: Social inequalities in a global age*. Wiley.

Bauman, Z. (2011b). Migration and identities in the globalized world. *Philosophy and Social Criticism*, *37*(4), 425–435. https://doi.org/10.1177/0191453710396809

Bauman, Z. (2012). From Pilgrim to Tourist – or a Short History of Identity. In *Questions of Cultural Identity*. https://doi.org/10.4135/9781446221907.n2

Bauman, Z., & Lyon, D. (2013). *Liquid surveillance: A conversation*. John Wiley & Sons.

Bauman, Zygmunt. (2003). *Liquid love : on the frailty of human bonds*. Polity Press. https://www.dubraybooks.ie

Bauman, Zygmunt. (2017). *Retrotopia*. Polity. https://www.wiley.com/en-us/Retrotopia-p-9781509515318

Bauman, Zygmunt., & Tester, Keith. (2001). *Conversations with Zygmunt Bauman*. Polity ; Blackwell Publishers.

Bayer, J. B., Ellison, N. B., Schoenebeck, S. Y., & Brady, E. B. (2018). Facebook in context(s): Measuring emotional responses across time and space. *New Media and Society*, *20*(3). https://doi.org/10.1177/1461444816681522

Bayer, J. B., Ellison, N. B., Schoenebeck, S. Y., & Falk, E. B. (2016). Sharing the small moments: ephemeral social interaction on Snapchat. *Information, Communication & Society*, *7*(19), 956–977. https://doi.org/https://doi.org/10.1080/1369118X.2015.1084349

Baygi, M. R., Introna, L. D., & Hultin, L. (2021). Everything flows: studying continuous sociotechnological transformation in a fluid and dynamic digital world. *MIS Quarterly*, *45*(1).

Baym, N. K., Wagman, K. B., & Persaud, C. J. (2020). Mindfully Scrolling: Rethinking Facebook After Time Deactivated. *Social Media + Society*, *6*(2).

BBC News. (2020). *BBC News: Coronavirus: WHO chief warns against "trolls and conspiracy theories"*. https://scholar.google.com/scholar_lookup?title=Coronavirus%3A%20WHO%20chief%20warns%20against%20trolls%20and%20conspiracy%20theories&publication_year=2020&author=BBC%20News

Bechky, B. A. (2006). Gaffers, gofers, and grips: Role-based coordination in temporary organizations. *Organization Science*, *17*(1), 3–21. https://doi.org/10.1287/ORSC.1050.0149

Beck, U. (1994). The reinvention of politics: Towards a theory of reflexive modernization. In *Reflexive modernization: Politics, tradition and aesthetics in the modern social order*.

Bednar, P., & Welch, C. (2020). Socio-Technical Perspectives on Smart Working: Creating Meaningful and Sustainable Systems. *Information Systems Frontiers*, *22*, 281–298. https://doi.org/10.1007/s10796-019-09921-1

Belanche, D., Cenjor, I., & Pérez-Rueda, A. (2019). Instagram Stories versus Facebook Wall: an advertising effectiveness analysis. *Spanish Journal of Marketing - ESIC*, *23*(1), 69–94. https://doi.org/10.1108/SJME-09-2018-0042/FULL/PDF

Bélanger, F., & Crossler, R. E. (2011). Privacy in the digital age: A review of information privacy research in information systems. *MIS Quarterly*, *35*(4), 1017–1041. https://doi.org/10.2307/41409971

Benbasat, I., & Zmud, R. W. (2003). The identity crisis within the IS discipline: Defining and communicating the discipline's core properties. In *MIS Quarterly: Management Information Systems* (Vol. 27, Issue 2). https://doi.org/10.2307/30036527

Benbya, H., Nan, N., Tanriverdi, H., & Yoo, Y. (2020). Complexity and information systems research in the emerging digital world. *MIS Quarterly*, *44*(1), 1–17. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3539079

Benjamin, W. (1936). *The work of art in the age of mechanical reproduction* (J. A. Underwood, Trans.). Penguin Books.

Benjamin, W. (2004). *Walter Benjamin : selected writings. Vol. 1 1913-1926* (M. Bullock & M. Jennings, Eds.; Vol. 1). Belknap Press of Harvard Univ. Press, Cambridge, Mass.

Berente, N., Seidel, S., & Safadi, H. (2019). Research Commentary—Data-Driven Computationally Intensive Theory Development. *Information Systems Research*, *30*(1), 50–64. https://doi.org/10.1287/isre.2018.0774

Bergson, H. (1910). *Time and Free Will: An Essay on the Immediate Data of Consciousness.* London, S. Sonnenschein & Co.; New York: Macmillan.

Bergson, H. (1911). *Matter and Memory*. London: S. Sonnenschein.

Bergson, H. (1922). *Creative Evolution*. Creative Evolution.

Bergson, H. (1946). *The creative mind* (M. L. Andison, Ed.). New York,: Philosophical library.

Bernard, J. G., Dennis, A., Galletta, D., Khan, A., & Webster, J. (2019). *The tangled web: studying online fake news*. https://aisel.aisnet.org/icis2019/panels/panels/4/

Berry, D. M. (2011). The computational turn: Thinking about the digital humanities. *Culture Machine*, *12*. https://edisciplinas.usp.br/pluginfile.php/7189524/mod_folder/content/0/BibliografiaComplementar/BERRY_TheComputationalTurn_ThinkingAboutTheDigitalHumanities.pdf

Beyes, T. (2016). Colour and Organization Studies. *Organization Studies*, *38*(10), 1467–1482. https://doi.org/10.1177/0170840616663240

Binkley, S. (2008). Liquid consumption: Anti-consumerism and the fetishized de-fetishization of commodities. *Cultural Studies*, *22*(5). https://doi.org/10.1080/09502380802245845

Biraghi, S., Gambetti, R., & Pace, S. (2018). Between tribes and markets: The emergence of a liquid consumer-entrepreneurship. *Journal of Business Research*, *92*. https://doi.org/10.1016/j.jbusres.2018.03.018

Bissell, D. (2014). Transforming Commuting Mobilities: The Memory of Practice. *Environment & Planning*, *46*(8), 1946–1965. https://doi.org/10.1068/A130047P

Blackshaw, T. (2005). Zygmunt Bauman. In *Zygmunt Bauman* (1st ed.). Routledge Taylor & Francis Group. https://doi.org/10.4324/9780203001752/ZYGMUNT-BAUMAN-TONY-BLACKSHAW/ACCESSIBILITY-INFORMATION

blog.aboutamazon.com. (2020). *Amazon Covid-19 blog*. Http://Refhub.Elsevier.Com/S0268-4012(20)31027-6/Sbref0130. http://refhub.elsevier.com/S0268-4012(20)31027-6/sbref0130

Blühdorn, I., & Butzlaff, F. (2019). Rethinking Populism: Peak democracy, liquid identity and the performance of sovereignty. *European Journal of Social Theory*, *22*(2). https://doi.org/10.1177/1368431017754057

Bødker, M. (2017). "What else is there…?": reporting meditations in experiential computing. *European Journal of Information Systems*, *26*(3), 274–286. https://doi.org/10.1057/S41303-017-0041-6

Bødker, M., Gimpel, G., & Hedman, J. (2014). Time-out/time-in: The dynamics of everyday experiential computing devices. *Information Systems Journal*, *24*(2). https://doi.org/10.1111/isj.12002

Boell, S. K., & Cecez-Kecmanovic, D. (2014). A Hermeneutic Approach for Conducting Literature Reviews and Literature Searches. *Communications of the Association for Information Systems*, *34*(1), 12. https://doi.org/10.17705/1CAIS.03412

Boje, D. M. (2001). Narrative Methods for Organizational & Communication Research. In *Narrative Methods for Organizational & Communication Research*. SAGE Publications. https://doi.org/https://doi.org/10.4135/9781849209496

Boje, D. M. (2019). 'Storytelling organization' is being transformed into discourse of 'digital organization'. *Management (France)*, *22*(2). https://doi.org/10.3917/mana.222.0336

Boland, R. J. (1991). *Information system use as a hermeneutic process*. Information Systems Research: Contemporary Approaches and Emergent Traditions. https://scholar.google.com/scholar_lookup?title=Information%20system%20use%20as%20a%20hermeneutic%20process&publication_year=1991&author=R.J.%20Boland

Boland, R. J. (2001). The tyranny of space in organizational analysis. *Information and Organization*, *11*(1). https://doi.org/10.1016/S0959-8022(00)00007-2

Boland, R. J., Newman, M., & Pentland, B. T. (2010). Hermeneutical exegesis in information systems design and use. *Information and Organization*, *20*(1). https://doi.org/10.1016/j.infoandorg.2009.09.001

Bonomo, E., & Provencher, K. (2013). Ephemeral Traces. *Spectator*, *33*(1). https://cinema.usc.edu/mediastudies/spectator/33.1spring2013.cfm

Bourdieu, P. (1977). *OUTLINE OF A THEORY OF PRACTICE* . Cambridge University Press. www.cambridge.org

Boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information Communication and Society*, *15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

Branaman, A. (2013). Gender and sexualities in liquid modernity. In *The Contemporary Bauman*. https://doi.org/10.4324/9780203946671

Brassley, P. (1998). On the unrecognized significance of the ephemeral landscape. *Landscape Research*, *23*(2), 119–132. https://doi.org/10.1080/01426399808706531

Browne, O., O'Reilly, P., & Hutchinson, M. (2017). Ephemeral Returns: Social Network Valuations and Perceived Privacy. *ICIS 2017 Proceedings*. https://aisel.aisnet.org/icis2017/Economics/Presentations/10

Bryant, A. (2007). Liquid Modernity, Complexity and Turbulence. *Theory, Culture & Society*, *24*(1). https://doi.org/10.1177/0263276407071580

Bryant, A. (2020). Liquid uncertainty, chaos and complexity: The gig economy and the open source movement. *Thesis Eleven*, *156*(1). https://doi.org/10.1177/0725513619898286

Buci-Glucksmann, C. (2012). *Time spirals: from the immemorial to the ephemeral*. Translator: Jonathan Pollock. http://dombis.com/wp-content/uploads/2012/11/CBG_Time-spirals.pdf

Burke, K., & Chidambaram, L. (1999). How much bandwidth is enough? A longitudinal examination of media characteristics and group outcomes. *MIS Quarterly: Management Information Systems*, *23*(4), 557–580. https://doi.org/10.2307/249489

Burton-Jones, A., Butler, B. S., Scott, S. V., & Xu, S. X. (2021a). Examining assumptions: Provocations on the nature, impact, and implications of is theory. In *MIS Quarterly: Management Information Systems* (Vol. 45, Issue 1). https://doi.org/10.25300/MISQ/2021/15434.1

Burton-Jones, A., Butler, B., Scott, S., & Xu, S. X. (2021b). Next-Generation Information Systems Theorizing: A Call to Action. *Management Information Systems Quarterly*, *45*(1). https://aisel.aisnet.org/misq/vol45/iss1/11

Butler, J. (1993). *Bodies that matter*. New York: Routledge.

Butler, T. (1998). Towards a Hermeneutic Method for Interpretive Research in Information Systems. *Journal of Information Technology*, *13*(4), 285–300. https://doi.org/10.1177/026839629801300407

Butterfield, R. (1965). Henry Ford, the Wayside Inn, and the problem of 'History is bunk'. *Proceedings of the Massachusetts Historical Society*, *77*, 53–66. https://www.jstor.org/stable/25080601

Cairns, G., McInnes, P., & Roberts, P. (2003). Organizational space/time: From imperfect panoptical to heterotopian understanding. *Ephemera: Critical Dialogues on Organization*, *3*(2), 126–138. https://pureportal.strath.ac.uk/en/publications/organizational-spacetime-from-imperfect-panoptical-to-heterotopia

Camacho, D. (2018). From ephemeral computing to deep bioinspired algorithms: new trends and applications. In *Future Generation Computer Systems*.

Campbell, T. (2013). The temporal horizon of 'the choice': Anxieties and banalities in 'time', modern and liquid modern. *Thesis Eleven*, *118*(1), 19–32. https://doi.org/10.1177/0725513613500269

Čapek, M. (1974). Bergson and Modern Physics: A Reinterpretation and Re-Evaluation. In R. S. Cohen, J. A. McGilvray, & M. W. Wartofsky (Eds.), *The Philosophical Review* (Vol. 7, Issue 2). D. Reidel Publishing Company. https://doi.org/10.2307/2184151

Carnap, R. (1963). *Intellectual Autobiography* (P. A. Schilpp, Ed.). La Salle, Ill.,: Open Court. https://philpapers.org/rec/CARIA-3

Castells, M. (1996). *The Information Age: Economy, Society and Culture* (2nd ed.). Blackwell, Oxford UK.

Castells, M. (2000). Materials for an exploratory theory of the network society. *Br. J. Sociol*, *51*(1), 5–24.

Castells, M. (2004). Informationalism, networks, and the network society: a theoretical blueprint. In M. Castells (Ed.), *The network society: a cross-cultural perspective*. Edward Elgar, Northampton, MA.

Cavalcanti, L. H. C., Pinto, A., Brubaker, J. R., & Dombrowski, L. . S. (2017). Meaning, and Context Loss in Ephemeral Communication Platforms: A Qualitative Investigation on Snapchat. *CSCW 2017*, 1934–1945. https://doi.org/10.1145/2998181.2998266

Cavusoglu, H., Phan, T. Q., Cavusoglu, H., & Airoldi, E. M. (2016). Assessing the Impact of Granular Privacy Controls on Content Sharing and Disclosure on Facebook. *Information Systems Research*, *27*(4), 848–879. https://doi.org/10.1287/ISRE.2016.0672

Cecez-Kecmanovic, D. (2016). From substantialist to process metaphysics – exploring shifts in IS research. *IFIP Advances in Information and Communication Technology*, *489*. https://doi.org/10.1007/978-3-319-49733-4_3

Chadha, M. (2015). Time-series of ephemeral impressions: the Abhidharma-Buddhist view of conscious experience. *Phenomenology and the Cognitive Sciences*, *14*(3). https://doi.org/10.1007/s11097-014-9354-2

Chayko, M. (2015). The first web theorist? Georg Simmel and the legacy of 'The web of group-affiliations'. *Information, Communication & Society*, *18*(12). https://doi.org/10.1080/1369118x.2015.1042394

Chen, A., Tasselli S., & Borgatti S.P. (2022). Network Dynamics and Organizations: A Review and Research Agenda. *Journal of Management*, *48*(6), 1602–1660. https://doi.org/10.1177/01492063211063218

Chen, E., Lerman, K., & Ferrara, E. (2020). *Covid-19: The first public coronavirus twitter dataset*. https://europepmc.org/article/ppr/ppr346005

Chen, K. J., & Cheung, H. L. (2019). Unlocking the power of ephemeral content: The roles of motivations, gratification, need for closure, and engagement. *Computers in Human Behavior*, *97*, 67–74. https://doi.org/10.1016/J.CHB.2019.03.007

Chia, R. (1995). From modern to postmodern organizational analysis. *Organization Studies*, *16*(4), 579–604. https://doi.org/10.1177/017084069501600406

Chia, R., & Nayak, A. (2017). Circumventing the logic and limits of representation: otherness in east–west approaches to paradox. In W. Smith, M. Lewis, J. Jarzabkowski, & A. Langley (Eds.), *The Oxford Handbook of Organizational Paradox.* Oxford University Press.

Chiasson, M., Davidson, E., & Winter, J. (2018). Philosophical foundations for informing the future(S) through IS research. *European Journal of Information Systems*, *27*(3), 367–379. https://doi.org/10.1080/0960085X.2018.1435232

Chuard, P. (2018). The Snapshot Conception of Temporal Experiences. In *The Routledge Handbook of Philosophy of Temporal Experience*. https://doi.org/10.4324/9781315269641-10

Chun, W. (2008). The enduring ephemeral, or the future is a memory. *Critical Inquiry*, *35*(1), 148–171.

Chun, W. (2016). *Updating to remain the same: habitual new media*. MIT Press.

Clarke J. P., & Warren, J. (2009). Ephemera: Between Archival Objects and Events. *Journal of the Society of Archivists*, *30*(1), 45–66. https://doi.org/10.1080/00379810903264617

Clarke, R. (2013). Morning dew on the Web in Australia: 1992–1995. *Journal of Information Technology*, *28*, 93–110. https://doi.org/10.1057/jit.2013.11

Clegg, S., & Baumeler, C. (2010). Essai: From iron cages to liquid modernity in organization analysis. *Organization Studies*, *31*(12). https://doi.org/10.1177/0170840610387240

Cole, M., & Avison, D. (2007). The potential of hermeneutics in information systems research. *European Journal of Information Systems*, *16*(6), 820–833. https://doi.org/10.1057/PALGRAVE.EJIS.3000725

Colfer, Donal. (2019). The legacy of the ephemeral. *Building Material. Architectural Association of Ireland.*, 207–214. https://www.jstor.org/stable/26816299

Comas-Herrera, A., Zalakaín, J., Lemmon E., & et al. (2020). Mortality associated with COVID-19 in care homes: international evidence. *Article in LTCcovid. Org, International Long-Term Care*

Policy Network, CPEC-LSE. https://ltccovid.org/wp-content/uploads/2021/02/LTC_COVID_19_international_report_January-1-February-1-2.pdf

Conboy, K. (2009). Agility from first principles: Reconstructing the concept of agility in information systems development. *Information Systems Research*, *20*(3), 329–354. https://doi.org/10.1287/ISRE.1090.0236

Conboy, K., Dennehy, D., & O'Connor, M. (2020). 'Big time': An examination of temporal complexity and business value in analytics. *Information & Management*, *57*(1), 103077. https://doi.org/10.1016/J.IM.2018.05.010

Constantinides, Chiasson, & Introna. (2012). The Ends of Information Systems Research: A Pragmatic Framework. *MIS Quarterly*, *36*(1). https://doi.org/10.2307/41410403

Cooper, R. (1987). Information, Communication and Organisation: A Post-Structural Revision. *The Journal of Mind and Behavior*, *8*(3), 395–415. http://www.jstor.org/stable/43853417

Cooper, R. (2005). Peripheral Vision: Relationality. *Organization Studies*, *26*, 1689.

Cooper, R., & Burrell, G. (1988). Modernism, Postmodernism and Organizational Analysis: An Introduction. *Organization Studies*, *9*(1), 91–112. https://doi.org/10.1177/017084068800900112

Cotta, C., Fernández-Leiva, A. J., De Vega, F. F., Chávez, F., Merelo, J. J., Castillo, P. A., Camacho, D., & Bello-Orgaz, G. (2015). Ephemeral computing and bioinspired optimization: Challenges and Opportunities. *IJCCI 2015 - Proceedings of the 7th International Joint Conference on Computational Intelligence*, *1*, 319–324. https://doi.org/10.5220/0005628903190324

Courpasson, D. (2017). The Politics of Everyday. *Organization Studies*, *38*(6), 843–859. https://doi.org/10.1177/0170840617709310

Crane, S. (2015). Rewriting the Battles of Algiers. *Space & Culture*, *18*(4), 387–410. https://doi.org/10.1177/1206331215616084

Crang, M., & Graham, S. (2007). Sentient cities ambient intelligence and the politics of urban space. *Information Communication and Society*, *10*(6), 789–817. https://doi.org/10.1080/13691180701750991

Crawford, K., Miltner, K., & Gray, M. (2014). Critiquing big data: politics, ethics, epistemology. *International Journal of Communication*, *8*, 1663–1672. https://scholar.google.com/scholar_lookup?title=Critiquing%20big%20data%3A%20Politics%2C%2

0ethics%2C%20epistemology&publication_year=2014&author=K.%20Crawford&author=K.%20Miltner&author=M.%20Gray

Crowther, T., & Cumhaill, C. Mac. (2018). *Perceptual Ephemera*. Oxford University Press. https://philpapers.org/rec/CROPE

Cule, P. E., & Robey, D. (2004). A Dual-Motor, Constructive Process Model of Organizational Transition. *Organization Studies*, *25*(2). https://doi.org/10.1177/0170840604040037

Currie, W. L., & Seddon, J. J. M. (2017). The Regulatory, Technology and Market 'Dark Arts Trilogy' of High Frequency Trading: A Research Agenda. *Journal of Information Technology*, *32*(2), 111–126. https://doi.org/10.1057/S41265-016-0025-3

Czarniawska, B. (2009). Emerging institutions: Pyramids or anthills? *Organization Studies*, *30*(4). https://doi.org/10.1177/0170840609102282

Dailey, S., & Browning, L. (2014). Retelling Stories in Organizations: Understanding the Functions of Narrative Repetition. *Academy of Management Review*, *39*(1), 22–43. https://doi.org/10.5465/amr.2011.0329

Dainton, B. (2000). *Stream of Consciousness. Unity and continuity in conscious experience*. Routledge.

Dainton, B. (2008a). The experience of time and change. *Philosophy Compass*, *3*(4), 619–638. https://doi.org/10.1111/J.1747-9991.2008.00153.X

Dainton, B. (2008b). The phenomenal self. In *Erkenntnis* (Vol. 71, Issue 2). New York: Oxford University Press. https://doi.org/10.1007/S10670-009-9162-1

Dainton, B. (2011). Time, Passage, And Immediate Experience. In *The Oxford Handbook of Philosophy of Time*. https://doi.org/10.1093/oxfordhb/9780199298204.003.0013

Dainton, B. (2017). Bergson on temporal experience and durée réelle. In *The Routledge Handbook of Philosophy of Temporal Experience*. https://doi.org/10.4324/9781315269641

Dainton, B. (2023a). Temporal Consciousness. In *The Stanford Encyclopedia of Philosophy.* https://plato.stanford.edu/archives/spr2023/entries/consciousness-temporal/

Dainton, B. (2023b). The Specious Present: Further Issues (supplementary file to Temporal Consciousness). In E. N. Zalta & U. Nodelman (Eds.), *Stanford Encyclopedia of Philosophy*.

D'Amato, A. (2021). Movement as Matter: A Practice-Based Inquiry into the Substance of Dancing. *Dance Research Journal*, *53*(3). https://doi.org/10.1017/S0149767721000346

Datry, T. (2017). Flow intermittence and ecosystem services in rivers of the Anthropocene. *Journal of Applied Ecology*. https://doi.org/10.1111/1365-2664.12941

Datta, P., Walker, L., & Amarilli, F. (2020). Digital transformation: Learning from Italy's public administration*. *Journal of Information Technology Teaching Cases*, *10*(2), 54–71. https://doi.org/10.1177/2043886920910437

Davidson, H. (2020). China's coronavirus health code apps raise concerns over privacy. *The Guardian*. https://www.theguardian.com/world/2020/apr/01/chinas-coronavirus-health-code-apps-raise-concerns-over-privacy

Davis, M. (2013). Hurried lives: Dialectics of time and technology in liquid modernity. *Thesis Eleven*, *118*(1), 7–18. https://doi.org/10.1177/0725513613500268

Davis, M. (2020). Hermeneutics contra fundamentalism: Zygmunt Bauman's method for thinking in dark times. *Thesis Eleven*, *156*(1), 27–44. https://doi.org/10.1177/0725513619898285

Davis, M. S. (1997). Georg Simmel and Erving Goffman: Legitimators of the Sociological Investigation of Human Experience. *Qualitative Sociology*, *20*, 369–388. https://doi.org/10.1023/A:

Dawson, P. (2014). Reflections: On Time, Temporality and Change in Organizations. *Journal of Change Management*, *14*(3), 285–308. https://doi.org/10.1080/14697017.2014.886870

de Certeau, M. (1984). *The Practice of Everyday Life* (S. Rendall, Trans.). University of California Press.

de Ville, D. (2015). The Persistent Transience of Microcinema (in the United States and Canada. *Film History: An International Journal*, *27*(3), 104–136. https://doi.org/10.2979/filmhistory.27.3.104.

Debord, G. (1970). *Society of the Spectacle*. Red & Black.

Del Vicario, M., Zollo, F., Caldarelli, G., Scala, A., & Quattrociocchi, W. (2017). Mapping social dynamics on Facebook: The Brexit debate. *Social Networks*, *50*, 6–16. https://doi.org/10.1016/j.socnet.2017.02.002

Deleuze, G. (1990). *The Logic of Sense*. Columbia University Press.

Deleuze, G. (1994). *Difference and Repetition* (P. Patton, Trans.). London: Athlone. https://philpapers.org/rec/PATDAR

Deleuze, G., & Guattari, F. (2005). *A Thousand Plateaus: Capitalism and Schizophrenia* (11th ed.). https://www.upress.umn.edu/9780816614028/a-thousand-plateaus/

Deleuze, G., & Parnet, C. (2002). Dialogues II. In *Dialogues II*. Columbia University Press.

Demetis, D., & Lee, A. S. (2018). When Humans Using the IT Artifact Becomes IT Using the Human Artifact. *Journal of the Association for Information Systems*, *19*(10). https://aisel.aisnet.org/jais/vol19/iss10/5

Depoux, A., Martin, S., Karafillakis, E., & et al. (2020). The pandemic of social media panic travels faster than the COVID-19 outbreak. *Journal of Travel Medicine*, *27*. https://academic.oup.com/jtm/article-abstract/27/3/taaa031/5775501

Desouza, O., Galliers, R., Loebbecke, C., Watson, R., & El Sawy, K. (2006). Beyond Rigor and Relevance Towards Responsibility and Reverberation: Information Systems Research That Really Matters. *Communications of the Associationfor Information Systems*, *17*. https://doi.org/10.17705/1CAIS.01716

Deuze, M., & Witschge, T. (2018). Beyond journalism: Theorizing the transformation of journalism. *Journalism*, *19*(2). https://doi.org/10.1177/1464884916688550

Die Welt. (2020). Diese Erfahrung wird Europa so schnell nicht vergessen. *Die Welt*. https://www.welt.de/wirtschaft/plus206563595/Trump-will-deutsche-Impfstoff-Firma-CureVac-Traumatische-Erfahrung.html

Dietrich, E. (2020). When Science Confronts Philosophy: Three Case Studies. *Axiomathes*, *30*(5), 479–500. https://doi.org/10.1007/S10516-019-09472-9

Doane, M. A. (2002). The Emergence of Cinematic Time. In *Current psychology (New Brunswick*. Harvard University Press. https://doi.org/10.1007/s12144-021-02463-3

Dong, R., Wu, H., Ni, S., & Lu, T. (2023). The nonlinear consequences of working hours for job satisfaction: The moderating role of job autonomy. *Current Psychology*, *42*(14), 11849–11870. https://doi.org/10.1007/S12144-021-02463-3/FIGURES/3

Dorato, M. (2012). Presentism/eternalism and endurantism/perdurantism: Why the unsubstantiality of the first debate implies that of the second. In *Philosophia Naturalis* (Vol. 49, Issue 1). https://doi.org/10.3196/003180212800605257

Döring, T., Sylvester, A., & Schmidt, A. (2013). A design space for ephemeral user interfaces. *TEI 2013*. https://doi.org/10.1145/2460625.2460637

Dourish, P. (2001). Where the Action Is: The Foundations of Embodied Interaction. *Where the Action Is the Foundations of Embodied Interaction*, *36*(3). https://doi.org/10.1162/leon.2003.36.5.412

Doyle, R., & Conboy, K. (2020a). Considering the merits of applying 'liquid modernity' as a theoretical lens for information systems research. *ECIS 2020 Research-in-Progress Papers. 90.* https://aisel.aisnet.org/ecis2020_rip/90

Doyle, R., & Conboy, K. (2020b). The role of IS in the Covid-19 pandemic: A liquid-modern perspective. *International Journal of Information Management*, *55*, 102184. https://doi.org/10.1016/J.IJINFOMGT.2020.102184

Doyle, R., Conboy, K., & Kreps, D. (2022a). An Interdisciplinary Review of Ephemerality for Information Systems Research. *IFIP Advances in Information and Communication Technology, Co-Creating for Context in the Transfer and Diffusion of IT*, *660 IFIP*, 3–23. https://doi.org/10.1007/978-3-031-17968-6_1

Doyle, R., Conboy, K., & Kreps, D. (2022b). The Ephemeral and Information Systems Research: Conceptualizing Ephemerality in a Post-pandemic World. *The Role of Digital Technologies in Shaping the Post-Pandemic World: 21st IFIP WG 6.11 Conference on e-Business, e-Services and e-Society, I3E 2022, Newcastle upon Tyne, UK, September 13–14, 2022, Proceedings*, 434–455. https://doi.org/10.1007/978-3-031-15342-6_34

Doyle, R., Conboy, K., & Kreps, D. (2022c). The Metaverse and Ephemerality. *Journal of Information Management*, *66*(66). https://doi.org/10.1016/j.ijinfomgt.2022.102542

Dupré, J. (2018). Processes, Organisms, Kinds and the Inevitability of Pluralism. In *Individuation, Process, and Scientific Practices*.

Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., … Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, *66*, 102542. https://doi.org/10.1016/J.IJINFOMGT.2022.102542

Earley, K. (2020). *Twitter is allowing staff to work remotely 'forever'*. Silicon Republic. https://www.siliconrepublic.com/business/twitter-remote-work-from-home-forever

Eckhardt, G. M., & Bardhi, F. (2020). The value in de-emphasizing structure in liquidity. *Marketing Theory*, *20*(4), 573–580. https://doi.org/10.1177/1470593120941038

EDPB. (2020). *Statement by the EDPB Chair on the processing of personal data in the context of the COVID-19 outbreak*. European Data Protection Board. https://www.edpb.europa.eu/news/news/2020/statement-edpb-chair-processing-personal-data-context-covid-19-outbreak_en

Egan, M. (2020). *The economy is in shambles but Big Tech stocks are on fire*. CNN Business. https://edition.cnn.com/2020/05/27/investing/faang-stocks-market-amazon-tech/index.html)

Ekbia, H. (2009). Digital Artifacts as Quasi-Objects: Qualification, Mediation, and Materiality. *Journal of the American Society for Information Science and Technology*, *60*(12), 2554–2566.

Ekström, B. (2022). Trace data visualisation enquiry: a methodological coupling for studying information practices in relation to information systems. *Journal of Documentation*, *78*(7), 141–159. https://doi.org/10.1108/JD-04-2021-0082

Elkjaer, B. (2017). Organizations as real and ephemeral. *Zeitschrift Für Weiterbildungsforschung 2017 40:1*, *40*(1), 53–68. https://doi.org/10.1007/S40955-017-0086-0

Elliott, A. (2013). The theory of liquid modernity: A critique of Bauman's recent sociology. In *The Contemporary Bauman*. https://doi.org/10.4324/9780203946671

Ellis, E. (2020). *For Homeless People, Covid-19 Is Horror on Top of Horror*. Wired. https://www.wired.com/story/coronavirus-covid-19-homeless/

Ellison, N. (2013). Citizenship, space and time: Engagement, identity and belonging in a connected world. *Thesis Eleven*, *118*(1), 48–63. https://doi.org/10.1177/0725513613500271

Epstein, S., Beltran, D., & et al. (2020). Exploring Design Principles for Sharing of Personal Informatics Data on Ephemeral Social Media. In *In Proceedings of the ACM on HumanComputer Interaction.* (Vol. 4). https://doi.org/10.1145/3415166

Erokhin, D., Yosipof, A., & Komendantova, N. (2022). COVID-19 Conspiracy Theories Discussion on Twitter. *Social Media and Society*, *8*(4).

https://doi.org/10.1177/20563051221126051/ASSET/IMAGES/LARGE/10.1177_20563051221126051-FIG1.JPEG

Evans, E. J. (2011). 'Carnaby Street, 10 a.m.': KateModern and the Ephemeral Dynamics of Online Drama. In P. Grainge (Ed.), *Ephemeral Media: Transitory Screen Culture from Television to YouTube.* Bloomsbury Publishing (UK). https://doi.org/10.5040/9781838710354.CH-009

Falk, D. (2020). A Debate over the Physics of Time. In *Alice and Bob Meet the Wall of Fire*. https://doi.org/10.7551/mitpress/11909.003.0019

Fan C., Kärreman D., & Grey Z. (2021). Confidential Gossip and Organization Studies. *Organization Studies, Sage*, *42*(10), 1651–1664.

Farias, C. (2017). That's What Friends Are For: Hospitality and affective bonds fostering collective empowerment in an intentional community. *Organization Studies*, *38*(5), 577–595. https://doi.org/10.1177/0170840616670437

Farjoun, M. (2010). Beyond Dualism: Stability and Change As a Duality. *Academy of Management Review*, *35*(2), 202–225. https://doi.org/10.5465/amr.35.2.zok202

Faulkner, J., & Runde, P. (2019). Theorizing the Digital Object. *MIS Quarterly*, *43*(4), 1279–1302.

Feldman, M. S. (2000). Organizational Routines as a Source of Continuous Change. *Organization Science*, *11*(6). https://doi.org/10.1287/orsc.11.6.611.12529

Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing organizational routines as a source of flexibility and change. In *Administrative Science Quarterly* (Vol. 48, Issue 1). https://doi.org/10.2307/3556620

Ferrara, E. (2020). What types of COVID-19 conspiracies are populated by Twitter bots? *First Monday*. https://doi.org/10.5210/FM.V25I6.10633

Fichman, R. G., Dos Santos, B. L., & Zheng, Z. (2014). Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS Quarterly: Management Information Systems*, *38*(2), 329–353. https://doi.org/10.25300/MISQ/2014/38.2.01

Fischer, F. (2021). Bergsonian Answers to Contemporary Persistence Questions. *Bergsoniana*, *1*. https://doi.org/10.4000/BERGSONIANA.448

Fischer-Lichte, E. (2008a). Sense and Sensation: Exploring the Interplay between the Semiotic and Performative Dimensions of Theatre. *Journal of Dramatic Theory and Criticism*, *22*(2). https://doi.org/10.1353/dtc.2008.0001

Fischer-Lichte, E. (2008b). The transformative power of performance: A new aesthetics. In *The Transformative Power of Performance: A New Aesthetics*. https://doi.org/10.4324/9780203894989

Fischer-Lichte, E. (2009). Culture as performance Theatre history as cultural history. *Modern Austrian Litertature*.

Fisher, G., Mayer, K., & Morris, S. (2021). From the Editors - Phenomenon-Based Theorizing. In *Academy of Management Review* (Vol. 46, Issue 4). https://doi.org/10.5465/amr.2021.0320

Fitzpatrick, M., Gill, I., Libarikian, A., Smaje, K., & Zemmel, R. (2020). The digital-led recovery from COVID-19: Five questions for CEOs. *McKinsey & Company*. https://www.mckinsey.com.br/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20digital%20led%20recovery%20from%20COVID%2019%20Five%20questions%20for%20CEOs/the-digital-led-recovery-from-covid-19.pdf

Flyverbom, M., & Murray, J. (2018). Datastructuring—Organizing and curating digital traces into action. *Big Data & Society*, *5*(2). https://doi.org/10.1177/2053951718799114

Fortwengel, J., Sydow, E., & Schüßler, J. (2017). Studying Organizational Creativity as Process: Fluidity or Duality? *Creativity and Innovation Management*, *26*, 5–16. https://doi.org/10.1111/caim.12187.

Fouweather, I., & Bosma, B. (2021). The Desire to Rethink Power AND Performativity AND Process. *Organization Studies*, *42*(12), 1795–1815. https://doi.org/10.1177/0170840621997622

Franko, M. (2018). The Power of Recall in a Post-Ephemeral Era. In M. Franko (Ed.), *The Oxford Handbook of Dance and Reenactment.* Oxford University Press.

Frisby, D. (1985). *Fragments of modernity : theories of modernity in the work of Simmel, Kracauer and Benjamin*. Routledge. https://www.routledge.com/Fragments-of-Modernity-Routledge-Revivals-Theories-of-Modernity-in-the-Work-of-Simmel-Kracauer-and-Benjamin/Frisby/p/book/9780415702645

Fuchs, C. (2017). Marx's Capital in the information age. *Capital and Class*, *41*(1), 51–67. https://doi.org/10.1177/0309816816678573

Gabrys, J. (2011). *Digital Rubbish: A Natural History of Electronics*. University of Michigan Press. https://doi.org/10.2307/j.ctv65swcp

Gadamer, H.-G. (1982). *Truth and Method* (2nd ed.). Crossroad Publishing, New York.

Gale, T. (2009). Urban Beaches, Virtual Worlds and 'The End of Tourism'. *Mobilities*, *4*(1), 119–138. https://doi.org/10.1080/17450100802657996

Garrett, P. M. (2012). From 'solid modernity' to 'liquid modernity'? Zygmunt Bauman and social work. *British Journal of Social Work*, *42*(4). https://doi.org/10.1093/bjsw/bcr094

Garud, R., Simpson, B., Langley, A., & Tsoukas, H. (2015). Introduction: How Does Novelty Emerge? In R. Garud, B. Simpson, A. Langley, & H. Tsoukas (Eds.), *The Emergence of Novelty in Organizations* (4th ed., pp. 1–24). Oxford University Press. https://doi.org/10.1093/ACPROF:OSO/9780198728313.003.0001

Giallorenzo, S., Montesi, F., Safina, L., & Zingaro, S. P. (2019). Ephemeral data handling in microservices. *In: IEEE International Conference on Services Computing (SCC)*. https://doi.org/10.1109/SCC.2019.00048

Gibbs, M., Mengel, F., Siemroth, C., Gisdakis, S., Manolopoulos, V. ., Tao, S., & Rusu, A. (2021). Work from home & productivity: evidence from personnel & analytics data on IT professionals. *IEEE Transactions on Intelligent Transportation Systems*, *19*(2–3).

Giddens, A. (1984). *The Constitution of Society. Outline of the Theory of Structuration*. University of California Press, Berkeley.

Giddens, A. (1991). Modernity and Self-Identity. In *Modernity and self-identity: Self and society in the late modern age*. Stanford University Press.

Ginsberg, J., Mohebbi, M. H., Patel, R. S., Brammer, L., Smolinski, M. S., & Brilliant, L. (2009). Detecting influenza epidemics using search engine query data. *Nature*, *457*(7232), 1012–1014. https://doi.org/10.1038/NATURE07634

Gisdakis, S., Manolopoulos, V., Tao, S., Rusu, A., & Papadimitratos, P. (2015). Secure and privacy-preserving smartphone-based traffic information systems. *IEEE Transactions on Intelligent Transportation Systems*, *16*(3), 1428–1438. https://doi.org/10.1109/TITS.2014.2369574

Glennan, S. (2010). Ephemeral mechanisms and historical explanation. *Erkenntnis*, *72*(2), 251–266. https://doi.org/10.1007/S10670-009-9203-9/METRICS

Goffman, E. (1959). *The Presentation of Self in Everyday Life*. Garden City, N. Y. Doubleday.

Graham, D. W. (2009). Heraclitus. In *Internet Encyclopedia of Philosophy*. https://iep.utm.edu/heraclit/#:~:text=The%20Doctrine%20of%20Flux%20and%20the%20Unity%20of%20Opposites,-According%20to%20both&text=For%20he%20held%20that%20(1,the%20Law%20of%20Non%2DContradiction.

Graham, D. W. (2023). Heraclitus. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/archives/win2023/entries/heraclitus/

Grainge, P. (2011). *Ephemeral media : transitory screen culture from television to YouTube*. Palgrave Macmillan : British Film Institute.

Gramsci, A. (2005). Americanism and Fordism. Selections from the prison notebooks. In *Social Theory*. https://doi.org/https://doi.org/10.1515/9781474469654-014

Grandi, F. (2020). *Refugees are on the front line of the COVID-19 pandemic. Let's give them the rights they deserve*. Weforum.Org. https://www.weforum.org/stories/2020/04/meet-the-asylum-seekers-on-the-frontline-of-the-coronavirus/

Gregor, S. (2006). The nature of theory in Information Systems. *MIS Quarterly: Management Information Systems*, *30*(3). https://doi.org/10.2307/25148742

Griffin, D., & Denholm, J. (2020). *This isn't the first global pandemic, and it won't be the last. Here's what we've learned from 4 others throughout history*. The Conversation. https://scholar.google.com/scholar_lookup?title=This%20isnt%20the%20first%20global%20pandemic%2C%20and%20it%20wont%20be%20the%20last.%20Heres%20what%20weve%20learned%20from%204%20others%20throughout%20history&publication_year=2020&author=D.%20Griffin&author=J.%20Denholm

Grisold, T., Kremser, W., Mendling, J., Recker, J., vom Brocke, J., & Wurm, B. (2024). Generating impactful situated explanations through digital trace data. *Journal of Information Technology*, *39*(1), 2–18. https://doi.org/10.1177/02683962231208724

Grisold, T., Kremser, W., Mendling, J., Recker, J., vom Brocke, J., & Wurm, B. (2023). Keeping pace with the digital age: Envisioning information systems research as a platform. *Journal of Information Technology*, *38*(1), 60–66. https://doi.org/10.1177/02683962221130429

Grosz, E. (2013). Habit Today: Ravaisson, Bergson, Deleuze and Us. *Body and Society*, *19*(2–3), 217–239. https://doi.org/10.1177/1357034X12472544

Grover, V., Lindberg, A., Benbasat, I., & Lyytinen, K. (2020). The Perils and Promises of Big Data Research in Information Systems. *Journal of the Association for Information Systems*, *21*(2). https://doi.org/10.17705/1jais.00601

Grover, V., & Lyytinen, K. (2015). NEW state of play in information systems research: The push to the edges. In *MIS Quarterly: Management Information Systems* (Vol. 39, Issue 2). https://doi.org/10.25300/MISQ/2015/39.2.01

Grover, V., & Lyytinen, K. (2023a). Not only data: The necessity of abstract thinking to make sense of digital phenomena. *Journal of Information Technology*, *38*(1), 74–78. https://doi.org/10.1177/02683962231156622

Grover, V., & Lyytinen, K. (2023b). The Pursuit of Innovative Theory in the Digital Age. *Journal of Information Technology*. https://doi.org/10.1177/02683962221077112

Grudin, J. (2002). Group Dynamics and Ubiquitous Computing. *Communications of the ACM*, *45*(12), 74–78. https://doi.org/10.1145/585597.585618/SUPPL_FILE/P74-GRUDIN.JP.PDF

Gruzd, A., & Mai, P. (2020). Going viral: How a single tweet spawned a COVID-19 conspiracy theory on Twitter. *Big Data & Society*, *7*(2). https://doi.org/10.1177/2053951720938405

GSMA. (2014). *GSMA guidelines on the protection of privacy in the use of mobile phone data for responding to the ebola outbreak*. https://www.gsma.com/mobilefordevelopment/resources/gsma-guidelines-on-the-protection-of-privacy-in-the-use-of-mobile-phone-data-for-responding-to-the-ebola-outbreak/

Guillaume, X., & Huysmans, J. (2018). The concept of 'the everyday': Ephemeral politics and the abundance of life. *Cooperation and Conflict*, *54*(2), 278–296. https://doi.org/10.1177/0010836718815520

Guo, X., Vogel, D., Zhou, Z., Zhang, X., & Chen, H. (2009). Chaos theory as a lens for interpreting blogging. *Journal of Management Information Systems*, *26*(1), 101–128. https://doi.org/10.2753/MIS0742-1222260105

Guyau, J.-M. (1890). *Genèse de L'idée de Temps* (J. A. Michon, V. Pouthas, & J. L. Jackson, Eds.). North-Holland Publishing Company, 1988.

Haber, B. (2019). The digital ephemeral turn: queer theory, privacy, and the temporality of risk. *Media Culture & Society*. https://doi.org/https://doi.org/10.1177/0163443719831600

Hagen, S., & Venturini, T. (2024). Memecry: tracing the repetition-with-variation of formulas on 4chan. *Information, Communication & Society*, *27*, 3, 466–497. https://doi.org/10.1080/1369118X.2023.2216769

Haj-Bolouri, A., Conboy, K., & Gregor, S. (2024). Research Perspectives: An Encompassing Framework for Conceptualizing Space in Information Systems: Philosophical Perspectives, Themes, and Concepts. *Journal of the Association for Information Systems*, *25*(2), 407–441. https://doi.org/10.17705/1jais.00830

Han, S. P., Park, S., & Oh, W. (2016). Mobile App Analytics: A Multiple Discrete-Continuous Choice Framework. *MIS Quarterly*, *40*(4), 983–1008. https://doi.org/10.25300/misq/2016/40.4.09

Handyside, S., & Ringrose, J. (2017). Snapchat memory and youth digital sexual cultures: mediated temporality, duration and affect. *Journal of Gender Studies*, *26: 3*, 347–360. https://doi.org/10.1080/09589236.2017.1280384

Haraway, D. J. (2013). Simians, cyborgs, and women: The reinvention of nature. *Simians, Cyborgs, and Women: The Reinvention of Nature*, 1–290. https://doi.org/10.4324/9780203873106/SIMIANS-CYBORGS-WOMEN-DONNA-HARAWAY

Harding, N., Gilmore, S., & Ford, J. (2022). Matter That Embodies: Agentive Flesh and Working Bodies/Selves. *Organization Studies*, *43*(5), 649–668. https://doi.org/10.1177/0170840621993235

Hardy, C., & Thomas, R. (2016). Power and Process: The Production of 'Knowing' Subjects and 'Known' Objects. In *The SAGE Handbook of Process Organization Studies* (pp. 466–479). SAGE Publications Ltd. https://doi.org/10.4135/9781473957954.N29

Hargadon, A., & Bechky, B. (2006). When Collections of Creatives Become Creative Collectives: A Field Study of Problem Solving at Work. *Organization Science*, *17*(4), 484–500. https://doi.org/10.1287/orsc.1060.0200

Harvey, David. (1989). *The condition of postmodernity : an enquiry into the origins of cultural change*. Blackwell. https://search.worldcat.org/title/18747380

Hassan, N. R., Mathiassen, L., & Lowry, P. B. (2019). The process of information systems theorizing as a discursive practice. *Journal of Information Technology*, *34*(3). https://doi.org/10.1177/0268396219832004

Hassan, N. R., Mingers, J., & Stahl, B. (2018). Philosophy and information systems: where are we and where should we go? In *European Journal of Information Systems* (Vol. 27, Issue 3). https://doi.org/10.1080/0960085X.2018.1470776

Hastie, A. (2007). Detritus and the moving image: Ephemera, materiality, history. *Journal of Visual Culture*, *6*(2), 171–174. https://doi.org/10.1177/1470412907078553/ASSET/1470412907078553.FP.PNG_V03

Hawkins, G. (2018). Plastic and Presentism: The Time of Disposability. *Journal of Contemporary Archaeology*, *5*(1). https://doi.org/10.1558/jca.33291

Hawley, K. (2011). How Things Persist. In *How Things Persist*. https://doi.org/10.1093/acprof:oso/9780199275434.001.0001

Hawley, K. (2020a). Metaphysics and Relativity. In *The Routledge Companion to Metaphysics*. https://doi.org/10.4324/9780203879306-53

Hawley, K. (2020b). Temporal Parts. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy* .

Hayes, N., & Westrup, C. (2012). Context and the processes of ICT for development. *Information and Organization*, *22*, 1, 23–36, 38. https://doi.org/10.1016/j.infoandorg.2011.10.001

He, D., & Kivetz, R. (2016). Blink and you'll miss it: the consequences of ephemeral messaging. *Advances in Consumer Research*. https://openurl.ebsco.com/c/t4a2lo/EPDB%3Agcd%3A14%3A29227742/detailv2?sid=ebsco%3Aocu%3Arecord&id=ebsco%3Agcd%3A122352690&bquery=AU%20He%2C%20Daniel&page=1&link_origin=www.google.com&x-cgp-token=t4a2lo

He, Y., Xu, X., Huang, N., Hong, Y. ., & Liu, D. (2024). Enhancing User Privacy Through Ephemeral Sharing Design: Experimental Evidence from Online Dating. *Information Systems Research*. https://doi.org/10.1287/isre.2021.0379.

Hedman, J., Srinivasan, N., & Lindgren, R. (2013). Digital Traces of Information Systems: Sociomateriality Made Researchable. In R. and C. Baskerville M. (Ed.), *Proceedings of the 34th International*

Conference on Information Systems. ICIS 2013 Article 1069 Association for Information Systems. AIS Electronic Library (AISeL). https://aisel.aisnet.org/icis2013/proceedings/ResearchMethods/6

Heidegger, M. (1962). *Being and Time* (J. Macquarrie & E. Robinson, Trans.). New York, NY: Harper & Row .

Henry, R., Herzberg, A., & Kate, A. (2018). Blockchain access privacy: Challenges and directions. *IEEE Security and Privacy*, *16*(4), 38–45. https://doi.org/10.1109/MSP.2018.3111245

Hernes, T. (2008). *Understanding organization as process: theory for a tangled world*. Routledge.

Hernes, T. (2014). A Process Theory of Organization. In *A Process Theory of Organization*. Oxford University Press. https://doi.org/10.1093/ACPROF:OSO/9780199695072.001.0001

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS Quarterly: Management Information Systems*, *28*(1). https://doi.org/10.2307/25148625

Hewer, P. (2022). Reimagining the terrain of liquid times: Reflexive marketing and the sociological imagination. *Journal of Consumer Culture*, *22*(2). https://doi.org/10.1177/1469540520955203

Heylighen, F. (2007). The Global Superorganism : an evolutionary-cybernetic model of the emerging network society. *Journal of Social and Evolutionary Systems*, *6*(1).

Hilbolling S, Deken, F., Berends, H., & Tuertscher, P. (2022). Process-based temporal coordination in multiparty collaboration for societal challenges. *Strategic Organization*, *20*(1), 135–163. https://doi.org/10.1177/1476127021992705

Hindmarsh, J., & Pilnick, A. (2007). Knowing bodies at work: Embodiment and ephemeral teamwork in Anaesthesia. *Organization Studies*, *28*(9), 1395–1416. https://doi.org/10.1177/0170840607068258

Hirschheim, R., & Klein, H. K. (1989). Four Paradigms of Information Systems Development. *Communications of the ACM*, *32*(10). https://doi.org/10.1145/67933.67937

Hobbs, M., Owen, S., & Gerber, L. (2017). Liquid love? Dating apps, sex, relationships and the digital transformation of intimacy. *Journal of Sociology*, *53*(2). https://doi.org/10.1177/1440783316662718

Hoerl, C. (2014). Do we (seem to) perceive passage? *Philosophical Explorations*, *17*(2), 188–202. https://doi.org/10.1080/13869795.2013.852615

Hollingsworth, S. (2022). *R.I.P. to the top 10 failed social media sites*. SearchEngineJournal. https://www.searchenginejournal.com/failed-social-media-sites/303421/#close

Holt, R., & Johnsen, R. (2019). Time and Organization Studies. *Organization Studies*, *40*(10), 1557–1572. https://doi.org/10.1177/0170840619844292

Howison, J., Wiggins, J., & Crowston, K. (2011). Validity Issues in the Use of Social Network Analysis with Digital Trace Data. *Journal of the Association for Information Systems*, *12*(12). https://doi.org/10.17705/1jais.00282

Hoy, R. C. (2013). Heraclitus and Parmenides. In H. and B. Dyke A. (Ed.), *In A Companion to the Philosophy of Time*. https://doi.org/10.1002/9781118522097.ch1

Huang, K., Zhang, X., Mu, Y., Rezaeibagha, F., Du, X., & Guizani, N. (2020). Achieving Intelligent Trust-Layer for Internet-of-Things via Self-Redactable Blockchain. *IEEE Transactions on Industrial Informatics*, *16*(4), 2677–2686. https://doi.org/10.1109/TII.2019.2943331

Hultin, L., & Introna, L. (2019). On Receiving Asylum Seekers: Identity working as a process of material-discursive interpellation. *Organization Studies*, *40*(9), 1361–1386. https://doi.org/10.1177/0170840618782280

Hung, S. C., & Tu, M. F. (2014). Is small actually big? the chaos of technological change. *Research Policy*, *43*(7), 1227–1238. https://doi.org/10.1016/j.respol.2014.03.003

Husserl, E. (1964). *The Phenomenology of Internal Time-Consciousness* (J. S. and H. Churchill M., Ed.). Indiana University Press.

IBM. (2019). *US Patent for Managing ephemeral locations in a virtual universe Patent (Patent # 11,004,121 issued May 11, 2021) - Justia Patents Search*. JUSTIA Patents. https://patents.justia.com/patent/11004121

Ienca, M., & Vayena, E. (2020). On the responsible use of digital data to tackle the COVID-19 pandemic. *Nature Medicine*, *26*(4), 463–464. https://doi.org/10.1038/S41591-020-0832-5

Ingold, T., & Simonetti, C. (2022). Introducing Solid Fluids. *Theory, Culture & Society*, *39*(2), 3–29. https://doi.org/10.1177/02632764211030990

Ingram, D., & Tallant, J. (2022). Presentism. In *The Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/archives/win2022/entries/presentism/

Introna, L. D. (2011). Hermeneutics and Meaning-Making in Information Systems. In *The Oxford Handbook of Management Information Systems: Critical Perspectives and New Directions*. https://doi.org/10.1093/oxfordhb/9780199580583.003.0011

Jacobsen, M. H., & Marshman, S. (2008). Bauman's metaphors: The poetic imagination in sociology. *Current Sociology*, *56*(5). https://doi.org/10.1177/0011392108093836

James, W. (1886). The Perception of Time. *The Journal of Speculative Philosophy*, *20*(4), 374–407.

James, W. (1890). *The Principles of Psychology*. H. Holt and company.

