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INFORMATION SYSTEMS RESEARCH
Vol. 36, No. 2, June 2025, pp. 647–668
ISSN 1047-7047 (print), ISSN 1526-5536 (online)

Advancing Next-Generation Multimethod Research in Information Systems: A Framework and Some Recommendations for Authors and Evaluators

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Received: May 5, 2025
Revised: May 5, 2025
Accepted: May 5, 2025
Published Online in Articles in Advance: May 30, 2025

https://doi.org/10.1287/isre.2025.editorial.v36.n2

Abstract. The increasing complexity of sociotechnical phenomena, proliferation of diverse data sources, expanding repertoire of research methods, and broadening multiparadigmatic awareness and competence have spurred a growing interest in multimethod research in the information systems (IS) field. This editorial recognizes and celebrates the value of integrating diverse methods and offers a framework to classify multimethod research using two dimensions: (a) methodological distance—the degree of difference (proximate or distant) between methods employed in terms of characteristics such as paradigmatic assumptions, techniques, and goals; and (b) nature of integration—the extent to which the methods are combined in loosely coupled (interlayered) or tightly coupled (intertwined) ways. These dimensions yield four types of multimethod research: assembly (proximate methods with interlayered integration), blend (proximate methods with intertwined integration), bridge (distant methods with interlayered integration), and fusion (distant methods with intertwined integration). We illustrate each archetype with studies published in leading IS journals. Building on these examples, we provide actionable guidance for authors on conducting and presenting multimethod research and also offer recommendations for evaluators of multimethod work. More broadly, we call on the IS community to embrace multimethod research not as an ad hoc stack of methods, but as a systematic strategy, aligning with these recommendations related to methodological distance and nature of integration, to produce a credible, revelatory, and rich body of knowledge on multifaceted IS phenomena.

Supplemental Material: The online appendix is available at https://doi.org/10.1287/isre.2025.editorial.v36.n2.

1. Introduction

There is a rich tradition of multimethod research in information systems (IS), and the number of multimethod manuscript submissions to *Information Systems Research* (*ISR*) and similar journals in the discipline has progressively increased. Often referred to as the "third research paradigm" (Johnson and Onwuegbuzie 2004, p. 15), following the widespread acceptance of quantitative and qualitative paradigms, multimethod research uses more than one methodological approach (