Jameson, F. (1991). Postmodernism, or, The Cultural Logic of Late Capitalism. In *Postmodernism, or, The Cultural Logic of Late Capitalism*. Duke University Press. https://doi.org/10.2307/J.CTV12100QM

Janssen, C., Vanhamme, J., Lindgreen, A., & Lefebvre, C. (2014). The Catch-22 of Responsible Luxury: Effects of Luxury Product Characteristics on Consumers' Perception of Fit with Corporate Social Responsibility. *Journal of Business Ethics*, *119*(1), 45–57. https://doi.org/10.1007/S10551-013-1621-6

Järventie-Thesleff, R., & Tienari, J. (2015). Roles as Mediators in Identity Work. *Organization Studies*, *37*(2), 237–265. https://doi.org/10.1177/0170840615604500

Jay, M. (2010). Liquidity Crisis: Zygmunt Bauman and the Incredible Lightness of Modernity. *Theory, Culture & Society*, *27*(6). https://doi.org/10.1177/0263276410382024

Johnson, S. L., Gray, P., & Sarker, S. (2019). Revisiting IS research practice in the era of big data. *Information and Organization*, *29*(1), 41–56. https://doi.org/10.1016/J.INFOANDORG.2019.01.001

Jones, M. (2018). What we talk about when we talk about (big) data. *Journal of Strategic Information Systems*. https://doi.org/10.1016/j.jsis.2018.10.005

Jones, M., Munir, K., Orlikowski, W. J., & Runde, J. (2008). About Time Too: Online News and Changing Temporal Structures in the Newspaper Industry. *Runde, J*. https://aisel.aisnet.org/icis2008/156

Kallinikos, J. (2009). *The making of ephemeria: on the shortening life spans of information*. http://iji.cgpublisher.com/

Kallinikos, J., Aaltonen, A., & Marton, A. (2010). A theory of digital objects. *First Monday*, *15*(6). https://doi.org/10.5210/FM.V15I6.3033

Kallinikos, J., Aaltonen, A., & Marton, A. (2013). The ambivalent ontology of digital artifacts. *MIS Quarterly: Management Information Systems*, *37*(2), 357–370. https://doi.org/10.25300/MISQ/2013/37.2.02

Kallinikos, J., & Tempini, N. (2014). Patient data as medical facts: Social media practices as a foundation for medical knowledge creation. *Information Systems Research*, *25*(4). https://doi.org/10.1287/isre.2014.0544

Kaun, A., & Stiernstedt, F. (2014). Facebook time: Technological and institutional affordances for media memories. *New Media and Society*, *16*(7), 1154–1168. https://doi.org/10.1177/1461444814544001

Kavanagh, D., Lightfoot, G., & Lilley, S. (2007). Running to Stand Still: Late Modernity's Acceleration Fixation. *Cultural Politics*, *3*(1), 95–122. https://doi.org/10.2752/174321907780031043

Keesara, S., Jonas, A., & Schulman, K. (2020). Covid-19 and Health Care's Digital Revolution. *New England Journal of Medicine*, *382*(23). https://doi.org/10.1056/NEJMP2005835

Kelly, T., & Baron, J. (2019). *The rise of ephemeral messaging apps in the business world*. https://natlawreview.com/article/rise-ephemeral-messaging-apps-business-world

Kilminster, R. (2016). Overcritique and ambiguity in Zygmunt Bauman's sociology: A long-term perspective. In *Beyond Bauman: Critical Engagements and Creative Excursions*. https://doi.org/10.4324/9781315569178

Kim, A., Bansal, P., & Haugh, H. (2019). No time like the present: how a present time perspective can foster sustainable development. *Academy of Management Journal*, *62*(2), 607–634. https://doi.org/10.5465/amj.2015.1295

Kirby, Michael. (1974). *The new theatre: performance documentation*. New York University Press. https://search.worldcat.org/title/1719039

Kishore, S., Sundaram, D., Janczewski, L., Peiris, K., & Dharini, A. (2022). Vulnerable Groups Online: Understanding Engagement with Facebook, Instagram and Snapchat. *AMCIS 2022 Proceedings. 4*, *Proceedings. 4*.

Kishore, S., Sundaram, D., & Myers, M. D. (2024). A temporal dynamics framework and methodology for computationally intensive social media research. *Journal of Information Technology*. https://doi.org/10.1177/02683962241283051

Kitchin, R. (2014). Big Data, new epistemologies and paradigm shifts. *Big Data and Society*, *1*(1). https://doi.org/10.1177/2053951714528481

Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly: Management Information Systems*, *23*(1). https://doi.org/10.2307/249410

Klein, N. (2020). How big tech plans to profit from the pandemic. *The Guardian*. https://www.theguardian.com/news/2020/may/13/naomi-klein-how-big-tech-plans-to-profit-from-coronavirus-pandemic

Knight, W. (2020). *The Value and Ethics of Using Phone Data to Monitor Covid-19*. Wired. https://www.wired.com/story/value-ethics-using-phone-data-monitor-covid-19/

Kompare, D. (2002). Flow to Files: Conceiving 21st Century Media. In *In: Media in Transition 2*.

Korica, M., & Bazin, Y. (2019). Fashion and Organization Studies: Exploring conceptual paradoxes and empirical opportunities. *Organization Studies*, *40*(10), 1481–1497. https://doi.org/10.1177/0170840619831059

Kramer, A. D. I., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(24), 8788–8790. https://doi.org/10.1073/PNAS.1320040111

Kreps, D., & Kimppa, K. (2015). Theorising Web 3.0: ICTs in a changing society. *Information Technology and People*, *28*(4), 726–741. https://doi.org/10.1108/ITP-09-2015-0223/FULL/XML

Kreps, D., & Rowe, F. (2024). Research Perspectives: Using a Process Philosophy Perspective in Information Systems Research: Principles of Creative Evolution. *Journal of the Association for Information Systems*, *25*(5), 1410–1433. https://doi.org/10.17705/1jais.00883

Kreps, D., Rowe, F., & Muirhead, J. (2020). Understanding digital events: Process philosophy and causal autonomy. *Proceedings of the Annual Hawaii International Conference on System Sciences*, *2020-January*, 6133–6142. https://doi.org/10.24251/HICSS.2020.750

Kreps, David. (2020). *Against nature : the metaphysics of information systems*. Routledge.

Kristensen, J. B., Albrechtsen, T., Dahl-Nielsen, E., Jensen, M., Skovrind, M., & Bornakke, T. (2017). Parsimonious data: How a single Facebook like predicts voting behavior in multiparty systems. *PLOS ONE*, *12*. https://doi.org/10.1371/journal.pone.0184562

Laato, S., Islam, A. K. M. N., Islam, M. N., & Whelan, E. (2020). What drives unverified information sharing and cyberchondria during the COVID-19 pandemic? *European Journal of Information Systems*, *29*(3), 288–305. https://doi.org/10.1080/0960085X.2020.1770632

LaFranco, R., Chung, G., & Peterson-Withorn, C. (2020). Forbes World's Billionaires List. *Forbes*. https://www.forbes.com/billionaires/

Lamprou, E. (2017). Spatiality as Care: A Heideggerian Perspective on Sociomaterial Practices. *Organization Studies*, *1–20*. https://doi.org/10.1177/0170840617693267

Langley, A. (1999). Strategies for Theorizing from Process Data. *The Academy of Management Review*, *24*(4), 691. https://doi.org/10.2307/259349

Langley, A., Smallman, C., Tsoukas, H., & Van De Ven, A. H. (2013). Process studies of change in organization and management: Unveiling temporality, activity, and flow. *Academy of Management Journal*, *56*(1). https://doi.org/10.5465/amj.2013.4001

Lanzara, G. F. (1983). Ephemeral organizations in extreme environments; Emergences, strategy, extinctions. *J. Manage. Stud*, *20*(1), 71–95.

Lanzara, G. F. (1999). Between transient constructs and persistent structures: designing systems in action. *Journal of Strategic Information Systems*, *8*, 331–349.

Lavin, F. (2020). China's E-Commerce Players Post Strong Quarterly Results Despite Covid-19. *Forbes*. https://www.forbes.com/sites/franklavin/2020/05/25/chinas-e-commerce-players-post-strong-quarterly-results-despite-covid-19/#317a1dca78a8

Law, J., & Urry, J. (2004). Enacting the social. *Economy and Society*, *33*(3), 390–410. https://doi.org/10.1080/0308514042000225716

Lazer, D. M. J., Baum, M. A., Benkler, Y., Berinsky, A. J., Greenhill, K. M., Menczer, F., Metzger, M. J., Nyhan, B., Pennycook, G., Rothschild, D., Schudson, M., Sloman, S. A., Sunstein, C. R., Thorson, E. A., Watts, D. J., & Zittrain, J. L. (2018). The science of fake news: Addressing fake news requires a multidisciplinary effort. *Science*, *359*(6380), 1094–1096. https://doi.org/10.1126/SCIENCE.AAO2998

Lazer, D., Pentland, A. S., Adamic, L., Aral, S., & ... (2009). Life in the network: the coming age of computational social science. In *Science (New York …*.

Le Poidevin, R. (2009). The Images of Time: An Essay on Temporal Representation. In *The Images of Time: An Essay on Temporal Representation*. Oxford University Press. https://doi.org/10.1093/ACPROF:OSO/9780199265893.001.0001

Le Poidevin, R. (2013). The Experience and Perception of Time. In *Stanford Encyclopedia of Philosophy*.

Lee, A. S. (1994). Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation. *MIS Quarterly*, *18*, 2.

Lee, A. S. (2004). Thinking about social theory and philosophy for information systems. *Social Theory and Philosophy for Information Systems*.

Lee, A. S., Thomas, M., & Baskerville, R. L. (2015). Going back to basics in design science: from the information technology artifact to the information systems artifact. *Information Systems Journal*, *25*(1), 5–21. https://doi.org/10.1111/ISJ.12054

Lee, G., Saad, W., Bennis, M., Kim, C., & Jung, M. (2020). An Online Framework for Ephemeral Edge Computing in the Internet of Things. *IEEE Transactions on Wireless Communications*, *22*(3), 1992–2007. https://doi.org/10.1109/TWC.2022.3208096

Lee, H. (1999). Time and Information Technology: monochronicity, polychronicity and temporal symmetry. *European Journal of Information Systems*, *8*, 16–26. https://doi.org/10.1057/palgrave.ejis.3000318

Lee, R. (2005). Bauman, Liquid Modernity and Dilemmas of Development. *Thesis Eleven*, *83*(1), 61–77. https://doi.org/10.1177/0725513605057137

Lee, R. (2011). Modernity, solidity and agency: Liquidity reconsidered. *Sociology*, *45*(4). https://doi.org/10.1177/0038038511406582

Lee, R. L. M. (2022). Time, space, and power in digital modernity: From liquid to solid control. *Time and Society*, *31*(1). https://doi.org/10.1177/0961463X211016781

Leetaru, K. (2019). A Reminder That 'Fake News' Is An Information Literacy Problem - Not A Technology Problem. *Forbes*. https://www.forbes.com/sites/kalevleetaru/2019/07/07/a-reminder-that-fake-news-is-an-information-literacy-problem-not-a-technology-problem/#d889f666a6f2

Lefebvre, H. (1961). *Critique of Everyday Life, Vol. 2: Foundations for a Sociology of the Everyday* (J. Moore, Trans.). Verso, 2008.

Lefebvre, H. (1970). The Urban Revolution. In R. Bononno (Ed.), *Trans.* University of Minnesota Press.

Lefebvre, H., & Levich, C. (1987). The Everyday and Everydayness. *Yale French Studies*, *73*, 7–11. https://doi.org/10.2307/2930193

Lehrer, C., Constantiou, I., Matt, C., & Hess, T. (2023). How Ephemerality Features Affect User Engagement with Social Media Platforms. *MIS Quarterly*, *47*(4), 1663–1678. https://doi.org/10.25300/MISQ/2023/17085

Leidner, D. (2018). Review and Theory Symbiosis: An Introspective Retrospective. *Journal of the Association for Information Systems*, *19*(6). https://aisel.aisnet.org/jais/vol19/iss6/1

Leidner, D., & Tona, O. (2021). The CARE Theory of Dignity Amid Personal Data Digitalization. *MIS Quarterly*, *45*, 1 343-370.

Lekakis, E. J. (2013). A liquid politics? Conceptualising the politics of fair trade consumption and consumer citizenship. *Ephemera: Theory & Politics in Organization*, *13*(2).

Leonardi, P. M. (2011). When flexible routines meet flexible technologies: Affordance, constraint, and the imbrication of human and material agencies. *MIS Quarterly: Management Information Systems*, *35*(1). https://doi.org/10.2307/23043493

Leonardi, P. M. (2012). Materiality, Sociomateriality, and Socio-Technical Systems: What Do These Terms Mean? How are They Related? Do We Need Them? In P. M. and N. Leonardi B.A. and Kallinikos J. (Ed.), *Materiality and Organizing: Social Interaction in a Technological World*. Oxford University Press. https://doi.org/10.2139/ssrn.2129878

Lepani, K. (2012). Islands of Love, Islands of Risk. In *Islands of Love, Islands of Risk*. Vanderbilt University Press. https://doi.org/10.2307/J.CTV16759ZT

Lepecki, A. (2004). *Of the Presence of the Body - Essays on dance and Performance Theory* (A. Lepecki, Ed.). Wesleyan University Press. https://www.weslpress.org/9780819566126/of-the-presence-of-the-body/

Lepecki, A. (2007). Choreography as Apparatus of Capture. *TDR: The Drama Review*, *51*(2), 119–123. https://www.muse.jhu.edu/article/216111.

Lewis, D. (1986). On the Plurality of Worlds. In *Noûs* (Issue 1). Wiley-Blackwell. https://doi.org/10.2307/2215836

Li, L., Zhang, Q., Wang, X., Zhang, J., Wang, T., Gao, T. L., Duan, W., Tsoi, K. K. F., & Wang, F. Y. (2020). Characterizing the Propagation of Situational Information in Social Media during COVID-19 Epidemic: A Case Study on Weibo. *IEEE Transactions on Computational Social Systems*, *7*(2), 556–562. https://doi.org/10.1109/TCSS.2020.2980007

Li, Y. (2020). China silences critics over deadly virus outbreak. *The New York Times*. https://www.nytimes.com/2020/01/22/health/virus-corona.html

Lim, J., Rong, G., & Grover, V. (2007). An Inductive Approach to Documenting the "Core" and Evolution of the IS Field. In *Communications of the Association for Information Systems.* https://doi.org/10.17705/1CAIS.01932

Lindberg, A. (2020). Developing Theory Through Integrating Human and Machine Pattern Recognition. *Journal of the Association for Information Systems*, *21*(1), 7. https://doi.org/10.17705/1jais.00593

Llewellyn, N. (2015). He probably thought we were students': Age norms and the exercise of visual judgement in service work. *Organization Studies*, *36*(2), 153–173. https://doi.org/10.1177/0170840614546151

López-Bertran, M. (2019). Ephemeral Art. *Encyclopedia of Global Archaeology*, 1–10. https://doi.org/10.1007/978-3-319-51726-1_2825-1

López-Forniés, I., Sierra-Pérez, J., Lorino, P., & Tricard, B. (2021). Ephemeral products: opportunities for circularity based on ideation for reuse. *In: An Experience. International Conference on Design, Simulation, Manufacturing: The Innovation Exchange ADM: Design Tools and Methods in Industrial Engineering II*, *32*(6), 365–372. https://doi.org/10.1080/14479338.2021.1938579

Lorin, H., Ball, L., & Eloy, G. (1987). Interconnect Technology as a Management Challenge. *MIS Quarterly*, *11*(4), 433–435.

Lortie, J., Cabantous, L., & Sardais, C. (2023). How Leadership Moments are Enacted within a Strict Hierarchy: The case of kitchen brigades in haute cuisine restaurants. *Organization Studies*, *44*(7). https://doi.org/10.1177/01708406221134225

Lothian, A. (2013). Archival anarchies: Online fandom, subcultural conservation, and the transformative work of digital ephemera. *International Journal of Cultural Studies*. https://doi.org/10.1177/136787791245913244

Lucchi, N. (2007). The supremacy of techno-governance: privatization of digital content and consumer protection in the globalized information society. *International Journal of Law and Information Technology*. https://academic.oup.com/ijlit/article-abstract/15/2/192/683909

Luhmann, N. (1996). *Social Systems*. Stanford University Press.

Lyytinen, K. (2022). Innovation logics in the digital era: a systemic review of the emerging digital innovation regime. *Innovation*, *24*(1), 13–34. https://doi.org/10.1080/14479338.2021.1938579

Lyytinen, K., & King, J. (2004). Nothing At The Center?: Academic Legitimacy in the Information Systems Field. *Journal of the Association for Information Systems*, *5*(6). https://doi.org/10.17705/1jais.00051

Lyytinen, K., & Newman, M. (2008). Explaining information systems change: A punctuated socio-technical change model. *European Journal of Information Systems*, *17*(6). https://doi.org/10.1057/ejis.2008.50

Ma, X., Qin, Y., Chen, Z., & Cho, H. (2021). Perceived ephemerality, privacy calculus, and the privacy settings of an ephemeral social media site. *Computers in Human Behavior*, *124*, 106928. https://doi.org/10.1016/J.CHB.2021.106928

MacCarthy, M. (2017). Doing away with Doba? Women's Wealth and Shifting Values in Trobriand Mortuary Distributions. *Sinuous Objects: Revaluing Women's Wealth in the Contemporary Pacific*, 61–88. https://doi.org/10.22459/SO.08.2017.02

Malhotra, A., & Majchrzak, A. (2022). Hidden patterns of knowledge evolution in fluid digital innovation. *Innovation*, *24*(1), 35–46. https://doi.org/10.1080/14479338.2021.1879653

Marabelli, M., Newell, S., & Galliers, R. (2016). The Materiality of Impression Management in Social Media Use: A focus on Time, Space and Algorithms. *ICIS 2016 Proceedings*. https://aisel.aisnet.org/icis2016/ISOrganizations/Presentations/14

Marabelli, M., Newell, S., & Handunge, V. (2021). The lifecycle of algorithmic decision-making systems: organizational choices and ethical challenges. *Journal of Strategic Information Systems, Elsevier*. https://doi.org/10.1016/j.jsis.2021.101683

Marcus, G. E., & Saka, E. (2006). Assemblage. *Theory, Culture & Society*, *23*(3), 101–106. https://doi.org/10.1177/0263276406062573

Markus, M. L., & Robey, D. (1988). Information Technology and Organizational Change: Causal Structure in Theory and Research. *Management Science*, *34*(5). https://doi.org/10.1287/mnsc.34.5.583

Markus, M. L., & Rowe, F. (2023). The Digital Transformation Conundrum: Labels, Definitions, Phenomena, and Theories. *Journal of the Association for Information Systems*, *24*(2), 328335. https://doi.org/10.17705/1jais.00809

Markus, M. L., & Saunders, C. (2007). Looking for a Few Good Concepts...and Theories...for the Information Systems Field. *MIS Quarterly*, *31*, 1 ,.

Marton, A., Avital, M., & Jensen, T. B. (2013). Reframing open big data. *Proceedings of European Conference on Information Systems*. https://research.cbs.dk/en/publications/reframing-open-big-data

Maruping, L. M., Venkatesh, V., & Agarwal, R. (2009). A control theory perspective on agile methodology use and changing user requirements. *Information Systems Research*, *20*(3), 377–399. https://doi.org/10.1287/ISRE.1090.0238

Massa, F. G. (2016). Guardians of the Internet: Building and Sustaining the Anonymous Online Community. *Organization Studies*, *1–30*. https://doi.org/10.1177/0170840616670436

MASS.gov. (2020). *Attorneys General Write to Amazon and Whole Foods Asking for Assurances on Compliance with State Laws and Federal COVID-19 Guidance*. Press Release, Office of Attorney General. https://www.mass.gov/news/ag-healey-leads-multistate-group-urging-amazon-and-whole-foods-to-strengthen-worker-protections-during-covid-19-pandemic

McCarthy, A., Ahearne, A., Bohle-Carbonell, K., Ó Síocháin, T., & Frost, D. (2020). *Remote working during COVID-19: Ireland's national survey initial report*. Galway, Ireland: National University of Ireland Galway, Whitaker Institute and Western Development Commission. https://scholar.google.com/scholar_lookup?title=Remote%20working%20during%20COVID-19%3A%20Irelands%20national%20survey%20initial%20report&publication_year=2020&author=A.%20McCarthy&author=A.%20Ahearne&author=K.%20Bohle%20Carbonell&author=T.%20%C3%93%20S%C3%ADoch%C3%A1in&author=D.%20Frost

McGrath, R. (2013). The Pace of Technology Adoption is Speeding Up. *Harvard Business Review*. https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up#

McKelvey, B. (2004). Toward a complexity science of entrepreneurship. *Journal of Business Venturing*, *19*(3), 313–341. https://doi.org/10.1016/S0883-9026(03)00034-X

McKinnon, N. (2003). Presentism and consciousness. *Australasian Journal of Philosophy*, *81*(3). https://doi.org/10.1093/ajp/jag301

McKinsey. (2020). How Amazon is built to try and learn. *McKinsey & Company*. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/fasttimes/interviews/beth-galetti

McPeak, A. (2018). Self-Destruct Apps: Spoliation by Design? *International and European Labour Law*, 958–981. https://doi.org/10.5771/9783845266190-974

McRoberts, S., Ma, H., Hall, A., & Yarosh, S. (2017). Share first, save later: Performance of self through Snapchat stories. *Conference on Human Factors in Computing Systems - Proceedings*, *2017-May*, 6902–6911. https://doi.org/10.1145/3025453.3025771

McTaggart, J. E. (1908). The Unreality of Time. *Mind*, *17*(68), 457–474. http://www.jstor.org/stable/2248314

Mendling, J., Pentland, B., & Recker, J. (2020). Building a complementary agenda for business process management and digital innovation. *European Journal of Information Systems*, *29: 3*, 208219,. https://doi.org/10.1080/0960085X.2020.1755207

Merleau-Ponty, M. (2012). *Phenomenology of perception / Maurice Merleau-Ponty, translated from the French by Donald A. Landes* (D. A. Landes, Trans.). Routledge.

Merriam Webster. (2022). *Definition for 'ephemeral'.* https://www.merriam-webster.com/dictionary/ephemeral

Michel, J. B., Kui Shen, Y., Presser Aiden, A., Veres, A., Gray, M. K., Pickett, J. P., Hoiberg, D., Clancy, D., Norvig, P., Orwant, J., Pinker, S., Nowak, M. A., & Aiden, E. L. (2011). Quantitative analysis of culture using millions of digitized books. *Science*, *331*(6014), 176–182. https://doi.org/10.1126/SCIENCE.1199644

Michels, C., & Steyaert, C. (2017). By accident and by design: Composing affective atmospheres in an urban art intervention. *Organization*, *24*(1), 79–104. https://doi.org/10.1177/1350508416668190

Milan, S. (2017). Digital Traces and Bottom-up Data Practices. *International Journal of Communication*, *12*, 507–525. https://ssrn.com/abstract=3055569

Mingers, J. (2001). Combining IS Research Methods: Towards a Pluralist Methodology. *Information Systems Research*, *12*(3). https://doi.org/10.1287/isre.12.3.240.9709

Miranda, S., Berente, N., Seidel, S., Safadi, H., & Burton-Jones, A. (2022). Editor's Comments: Computationally Intensive Theory Construction: A Primer for Authors and Reviewers. *Management Information Systems Quarterly*, *46*(2). https://aisel.aisnet.org/misq/vol46/iss2/4

Miranda, S. M., Young, A., & Yetgin, E. (2016). Are social media emancipatory or hegemonic? Societal effects of mass media digitization in the case of the SOPA discourse. *MIS Quarterly: Management Information Systems*, *40*(2), 303–329. https://doi.org/10.25300/MISQ/2016/40.2.02

Møller, K., & Robards, B. (2019). Walking through, going along and scrolling back: Ephemeral mobilities in digital ethnography. *Nordicom Review*, *40*(Special Issue 1), 95–109. https://doi.org/10.2478/nor-2019-0016.

Moran, D. (2011). Edmund Husserl's phenomenology of habituality and habitus. *Journal of the British Society for Phenomenology*, *42*.

Morlok, T., Constantiou, I., & Hess, T. (2018). Gone for better or for worse? exploring the dual nature of ephemerality on social media platforms. *ECIS Completed Research Papers. Paper*, *15*.

Morlok, T., Schneider, K., Matt, C., & Hess, T. (2017). Share. (Don't) Care? Ephemerality, Privacy Concerns, and the Use of Ephemeral Social Network Sites. In *In: Proceedings of Twenty-third Americas Conference on Information Systems*.

Mortensen, C. (2011). Change and Inconsistency. In *The Stanford Encyclopedia of Philosophy*.

Mueller, R. (2019). *Report on the investigation into Russian interference in the 2016 presidential election*. https://www.justice.gov/storage/report.pdf

Müller, O., Junglas, I., Brocke, J. Vom, & Debortoli, S. (2016). Utilizing big data analytics for information systems research: Challenges, promises and guidelines. *European Journal of Information Systems*, *25*(4), 289–302. https://doi.org/10.1057/EJIS.2016.2

Muñoz, J. E. (1996). Ephemera as evidence: introductory notes to queer acts. *Women & Performance: A Journal of Feminist Theory*, *8*(2), 5–16. https://doi.org/10.1080/07407709608571228

Myers, M. D. (1995). Dialectical hermeneutics: a theoretical framework for the implementation of information systems. *Information Systems Journal*, *5*(1), 51–70. https://doi.org/10.1111/J.1365-2575.1995.TB00089.X

Nacoti, M., Ciocca, A., Giupponi, A., Brambillasca, P., Lussana, F., Michele, P., Giuseppe, G., Daniele, B., & Francesco, F. (2020). At the Epicenter of the Covid-19 Pandemic and Humanitarian Crises in Italy: Changing Perspectives on Preparation and Mitigation. *Catalyst: Innovations in Care Delivery*. https://doi.org/10.1056/CAT.20.0080

Nanni, M., Andrienko, G., Barabási, A. L., Boldrini, C., Bonchi, F., Cattuto, C., Chiaromonte, F., Comandé, G., Conti, M., Coté, M., Dignum, F., Dignum, V., Domingo-Ferrer, J., Ferragina, P., Giannotti, F., Guidotti, R., Helbing, D., Kaski, K., Kertesz, J., … Vespignani, A. (2021). Give more data, awareness and control to individual citizens, and they will help COVID-19 containment. *Ethics and Information Technology*, *23*(1), 1–6. https://doi.org/10.1007/S10676-020-09572-W/METRICS

Nayak, A., Chia, R., & Canales, J. (2020). Noncognitive Microfoundations: Understanding Dynamic Capabilities as Idiosyncractically Refined Sensitivities and Predispositions. *AMR*, *45*, 280. https://doi.org/10.5465/amr.2016.0253

Nazar, S., & Pieters, T. (2021). Plandemic Revisited: A Product of Planned Disinformation Amplifying the COVID-19 "infodemic". *Frontiers in Public Health*, *9*. https://doi.org/10.3389/FPUBH.2021.649930/BIBTEX

Ngwenyama, O. (2023). Analyzing genres of discourse in IS research: An approach to interrogating validity claims in IS scientific argumentation. In *Handbook of Qualitative Research Methods for Information Systems: New Perspectives*. https://doi.org/10.4337/9781802205398.00008

Ngwenyama, O., Rowe, F., Klein, S., & Henriksen, H. Z. (2023). The open prison of the big data revolution: false consciousness, Faustian bargains, and digital entrapment. *Information Systems Research*. https://doi.org/10.1287/ISRE.2020.0588

Nicholson, D. J., & Dupré, J. (2018). *Everything Flows: Towards a Processual Philosophy of Biology*. Oxford University Press.

Niederman, F., Brancheau, J. C., & Wetherbe, J. C. (1991). Information systems management issues for the 1990s. *MIS Quarterly: Management Information Systems*, *15*(4), 475–495. https://doi.org/10.2307/249452

Nissen, M. (2005). Dynamic Knowledge Patterns to Inform Design: A Field Study of Knowledge Stocks and Flows in an Extreme Organization. *Journal of Management Information Systems*, *22*, 3, 225–263. https://doi.org/10.2753/MIS0742-1222220308

Ocasio, W., Loewenstein, J., & Nigam, A. (2015). How Streams of Communication Reproduce and Change Institutional Logics: The Role of Categories. *Academy of Management Review*, *40*(1), 28–48. https://doi.org/10.5465/amr.2013.0274

Ohme, J., Araujo, T., Boeschoten, L., Freelon, D., Ram, N., Reeves, B. B., & Robinson, T. N. (2024). Digital Trace Data Collection for Social Media Effects Research: APIs, Data Donation, and (Screen) Tracking. *Communication Methods and Measures*, *18*(2), 124–141. https://doi.org/10.1080/19312458.2023.2181319

Ong, W. S. J. (1982). *Orality and literacy - The technologizing of the word*. Methuen.

Orlikowski, W. J. (1992). The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, *3*(3). https://doi.org/10.1287/orsc.3.3.398

Orlikowski, W. J. (1996). Improvising Organizational Transformation over Time: A Situated Change Perspective. In *Information Systems Research* (Vol. 7, Issue 1). https://doi.org/10.1287/isre.7.1.63

Orlikowski, W. J. (2007). Sociomaterial Practices: Exploring Technology at Work. *Organization Studies*, *28*, 9, 1435–1448.

Orlikowski, W. J., & Baroudi, J. J. (1991). Studying information technology in organizations: Research approaches and assumptions. *Information Systems Research*, *2*(1). https://doi.org/10.1287/isre.2.1.1

Orlikowski, W. J., & Iacono, C. S. (2001). Research Commentary: Desperately Seeking the 'IT' in IT Research - A Call to Theorizing the IT Artifact. *Information Systems Research*, *12*(2). https://doi.org/10.1287/isre.12.2.121.9700

Orlikowski, W. J., & Robey, D. (1991). Information technology and the structuring of organizations. *Information Systems Research*, *2*(2). https://doi.org/10.1287/isre.2.2.143

Orlikowski, W. J., & Scott, S. V. (2008). Sociomateriality: challenging the separation of technology, work and organization. *Academy of Management Annals*, *2*(1), 433–474. https://doi.org/10.5465/19416520802211644

Orlikowski, W. J., & Scott, S. V. (2015). The algorithm and the crowd: Considering the materiality of service innovation. *MIS Quarterly: Management Information Systems*, *39*(1). https://doi.org/10.25300/MISQ/2015/39.1.09

Orlikowski, W. J., & Yates, J. A. (2002). It's about time: Temporal structuring organizations. *Organization Science*, *13*(6). https://doi.org/10.1287/orsc.13.6.684.501

Osborne, P., & Charles, M. (2020). Walter Benjamin. In E. N. . Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=benjamin&archive=fall2021

Østerlund, C., Crowston, K., & Jackson, C. (2016). The Hermeneutics of Trace Data: Building an Apparatus. *IFIP Working Group 8.2 Working Conference, Dublin*, *10*, 2019. https://citsci.syr.edu/sites/crowston.syr.edu/files/Crowston_Osterlund_Jackson_The_Hermeneutics_of_Trace_Data-Full_Paper.pdf

Østerlund, C., Crowston, K., & Jackson, C. (2020). Building an Apparatus: Refractive, Reflective, and Diffractive Readings of Trace Data. *Journal of the Association for Information Systems*, 1–22. https://doi.org/10.17705/1jais.00590

Oxford English Dictionary. (2004). *Definition for 'ephemeral'*. Oxford: Clarendon Press; Oxford University Press .

Paasonen, S. (2018). Affect, data, manipulation and price in social media. *Distinktion: Journal of Social Theory*, *19*(2), 214–229. https://doi.org/10.1080/1600910X.2018.1475289

Pentland, B. T. (1999). Building process theory with narrative: From description to explanation. *Academy of Management Review*, *24*(4). https://doi.org/10.5465/AMR.1999.2553249

Pentland, B. T., Recker, J., Wolf, J. R., & Wyner, G. (2020). Bringing Context Inside Process Research with Digital Trace Data. *Journal of the Association for Information Systems*, *21*(5), 5. https://doi.org/10.17705/1jais.00635

Pentland, B. T., Vaast, E., & Wolf, J. R. (2021). Theorizing Process Dynamics with Directed Graphs: A Diachronic Analysis of Digital Trace Data. *MIS Quarterly*, *45*(2), 967–984. https://doi.org/10.25300/MISQ/2021/15360

Pescosolido, B. A., & Rubin, B. A. (2000). The web of group affiliations revisited: social life, postmodernism, and sociology. *American Sociological Review*, *65*(1). https://doi.org/10.2307/2657289

Phelan, P. (2012). LIVE ART IN LA: Performance in Southern California, 1970-1983. In *Live Art in La: Performance in Southern California, 1970-1983*. https://doi.org/10.4324/9780203128152

Phelan, Peggy. (1993). *Unmarked: The Politics of Performance*. Routledge.

Piaget, Jean. (1977). *Psychology and epistemology: towards a theory of knowledge*. Penguin.

Piccoli, G., Rodriguez, J. A., Palese, B., & Bartosiak, M. (2017). The Dark Side of Digital Transformation: The case of Information Systems Education . *International Conference on Information Systems*. https://aisel.aisnet.org/icis2017/TransformingSociety/Presentations/6

Pieper, M., Fallon, M., & Heinzl, A. (2024). Micro-randomized trials in Information Systems research: An experimental method for advancing knowledge about our dynamic and digitalized world. *Journal of Information Technology*. https://doi.org/10.1177/02683962241280287

Piller, C. (2020). Who's to blame? These three scientists are at the heart of the Surgisphere COVID-19 scandal. *Science*. https://www.science.org/content/article/whos-blame-these-three-scientists-are-heart-surgisphere-covid-19-scandal

Pimlott, H. (2011). 'Eternal ephemera' or the durability of 'disposable literature': The power and persistence of print in an electronic world. *Media, Culture and Society*, *33*(4), 515–530. https://doi.org/10.1177/0163443711398690

Politico. (2020). *German firm insists Trump didn't try to buy coronavirus vaccine*. Politico.

Poole, M. S., & van de Ven, A. H. (1989). Using Paradox to Build Management and Organization Theories. *The Academy of Management Review*, *14*(4), 562. https://doi.org/10.2307/258559

Pousti, H., Urquhart, C., & Linger, H. (2021). Researching the virtual: A framework for reflexivity in qualitative social media research. *Information Systems Journal*, *31*(3), 356–383. https://doi.org/10.1111/ISJ.12314

Prado, P., & Sapsed, J. (2016). The Anthropophagic Organization: How Innovations Transcend the Temporary in a Project-based Organization. *Organization Studies*, *37*(12), 1793–1818. https://doi.org/10.1177/0170840616655491

Prester, J., Cecez-Kecmanovic, D., & Schlagwein, D. (2019). Becoming a digital nomad: decentered identity work along agentic lines. *11th International Process Symposium*.

Preston, B. (2022). Artifact. In Zalta N & Nodelman U (Eds.), *The Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/archives/win2022/entries/artifact/

Purpura, A. (2009). Framing the Ephemeral. *African Arts*, *42*(3), 11–15. https://doi.org/10.1162/AFAR.2009.42.3.11

Qi, C., Karlsson, D., Sallmen, K., & Wyss, R. (2020). *Model studies on the COVID-19 pandemic in Sweden*. http://arxiv.org/abs/2004.01575

Quintarelli, E., Rabosio, E., & Tanca, L. (2019). Efficiently using contextual influence to recommend new items to ephemeral groups. *Information Systems*, *84*, 197–213. https://doi.org/10.5539/mas.v6n4p49

Rattansi, Ali. (2017). *Bauman and contemporary sociology : a critical analysis*. Manchester University Press.

Reason, M. (2006). Documentation, Disappearance and the Representation of Live Performance. In *Documentation, Disappearance and the Representation of Live Performance*. Palgrave Macmillan. https://doi.org/10.1057/9780230598560/COVER

Reimers, K., Johnston, R. B., & Klein, S. (2014). An empirical evaluation of existing IS change theories for the case of IOIS evolution. *European Journal of Information Systems*, *23*(4). https://doi.org/10.1057/ejis.2013.7

Reinecke, J., & Ansari, S. (2015). When times collide: Temporal brokerage at the intersection of markets and developments. *Academy of Management Journal*, *58*(2). https://doi.org/10.5465/amj.2012.1004

Rescher, N. (1996). *Process Metaphysics | State University of New York Press*. Suny Press.

Ricoeur, P. (1981). Hermeneutics and the Human Sciences: Essays on Language, Action and Interpretation (J. B. Thompson, Trans.). In J. B. Thompson (Ed.), *Hermeneutics and the Human Sciences: Essays on Language, Action and Interpretation*. Cambridge University Press. https://doi.org/10.1017/CBO9781316534984

Ricoeur, Paul. (1984). *Time and Narrative* (K. McLaughlin & D. Pellauer, Trans.; Vol. 1). University of Chicago Press.

Rivard, S. (2014). The ions of theory construction. In *MIS Quarterly: Management Information Systems* (Vol. 38, Issue 2).

Robey, D., & Boudreau, M. C. (1999). Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications. *Information Systems Research*, *10*(2). https://doi.org/10.1287/isre.10.2.167

Rogers, E. M. (1962). Diffusion of Innovations. In *Geology* (Issue 11). New York, Free Press of Glencoe. https://doi.org/10.25300/MISQ/2020/14520

Rogers, R. (2013). *The End of the Virtual: Digital Methods* (R. Rogers, Ed.). MIT Press.

Rohr, K. M. M., Furlong, K. P., Rohr, K. M. M., & Furlong, K. P. (1995). Ephemeral plate tectonics at the Queen Charlotte triple junction. *Geo*, *23*(11), 1035. https://doi.org/10.1130/0091-7613(1995)023

Romano, B. (2020). Amazon urged by 13 attorneys general to disclose data on worker coronavirus infections and reinstate unpaid time off policy. *The Seattle Times*. https://www.seattletimes.com/business/amazon/amazon-urged-by-13-attorneys-general-to-disclose-data-on-worker-coronavirus-infections-and-reinstate-unpaid-time-off-policy/

Rosa, H. (2013). Social Acceleration (J. Trejo-Mathys, Trans.). In *Social Acceleration*. Columbia University Press. https://doi.org/10.7312/ROSA14834

Rosa, H. (2019). *Resonance : a sociology of our relationship to the world* (J. C. . Wagner, Trans.). Polity Press.

Roselli, A. (2018). How long is now? A new perspective on the specious present. In *Disputatio* (Vol. 10, Issue 49). https://doi.org/10.2478/disp-2018-0009

Rowe, F. (2014). What literature review is not: diversity, boundaries and recommendations. *European Journal of Information Systems*, *23*, 241–255. https://doi.org/10.1057/ejis.2014.7

Rowe, F. (2018). Being critical is good, but better with philosophy! From digital transformation and values to the future of IS research. *European Journal of Information Systems*, *27*(3). https://doi.org/10.1080/0960085X.2018.1471789

Sabherwal, R., & Robey, D. (1995). Reconciling variance and process strategies for studying information system development. *Information Systems Research*, *6*(4). https://doi.org/10.1287/isre.6.4.303

Sahay, S., Sein, M. K., & Urquhart, C. (2017). Flipping the context: ICT4D, the next grand challenge for is research and practice. *Journal of the Association for Information Systems*, *18*(12), 837–847. https://doi.org/10.17705/1JAIS.00479

Salovaara, A., & Tuunainen, V. (2015). Mediated Sharing as Software Developers' Strategy to Manage Ephemeral Knowledge. *ECIS 2015 Completed Research Papers*. https://doi.org/10.18151/7217462

Samson, K., & Kostyszyn, P. (2015). Effects of cognitive load on trusting behavior - An experiment using the trust game. *PLoS ONE*, *10*(5). https://doi.org/10.1371/JOURNAL.PONE.0127680

Sandberg, J., Holmström, J., & Lyytinen, K. (2020). Digitization and Phase Transitions in Platform Organizing Logics: Evidence from the Process Automation Industry. *MIS Quarterly*, *44*(1a), 129–153. https://doi.org/10.25300/MISQ/2020/14520

Sandberg, J., Loacker, B., & Alvesson, M. (2015). Conceptions of Process in Organization and Management: The Case of Identity Studies. In R. , Garud, B. , Simpson, A. Langley, & H. Tsoukas (Eds.), *The Emergence of Novelty in Organizations* (pp. 318–344). Oxford University Press. https://doi.org/10.1093/ACPROF:OSO/9780198728313.003.0012

Saunders, C., & Kim, J. (2007). Perspectives on Time. *MIS Quarterly*, *31*, 4.

Savage, P., Cornelissen, J. P., & Franck, H. (2018). Fiction and Organization Studies. *Organization Studies*, *39*(7). https://doi.org/10.1177/0170840617709309

Sawyer, R. K. (2005). *Social Emergence: Societies as Complex Systems*. Cambridge University Press.

Schechner, R. (1988). *Performance Theory* (1st ed.). Routledge. https://doi.org/10.4324/9780203361887

Schieffelin, E. L. (2017). Problematizing Performance. *Ritual and Religious Belief*, 124–138. https://doi.org/10.4324/9781315475738-10

Schlesinger, A., Chandrasekharan, E., Masden, C. A., Bruckman, A. S., Edwards, W. K., & Grinter, R. E. (2017). Situated anonymity: Impacts of anonymity, ephemerality, and hyper-locality on social media. *Conference on Human Factors in Computing Systems - Proceedings*, *2017-May*, 6912–6924. https://doi.org/10.1145/3025453.3025682

Schmidt, S. (2009). Shall we Really do it Again? The Powerful Concept of Replication is Neglected in the Social Sciences. *Review of General Psychology*, *13*(2), 90–100. https://doi.org/10.1037/a0015108

Schneider, R. (2011). *Performing Remains: Art and War in Times of Theatrical Reenactment* (1st ed.). Routledge. https://doi.org/10.4324/9780203852873

Schneider, S. M., & Foot, K. A. (2004). The web as an object of study. *New Media and Society*, *6*(1), 114–122. https://doi.org/10.1177/1461444804039912/ASSET/1461444804039912.FP.PNG_V03

Scissors, D. (2020). *Estimating the True Number of China's COVID-19 Cases*. American Enterprise Institute. https://www.aei.org/research-products/report/estimating-the-true-number-of-chinas-covid-19-cases/

Seibt, J. (2013). Beyond endurance and perdurance: Recurrent dynamics. In *Persistence*. https://doi.org/10.1515/9783110327052.133

Seibt, J. (2022). Process Philosophy. In E. N. Zalta & U. Nodelman (Eds.), *The Stanford Encyclopedia of Philosophy*.

Sein, M. K. (2020). The serendipitous impact of COVID-19 pandemic: A rare opportunity for research and practice. *International Journal of Information Management*, *55*. https://doi.org/10.1016/J.IJINFOMGT.2020.102164

Sekara, V., Stopczynski, A., & Lehmann, S. (2016). Fundamental structures of dynamic social networks. *Proceedings of the National Academy of Sciences of the United States of America*, *113*(36), 9977–9982. https://doi.org/10.1073/PNAS.1602803113

Settle, J. E. (2018). *Frenemies: How social media polarizes America*. Cambridge University Press.

Shahi, G. K., Dirkson, A., & Majchrzak, T. A. (2021). An exploratory study of COVID-19 misinformation on Twitter. *Online Social Networks and Media*, *22*. https://doi.org/10.1016/J.OSNEM.2020.100104

Shaikh, M., & Vaast, E. (2018). The Algorithmic Ordering of Distributed Work in Open Source. *Academy of Management Annual Meeting Proceedings*, *2018*(1), 10711. https://doi.org/10.5465/AMBPP.2018.10711ABSTRACT

Shaviro, S. (2012). *Without Criteria. Kant, Whitehead, Deleuze, and Aesthetics*. The MIT Press.

Shein, E. (2013). Ephemeral data. *Communications of the ACM*, *56*(9), 20–22. https://doi.org/10.1145/2500468.2500474

Shen, Z., Lyytinen, K., & Yoo, Y. (2015). Time and information technology in teams: a review of empirical research and future research directions. *European Journal of Information Systems*, *24*(5), 492–518. https://doi.org/10.1057/EJIS.2014.8

Shepherd, D. A., & Sutcliffe, K. M. (2011). INDUCTIVE TOP-DOWN THEORIZING: A SOURCE OF NEW THEORIES OF ORGANIZATION. *Academy of Management Review*, *36*(2), 361–380. https://doi.org/10.5465/AMR.2011.59330952

Sheptycki, J. (2017). Liquid modernity and the police métier; thinking about information flows in police organisation. *Global Crime*, *18*(3), 286–302. https://doi.org/10.1080/17440572.2017.1313734

Shipp, A. J., & Jansen, K. J. (2021). The "other" time: A review of the subjective experience of time in organizations. *Academy of Management Annals*, *15*(1), 299–334. https://doi.org/10.5465/ANNALS.2018.0142

Shotter, J. (2005). Inside the Moment of Managing: Wittgenstein and the Everyday Dynamics of Our Expressive-Responsive Activities. *Organization Studies*, *26*(1), 113–135. https://doi.org/10.1177/017084060504971852

Siegel, M. B. . (1972). *At the vanishing point; a critic looks at dance*. Saturday Review Press. https://www.rarebookcellar.com/pages/books/140529/m-b-siegel/at-the-vanishing-point

Simanowski, R. (2017). Instant selves: Algorithmic autobiographies on social network sites. *New German Critique*, *44*(1). https://doi.org/10.1215/0094033X-3705766

Simmel, G. (1900). *The Philosophy of Money* (T. Bottomore & D. Frisby, Trans.; 1st ed.). Routledge, 1978. https://philpapers.org/rec/SIMTPO-34

Simmel, G. (1903). The metropolis and mental life. In D. and F. Frisby M. (Ed.), *Simmel on Culture.* SAGE.

Simmel, G. (1908). Sociology: Inquiries into the construction of social forms. In *Sociology: Inquiries into the Construction of Social Forms* (Vols 1–2). Leiden, The Netherlands: Brill, 2009. https://doi.org/10.1163/ej.9789004173217.i-698

Singh, P., & Doherty, C. (2007). Mobile students in liquid modernity: Negotiating the politics of transnational identities. In *Youth Moves: Identities and Education in Global Perspective*. https://doi.org/10.4324/9780203938836

Skågeby, J. (2010). Gift-giving as a conceptual framework: framing social behavior in online networks. *Journal of Information Technology*, *25*, 170–177.

Smith, J. A. (2007). Hermeneutics, human sciences and health: Linking theory and practice. *International Journal of Qualitative Studies on Health and Well-Being*, *2*(1), 3–11. https://doi.org/10.1080/17482620601016120

Smith, J. A., Dinev, T., & Xu, H. (2011). Information privacy research: An interdisciplinary review. *MIS Quarterly: Management Information Systems*, *35*(4), 989–1015. https://doi.org/10.2307/41409970

Smith, W. R. (2021). On Relationality and Organizationality: Degrees of durability, materiality, and communicatively constituting a fluid social collective. *Organization Studies*, 1–23.

Steele, L. (2020). *The ethics of ordering non-essential items online during the coronavirus lockdown*. The Conversation. https://theconversation.com/the-ethics-of-ordering-non-essential-items-online-during-the-coronavirus-lockdown-135489

Stern, W. L. (1897). Mental Presence-Time (N. de Warren, Trans.). In B. Hopkins & S. Crowell (Eds.), *The New Yearbook for Phenomenology and Phenomenological Philosophy* (Vol. 5, pp. 310–351). Seattle, WA: Noesis Press.

Strawson, G. (2009). Selves: An Essay in Revisionary Metaphysics. In *Selves: An Essay in Revisionary Metaphysics*. Oxford: Clarendon Press. https://doi.org/10.1093/acprof:oso/9780198250067.001.0001

Sultan, M., Scholz, C., & van den Bos, W. (2023). Leaving traces behind: Using social media digital trace data to study adolescent wellbeing. *Computers in Human Behavior Reports*, *10*. https://doi.org/10.1016/j.chbr.2023.100281

Sultana, R. G. (2018). Precarity, Austerity and the Social Contract in a Liquid World. In *Career Guidance for Social Justice*. https://doi.org/10.4324/9781315110516-4

Susarla, A., Oh, J. H., & Tan, Y. (2012). Social networks and the diffusion of user-generated content: Evidence from youtube. *Information Systems Research*, *23*(1). https://doi.org/10.1287/isre.1100.0339

Susen, S. (2016). Hermeneutic bourdieu. In *Bourdieusian Prospects*. https://doi.org/10.4324/9781315728353

Sutton, R. I., & Staw, B. M. (1995). What Theory is Not. *Administrative Science Quarterly*, *40*(3). https://doi.org/10.2307/2393788

Sydow, J. (2017). Temporary Organizing – The End of Organizations as We Know Them? *Rutgers Business Review*, *2*(2).

Sydow, J., Schreyögg, G., & Koch, J. (2020). On the theory of organizational path dependence: Clarifications, replies to objections, and extensions. *Academy of Management Review*, *45*(4), 717–734. https://doi.org/10.5465/AMR.2020.0163

Taani, I., & Pahuja, A. (2022). From constitution to disbandment: ephemeral decentralized autonomous organizations. *International Conference on Information Systems*.

Tannen, D. (2007). *Talking voices. Repetition, dialogue, and imagery in conversational discourse*. Cambridge University Press.

Tarkowska, E. (2006). Zygmunt Bauman on time and detemporalisation processes. *Polish Sociological Review*, *3*.

Taylor, D. (2003). The Archive and the Repertoire. In *The Archive and the Repertoire*. Duke University Press. https://doi.org/10.1215/9780822385318

Taylor, D. (2010). Save As ... Knowledge and Transmission in the Age of Digital Technologies. *Imagining America's 2010 Convergence Zones: Public Cultures and Translocal Practices*.

Templier, M., & Paré, G. (2015). A Framework for Guiding and Evaluating Literature Reviews. *Communications of the Association for Information Systems*, *37*. http://aisel.aisnet.org/cais/vol37/iss1/6

Terranova, T. (2006). Of Sense and Sensibility: Immaterial Labour in Open Systems. *Curating Immateriality The Work of the Curator in the Age of Network Systems*, *3*(03), 27–37. http://www2.kurator.org/media/uploads/publications/DB03/Terranova.pdf

Tester, Keith., & Jacobsen, M. Hviid. (2005). *Bauman Before Postmodernity: Invitation, Conversations and Annotated Bibliography 1953-1989*. Aalborg Universitetsforlag.

The Atlantic. (2020). *The U.K.'s Coronavirus 'Herd Immunity' Debacle*. The Atlantic. https://www.theatlantic.com/health/archive/2020/03/coronavirus-pandemic-herd-immunity-uk-boris-johnson/608065/

The Economist. (2020a). Has covid-19 killed globalisation? *The Economist*. https://www.economist.com/leaders/2020/05/14/has-covid-19-killed-globalisation

The Economist. (2020b). Many covid deaths in care homes are unrecorded. *The Economist*. https://www.economist.com/europe/2020/05/09/many-covid-deaths-in-care-homes-are-unrecorded

The Economist. (2020c). Working life has entered a new era. *The Economist*. https://www.economist.com/business/2020/05/30/working-life-has-entered-a-new-era

The Guardian. (2020a). How science finally caught up with Trump's playbook – with millions of lives at stake. *The Guardian*. https://www.theguardian.com/us-news/2020/apr/04/trump-coronavirus-science-analysis

The Guardian. (2020b). Judge orders Bolsonaro to resume publishing Brazil Covid-19 data. *The Guardian*. https://www.theguardian.com/world/2020/jun/09/judge-orders-bolsonaro-to-resume-publishing-brazil-covid-19-data

The Irish Times. (2020). Amazon sales surge as retailer emerges as Covid-19 winner. *The Irish Times*. https://www.irishtimes.com/business/retail-and-services/amazon-sales-surge-as-retailer-emerges-as-covid-19-winner-1.4242306

Thrift, N. (2008). Non-Representational Theory: Space | politics | affect. In *Non-Representational Theory: Space | Politics | Affect*. Taylor and Francis. https://doi.org/10.4324/9780203946565/NON-REPRESENTATIONAL-THEORY-NIGEL-THRIFT

Till, C. (2013). Architects of time: Labouring on digital futures. *Thesis Eleven*, *118*(1), 33–47. https://doi.org/10.1177/0725513613500270

Ting, D. S. W., Carin, L., Dzau, V., & Wong, T. Y. (2020). Digital technology and COVID-19. *Nature Medicine*, *26*(4), 459–461. https://doi.org/10.1038/S41591-020-0824-5

Tooley, M. (2000). *Time, Tense, and Causation* (online edn). https://doi.org/10.1093/0198250746.001.0001

Trauth, E. (2017). A research agenda for social inclusion in information systems. *Data Base for Advances in Information Systems*, *48*(2), 9–20. https://doi.org/10.1145/3084179.3084182

Trauth, E., & Howcroft, D. (2006). Social inclusion and the information systems field: Why now? *IFIP International Federation for Information Processing*, *208*, 3–12. https://doi.org/10.1007/0-387-34588-4_1

Tsang, T. K., Wu, P., Lin, Y., Lau, E. H. Y., Leung, G. M., & Cowling, B. J. (2020). Effect of changing case definitions for COVID-19 on the epidemic curve and transmission parameters in mainland China: a modelling study. *The Lancet. Public Health*, *5*(5), e289–e296. https://doi.org/10.1016/S2468-2667(20)30089-X

Tsoukas, H. (2017). Don't Simplify, Complexify: From Disjunctive to Conjunctive Theorizing in Organization and Management Studies. *Journal of Management Studies*, *54*(2), 132–153. https://doi.org/10.1111/JOMS.12219

Turchin, A., Denkenberger, D., & Green, B. P. (2019). Global solutions vs. Local solutions for the ai safety problem. *Big Data and Cognitive Computing*, *3*(1), 1–23. https://doi.org/10.3390/BDCC3010016

Turner, B. S. (2003). McDonaldization: Linearity and Liquidity in Consumer Cultures. *American Behavioral Scientist*, *47*(2), 137–153. https://doi.org/10.1177/0002764203256180

UNICEF. (2020). *COVID-19: Number of children living in household poverty to soar by up to 86 million by end of year*. Unicef.Org. https://www.unicef.org/press-releases/covid-19-number-children-living-household-poverty-soar-86-million-end-year

Uricchio, W. (2011). The Recurrent, the Recombinatory and the Ephemeral. In P. Grainge (Ed.), *Ephemeral Media*. Bloomsbury Publishing (UK). https://doi.org/10.5040/9781838710354.CH-001

Urquhart, C., & Vaast, E. (2012, December 14). Building social media theory from case studies: A new frontier for IS research. *ICIS 2012 Proceedings*. https://aisel.aisnet.org/icis2012/proceedings/ResearchMethods/8

Urry, J. (2000). Sociology beyond societies: Mobilities for the twenty-first century. In *Sociology beyond Societies: Mobilities for the Twenty-First Century*. Routledge. https://doi.org/10.4324/9780203021613/SOCIOLOGY-BEYOND-SOCIETIES-JOHN-URRY/ACCESSIBILITY-INFORMATION

Urry, John. (1995). *Consuming places* (1st ed.). Routledge.

Utz, S., Muscanell, N., & Khalid, C. (2015). Snapchat elicits more jealousy than Facebook: a comparison of Snapchat and Facebook use. *Cyberpsychol. Behav. Soc. Netw*, *18*(3), 141–146. https://doi.org/10.17705/1CAIS.01715

Vaast, E., Safadi, H., Lapointe, L., & Negoita, B. (2017). Social Media Affordances for Connective Action: An Examination of Microblogging Use During the Gulf of Mexico Oil Spill. *MIS Quarterly*, *41*(4), 1179–1205. https://doi.org/10.25300/misq/2017/41.4.08

Vaast, E., & Urquhart, C. (2017). Building grounded theory with social media data. *The Routledge Companion to Qualitative Research in Organization Studies*, 408–421. https://doi.org/10.4324/9781315686103-27/BUILDING-GROUNDED-THEORY-SOCIAL-MEDIA-DATA-EMMANUELLE-VAAST-CATHY-URQUHART

van de Ven, A. H., & Poole, M. S. (1995). Explaining development and change in organizations. *The Academy of Management Review*, *20*(3), 1745–1769.

Van der Aalst, W. (2016). Process mining: Data science in action. In *Process Mining: Data Science in Action*. https://doi.org/10.1007/978-3-662-49851-4

van Marrewijk, A., Ybema, S., Smits, K., Clegg, S., & Pitsis, T. (2016). Clash of the Titans: Temporal Organizing and Collaborative Dynamics in the Panama Canal Megaproject. *Organization Studies*, *37*(12). https://doi.org/10.1177/0170840616655489

van Nimwegen, C., & Bergman, K. (2019). Effects on cognition of the burn after reading principle in ephemeral media applications. *Behaviour & Information Technology*, *38*(10), 1060–1067. https://doi.org/10.1080/0144929X.2019.1659853

VanderBurgh, J. (2014). AGAINST EPHEMERALITY: THE CBC'S ARCHIVAL TURN, 1989–96. In Z. Druick & G. Cammaer (Eds.), *Cinephemera: Archives, Ephemeral Cinema, and New Screen Histories in Canada* (pp. 210–231). McGill-Queen's University Press.

Vázquez-Herrero, J., Direito-Rebollal, S., & López-García, X. (2019). Ephemeral Journalism: News Distribution Through Instagram Stories. *Social Media and Society*, *5*(4). https://doi.org/10.1177/2056305119888657/ASSET/IMAGES/LARGE/10.1177_2056305119888657-FIG1.JPEG

Venkatesh, V., Sykes, T. A., Aljafari, R., & Poole, M. S. (2021). The future is now: calling for a focus on temporal issues in information system research. *Industrial Management & Data Systems*, *121*(1), 30–47. https://doi.org/10.1108/imds-08-2020-0506

Vera, F., & Mehrotra, R. (2015). *Temporary Flows & Ephemeral Cities*.

Vidal-Abarca, M. R., Gómez, R., Sánchez-Montoya, M., Arce, M., Nicolás, N., & Suárez, M. (2020). Defining dry rivers as the most extreme type of non-perennial fluvial ecosystems. *Sustainability*, *12*, 7202. https://doi.org/10.3390/su12177202

Vijaya, R., Bebbington, A., & Sarat, A. (2020). *Coronavirus versus democracy: 5 countries where emergency powers risk abuse*. The Conversation. https://theconversation.com/coronavirus-versus-democracy-5-countries-where-emergency-powers-risk-abuse-135278

Villaespesa, E., & Wowkowych, S. (2020). Ephemeral storytelling with social media: snapchat and instagram stories at the brooklyn museum. *Social Media + Society, Sage.*, *1*(13).

vom Brocke, J., Winter, R., Hevner, A., & Maedche, A. (2021). Accumulation and evolution of design knowledge in design science research: a journey through time and space. *Journal of the Association for Information Systems*.

von Briel, F. (2018). Not all digital venture ideas are created equal: Implications for venture creation processes. *Journal of Strategic Information Systems*. https://doi.org/10.1016/j.jsis.2018.06.002

von Krogh, G. (2002). The communal resource and information systems. *Journal of Strategic Information Systems*, *11*, 85–107.

Vuorinen, J., & Tetri, P. (2012). The Order Machine – The Ontology of Information Security. *Journal of the Association for Information Systems*, *13*(9). https://doi.org/10.17705/1jais.00306

Wajcman, J., & Dodd, N. (2016). Simmel and Benjamin: Early Theorists of the Acceleration Society. In J. Wajcman & N. Dodd (Eds.), *The Sociology of Speed: Digital, Organizational, and Social Temporalities*. Oxford University Press. https://doi.org/10.1093/ACPROF:OSO/9780198782858.001.0001

Wakefield, L., & Wakefield, R. (2018). Anxiety and ephemeral social media use in negative eWOM creation. *Journal of Interactive Marketing*, *41*, 44–59.

Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, *4*(2). https://doi.org/10.1057/ejis.1995.9

Walsham, G. (2012). Are we making a better world with ICTs? Reflections on a future agenda for the IS field. In *Journal of Information Technology* (Vol. 27, Issue 2). https://doi.org/10.1057/jit.2012.4

Wand, Y., & Weber, R. (1995). On the deep structure of information systems. *Information Systems Journal*, *5*(3). https://doi.org/10.1111/j.1365-2575.1995.tb00108.x

Warnock, Mary. (1994). *Imagination and time*. Blackwell.

Warren, T. (2020). *Zoom grows to 300 million meeting participants despite security backlash*. The Verge. https://www.theverge.com/2020/4/23/21232401/zoom-300-million-users-growth-coronavirus-pandemic-security-privacy-concerns-response

Wearden, J. (2016). *The Psychology of Time Perception*. Palgrave Macmillan London. https://doi.org/10.1057/978-1-137-40883-9

Weber, M. (1978). Economy and Society: An Outline of Interpretive Sociology. In *Economy and Society: An Outline of Interpretive Sociology* (Vol. 1). Berkeley, CA: University of California Press. https://books.google.com/books/about/Economy_and_Society.html?id=MILOksrhgrYC

Weber, R. (2003). Editor's Comments: The Problem of the Problem. *MIS Quarterly*, *27*(1).

Weber, R. (2012). Evaluating and developing theories in the information systems discipline. *Journal of the Association for Information Systems*, *13*(1). https://doi.org/10.17705/1jais.00284

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: writing a literature review. *MIS Quarterly*, *26*(2), xiii–xxiii.

Weick, K. E. (1995). What Theory is Not, Theorizing Is. *Administrative Science Quarterly*, *40*(3). https://doi.org/10.2307/2393789

Weinmann, M., Valacich, J., Schneider, C., Jenkins, J. L., & Hibbeln, M. T. (2021). The Path of the Righteous: Using Trace Data to Understand Fraud Decisions in Real Time. *MIS Quarterly*, *46*, 2317–2336. https://papers.ssrn.com/abstract=4008223

Welsh, S. (2020). Ephemerality as Data Prevention: Values for an Ethics of Ephemeral Mobile Media. *Mobile Media & Communication*, *8*(3), 419–435. https://doi.org/10.1177/2050157920932956

Whitehead, A. N. (1920). *The Concept of Nature*. Cambridge, The University Press.

Whitehead, A. N. (1927). *Science and the modern world*. Free Press.

Whitehead, A. N. (1929). *Process and reality*. Macmillan.

Williams, J. (2011). Gilles Deleuze's Philosophy of Time: A Critical Introduction and Guide. In *Edinburgh University Press.* http://www.jstor.org/stable/10.3366/j.ctt1g09xr1

Williams, J. H., & Dawson, A. (2020). Prioritising access to pandemic influenza vaccine: A review of the ethics literature. *BMC Medical Ethics*, *21*(1). https://doi.org/10.1186/S12910-020-00477-3

Williams, R. (1974). *Television: Technology and Cultural Form* (3rd ed.). Routledge.

Wolf, Y. (2021). A Memory within Change Itself. Bergson and the Memory Theory of Temporal Experience. *Bergsoniana.Société Des Amis de Bergson.* https://doi.org/10.4000/bergsoniana.286

World Economic Outlook. (2020). *April 2020: The great lockdown*. https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020

worldometers.info. (2020). *worldometers.info/coronavirus/us*. Www.Worldometers.Info/Coronavirus/Us. https://www.sciencedirect.com/science/article/pii/S0268401220310276#bbib0720

Xu, B., Chang, P., Welker, C. L., Bazarova, N. N., & Cosley, D. (2016). Automatic archiving versus default deletion: What snapchat tells us about ephemerality in design. *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW*, *27*, 1662–1675. https://doi.org/10.1145/2818048.2819948

Yoo, Y. (2010). Computing in everyday life: a call for research on experiential computing. *MIS Quarterly*, *34*(2), 213–231. https://doi.org/10.5860/rbm.4.1.214

Yoo, Y. (2015). It is not about Size: A Further thought on Big Data. *Journal of Information Technology*, *30*(1), 63–65. https://doi.org/10.1057/jit.2014.30

Young, T. G. (2003). Evidence: toward a library definition of ephemera. *RBM. A Journal of Rare Books, Manuscripts and Cultural Heritage*, *4*(1). https://doi.org/10.5860/rbm.4.1.214

Zhang, Y., Wang, H., Luo, C., & Chen, S. (2021). Ephemerality in Social Media: Unpacking the Personal and Social Characteristics of Time Limit Users on WeChat Moments. *Frontiers in Psychology*, *12*, 712440. https://doi.org/10.3389/FPSYG.2021.712440

Zhang, Z., Lee, H., Yoo, Y., & Choi, Y. T. (2022). Theorizing Routines with Computational Sequence Analysis: A Critical Realism Framework. *Journal of the Association for Information Systems*, *23*(2), 589–630. https://doi.org/10.17705/1jais.00734

Zhou, C., Su, F., Pei, T., Zhang, A., Du, Y., & … B. L. et al. (2020). COVID-19: challenges to GIS with big data. *Geography and Sustainability*, *1*, 77–87. https://www.sciencedirect.com/science/article/pii/S2666683920300092

Zhu, Y. Q., Kanjanamekanant, K., & Chiu, Y. Te. (2023). Reconciling the Personalization-Privacy Paradox: Exploring Privacy Boundaries in Online Personalized Advertising. *Journal of the Association for Information Systems*, *24*(1), 294–316. https://doi.org/10.17705/1jais.00775

Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power - Book - Faculty & Research - Harvard Business School*. New York: PublicAffairs. https://www.hbs.edu/faculty/Pages/item.aspx?num=56791

Zuckerberg, M. (2019). *A Privacy-Focused Vision For Social Networking*. https://m.facebook.com/nt/screen/?params=%7B%22note_id%22%3A2420600258234172%7D&path=%2Fnotes%2Fnote%2F&refsrc=deprecated

8 Appendices

8.1 Appendix A: PhD Research Proposal (Ronan Doyle)

Narrative Transformed: Organisational Storytelling in Liquid Modernity

Introduction: on the history and current standing of organisational storytelling

A review of the literature suggests that the relevance of storytelling as an organisational tool waxes and wanes with academics and business leaders alike. Scientists, philosophers, logicians, and management theorists have at times derided, censored, and ignored storytelling (Denning, 2000). Analysts and consultants have found it trivial and irrelevant or have dismissed it altogether (Alvarez & Urla, 2002). There is an occasional sense that storytelling, even the designation, might be a little too folksy for the cut and thrust of business and research. Organisations—particularly business organisations—explicitly value forms of knowledge that can be readily classified, categorised, calculated, and analysed (Sole & Wilson, 2002).

Storytelling is, however, in a period of popular resurgence. Kendall and Kendall (2012), Davidson and MacLeod (2007), and Sole and Wilson (2002) each present wide-ranging reviews of the importance of storytelling in the fields of information systems (IS) and organisation studies. Numerous journal articles have promoted the importance of storytelling as a business tool. At Princeton University, Uri Hasson and his team are researching the implications of neural entrainment between storyteller and listener, the idea that communication is "a single act performed by two brains." Cognitive scientists in Spain, France, Canada, the UK, the U.S., and elsewhere have further advanced the study of language and storytelling on brain stimulation. And in organisational theory, storytelling has been identified as a vital means of sharing norms and values, developing trust and commitment, sharing tacit knowledge, facilitating unlearning, resolving conflict, and generating emotional connection (Sole & Wilson, 2002).

Stories are—or at least seem to be—more authentic than a documentation of facts (Aaker & Aaker, 2016). From Lascaux's caves, through Gutenberg's printing press and social media, storytelling has been fundamental to human interaction and interconnectedness. In story mode, as opposed to analytical mode, we are better predisposed to empathising with, absorbing, and remembering information (Green & Brock, 2002). Storytelling stimulates memorability by creating a surrogate experience (Sole & Wilson, 2002) of narrative transportation (Green & Brock, 2002). Business has long capitalised on these features of storytelling.

Deloitte devoted their 2014 Analytics Summit to storytelling. Johnson & Johnson have created an online database full of employee stories (Sole & Wilson, 2002). In his 2018 annual letter to shareholders, Jeff Bezos reiterated his rule that PowerPoint be banned from executive meetings at Amazon, with participants instead sitting silently for twenty to thirty minutes in advance of meetings to read a "six-page memo that's narratively structured with real sentences, topic sentences, verbs, and nouns." And new digital storytelling tools and social media platforms like Facebook, Snapchat, and Twitter continue to transform the ways we produce, share, and consume our stories.

Problem Statement: Organisational Storytelling in Liquid Modernity

But what about storytelling in Zygmunt Baumann's contexts of liquid modernity (Baumann, 2000)? How can storytelling be appropriately interweaved and structured into organisational reality when the component parts of that reality—the shifting spaces and hierarchies, the lack of "control" over time and information flow, its psychological and intrapersonal anxieties and the fluctuating parameters of digital transformation—seem to resist or even deny such structuring? Organisational research applying Baumann's characterisation of late modernity remains relatively scarce (Clegg & Baumeler, 2010 and Lippi, 2013). With regards storytelling, excluding a small number of papers discussing the implications of liquid modernity for journalism (Deuze, 2008 and Jaakkola et al., 2015), nothing is easily located. Therefore, from an evaluation of available literature, the following four key characteristics will be used to inform this research:

Organisational Structure in Liquid Modernity

The liquidly modern organisation is in a continual present of dialectical fluid mutation where organisations are increasingly liquid toward individuals and individuals are increasingly liquid toward organisations (Clegg & Baumeler, 2010). The permanence and stability of traditional structures has been replaced by (or is evolving in) continual flux. Structural stability, however, remains the customary goal for organisational planners (Lee, 2005), with instability signifying being reactive, problem-oriented, chaotic, and out of control. Early twenty-first century organisations are not, of course, without structure but rather exist in a state where significant and sudden change is *always* possible and frequently occurs. In this context of mutable structures and realities it is perhaps predictable that instituting and evolving corporate culture is presently considered so important. And with research showing that organisational storytelling is a key component in building corporate culture the following two questions might be asked:

1. How can organisational storytelling (which in and of itself defies simple categorisation, evaluation, and definition) be streamlined into processes that are themselves so changeable?

2. If culture is being promoted at the expense of boundary—a promotion, in essence, of the story over structure—is storytelling inadvertently feeding Baumann´s "perpetual anxiety" (Baumann, 2000, p61)?

Stories are certainly more pliable and cheaper to produce than traditional structures—start-up capital can be raised on story alone—but stories are also more volatile, eminently collapsible, and, in "fail-fast," agile business environments, perhaps storytelling itself is inherently characteristic of the fragility of organisational architecture in the liquid modern age.

Organisational Culture in Liquid Modernity

Storytelling is a means of directing and strengthening existent leadership and of building next-generation leaders, both through internal strategy and external consultation. An April 2019 report advises that executives must be fully engaged with those around them, coaching as much as leading. But leaders can as easily misdirect as appropriately educate, can corrupt rather than create. 2018 was notable for the negative manifestation of ego in several high-profile leadership communications "failures": the Elizabeth Holmes/Theranos story; Elon Musk´s many public pronouncements, and Mark Zuckerberg and Sheryl Sandberg´s initial silence and eventual public statements following the Cambridge Analytica scandal. Musk inspires devotion as well as animosity and encourages parallels with another executive leader and master manipulator of contemporary storytelling, Donald Trump, who habitually communicates fiction over fact and engages feelings over analysis with astounding success. Accordingly, storytelling at all organisational levels can pose an unchecked danger to what businesses prize: facts, analysis, and veracity. Stories can be so compelling and seductive in both detail and presentation that consumers—and/or the storyteller´s themselves—are absorbed by the story´s "truth" at the expense of critical evaluation (Sole & Wilson, 2002). Too often, organisational actors report disconnects between the story being told and the facts as understood. In the extreme case of Theranos, the available medical and technological data produced by its own employees were aggressively ignored by leadership in favour of the organisational vision as encapsulated in its story.

Conversely, market-leading organisations tend to have dismantled siloed structures, decentralised decision-making processes, and cultures of collaboration. These are characteristics that seem innately liquid modern: fewer borders, increased individual autonomy, and less restricted movement of people and ideas. For most organisations, however, the reality is different. Despite the importance industry places on data generation, for instance, research shows that a culture of "gut-based" executive decision-making persists, where experience and instinct is often valued over analytics. Reports by *The Economist Intelligence Unit*, *Harvard Business Review*, and Deloitte corroborate the results of a 2014 BARC market research survey, which reports that just 24% of managers and 22% of executives felt their

decisions were predominantly based on data. A 2019 *Harvard Business Review* survey of C-level executives (representing corporations including Ford, Johnson & Johnson, and American Express) reports 72% of participants yet to create a data culture at all and the percentage of organisations identifying themselves as being data-driven declining in concurrent surveys in each of the last three years. Cultural and leadership issues identified here do need to be addressed but leaders also need to be convinced that good data is at least as valuable as the accumulated value of instinct and experience.

In light of the above, at this point the following generative questions are suggested and can also be considered the core of this research proposal:

1. How can storytelling support development of collaborative, decentralised corporate cultures in liquidly modern organisations?
2. Can organisational storytelling facilitate functional comprehension between analyst and decision-maker, between complex data and valuable information?

Time-management, Speed, and Anxiety in Liquid-Modern Organisations

Organisational inability to effectively deal with the volume and velocity of multitudinous flows of data and information are intertwined with pressures of time-management, speed, and anxiety. The conditions of modern life *are* impermanent. States of change *do* create palpable discord and anxiety (Clegg & Baumeler, 2010) and actors in organisations now exist in "real time"/"zero time" fear of competitors gaining an advantage. The Theranos story is a flagrant example of the pitfalls of the "fake it ′till you make it" credo in a business environment where "failing fast" is popularly considered preferable to stagnation. Within these high-speed, time-pressured environments our increasingly individualistic, liquid modern approaches to fracturing and structuring professional and personal time—both on and off the internet, with and without technology—grate against the fact that organisational temporal structuring is a social process that requires the cooperation of community (Orlikowski & Yates, 2002). Storytelling can help develop such communities and will also provide its own temporal structures, causal or linear as required (Boal & Schultz, 2007 and Kosara & Mackinlay, 2013). However, while beneficial for retrospective understanding or establishing precedent, these timelines do not provide for prescriptive action.

Similarly, in identifying limitations with prevailing "chrono-centric" approaches to time-management Reinecke & Ansari (2014) describe linear clock-time as being both structuring device and fiction. Just as storytelling is unable to consistently describe future events, overarching orientation of linear clock-time is unsuitable for managing multiple inexact, unfixed processes. Disparate groups within organisations and individuals within those groups do not experience time with linear consistency.

Indeed, it might be asked whether any organisational temporal framework, such as that proposed by Ancona (Ancona et al., 2001), is efficiently applicable in the fluctuating context of liquid modernity. Meanwhile, ongoing digital transformation is further accelerating the speed at which data and business opportunities arise and disappear, with comparative innovation, product and employee life-cycles shortening.

"The deepest, perhaps the sole meaning of progress is made up of two closely interrelated beliefs – that 'time is on our side´ and that we are the ones who ´make things happen´" (Bauman, 2000, p132). We compartmentalise our professional and personal lives, entrain ourselves to technologies, and author our own stories to impose structure upon our routines, our objectives, and our identities. In our development, however, into self-forming, monitorial citizens (Schudson, 1999 in Deuze, 2008)—perhaps capable of transition through liquid into reflexive modernity—these subjective, compartmentalised self-stories that we time ourselves by and coerce ourselves to believe are undermined by existential anxieties that, in fact, we do not have enough time, and we are not really in control. It is as if the aspiration to be fully realised, holistic individuals is seeing us create multiple siloed versions of ourselves. Should evolving organisational storytelling reflect this compartmentalisation, where the sum of the parts embodies the whole? Are speed and mismanagement of time compatible with critical evaluation, with notions of reflexive modernity, with telling or hearing a story or might storytelling itself prove a partial antidote to these issues?

In consideration of the above, this section concludes with the following questions:

1. Into what framework of liquid modernity can concepts of time-management be applied?
2. Can organisational storytelling fit such a framework?

Storytelling Technologies in Liquid Modernity

Historically, storytelling methods can be broadly categorised in the following three ways, with each individual method significantly shaped by technological progression:

Oral

The oral storytelling tradition—including ancient literary works such as the *Iliad*, the *Odyssey* and the Old English epic *Beowulf*—was transformed by the invention of (commercial) radio and again, more recently, by the rise of podcasts, internet radio streaming, and other forms of digital audio.

Written

Similarly, where the earliest Sumerian *cuneiform* scripts were etched on clay tablets with blunted reeds, our written storytelling methods now see storytellers using electronic tablets and devices, which

"contain" vast archives of information as well as the mobile means to create, edit, store, distribute, and obtain our stories.

Visual

Visual storytelling practices have likewise been shaped by technological advancement. What began on the walls of prehistoric caves like Lascaux (c. 17,000 years old, France) and El Castillo (c. 40,000 years old, Spain) would evolve and be conveyed and portrayed through invention and development in art, theatre, photography, film, home television, the latest portable and tailored streaming services, and in memes, GIFs, infographics, and apps like Flickr and Instagram.

Finally, to this brief categorisation we might now tentatively add a fourth method of delivery:

Transmedia

Transmedia storytelling is the delivery of a story (or, more accurately, a story *experience*) across multiple platforms and formats using digital technologies. In this way teams of storytellers aim to create *storyworlds*, widening the story's frame of reference, extending its reach, increasing its potential profitability and, in theory, deepening audience understanding.

The situation is no different for organisational storytelling, its past, present and future practice interwoven with the tools, transformations, benefits and burdens of technology. On the one hand, in present-day organisational environments experiencing accelerated technological change, storytelling strategies can support the collaborative creation of shared meaning between relevant groups and actors (Davidson & MacLeod, 2007); on the other, technological change is fundamentally changing the way stories are created, distributed, and received, as well as encouraging a rethink on *what kind* of stories can and should be produced. And while software like *Tableau*, *Many Eyes*, and *storymap* are ostensibly already using storytelling in data visualisation, for example, the area is generally under-researched and clearly far from fully realised (Kosara & Mackinlay, 2013), at least in part because of the ongoing rapid rate of technological change occurring within a relatively short and recent timeframe.

Mobile technology, app development, and social media have, quite literally, put everything that we need to create, share, and respond to stories in our pockets. Through the ubiquitous use of these technologies, the consumerist and ephemeral core of liquid modernity's philosophy is also identifiable. Within this context—or these *contexts*—of liquid modernity, organisational storytelling, and technology, are there any fundamental constants? Perhaps, in conclusion, it should be remembered that from the earliest stages of development, stories were not simply about conveying and sharing events that had occurred but could also implicitly examine or promote examination of *why* such events had occurred, reveal the sequence of events, preserve both the critical and emotional responses to those events and, where

appropriate, speculate upon what events might follow. On this latter point alone, research into applying concepts like design fiction could prove useful in the debate and collective comprehension of complex and emergent conditions (not least technological) in organisational settings. For now, however, the following two questions are posed:

1. How can technology and storytelling support each other within a liquid modern framework?
2. Can fixed fundamentals of organisational storytelling be defined?

Conclusions, Challenges, and Objectives

If the potential of organisational storytelling is to be realised in role and execution its limitations must be established, continuing goals clearly defined, and metrics developed to evaluate its progress. Liquid modernity provides a timely lens for framing this research. From the outset the study is faced with its own incumbent challenges and limitations, including:

1. The lack of an established framework employing liquid modernity in organisational theory.
2. The idea that liquid modernity fails to provide for the possibility of re-solidification (Lee, 2011), which ultimately may prove required on examination of the relationship between organisational structure and culture.
3. The natural static-ness or petrification (Ruggles, 2002 in Sole & Wilson, 2002) of a storytelling snapshot in fluctuating environments.
4. The fact that organisational storytelling itself is ordinarily not subject to evaluating criteria of classification, categorisation, calculation, and analysis.

On the verge of the quantum age of computing we should expect intensified digital transformation, increased use of technology, further fragmentation of information, greater speeds and less time, all of which will be impactful upon organisational storytelling (Boje, 2014). Anxieties around data are pressing, be they about volume, velocity, variety and veracity or subjective concerns about privacy in a world where information is surreptitiously harvested for political purposes, where even our virtual identities, floating in perpetually expanding cloud galleries, are owned in death *ad infinitum* by social media corporations.

For the purposes here, however, it is this area that may provide organisational storytelling its most impactful opportunity moving forward, as well as one which brings together the four key areas outlined above. The average executive cannot interpret data as an analyst can but, just as black holes can be analogously conceptualised and visualised in terms comprehensible to those who are not astrophysicists, so too might organisational storytelling—or the organisational storyteller (*or* alternative

designation)—facilitate comprehension between analyst and decision-maker, between complex data and valuable information. Data must be presented to decision-makers in functional, expedient forms and "storytelling" can centre itself in organisational life as the sense-making bridge for this transfer of knowledge. The solution may lie in the realisation of new working roles combining elements of design thinking, psychology, data visualisation, traditional storytelling methods, analytics, and best-fit digital transformation tools. Moving toward this solution is the overarching objective of this research.

Preliminary Literature Review

The preliminary review shows past studies primarily focused on why and how various aspects of organisational storytelling should be utilised within organisations. The most recent literature is overwhelmingly positive in nature. Similarly, work examining organisations through liquid modernity is very limited and—excepting a section in Boje, 2014—there is nothing combining storytelling, organisational theory, and liquid modernity. Moving forward, the literature should reflect the cross-disciplinary nature of storytelling and storytelling theory, embracing weighted elements from a selection including organisational theory, information systems, psychology, technology, neuroscience, anthropology, journalism, analytics, philosophy, and literature.

Methodology

The primary research methods for this study are literature review, reportage, and survey. The study will first examine the current state of organisational storytelling and develop upon the emergent factors that threaten to undermine this status. It will outline a conceptual framework (with liquid modernity as lens), within which this examination can be conducted and within this framework develop the idea of "storyteller" as intermediary between analyst and decision-maker as fully as is possible.

References

Aaker, D., & Aaker, J. L. (2016). What are your signature stories? *California Management Review*, *58*(3). https://doi.org/10.1525/cmr.2016.58.3.49

Alvarez, R., & Urla, J. (2002). Tell Me a Good Story: Using Narrative Analysis to Examine Information Requirements Interviews during an ERP Implementation. *Data Base for Advances in Information Systems*, *33*(1). https://doi.org/10.1145/504350.504357

Ancona, D. G., Okhuysen, G. A., & Perlow, L. A. (2001). Taking Time to Integrate Temporal Research. *The Academy of Management Review*, *26*(4), 512. https://doi.org/10.2307/3560239

Bauman, Z. (2000). *Liquid modernity*. Polity Press.

Beckman, S., & Barry, M. (2009). Design and Innovation through Storytelling. *International Journal of Innovation Science*, *1*(4). https://doi.org/10.1260/1757-2223.1.4.151

Boal, K. B., & Schultz, P. L. (2007). Storytelling, time, and evolution: The role of strategic leadership in complex adaptive systems. *Leadership Quarterly*, *18*(4). https://doi.org/10.1016/j.leaqua.2007.04.008

Boje, D. M. (2014). Storytelling organizational practices: Managing in the quantum age. In *Storytelling Organizational Practices: Managing in the Quantum Age*. https://doi.org/10.4324/9780203597767

Denning, S. (2012). The springboard: How storytelling ignites action in knowledge-era organizations. In *The Springboard: How Storytelling Ignites Action in Knowledge-Era Organizations*. https://doi.org/10.4324/9780080517568

Deuze, M. (2008). The changing context of news work: Liquid journalism and monitorial citizenship. *International Journal of Communication*, *2*.

Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology*, *79*(5). https://doi.org/10.1037/0022-3514.79.5.701

Jaakkola, M., Hellman, H., Koljonen, K., & Väliverronen, J. (2015). Liquid Modern Journalism with a Difference. *Journalism Practice*, *9*(6). https://doi.org/10.1080/17512786.2015.1051361

Kendall, J. E., & Kendall, K. E. (2012). Storytelling as a qualitative method for is research: Heralding the heroic and echoing the mythic. *Australasian Journal of Information Systems*, *17*(2). https://doi.org/10.3127/ajis.v17i2.697

Kosara, R., & MacKinlay, J. (2013). Storytelling: The next step for visualization. *Computer*, *46*(5). https://doi.org/10.1109/MC.2013.36

Lee, R. L. M. (2005). Bauman, Liquid Modernity and Dilemmas of Development. *Thesis Eleven*, *83*(1), 61–77. https://doi.org/10.1177/0725513605057137

Lee, R. L. M. (2011). Modernity, solidity and agency: Liquidity reconsidered. *Sociology*, *45*(4). https://doi.org/10.1177/0038038511406582

Lippi, J. (2013). Leadership in liquid modernity. *Journal of Contemporary Issues in Business and Government*, *19*(1). https://doi.org/10.7790/cibg.v19i1.7

MacLeod, M., & Davidson, E. (2007). Organizational storytelling and technology innovation. *Proceedings of the Annual Hawaii International Conference on System Sciences*. https://doi.org/10.1109/HICSS.2007.420

Orlikowski, W. J., & Yates, J. A. (2002). It's about time: Temporal structuring organizations. *Organization Science*, *13*(6). https://doi.org/10.1287/orsc.13.6.684.501

Reinecke, J., & Ansari, S. (2015). When times collide: Temporal brokerage at the intersection of markets and developments. *Academy of Management Journal*, *58*(2). https://doi.org/10.5465/amj.2012.1004

Sole, D., & Wilson, D. G. (1999). Storytelling in Organizations : The power and traps of using stories to share knowledge in organizations. *Training and Development*, *53*.

Proposal Review of 8 Key Questions

1. How can organisational storytelling (which in and of itself defies simple categorisation, evaluation and definition) be streamlined into processes that are themselves so changeable? *[STRUCTURE]*
2. If culture is being promoted at the expense of boundary—a promotion, in essence, of the story over structure—is storytelling inadvertently feeding Baumann´s "perpetual anxiety"? *[STRUCTURE]*

3. How can storytelling support development of collaborative, decentralised corporate cultures in liquidly modern organisations? *[CULTURE]*

4. Can organisational storytelling facilitate functional comprehension between analyst and decision-maker, between complex data and valuable information? *[CULTURE]*

5. Into what framework of liquid modernity can concepts of time-management be applied? *[TIME]*

6. Can organisational storytelling fit such a framework? *[TIME]*

7. How can technology and storytelling support each other within a liquid modern framework? *[TECHNOLOGY]*

8. Can fixed fundamentals of organisational storytelling be defined? *[STORYTELLING]*

8.2 Appendix B: JAIS Theory Development Workshop 2020:

On conceptualising fake news in conditions of liquid modernity

Introduction: Fake News and IS Research

Listed by the World Economic Forum as a twenty-first century threat to global society (Howell, 2013), fake news and related mis/dis/information constructs are a wicked and pervasive sociotechnical problem (Lazer et al., 2018) with no clear solution that should now be considered an interdisciplinary "grand challenge" (Ferraro et al., 2015). Our review of the relevant information systems (IS) literature reveals that IS research objectives predominantly aim for technical control of this challenge through *detection* (Zhao et al., 2014), *prediction* (Horne & Adali, 2017) and *prevention* (Kumar & Geethakumari, 2014), whereby a scientific understanding of social media dynamics is deemed critical (Shao et al., 2017).

Empirical and organisational confusion is generated by competing and overlapping conceptualisations of fake news with similar constructs (Søe, 2017). Some studies claim technologies already exist to combat the fake news challenge (Safieddine et al, 2016); others suggest that new safeguards and approaches are required (Lazer et al., 2018). Lack of clarity is to be expected in a nascent research area, but one large-scale survey of expert opinion (Anderson & Rainie, 2017) finds 49% of respondents believing that information ecosystem problems will improve (with technological interventions as a catalyst), while 51% forecast no improvement (with technological interventions as a catalyst). Research that aims to categorise "fake news and everything related to it" (Zhang & Ghorbani, 2019) is indicative of a reductionist and technocentric IS inclination toward order and control that may no longer be fit for purpose. The scale and depth of the problem (Lazer et al., 2018) make clear that our solutions are not working.

We suggest that a sociophilosophical understanding of this challenge in the IS context is of equal importance to a scientific understanding. If the philosophical centre still guiding IS research does indeed remain positivistic (Hassan et al., 2018), such an understanding will be vital should IS hope to meet calls for responsible research and innovation (von Schomberg, 2011). The technical approach aims to control the problem; we want to know, in the IS context, why the problem exists. Sensitisation to *why* may be most vital for those in IS most predisposed to the application of technical solutions to social problems. Existing at the epicentre of organisational enquiry (Grover & Lytinnen, 2015) and an intersection of machines and human behaviour (Gregor, 2006), IS is well-positioned to contribute to sociophilosophical understanding in return.

Toward a Framework of Liquid-Modern Theoretical Principles

Liquid-modern theory (Bauman, 2000) has demonstrated significant value in multiple fields, including surveillance (Lyon, 2010), organisational analysis (Clegg & Baumeler, 2010), journalism studies (Deuze & Witschge, 2017) and human-computer interaction (Flintham et al., 2018 (a fake news study)). IS has been described as "the paradigmatic liquid discipline" (Bryant, 2008), the Baumanian ethical perspective applied to IS development players (Chatterjee et al., 2009) and surprise expressed that IS has not drawn more value (Avgerou, 2007) from Bauman's canonical contribution. Given space-restrictions, Table 15 below introduces and briefly outlines a selection of four liquid-modern principles (Doyle & Conboy, 2020[a]; Doyle & Conboy, 2020[b]):

Table 15: A Selection of Liquid-Modern Principles (a)

	Liquid-modern principle	**Outline of the principle**
1	Liquid-modern conditions are shaped by solid-modern motivations.	The epistemological, socio-political and ethical impacts of complex "liquid" change as it relates to our previously established solid-modern need for rationalistic order-building and modernising progress constitutes the mutable core of liquid-modern theory.
2	Solid-modern motivations are shaped by liquid-modern conditions.	Liquid modernity prioritises mobility over rootedness, flexibility over rigidity, ephemerality over durability, elusiveness over fidelity and responsiveness over restraint. Meeting the criteria for liquid-modern success simultaneously liquefies solid structures and foundations.
3	Instability and uncertainty are required in liquid modernity.	Liquid-modern paradoxicality sees uncertainty necessarily and cyclically generated in the pursuit of stability: instability creates the conditions for innovation; innovation creates uncertainty; uncertainty creates instability.
4	Emancipated, privatised individualism undermines public agency and requires perpetual self-construction of identity.	Privatised individualism delegitimises the public space, challenges citizenship and reinforces inequalities. The individual belongs to a community; a network belongs to the individual. Emancipation forces self-construction of identity that must be solid and liquid enough to meet liquid-modern criteria.

A Liquid-Modern Understanding of the Fake News Challenge

We now apply the outlined principles to our review of the literature:

Liquid-modern conditions are shaped by solid-modern motivations.

Attempts to control unstructured liquid data with solid data mining processes may upgrade the technological artefact at the expense of its social subject. Solid, technocentric sentiment, semantic and linguistic-based analyses (Zhang & Ghorbani, 2019) prioritise machine learning over human learning and reduce the complexity of human communication to a set of nouns, verbs and adjectives. The "bag

of words" technique loses rich information by ignoring the contextual meaning of words (Conroy et al., 2015). Technological innovation is a key driver of liquid-modern conditions. By replacing humans with algorithms social media platforms may have fuelled the liquid fake news problem (Mustafaraj & Metaxas, 2017). Solid algorithmic attempts to solve a liquid problem that algorithms have intensified may make the current conditions worse by facilitating censorship, concentrating power and propagating further unintended consequences. Disseminating fake news demonstrates unanchored control, where control in itself is a form of liquid disruption. Fake news is quintessentially liquid-modern.

Solid-modern motivations are undermined by liquid-modern conditions.

The liquidity of information undermines solid efforts to control understanding. New social media erode the institutional credibility of traditional media (Lazer et al., 2018). New writing patterns, styles and purposes emerge online daily (Zhang & Ghorbani, 2019), undermining detection attempts. Competing, solid definitions for the same liquid problem produce inconsistent results (Wu et al., 2017). One study identifies four distinct detection algorithms utilising four different understandings of misinformation and three of disinformation (Søe, 2018), which subsequently detect different things under the same headings, creating empirical and organisational confusion. Into which construct do spamming, trolling, astroturfing, crowdturfing, rumour, cyberbullying, unverified information and alternative facts fit? Liquid conditions undermine controlling motivations. Solid social media platform regulations (Boyd & Crawford, 2012) are liquidly circumvented with tools like the Hydrator (Chen et al, 2020). Incomplete, unstructured, unlabelled and noisy (Shu et al., 2017) real-world fake news datasets will resist taming. Complex human fact-checking should not be "reduced to a simple network analysis problem" (Ciampaglia et al., 2015) upon critically unstable empirical foundations.

Instability and uncertainty are required in liquid modernity.

Fake news dissemination creates the uncertain space for counterpoint information. Counterpoint information creates space for counter-counterpoint information. This process is inherently innovative: the uncertainty (liquidity) generated by fake news motivates reinforcing certainty (solidity), which motivates propagation of further information (liquidity). In the current conditions fake news may not only be inevitable, it may also be required. Liquid-modern paradoxicality propagates these unintended consequences, creating conditions where social media are both emancipatory *and* hegemonic (Miranda et al., 2016). A stable "continuum of veracity, with an associated measure of uncertainty" to detect fake news (Conroy et al., 2015) is unachievable. The pervasiveness of social bots means we cannot even be certain that the subjects of our analyses are human, with any success at solid bot detection inspiring liquid "countermeasures by bot producers" (Lazer et al., 2018). Institutionalised, manufactured uncertainty (Giddens, 1994) is systematically produced in liquid modernity. Where data is withheld is

fake news research fake news? When it is “almost impossible” to determine whether a news item is false or accurate based upon the news item itself (Laato et al., 2020) and an individual, uncredited, anonymous producer can reach as many consumers as traditional media (Allcott & Gentzkow, 2017), the controller and the controlled have been separated.

Emancipated, privatised individualism undermines public agency and requires perpetual reconstruction of identity.

The assumption that false online content should be flagged or removed assumes that the technical categorisation of truth and falsity is sufficient for the detection of misinformation and disinformation (Søe, 2017) and fundamentally challenges the emancipated individual. Propagation-based detection approaches, user-profiling analysis (Zhang & Ghorbani, 2019) and style-based analysis (Horne & Adali, 2017) may in some instances check the lack of individual accountability in self-publishing but also facilitate the mapping of individual lives with potentially profound ethical and real-world consequences. The assumptions inherent in stance-based social-context modelling (Zhang & Ghorbani, 2019) are fundamentally flawed. Given individual responsibility for fluctuating identity-formation, homophily, polarization, filter bubbles and echo chambers no longer seem “peculiar” (Shao et al., 2017.). Consistent association of fake news with nefarious agency— “political activists, scammers, alternative news media and hostile governments” (Bernard et al., 2019)—already seems outdated. Should legitimate users who unwittingly spread false information be considered scammers or hostile and be targeted by algorithms? Are mainstream governments that engage in information manipulation still legitimate? Solid impositions of control in liquid conditions are inherently problematic; no control at all may propagate further contraction of traditional public agency.

Recommendations

“In a world of communication, the problem is noise.”

(Bauman, 1987)

Information, disinformation, misinformation and information systems

Information/misinformation/disinformation (Stahl, 2006) must be re-examined in liquid modernity. When “fake” news outperforms or liquefies “real” news in network spread (Zhang & Ghorbani, 2019) we must re-examine news. Entrusting algorithms to solidly define the truth may be unwise in conditions that necessarily generate liquid uncertainty. At the organisational level, institutional integrity must not be assumed, yet this assumption is implicit in many technocentric misinformation studies (e.g.: Li et al., 2020). Distributed projects/actors may benefit from a framework that can assist shaping their solid

framing of misinformation and information but shift as that framing liquidly changes within a project or strategic operation.

The problem of control

The default response to uncertainty must not be to control, steer or tame. Expanding our theoretical toolbox means deepened legitimisation of uncertainty within scientific frameworks. That control concepts remained "remarkably stable for several decades" (Wiener et al., 2015) is not remarkable when liquid conditions are shaped by solid motivations. In their conceptual expansion of control frameworks, a key but undeveloped construct was presented: "unintended consequences" (*ibid*.) With critical control implications inherent, we believe that rigorously developed liquid-modern principles can extend this space. In the meantime, studies proposing simple algorithmic misinformation solutions should be mistrusted: there is no simple solution.

Sensitised IS research and development

While this abstract intentionally adopts a critical stance, the issues outlined are of as much epistemological as methodological concern. The liquid-modern interregnum affords us both extraordinary technological innovations and complex grand challenges like climate change and fake news. Collaboration and interconnection is now required on a scale never before seen. The rate of change, in concert with emancipated, privatised individualism, undermines agency and impedes the means and vision to achieve required interconnection. We must work within these conditions and with the tools available to us – and can never be certain if the work will improve or disimprove these conditions – but adopting appropriate theoretical lenses is a starting point. As Hannah Arendt pointed out in 1958: "We must *think* what we are doing" (Arendt, 1958).

Methodology and Future Direction

To evolve our framework, we favour adopting critical research principles (Klein & Myers, 2011) or non-traditional literature-review-based abductive grounded theory (Timmermans & Tavory, 2012). Both approaches may be applied in literature review and data analysis. In application we adopt the thematically related reflexive-modern perspective (in opposition to most postmodern positions): even if arbitrary multiplicity is now an ultimate "fact," IS is not "free from the burden of decision-making" (Beck et al., 2003). By examining what motivates "fake/mis/dis/information," we hope to illuminate both *why* fake news proliferates as well as the most appropriate ways to approach this grand challenge.

Conclusion

As an emergent, complex and fluctuating site of enquiry, we believe that mis/disinformation is particularly well suited for a liquid-modern lens. We hope to have the opportunity to test and develop these ideas at the JAIS Theory Development workshop.

References

Allcott, H. & Gentzkow, M. (2017). *Social Media and Fake News in the 2016 Election*. Journal of Economic Perspectives. 31(2):211-36.

Anderson, J., & Rainie, L. (2017). *The Future of Truth and Misinformation Online*. Pew Research Center.

Arendt, H. (1958). *The Human Condition*. University of Chicago Press.

Avgerou, C, (2007). *"Thinking "Informatically": A New Understanding of Information Communication and Technology*. Information Technology & People, (20)2;205-206.

Bauman, Z. (2000). *Liquid Modernity*. Polity Press; Blackwell.

Bauman, Z. (1987). *Legislators and Interpreters: On Modernity, Postmodernity and Intellectuals*. Cambridge:Polity Press.

Beck, U., Bonss, W., & Lau, C. (2003). *The Theory of Reflexive Modernization: Problematic, Hypotheses and Research Programme*. Theory Culture Society;20:1; Sage.

Bernard, J.-G., Dennis, A., Khan, A., & Webster, J. (2019). *The tangled web: Studying online fake news*. ICIS 2019 proceedings.

Boyd, D. & Crawford, K. (2012). *Critical questions for big data*. Information, Communication and Society. 15(5);662–679.

Bryant, A. (2008). *The future of information systems – Thinking Informatically*. European Journal of Information Systems. 17:6;695-698.

Chatterjee, S., Sarker, S., & Fuller, M. (2009). *Ethical Information Systems Development: A Baumanian Postmodernist Perspective*. Journal of the Association for Information Systems: Vol. 10; Iss. 11; Article 3. DOI: 10.17705/1jais.00214

Ciampaglia GL., Shiralkar P., Rocha LM., Bollen J., Menczer F., Flammini A. (2015). *Computational Fact Checking from Knowledge Networks*. PLoS ONE. 10(6):e0128193.doi:10.1371/ journal.pone.0128193

Chen, E., Lerman, K., & Ferrara, E. (2020). *COVID-19: The first public coronavirus twitter dataset.*

Clegg, S. & Baumeler, C. (2010). *From iron cages to liquid modernity in organization analysis*. Organization Studies. 3(12);1713-1733.

Conroy, N., Rubin, V., & Chen, Y. (2015). *Automatic deception detection: Methods for finding fake news*. https://doi.org/10.1002/pra2.2015.145052010082.

Deuze, M. & Witschge, M. (2017). *Beyond journalism: Theorizing the transformation of journalism*. Sage, Journalism. Vol:19 issue:2;165-181.

Doyle, R., & Conboy, K. (2020[a]). *Considering the merits of applying liquid modernity as a theoretical lens for information systems research*. ECIS 2020 Research-in-Progress Papers. https://aisel.aisnet.org/ecis2020_rip/90.

Doyle, R., & Conboy, K. (2020[b]). *The role of IS in the covid-19 pandemic: A liquid-modern perspective.* International Journal of Information Management. https://doi.org/10.1016/j.ijinfomgt.2020.102184.

Ferraro, F., Etzion, D., & Gehman, J. (2015). *Tackling grand challenges pragmatically: Robust action revisited*. Organization Studies, 36:363–390.

Flintham, M., Karner, C., Bachour, K et al. (2018). *Falling for Fake News: Investigating the Consumption of News via Social Media.* Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems

Giddens, A. (1994). *Risk, trust, reflexivity*. In Beck, U., Giddens, A., & Lash, S. Reflexive Modernization. P.184. Polity Press.

Gregor, S. (2006). *The Nature of Theory in Information Systems*. MIS Quarterly 30:3.

Grover, V., & Lyytinen, K. (2015). *New State of Play in Information Systems Research: The Push to the Edges.* MIS Quarterly 39: 271-296.

Hassan, N, Mingers, J, Stahl, B. (2018). *Philosophy and information systems: where are we and where should we go?* European Journal of Information Systems. 27:3;263-277

Horne, B.D. & Adali, S. (2017). *This Just In: Fake News Packs a Lot in Title, Uses Simpler, Repetitive Content in Text Body, More Similar to Satire than Real News*. https://arxiv.org/abs/1703.09398

Howell L. (2013). *Digital wildfires in a hyperconnected world*. WEF Report 2013. reports.weforum.org/global-risks-2013/risk-case-1/digital-wildfires-in-a- hyperconnected-world.

Klein, H. & Myers, M. (2011). *A set of principles for conducting critical research in information systems*. MIS Quarterly, 35:1.

Kumar, KP K. & Geethakumari, G. (2014). *Detecting misinformation in online social networks using cognitive psychology*. Human-centric Computing and Information Sciences. 4:14.

Laato, S., Islam, A, Islam, M. & Whelan, E. (2020). *What drives unverified information sharing and cyberchondria during the COVID-19 pandemic?* European Journal of Information Systems. https://doi.org/10.1080/0960085X.2020.1770632.

Lazer, D., Baum, M. A., Benkler, Y., Berinsky, A. J., Greenhill, K. M., Menczer, F., et al. (2018). *The science of fake news*. Science, 359(6380);1094–1096.

Li, L., Zhang, Q., Wang, X., Zhang, J., Wang, T., Gao, T.-L., et al. (2020). *Characterizing the propagation of situational information in social media during COVID-19 epidemic: A case study on weibo*. IEEE Transactions on Computational Social Systems. 556–562.

Lyon, D. (2010). *Liquid Surveillance: The Contribution of Zygmunt Bauman to Surveillance Studies*. International Political Sociology.4;325–338

McKinsey. (2020). *How Amazon is built to try and learn* https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/fasttimes/interviews/beth-galetti.

Miranda, S., Young, A., & Yetgin, E. (2016). *Are Social Media Emancipatory or Hegemonic? Societal Effects of Mass Media Digitization in the Case of the SOPA Discourse*. MIS Quarterly, 40(2);303–329.

Mustafaraj, E. & Metaxas, P.T. (2017). *The Fake News Spreading Plague: Was it Preventable?* https://dl.acm.org/doi/proceedings/10.1145/3091478

Safieddine, F., Masri, W., & Pourghomi, P. (2016). *Corporate Responsibility in Combating Online Misinformation*. International Journal of Advanced Computer Science and Applications; Vol.7;No.2.

Shao, C., Ciampaglia, G., Flammini, A., & Menczer, F. (2016). *Hoaxy: A Platform for Tracking Online Misinformation*. In Proceedings of the 25th International Conference Companion on World Wide WeB. CHE;745–750.

Shu, K., Sliva, A., Wang, S., Tang, J. & Liu, H. (2017). *Fake News Detection on Social Media: A Data Mining Perspective*. DOI:https://doi.org/10.1145/3137597.3137600

Søe, S. O. (2018). *Algorithmic detection of misinformation and disinformation: Gricean perspectives*. Journal of Documentation. Vol.74;No. 2; 309-332 Emerald Publishing Limited.

Stahl, B. (2006). *On the Difference or Equality of Information, Misinformation, and Disinformation: A Critical Research Perspective.* Informing Science Journal. Vol 9.

Timmermans, S. & Tavory, I. (2012). *Theory Construction in Qualitative Research: From Grounded Theory to Abductive Analysis*. Sociological Theory. 30:167.

von Schomberg, R. (2011). *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields*. Luxembourg: Publications Office of the European Union.

Wiener, M., Mähring, M., Remus, U. & Saunders, C. (2016). *Control configuration and control enactment in information systems projects: review and expanded theoretical framework*. MIS Quarterly. 40;3;741–774.

Wu, K., Yang, S., & Zhu, K.Q. (2015). *False rumors detection on Sina Weibo by propagation structures*. 2015 IEEE 31st International Conference on Data Engineering. 651-662.

Zhang, X., & Ghorbani, A. (2020). *An overview of online fake news: Characterization, detection, and discussion*. Information Processing and Management. Vol57;Iss2.

Zhao, J., Cao, N., Wen, Z., Song, Y., Lin, Y.-R., & Collins, C. (2014). *# fluxflow: Visual analysis of anomalous information spreading on social media*. IEEE Transactions on Visualization and Computer Graphics, 20(12);1773–1782.

8.3 Appendix C: JAIS Special Issue Developmental Workshop 2021:

Developing a liquid-modern framework of digital transformation for IS

Introduction

"When IS specialists specifically examine transformation, this goal paradoxically mitigates the problem of dependence of structures and institutions. This difficulty is indeed rarely analysed—as if the magic reference to transformation would get rid of the problem." (Besson & Rowe, 2012)

The digital transformation (DT) phenomenon illuminates the profound high level (Majchrzak et al, 2016) and organisational (Kotarba, 2018) changes occurring with digital innovation and adoption. While the potential benefits of DT are manifold (Matt et al., 2015), our review identifies two interrelated problems in the extant information systems (IS) DT research: lack of conceptual clarity and theorising that is too traditionally rigid for the current conditions.

One high-impact state of the art review (Vial, 2019) considers unclear terminology, conceptual conflation, and circularity the key IS DT concerns. No reconciled definition for DT is "a huge challenge" as studies now frame DT "as totally different things" (Morakanyane et al., 2017). This base uncertainty extends to DT business strategy (Matt et al., 2015). However, when traditional delineation of DT concepts in radically complex and turbulent conditions is still considered paramount (Kotarba, 2018), IS approaches may be overcompensating for their own theoretical and methodological deficiencies. The structural rigidity that empirical research and organisational routine traditionally demand (Besson & Rowe, 2012) is ill-suited to the fluid nature of DT.

Liquid-modern theory (Bauman, 2000) provides a theoretical lens more suitable to the conditions. Liquid modernity describes a world characterised by the continuing failure to rationalise relentless change (Sheptycki, 2017); a world with weakened institutional and interpersonal relationships (Jay, 2010) where all forms of durability are denied (Lee, 2005), preceding strategies rendered impotent (Bryant, 2007) and the modernist dream of coherence, stability and consensus becomes a fallacy (Deuze, 2017). A liquid-modern lens suggests that traditional, controlling attempts to unravel DT complexities—establishing rigid site-of-analysis boundaries, strictly circumscribed constructs, and (pseudo-)reliable empirical foundations—will produce less empirical and organisational DT clarity but more risk of multi-level and potentially profound societal consequences, which no longer can be rationalised or foreseen.

When all attempts to steer, tame or control (Benbya et al., 2020) institutionally manufactured uncertainty (Giddens, 1994) can paradoxically propagate further erosion of empirical, societal and organisational stability, the view that there has been no fundamental transformation in the philosophy underlying IS research (Agarwal & Dhar, 2014; Hassan et al, 2018) becomes the central motivation for this study. Responding to the call for theories of the problem (Majchrzak et al, 2016), as well as DT theories that are broad and descriptive (Besson & Rowe, 2012), the objective of this study is: *the development of a new conceptual framework of digital transformation based upon the core principles of liquid modernity*.

Liquid Modernity: Unstable, Undermining, and Uncertain

Demonstrating significant value in multiple fields (e.g.: organisational studies (Clegg & Baumeler, 2010) and human-computer interaction (Flintham et al., 2018)), liquid-modern theory (Bauman, 2000) is constitutive of the broader body of "late modern" theory (Beck et al., 1994), through which the globalised threats of modernisation become a "coproduction' of science, economics and politics" (Beck, 2009). Bauman's perspective is, arguably, most "challenging in its criticality" (Avgerou, 2007). With IS described as 'the paradigmatic liquid discipline' (Bryant, 2008), the Baumanian ethical perspective has been applied to development players (Chatterjee et al., 2009) and liquid-modern principles applied to the role of IS in the covid-19 pandemic response (Doyle & Conboy, 2020) but surprise has also been expressed that IS has not yet drawn more value from Bauman's canonical contribution (Avgerou, 2007). Table 16 outlines a restricted selection of three liquid-modern principles:

Table 16. A Selection of Liquid-Modern Principles (b)

	Liquid-modern principle	**Outline of the principle**
1	Liquid-modern conditions are shaped by solid-modern motivations.	The epistemological, socio-political and ethical impacts of postmodern 'liquid' change characterise the current conditions but are shaped by previously established solid-modern motivations for order-building, control and modernising progress. Solid attempts at order, control and progress will further destabilise and intensify the liquid conditions.
2	Solid-modern motivations are shaped by liquid-modern conditions.	Liquid-modern theory prioritises liquid mobility over solid rootedness, flexibility over rigidity, ephemerality over durability, elusiveness over fidelity and responsiveness over restraint. Degrees of solidity and liquidity are interlocked within

		modernising processes: meeting the liquid-modern criteria for success simultaneously liquefies all solid structures.
3	Instability and uncertainty are both generated and required in liquid modernity.	Liquid-modern paradoxicality sees uncertainty necessarily and cyclically generated in the pursuit of order and stability: instability creates the conditions for innovation; innovation creates uncertainty; uncertainty creates instability. With change the only liquid-modern permanence, presentism is automated while concepts of destination are delegitimised.

A Liquid-Modern Conceptualisation of Digital Transformation

We now apply the three principles outlined in Table 16 to our review of the DT literature:

Liquid-modern conditions are shaped by solid-modern motivations.

Establishing a "solid foundation" (Morakanyane et al., 2017) for analysing the DT phenomenon is a controlling and misguided empirical motivation. Research conceptualising DT as "changes built on the foundation of digital technologies" (Nwankpa & Roumani, 2016) is destabilised by outdated theorisation of foundations that is inimical to the conditions. That DT terminology remains *unclear* (Vial, 2019) is a consequence of these conditions. Fundamental differences in the literature regarding the nature of DT and the types of technologies involved (*ibid*.) reflect transformation of the traditional business model that sees new wave resources include apps, platforms, big data, smart devices, biometrics, the Internet of Things, artificial intelligence, robotics, cryptocurrency and cybersecurity (Kotarba, 2018). Traditional disentanglement of DT terminologies is neither achievable nor desirable but remains an overarching IS objective. Solid attempts to force clarity may support the traditional bounded objectives of singular studies but will generate less overarching consensus and deepened liquid incoherence. Forcing terminological clarity not only buttresses technocentric determinism (Majchrzak et al, 2016) and modernist conceptions of progress (Andrade & Urquhart, 2012) but ignores the liquid reality that the liquid *need* for DT is now largely outside the traditional scope of control (Kane, 2017). When DT is partially defined as "a process that aims to improve *an entity* by triggering significant changes to its properties…' (Vial, 2019; emphasis added) we ask if the word "entity" encompasses contains epistemology, institution, organisation, society, and actor.

Solid-modern motivations are shaped by liquid-modern conditions.

The separation of DT drivers from DT impacts (Piccinini et al., 2015) is a traditional response to the problem of *conflation* (Vial, 2019). This response perceives conflation as problematic muddying of the

water; not an accurate reflection *of* muddied water. Conceptual definitions for DT in IS must subsequently be unique, unambiguous, parsimonious, consistent, and as narrow as possible (*ibid*.). As the breadth, depth, and dynamism of liquid DT is a critical challenge to the stability of narrowed conceptualisations, liquid modernity will undermine each of these rule-based motivations. Digital architectures not only reduce empirical and organisational deep structure stickiness (Besson & Rowe, 2012) but, in tandem with socio-political and economic drivers, will undermine solid organisational attempts to "plan" structural change and "manage" the turbulence (Vial, 2019) that liquid modernity generates. As digital transformation goes to "the very foundations of how liberal markets and liberal democracies have coevolved for almost two centuries" (Benkler, 2006), we concur with the view that DT theory should be broad and descriptive (Besson & Rowe, 2012), particularly where societal challenges are concerned (Majchrzak et al, 2016). However, with DT in IS "primarily assessed at the organisation level" (Vial, 2019), where value creation is considered "the key impact" (Piccinini et al., 2015), the requisite breadth and description is not currently being demonstrated in the IS literature. Excessively motivated by capitalist concern, IS DT research is not facilitating development of new skills of interconnection now required for equitable and measured digital transformation.

Instability and uncertainty are both generated and required in liquid modernity.

DT is a source of *continuous* change and disruption (Vial, 2019). Manufactured uncertainty generates multifurcated and/or responsive innovation, concomitantly producing *circularity*. Despite the lack of empirical clarity, the IS field remains "enthusiastic" about DT (*ibid*.). The philosophical assumptions underpinning DT routinely contain an in-built, technocentric notion of modernising progress, as if DT appropriately harnessed will, by nature, propagate *evolution* (Morakanyane et al. 2017), *radical improvement* (Chanias, 2017), capture of *value* (Haffke et al., 2016), leverage of *opportunity* (Demirikan et al., 2016), and *positive* disruption (Vial, 2019). Of comparatively minor concern are contradictory accounts suggesting IS may be evolving *against* nature (Kreps, 2018). Liquid-modern paradoxicality creates conditions where social media are both emancipatory and hegemonic (Miranda et al., 2015), where SISD's doubly disadvantage those they are intended to assist (Pethig & Kroenung, 2019), where digital architectures reinforce inertia (Besson & Rowe, 2012) and liquefy the solid organisational structures where inertia is thought to reside. If the IS artefact and its context are now mutually defining and subject to multiple interpretations (Harrison et al., 2007), rather than cultivating a DT willingness to *take* risks (Fehér and Varga, 2017) critical theoretical lenses must expand our capacity for interpreting paradoxicality and risk. Innovation fatigue (Fitzgerald et al., 2014) need neither necessarily be challenged nor corrected when IS research and development is co-driving these conditions and one side only of the socio-technical equation is being upgraded.

Propositions and Reflections

Proposition 1: *Theorising digital transformation through traditional methodology will propagate more empirical confusion and less organisational control.*

Controlling DT uncertainty must not be the default IS response. With socio-political skills not evolving at the same rate as technologies, Derridean doubt must be embraced (Hassan et al. 2018) through theoretical lenses that do not automatically reject uncertainty by imposing "control". In liquid modernity, the controller and the controlee have been separated.

Proposition 2: *Breaching traditional IS research boundaries will elicit more appropriate conceptualisations of DT and broader conceptualisations of DT risk.*

Solid empirical order fragments information systems DT research, increasing the complexity it aims to solve. When the demand for control counterintuitively produces uncertainty, ambivalence, and alienation (Beck, 1994), risk awareness (Besson & Rowe, 2012) must now imply breaching of the mainstream IS research boundaries in IS DT research.

Proposition 3: *IS research must adopt a neutral stance toward digital transformation.*

Extant DT literature is habitually technocentric, shaped by capitalist concern, and pays little attention to the societal and epistemic foundations that DT is transforming. The overarching positivity toward DT must be constructively challenged from *within* IS. Best conceived as a journey (Kane, 2017), not a project, we simply do not know the destination of DT.

Methodology

To evolve our framework, we favour critical research principles (Klein & Myers, 2011) or literature-review-based abductive grounded theory (Timmermans & Tavory, 2012). In application we adopt the Beckian position: although uncertainty is philosophically axiomatic, IS is not "free from the burden of decision-making" (Beck et al., 2003). We believe that a liquid-modern framework will benefit both DT researchers and practitioners, as well as the wider IS field, by providing an overarching and relatively coherent overview of DT concepts that is appropriate to the present liquid-modern contexts.

Conclusion and Future Direction

If digital transformation is "the elixir of the twenty-first century" (Datta et al., 2020), we must be prudent with language and cautious in approach to transformation that is happening regardless of collective intent. Hannah Arendt cautioned that we must *think* what we are doing (Arendt, 1958). Should

calls for responsible software engineering (von Schomberg, 2011) not remain soundbites in conference keynote addresses and footnotes in strategic documents, the epistemic motivations and socio-political roles of IS in DT research and development must be reconsidered and reshaped. Liquid-modern conceptualisations of the IS role in digital transformation will prove more appropriate to the *something* that we are doing.

References

Agarwal, R., Dhar, V. (2014) *Editorial—Big Data, Data Science, and Analytics: The Opportunity and Challenge for IS Research.* Information Systems Research. 25(3):443-448 2014

Andrade, A., Urquhart, C. (2012) *Unveiling the modernity bias: a critical examination of the politics of ICT4D*. Information Technology for Development. 18:4.

Arendt, H. (1958) *The Human Condition*. University of Chicago Press.

Avgerou, C, (2007) *"Thinking "Informatically": A New Understanding of Information Communication and Technology*. Information Technology & People. (20)2;205-206.

Bauman, Z. (2000) *Liquid Modernity*. Polity Press; Blackwell.

Beck, U. (1994) *The reinvention of politics: towards a theory of reflexive modernization*. In Beck, U., Lash, S. & Giddens, A. *Reflexive Modernity*. Polity Press.

Beck, U., Bonss, W., & Lau, C. (2003). *The Theory of Reflexive Modernization: Problematic, Hypotheses and Research Programme*. Theory Culture Society; 20:1; Sage.

Benbya, H., Nan, N., Tanriverdi, H., & Yoo, Y. (2020). *Complexity and information systems research in the emerging digital world*. MIS Quarterly, 44(1), 1–17.

Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven and London: Yale University Press.

Besson, P., Rowe, F. (2012) *Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions*. The Journal of Strategic Information Systems.

Bryant, A (2007) *Liquid Modernity, Complexity and Turbulence*, Theory, Culture & Society. 24(1).

Chanias, S. (2017) *Mastering digital transformation: the path of a financial services provider towards a digital transformation strategy*. In: European Conference of Information Systems, Portugal.

Chatterjee, S., Sarker, S., & Fuller, M. (2009). *Ethical Information Systems Development: A Baumanian Postmodernist Perspective*. Journal of the Association for Information Systems.

Clegg, S, Baumeler, C. (2010) *From iron cages to liquid modernity in organization analysis, Organization Studies*. 31(12), 1713-1733.

Datta, P., Walker, L., Amarilli, F. (2020) *Digital transformation: Learning from Italy's public administration*. Journal of Information Technology Teaching Cases.

Demirkan, H., Spohrer, J.C., Welser, J.J. (2016) *Digital innovation and strategic transformation*.

Deuze, M, Witschge, M (2017) *Beyond journalism: Theorizing the transformation of journalism*, Sage, Journalism, Volume: 19 issue: 2, page(s): 165-18

Doyle, R. & Conboy, K. (2020) *The role of IS in the covid-19 pandemic: A liquid-modern perspective*. International Journal of Information Management.

Fehér, P., Varga, K. (2017) *Using design thinking to identify banking digitization opportunities – Snapshot of the Hungarian banking system*. In: Bled eConference, Bled, Slovenia, pp. 151–168.

Fitzgerald, M., Kruschwitz, N., Bonnet, D., Welch, M. (2014) *Embracing digital technology: a new strategic imperative*. MIT Sloan Management Review. 55 (2) 1–12.

Flintham, M., Karner, C., Bachour, K et al. (2018). *Falling for Fake News: Investigating the Consumption of News via Social Media*. CHI Conf. on Human Factors in Computing Systems.

Haffke, I., Kalgovas, B.J., Benlian, A. (2016) *The role of the CIO and the CDO in an organization's digital transformation*. In: International Conference of Information Systems, Dublin, Ireland.

Harrison, S., Gail, D., Tatar, D., Sengers P., et al. (2007) *The three paradigms of HCI*. Alt. Chi. Session SIGCHI Conference on Human Factors in Computing Systems San Jose, USA.

Hassan, N., Mingers, J., Stahl, B. (2018) *Philosophy and information systems: where are we and where should we go?* European Journal of Information Systems, 27:3, 263-277

Jay, M. (2010) *Liquidity Crisis: Zygmunt Bauman and the Incredible Lightness of Modernity*. Sage, Theory, Culture and Society, Volume: 27 issue: 6, page(s): 95-106

Kane, G.C. (2017) *Digital maturity, not digital transformation*. Retrieved 25 October 2020: http://sloanreview.mit.edu/article/digital-maturity-not-digital-transformation/.

Klein, H. & Myers, M. (2011). *A set of principles for conducting critical research in information systems*. MIS Quarterly, 35:1.

Kotarba, M. (2018) *Digital Transformation of Business Models*. Foundations of Management, 10:1.

Kreps, D. (2018) *Against nature: the metaphysics of information systems*. Focus , Routledge, London.

Lee, R (2005) *Bauman, Liquid Modernity and dilemmas of development*. Thesis Eleven. 83: 61–77.

Majchrzak, A., Markus, M.L., Wareham, J. (2016) *Designing for digital transformation: lessons for information systems research from the study of ICT and societal challenges*. MIS Quarterly, 40 (2).

Matt, C., Hess, T., Benlian, A. (2015). *Digital transformation strategies*. Bus. Inform. Syst. Eng. 57:5.

Miranda, S., Young, A., & Yetgin, E. (2016). *Are Social Media Emancipatory or Hegemonic? Societal Effects of Mass Media Digitization in the Case of the SOPA Discourse*. MIS Quarterly, 40:2.

Morakanyane, R., Grace, A.A., O'Reilly, P. (2017) *Conceptualizing digital transformation in business organizations: a systematic review of literature*. In: Bled eConference, Bled, Slovenia.

Nwankpa, J.K., Roumani, Y. (2016) *IT capability and digital transformation: a firm performance perspective*. In: International Conference of Information Systems, Dublin, Ireland.

Pethig, F., Kroenung, J. (2019) *Specialized Information Systems for the Digitally Disadvantaged*. Journal of the Association for Information Systems: 20:10 (5). DOI: 10.17705/1jais.00573

Piccinini, E., Gregory, R.W., Kolbe, L.M. (2015) *Changes in the producer-consumer relationship-towards digital transformation*. Wirtschaftsinformatik Conference. AIS Electronic Library.

Sheptycki, J. (2017) *Liquid modernity and the police métier; thinking about information flows in police organisation*. Global Crime. 18:3, 286-302

Timmermans, S. & Tavory, I. (2012) *Theory Construction in Qualitative Research: From Grounded Theory to Abductive Analysis*. Sociological Theory. 30:167.

Vial, G. (2019) *Understanding digital transformation: A review and a research agenda*. Journal of Strategic Information Systems

von Schomberg, R. (2011). *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields*. Publications Office of the EU.

8.4 Appendix D: Collective Intelligence Conference, Copenhagen 2021: Theorising Liquid-Modern Digital Transformation[35]

Introduction

In academia and industry, the digital transformation (DT) concept is beset by lack of clarity (Vial, 2019). For example, digitisation, digitalisation, and digital transformation are regularly confused or synonymously used (Bockshecker, Hackstein & Baumöl, 2018). However, despite extant confusion, the logic underpinning most DT definitions and guiding most DT theorising is that digital technologies will improve business outcomes (Wessel et al., 2021; Vial, 2019). DT is subsequently and primarily considered a business and organisational concern. In other words, while we lack a clear understanding of what digital transformation *is*, we must readily assume and advise around its critical importance for business and organisational success.

A resultant concern is that our empirical and strategic understanding of a concept that we are struggling to theorise, strategise, and understand (Besson and Rowe, 2012; Kane, 2017) is already empirically and strategically bound by the same business and organisational contexts. This is problematic because, firstly, many of the dynamics associated *with* digital technologies—complexity (Benbya et, al, 2020), interconnectivity (Sandberg et al. 2020), leaky overflow (Kalinkos et al., 2013), *wicked* impacts (Majchrzak et al, 2016), and multi-temporality (Mousavi Baygi et al., 2021)—are challenging these contexts in ways that we are only beginning to comprehend.

Secondly, with DT understanding restrained by organisational contexts, an opportunity to transfer the collective gaze of technological expertise to the broader realities and ramifications of DT will be lost. The sociophilosophical basis of DT must not be offloaded by technologists to sociologists and philosophers but articulated by those who research technologies (Feenberg, 2010; Chiasson et al., 2018). The potential for profoundly negative unintended DT consequences is very real (Rowe, 2018). Digital technologies are already implicated, for example, in the manipulation of the world's most powerful democracies (Hassan et al, 2018).

Thirdly, information systems (IS) commentary notes that the IS community *should have* a powerful story to tell about the macro transformational impacts of technology (Agarwal and Lucas, Jr, 2005). IS

[35] This extended abstract was accepted for publication in the proceedings of the Collective Intelligence conference, Copenhagen 2021. At this point, as ephemerality emerged as the primary PhD research focus, the decision was made to exclude the abstract from the proceedings and no longer focus on developing a liquid-modern framework.

has also called for a critical review of the categories that we delimit to make sense of the sociotechnical world (Tilson et al., 2010). The review is necessary not least because IS analysis of transformation itself routinely ignores the paradoxical problem of transformation dependence on structures (Besson and Rowe, 2010). We contend that DT is implicated in both this call and problem.

We propose, firstly, that DT be unshackled from its organisational and business-focussed definitions (see below). In our view, DT definitions must encompass *more* than business strategy, models, and performance (Matt et al., 2015; Piccinini et al., 2015; Bekkhus, 2016) to include broader change. Through this lens, organisations may align with higher goals (Unruh and Kiron, 2017). Secondly, we theorise DT as spatiotemporal processes, conceptualising digital technologies and end-user experiences not as adoptions and impacts respectively but as *comprising the interlaced transformational processes of* DT. Premature DT bounding will limit our ability to analyse broader DT dynamics (Unruh & Kiron, 2017) as well as digital-related transformation itself. We suggest that DT is the IS vehicle for telling the story of contemporary sociotechnical transformation.

Research Objective

The sociological characterisation of liquid modernity (LM) (Bauman, 2000) proposes that our "solid" systemic structures—be they digital, organisational, societal—are now continually undermined by socio-political and technological "liquid" processes. Consequently, nothing can be considered traditionally stable. We use the LM concept of teleological generativity through processes that are simultaneously solid *and* liquid to illuminate and articulate the paradoxical characteristics *of* DT.

Our explicit objective is to produce a liquid-modern theory of digital transformation:

RQ1: What are the core liquid-modern theoretical assertions?

RQ2: How can researchers and practitioners conceptualise liquid-modern digital transformation?

RQ3: How well does the digital transformation literature align with the liquid-modern perspective?

To achieve our objective, we coalesce two research strands: the sociological strand, primarily informed by LM, and the technological strand, informed by DT research. To conduct this research, we adopt an *inductive top-down theorising approach* (see Shepherd & Sutcliffe, 2011; Leidner & Tona, 2021), whereby the literature becomes our primary data source. Inductive top-down theorising is suitable when the literature is "vast, dynamic, complex, and/or from disparate sources" (Shepherd & Sutcliffe, 2011) and the objective is the illumination of paradox and theorisation through intuition.

Theoretical Rationale

Almost all DT definitions foreground technologies and organisational value creation (Wessel et al., 2021). Of 23 DT definitions collated in an IS review (Vial, 2019), just one includes the word "society", and is still in relation to business activities (Demirikan et al., 2016). An assumption underlying DT definitions and theorising seems to be that "digital fluidity" is a problem that needs to be solved. We view digital fluidity as a *new reality* and interpret the "push to the edges" of theory (Grover & Lytinnen, 2015) as an invitation to theoretically align or *flow with* fluidity. Bounding *where* DT is happening—and thus *where* we deem it relevant—imposes restrictions and assumptions of control upon DT processes that are empirically and strategically inappropriate. We suggest that DT is better conceived as occurring along processual *flowing lines of action* (Mousavi Baygi et al., 2021), which has the effect of decentring both agency and space in our analysis. To enable such analysis, DT in our study is defined as *the systems-level restructuring of economies, organisations, and society that occurs through digital diffusion* (Unruh & Kiron, 2017).

An Overview of Liquid Modernity

LM describes a world of continuous innovation (Bauman, 2005). This world emerges in two phases. Phase one, solid modernity, saw pre-modern structures broken (Caldas, 2009) but then immediately replaced by new "solids", such as empirical categories, social classes, and the Fordist factory model. The solid organisation objectified rootedness, rigidity, and durability. It was motivated to control, order-build, and expand. Paradoxically, the same solid motivations eventually trigger LM (Bauman, 2000). In the historical development of the IS field, we view early information systems—and their closed-system function of improving organisational efficiency—as "solid" technological artifacts.

Phase two, LM, begins with "the advent of software capitalism" (Bauman, 2000). LM is characterised by fluctuation, instability, and uncertainty. Solidity and liquidity remain implicated *together* (Clegg and Cunha, 2019) but solid structures do not now *constrain* liquids, which spread and seep, overflow, and liquefy their containers. New containers are continually developed but can only temporarily re-restrict viscosity. Structures that once interlocked into a system, with the purpose of catapulting and steering agency, can no longer fulfil their function (Bauman, 2009). When liquidity dominates the interlaced solid/liquid partnership, solid goals and strategies will impede agency (Bryant, 2008).

LM objectifies mobility and ephemerality. The problem arising is that our objectives have changed but the empirical and strategic motivations underpinning our objectives have remained the same. In IS research and development, for example, these solid motivations habitually manifest as empirical and strategic efforts at technical control, prediction, and stabilisation. However, with stability permanently

transient in LM (Bauman, 2000), liquid modernity becomes self-generating: liquidity creates instability; instability demands innovation; innovation liquefies stability. Meeting the liquid-modern criteria for solid DT success simultaneously creates its permeable characteristics.

In solid modernity change was seen to enable evolutionary progress. In the LM interregnum, change is our *only* permanence (Bauman, 2000). Organisational LM time cannot be solidly or unilaterally routinised, disciplined, enclosed, divided, or controlled. LM warns that in a presentist culture "systems and processes" are "split off from any consideration of morality" (Bauman & Lyon, 2013). In fluctuating LM, unintended consequences cannot be proactively foreseen. If we can accept that liquidity now dominates solid/liquid processes, alternative modes of theorising can be justified.

Digital Transformation: Three Liquid-Modern Theoretical Assertions

Digital transformation is mobile and continually ephemeral

DT is a continual, distributed, diachronic phenomenon, in that DT may only be observed over time. Bifurcating into technological and end-user branches, we theorise DT as interlacing spatiotemporal processes, with (liquid) temporal *flows of action* in continual conflict with (solid) spatial *steps of action*. DT *flows* trigger unstable DT ephemerality. Stability infers periodic solidity of change. DT flows continually through innovation and adoption. Liquid instability prioritises ephemerality and requires mobility. Mobility underpins unstable ephemerality. DT *flows* move in and between levels (mobility), from DT opportunity to opportunity (ephemerality). As neither technology nor end-user flows alone will catalyse DT, systems-level transformation is generated. Mobility and ephemerality deny overarching or unifying DT direction. Over time, DT motility alters its own course, incrementally, disruptively and/or radically. DT is not changing that which is *always* changing. DT is changing our (liquid) *experience* of what is always changing and the (solid) conditions *along which* change is taking place. Organisational failure to flow with DT represents *negative* DT, not *no* DT. Society, and organisations, must learn to exert influence over our *experience* of the *conditions* of DT.

Solid digital transformation flows are undermined by liquid digital transformation flows

DT solidity is produced in technological and end-user flows, through digital technology research, development, and societal adoption. The more embedded, routinised, or solidified the DT flow becomes, the less transformational power it contains. Solidifying is required, not to facilitate progress but to enable continued liquefication and, ostensibly, bulwark against liberated complexity. However, DT liquidity will continually undermine its own solidity. DT positions systems and actors between two states: manufactured solidity *and* inevitable liquefication. Solidity is manufactured in mandatory

decision-making, strategising, and the rules and routines embedded in technologies and social behaviour. Organisations must therefore solidify DT with the knowledge that any solidity is actively liquefied *by* DT. In other words, DT theory and practice cannot ignore that the structures we require to *experience* DT are being liquefied by the *conditions* we impose upon DT. Bounding DT at the organisational level will increase solidity *and* liquidity. Beyond the organisation, however, regardless of solid intent or boundary, DT is similarly eroding its own solidity and self-propagating. While clearly an organisational issue, the macro societal DT flows merit more urgent attention.

Digital transformation disconnects resist solid control

Spatiotemporal disconnections within continual but distributed, mobile, and ephemeral DT flows are such that controlling DT is not possible. Paradoxically, too solid control will generate—not bulwark against—increased complexity and uncertainty. If all digital technology flows carry the *possibility* of DT, true disentangling of DT from, for example, digital innovation, is only achieved over time and in relation to its interlaced end-user flow. DT flows are not replicable chains of events. Technological and end-user rules are habitually re-written, posing fundamental problems for management. Denied a progressive view of where DT is leading us intensifies the societal need for DT coherence. DT itself is devoid of values due to the solid/liquid conflict at its core. To mitigate DT threat and realise DT opportunity, the macro-DT lens is essential. Borderless digital technological interconnectivity, through DT, is fostering new forms of control and collaboration. Collaboration ultimately implies collective decision-making, at all levels, on *where* DT controls might be placed. Without socio-political tools to collaborate as required, control implies that decisions are made remotely. In LM interregnum, herein is the societal (and organisational) opportunity for alignment with higher DT goals.

Two Implications and Research Next Steps

Research: focus on paradoxical characteristics of digital transformation

That solid DT control, stabilisation, and prediction IS objectives may be counterproductive should constitute a broad strand of IS research. Continued development of flow-based theoretical vocabulary and concepts is required. Unshackling DT from organisations *expands* IS relevance.

Practice: Side-to-side, liquid-oriented organisational flow with digital transformation

Horizontal organisational structures facilitate DT liquidity. Holistic management of DT *experience* flows with DT, side-to-side. Continually align identity with higher DT goals (von Kutzschenbach & Daub, 2021). Harness *digitalisation*, not DT, for improved value propositions.

Next steps: a processual liquid-modern digital transformation theoretical model

In our view, a processual approach (Mousavi Baygi et al., 2021) offers an appropriate philosophical base for analysing DT. The temporal bracketing concept (Giddens, 1986; Langley et al, 2013) enables this analysis. Our aim is to produce a processual LM DT model for researchers and practitioners. Figure 5 tentatively presents a processual model of liquid-modern digital transformation.

See Figure 5. A Processual Model of Liquid-Modern Digital Transformation. **Page 48.**

References

Agarwal, R, Henry C. L. (2005). *The Information Systems Identity Crisis: Focusing on High-Visibility and High-Impact Research*. *MIS Quarterly*, vol. 29, no. 3, pp. 381–398.

Bauman, Z. (2000) *Liquid Modernity*. Polity Press; Blackwell.

Bauman, Z. (2005) *Liquid Life*. Wiley.

Bauman, Z., Lyon, D. (2013) *Liquid Surveillance*. Polity Press

Bekkhus, R. (2016). *Do KPIs used by CIOs decelerate digital business transformation? The case of ITIL*. Digital Innovation, Technology, and Strategy Conference, Dublin, Ireland.

Benbya, H, Nan, N, Tanriverdi, H, Yoo, Y (2020) *Complexity and Information Systems Research in the Emerging Digital World*, MIS Quarterly, (44: 1) pp. 1–17

Besson, P., Rowe, F. (2012) *Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions*. The Journal of Strategic Information Systems.

Bockshecker, A., Hackstein, S., & Baumöl, U. (2018). *Systematization of the term digital transformation and its phenomena from a socio-technical perspective – A literature review*. Research Papers. 43. https://aisel.aisnet.org/ecis2018_rp/43

Bryant, A. (2008) *Liquid Modernity, Complexity and Turbulence*. Theory, Culture & Society. 24(1).

Caldas, J.M.C. (2009) *The Art of Escape: Liquidity Mechanisms*. RCCS Annual Review.

Chiasson, M, Davidson, E, Winter, J, Hassan, R, Mingers, J, Stahl, B. (2018) *Philosophical foundations for informing the future(S) through IS research*, European Journal of Information Systems.

Clegg, S., Cunha, P. (2019) *Liquefying modernity: Zygmunt Bauman as organization theorist*. Management, Organizations and Contemporary Social Theory. Routledge.

Demirkan, H., Spohrer, J.C., Welser, J.J., 2016. *Digital innovation and strategic transformati*on. IT Prof. 18 (6), 14–18.

Feenberg, A. (2010) *Ten Paradoxes of Technology*. In Techné: Research in Philosophy and Technology, Vol 14/1

Giddens, A. (1986). *The constitution of society: Outline of the theory of structuration*. Cambridge: Polity.

Grover, V., Lyytinen, K. (2015). *New State of Play in Information Systems Research: The Push to the Edges*. *MIS Quarterly*, (39: 2) pp.271-296.

Hassan, N., Mingers, J., Stahl, B. (2018) *Philosophy and information systems: where are we and where should we go?* European Journal of Information Systems, 27:3, 263-277

Kane, G.C. (2017) Digital maturity, not digital transformation. Retrieved 25 October 2020:

http://sloanreview.mit.edu/article/digital-maturity-not-digital-transformation/.

Kallinikos, J., Aaltonen, A., Marton, A. (2013) *The Ambivalent Ontology of Digital Artifacts*. MIS Quarterly (37:2)pp.357-370.

Langley, A., Smallman, C., Tsoukas, H., and Van de Ven, A. H. (2013) *Process Studies of Change in Organization and Management: Unveiling Temporality, Activity, and Flow*. Academy of Management Journal (56:1), pp. 1–13.

Leidner, D., Tona, O. *The CARE Theory of Dignity Amid Personal Data Digitalization*. MIS Quarterly, 2021.

Majchrzak, A., Markus, M.L., Wareham, J. (2016) *Designing for digital transformation: lessons for information systems research from the study of ICT and societal challenges*. MIS Quarterly, 40 (2).

Matt, C., Hess, T., Benlian, A. (2015). *Digital transformation strategies*. Bus. Inform. Syst. Eng. 57:5.

Mousavi Baygi, R., Introna, L. D., and Hultin, L. (2021) *Everything Flows: Studying Continuous Socio-Technological Transformation in a Fluid and Dynamic Digital World*. *MIS Quarterly* (45:1).

Piccinini, E., Gregory, R.W., Kolbe, L.M. (2015) *Changes in the producer-consumer relationship-towards digital transformation*. Wirtschaftsinformatik Conference. AIS Electronic Library.

Rowe, F. (2018). *Being critical is good, but better with philosophy! From digital transformation and values to the future of IS research*. European Journal of Information Systems, 27:3, 380-393, DOI: 10.1080/0960085X.2018.1471789

Sandberg, J., Holmström, J., and Lyytinen, K. (2020) *Digitization and Phase Transitions in Platform Organizing Logics: Evidence from the Process Automation Industry.* MIS Quarterly (44:1), pp. 129–153.

Shepherd, D.A., Sutcliffe. K. (2011) *Inductive Top-Down Theorizing: A Source of New Theories of Organization.* Academy of Management Review. 36, 2, 361–380.

Tilson, D., Lyytinen, K., Sørensen, C. (2010) *Digital Infrastructures: The Missing IS Research Agenda*. Information Systems Research 21(4):748-759

Unruh, G., & Kiron, D. (2017). *Digital Transformation on Purpose*. MIT Sloan Management Review.

Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., Jensen, T. (2021). *Unpacking the Difference Between Digital Transformation and IT-Enabled Organizational Transformation*. Journal of the Association for Information Systems. 22(1), 102-129.

Vial, G. (2019) *Understanding digital transformation: A review and a research agenda*. Journal of Strategic Information Systems

von Kutzschenbach, M., Daub, C-H. (2021) *Digital Transformation for Sustainability: A Necessary Technical and Mental Revolution*. In: Dorberger, R. (ed). *New Trends in Business Information Systems and Technology*. Studies in Systems, Decision and Control. Springer.

8.5 Appendix E: Selected Key Texts in Core Review Disciplines

Table 17. Selected Key References in Core Review Disciplines

Philosophy
Bergson, H. (1910). 'Time and Free Will: An Essay on the Immediate Data of Consciousness.' London, S. Sonnenschein & Co.; New York: Macmillan.
Bergson, H. (1911*). Matter and Memory*. London: S. Sonnenschein & Co.; New York: Macmillan.
Bergson, H. (1922). *Creative Evolution*. London: Macmillan
Dainton, B. (2023) 'Temporal Consciousness', *The Stanford Encyclopedia of Philosophy*, Zalta, E.N. & Nodelman, U. (eds.)
Deleuze, G. & Guattari, F. (2005). *A thousand plateaus: capitalism and schizophrenia*. Eleventh edition. University of Minnesota Press.
Deleuze, G. (1990). *The Logic of Sense*. New York: Columbia University Press.
Deleuze, G. (1994). *Difference and repetition*. London: Athlone Press.
Deleuze, G. & Parnet, C. (2007). *Dialogues II*. Tomlinson, H. & Habberjam, B. (trans). Columbia University Press
Glennan, S. (2010). 'Ephemeral Mechanisms and Historical Explanation.' Erkenntnis (1975-), 72(2), 251–266. http://www.jstor.org/stable/20642292
Graham, D.W. (2023) 'Heraclitus', *The Stanford Encyclopedia of Philosophy*. Zalta, E.N. & Nodelman, U. (eds.)
Rescher, N. (1996). *Process metaphysics: An introduction to process philosophy*. State University of New York Press.
Whitehead, A.N. (1920). *The Concept of Nature*. Cambridge, The University Press
Whitehead, A.N. (1929). *Process and reality: an essay in cosmology*. New York: Free Press.
Whitehead, A. N. (1927). *Science and the modern world*. New York,: Free Press.
Williams, J. (2011). *Gilles Deleuze's Philosophy of Time: A Critical Introduction and Guide*. Edinburgh University Press.
Information Systems
He, Y., Xu, X., Huang, N., Hong, K. & Liu, D. (2024). 'Enhancing User Privacy Through Ephemeral Sharing Design: Experimental Evidence from Online Dating.' Information Systems Research.

10.1287/isre.2021.0379.

Lanzara, G.F. (1999). 'Between transient constructs and persistent structures: designing systems in action.' Journal of Strategic Information Systems, 8, 331–349. Elsevier.

Lehrer, C., Constantiou, I., Matt, C., & Hess, T. (2023). 'How Ephemerality Features Affect User Engagement with Social Media Platforms.' MIS Quarterly, 47(4), 1663-1678. https://doi.org/10.25300/MISQ/2023/17085

Lorin, H., Ball, L., Eloy, G. (1987). 'Interconnect Technology as a Management Challenge.' MIS Quarterly, Vol. 11, No. 4, pp. 433-435

Mousavi Baygi, R., Introna, L.D., Hultin, L. (2021). 'Everything flows: studying continuous socio-technological transformation in a fluid and dynamic digital world. MIS Quarterly 45(1)

Vaast, E, Urquhart, C. (2018) 'Building Grounded Theory with Social Media Data.' In: *The Routledge Companion to Qualitative Research in Organization Studies*. Routledge Companions in Business and Management. Routledge.

von Briel, F., Recker, J., Davidsson, P. (2018) 'Not all digital venture ideas are created equal: Implications for venture creation processes.' Journal of Strategic Information Systems. https://doi.org/10.1016/j.jsis.2018. 06.002

Yoo, Y. (2010). 'Computing in everyday life: a call for research on experiential computing.' MIS Quarterly, 34(2), 213–231

Organisation & Management Studies

Bakker, R. M., DeFillippi, R. J., Schwab, A., & Sydow, J. (2016). Temporary Organizing: Promises, Processes, Problems. Organization Studies, 37(12), 1703-1719. https://doi.org/10.1177/0170840616655982

Bechky, B. A. (2006). Gaffers, gofers, and grips: Role-based coordination in temporary organizations. Organization Science, 17, 3–21.

Brookes, N., Sage, D., Dainty, A., Locatelli, G. & Whyte, J. (2017). 'An island of constancy in a sea of change: Rethinking project temporalities with long-term megaprojects.' International Journal of Project Management, Vol 35, Issue 7, https://doi.org/10.1016/j.ijproman.2017.05.007

Chia, R. (1995). 'From Modern to Postmodern Organizational Analysis.' Organization Studies, 16:579, DOI: 10.1177/017084069501600406

Chia, R. (1999). 'A 'Rhizomic' Model of Organizational Change and Transformation: Perspective from a Metaphysics of Change.' British Journal of Management, Vol. 10, 209–227

Cooper, R. (2005). 'Peripheral Vision: Relationality.' Organization Studies 26: 1689 Sage, DOI:

10.1177/0170840605056398

Courpasson, D. (2017). 'The Politics of Everyday.' Organization Studies, 38(6), 843-859. https://doi.org/10.1177/0170840617709310

Fortwengel, J., Schüßler, E., and Sydow, J. (2017) 'Studying Organizational Creativity as Process: Fluidity or Duality?' Creativity and Innovation Management, 26: 5–16. doi: 10.1111/caim.12187.

Fouweather, I., & Bosma, B. (2021). 'The Desire to Rethink Power AND Performativity AND Process.' Organization Studies, 42(12), 1795-1815. https://doi.org/10.1177/0170840621997622

Garud, R., Simpson, B., Langley, A. & and Tsoukas, H. (2015). 'How Does Novelty Emerge,' in Garud, R., Simpson, B., Langley, A. & and Tsoukas, H. (eds.) *The Emergence of Novelty in Organizations, Perspectives on Process Organization Studies.* Oxford University Press.

Hindmarsh, J., & Pilnick, A. (2007). Knowing Bodies at Work: Embodiment and Ephemeral Teamwork in Anaesthesia. Organization Studies, 28(9), 1395-1416. https://doi.org/10.1177/0170840607068258

Lanzara, G.F. (1983). 'Ephemeral organizations in extreme environments; Emergences, strategy, extinctions.' Journal of Management Studies. 20(1), 71–95

Llewellyn, N. (2015). 'He probably thought we were students': Age norms and the exercise of visual judgement in service work. Organization Studies, 36(2), 153-173. https://doi.org/10.1177/0170840614546151

Ocasio, W., Loewenstein, J., Nigam, A. (2015). 'How Streams of Communication Reproduce and Change Institutional Logics: The Role of Categories.' Academy of Management Review, Vol. 40, No. 1, 28–48. http://dx.doi.org/10.5465/amr.2013.0274

Orlikowski, W.J. (2007). 'Sociomaterial Practices: Exploring Technology at Work,' Organization Studies (28:9), pp. 1435-1448.

Smith, W.R. (2021). 'On Relationality and Organizationality: Degrees of durability, materiality, and communicatively constituting a fluid social collective.' Organization Studies, 1–23, Sage.

Sydow, J. (2017). 'Temporary Organizing – The End of Organizations as We Know Them?' Rutgers Business Review Vol. 2, No. 2

Performance Studies

Auslander, P. (1999). *Liveness: Performance in a Mediatized Culture*. Routledge. https://doi.org/10.4324/9781003031314

Auslander, P. (2008). 'Live and tecnologically mediated performance.' In: Davis, Tracy C. *The Cambridge*

Companion to Performance Studies. Cambridge: Cambridge University Press.

Franko, M. (2018). 'The Power of Recall in a Post-Ephemeral Era.' In: Franko, M. (ed). (2018). *The Oxford Handbook of Dance and Reenactment*. New York: Oxford University Press.

Muñoz, J.E. (1996). 'Ephemera as evidence: introductory notes to queer acts.' Women & Performance: a Journal of Feminist Theory 8(2), 5–16. https://doi.org/10.1080/07407709608571228

Phelan, P. (1993). *Unmarked: The Politics of Performance*. London: Routledge

Reason, M. (2006). *Documentation, Disappearance, and the Representation of Live Performance*. Palgrave Macmillan.

Schechner, R. (1988). *Performance Theory* (1st ed.). Routledge. https://doi.org/10.4324/9780203361887

Schneider, R. (2011). *Performing Remains: Art and War in Times of Theatrical Reenactment* (1st ed.). Routledge. https://doi.org/10.4324/9780203852873

Taylor, D. (2004). *The Archive and the Repertoire*. Duke University Press.

Taylor, D. (2010). 'Save as... Knowledge and Transmission in the Age of Digital Technologies.' Imagining America. 7. Accessed online 15 May 2023 at https://surface.syr.edu/ia/7

Media & Communication Studies

Bayer, J. B., Ellison, N., Schoenebeck, S. Y., & Falk, E. B. (2015). 'Sharing the Small Moments: Ephemeral Social Interaction on Snapchat.' Information, Communication & Society. DOI: 10.1080/1369118X.2015.1084349

Benjamin, W. (1936; 2008). *The work of art in the age of mechanical reproduction* (J. A. Underwood, Trans.). Penguin Books.

Chun, W. (2008). 'The enduring ephemeral, or the future is a memory.' Critical Inquiry 35(1), 148–171. The University of Chicago Press.

Chun, W. (2016). *Updating to remain the same: habitual new media*. MIT Press.

Doane, M. A. (2002). *The Emergence of Cinematic Time: Modernity, Contingency, the Archive*. Harvard University Press.

Grainge, P. (2011). *Ephemeral Media: Transitory Screen Culture from Television to YouTube*. Palgrave Macmillan.

Haber, B. (2019). 'The digital ephemeral turn: queer theory, privacy, and the temporality of risk. Media, Culture & Society. Sage.

Kaun, A., & Stiernstedt, F. (2014). 'Facebook time: Technological and institutional affordances for media memories.' New Media & Society, 16(7), 1154-1168. https://doi.org/10.1177/1461444814544001

Møller, K., Robards, B. (2019). 'Walking through, going along and scrolling back: Ephemeral mobilities in digital ethnography.' Nordicom Review, 40 (Special Issue 1): 95-109. doi:10.2478/ nor-2019-0016.

Pesce, S., & Noto, P. (Eds.). (2016). *The Politics of Ephemeral Digital Media: Permanence and Obsolescence in Paratexts* (1st ed.). Routledge. https://doi.org/10.4324/9781315718330

Schneider, S. M., & Foot, K. A. (2004). The Web as an Object of Study. New Media & Society, 6(1), 114-122. https://doi.org/10.1177/1461444804039912

Uricchio, W. (2011). 'The Recurrent, the Recombinatory and the Ephemeral', in Grainge, P. (ed.). *Ephemeral Media: Transitory Screen Culture from Television to YouTube*. Palgrave Macmillan.

Vázquez-Herrero, J., Direito-Rebollal, S., López-García, X. (2019). 'Ephemeral Journalism: News Distribution Through Instagram Stories.' Social Media+Society. Sage Publishing

Sociology

Bauman, Z. (2000) *Liquid Modernity*. Polity Press, Cambridge.

Castells, M. (1996/2010). *The Information Age: Economy, Society and Culture*. Oxford: UK, Blackwell. (2nd ed.)

De Certeau, M. (1984). *The Practice of Everyday Life* (S. Rendall, Trans.). Berkeley: University of California Press.

Frisby, D. (1986). *Fragments of Modernity* (Routledge Revivals): Theories of Modernity in the Work of Simmel, Kracauer and Benjamin (1st ed.). Routledge. https://doi.org/10.4324/9780203795569

Giddens, A. (1984) *The Constitution of Society. Outline of the Theory of Structuration*. University of California Press, Berkeley.

Guillaume, X., & Huysmans, J. (2019). The concept of 'the everyday': Ephemeral politics and the abundance of life. Cooperation and Conflict, 54(2), 278-296. https://doi.org/10.1177/0010836718815520

Lefebvre, H. (2002). *Critique of Everyday Life*, vol 2. Moore, J. (trans). Verso.

Lefebvre, H., & Levich, C. (1987). The Everyday and Everydayness. Yale French Studies, 73, 7–11. https://doi.org/10.2307/2930193

Rosa, H. (2013). *Social acceleration : a new theory of modernity*. Columbia University Press, New York.

Simmel, G. (1900; 2004). *The Philosophy of Money* (3rd enlarged ed.), edited by D. Frisby, translated by D. Frisby and T. Bottomore. London: Routledge. – via Eddie Jackson.

Simmel, G. (1903; 1997) 'The metropolis and mental life.' In: Frisby D, Featherstone M (eds). *Simmel on Culture*. London: SAGE, pp.174–185.

Thrift, N. (2008). *Non-Representational Theory: Space. Politics. Affect*. Routledge

8.6 Appendix F: IS Literature Base for DTD Overview (Section 5.4)

Note that references marked ** are directly referenced in the overview section. The remaining articles in Appendix F have informed thinking around DTD and/or are referenced elsewhere in key paper 4.

References

**Aaltonen, A. & Stelmaszak, M. (2023) "The Performative Production of Trace Data in Knowledge Work." Information Systems Research. https://doi.org/10.1287/isre.2019.0357

**Avital, M., Blegind Jensen, T. & Dyrby, S. (2021). "The social fabric framework: steps to eliciting the social making of organisations in the digital age", European Journal of Information Systems, DOI: 10.1080/0960085X.2021.1907236

**Berente, N., Seidel, S. & Safadi, H. (2018) "Research Commentary—Data-Driven Computationally Intensive Theory Development" Information Systems Research, https://doi.org/10.1287/isre.2018.0774

Grisold, T., Kremser, W., Mendling, J., Recker, J., Brocke, J. vom, & Wurm, B. (2023). "Keeping pace with the digital age: Envisioning information systems research as a platform." Journal of Information Technology, 38(1), 60-66. https://doi.org/10.1177/02683962221130429

**Grisold, T., Kremser, W., Mendling, J., Recker, J., vom Brocke, J., & Wurm, B. (2024). "Generating impactful situated explanations through digital trace data." Journal of Information Technology, 39(1), 2-18. https://doi.org/10.1177/02683962231208724

Grover, V., Lindberg, A., Benbasat, I., & Lyytinen, K. (2020) "The Perils and Promises of Big Data Research in Information Systems" Journal of the Association for Information Systems, 21(2), DOI: 10.17705/1jais.00601

Grover, V., & Lyytinen, K. (2023) "The Pursuit of Innovative Theory in the Digital Age" Journal of Information Technology, 38(1), 45-59. https://doi.org/10.1177/02683962221077112

Grover, V., & Lyytinen, K. (2023) "Not only data: The necessity of abstract thinking to make sense of digital phenomena" Journal of Information Technology, 38(1), 74-78. https://doi.org/10.1177/02683962231156622

Han, S. P., Park, S., & Oh, W. (2016). "Mobile App Analytics: A Multiple Discrete-Continuous Choice Framework." MIS Quarterly, 40(4), 983–1008. https://www.jstor.org/stable/26629685

**Hedman, J., Srinivasan, N., & Lindgren, R. (2013). “Digital Traces of Information Systems: Sociomateriality Made Researchable.” In R. Baskerville, & M. Chau (Eds.), Proceedings of the 34th International Conference on Information Systems. ICIS 2013 Article 1069 Association for Information Systems. AIS Electronic Library (AISeL).

**Howison, J., Wiggins, A. & Crowston, K. (2011). “Validity Issues in the Use of Social Network Analysis with Digital Trace Data,” Journal of the Association for Information Systems, 12(12), DOI: 10.17705/1jais.00282

Johnson, S.L., Gray, P., & Sarker, S. (2019). Revisiting IS research practice in the era of big data. Information & Organization., 29, 41-56.

Kreps, D. & Rowe, F. (2024) “Using a Process Philosophy Perspective in Information Systems Research: Principles of Creative Evolution” Journal of the Association for Information Systems, 134, DOI: 10.17705/1jais.00883

**Kishore, S., Sundaram, D., & Myers, M. D. (2024). “A temporal dynamics framework and methodology for computationally intensive social media research.” Journal of Information Technology, 0(0). https://doi.org/10.1177/02683962241283051

**Lindberg, A. (2020). “Developing Theory Through Integrating Human and Machine Pattern Recognition,” Journal of the Association for Information Systems, 21(1), DOI: 10.17705/1jais.00593

Mendling, J., Pentland, B. & Recker, J. (2020) “Building a complementary agenda for business process management and digital innovation.” European Journal of Information Systems, 29:3, 208-219, DOI: 10.1080/0960085X.2020.1755207

Miranda, S., Berente, N., Seidel, S., Safadi, H. & Burton-Jones, A. (2022). “Editor's comments: computationally intensive theory construction: a primer for authors and reviewers.” MIS Quarterly 46 (2) iii-xviii.

**Mousavi Baygi, R., Introna, L. & Hultin, L. (2021). “Everything Flows: Studying Continuous Socio-Technological Transformation in a Fluid and Dynamic Digital World,” MIS Quarterly, (45: 1) pp.423-452.

Nyman, S., Bødker, M., & Blegind Jensen, T. (2024). “Reforming work patterns or negotiating workloads? Exploring alternative pathways for digital productivity assistants through a problematization lens.” Journal of Information Technology, 39(3), 503-520.

https://doi.org/10.1177/02683962231181602

**Østerlund, C., Crowston, K. & Jackson, C. (2020) "Building an Apparatus: Refractive, Reflective, and Diffractive Readings of Trace Data," Journal of the Association for Information Systems, 21(1), DOI: 10.17705/1jais.00590

**Pentland, B., Recker, J., Wolf, J. R. & Wyner, G. (2020) "Bringing Context Inside Process Research with Digital Trace Data," Journal of the Association for Information Systems, 21(5), DOI: 10.17705/1jais.00635

**Pentland, B., Vaast, E. & Wolf, J. R. (2021). "Theorizing Process Dynamics with Directed Graphs: A Diachronic Analysis of Digital Trace Data," MIS Quarterly, (45: 2) pp.967-984.

Pieper, M., Fallon, M., & Heinzl, A. (2024). "Micro-randomized trials in Information Systems research: An experimental method for advancing knowledge about our dynamic and digitalized world." Journal of Information Technology, 0(0). https://doi.org/10.1177/02683962241280287

Tremblay, M. & Forsgren, N. (2021). "THEORIES IN FLUX: REIMAGINING THEORY BUILDING IN THE AGE OF MACHINE LEARNING." MIS Quarterly. 45. 455. 10.25300/MISQ/2021/15434.1.1.

**Vaast, E., Safadi, H., Lapointe, L., & Negoita, B. (2017). "Social Media Affordances for Connective Action: An Examination of Microblogging Use During the Gulf of Mexico Oil Spill." MIS Quarterly, 41(4), 1179–1206. https://www.jstor.org/stable/26630290

**Weinmann, M., Valacich, J., Schneider, C., Jenkins, J. L. & Hibbeln, M. (2022). "The Path of the Righteous: Using Trace Data to Understand Fraud Decisions in Real Time", MIS Quarterly, (46: 4) pp.2317-2336.

Yoo, Y. (2010) "Computing in everyday life: a call for research on experiential computing." MIS Quarterly, 34(2), 213–231

Yoo, Y. (2015). "It is not about Size: A Further thought on Big Data." Journal of Information Technology, 30(1), 63-65. https://doi.org/10.1057/jit.2014.30

**Zhang, Z., Lee, H., Yoo, Y. & Choi, Y. T. (2022) "Theorizing Routines with Computational Sequence Analysis: A Critical Realism Framework," Journal of the Association for Information Systems, 23(2), 589-630. DOI: 10.17705/1jais.00734

8.7 Appendix G: 8 Figures from the Gruzd and Mai (2020) Case Study*

*To comply with copyright permissions for third-party materials, reproductions of the figures from the Gruzd and Mai (2020) study have been removed.

The figures can be accessed at https://journals.sagepub.com/doi/10.1177/2053951720938405.

The titles of the 8 figures most relevant to this study are as follows:

1. Figure 1. Number of Tweets with #FilmYourHospital over time.
2. Figure 2. Discovering a network structure, one Tweet at a time.
3. Figure 3. #FilmYourHospital Communication Network of 41,903 users (ties represent reply, retweet, or mention). Usernames are shown for accounts with 100k or more followers.
4. Figure 4. (a) #FilmYourHospital Communication Network: Day 1–3, (b) #FilmYourHospital Communication Network: Day 1–4, and (c) #FilmYourHospital Communication Network: Day 1–5.
5. Figure 5. 100 most frequently used profile words by 100 or more users (visualized with wordclouds.com).
6. Figure 6. #FilmYourHospital Communication Network showing users tweeting in different languages. Top four languages/ English (purple nodes), Portuguese (green); Arabic (orange); and Japanese (red).
7. Figure 7. #FilmYourHospital Communication Network (full dataset). Red nodes/ties = accounts suspended or temporary restricted by Twitter (as of 17 April 2020). Indigo nodes/ties = all other accounts.
8. Figure 8. The distribution of Botometer CAP scores using the logarithmic scale (n = 1187). Cenglish = includes content analysis; and cuniversal = language-independent model.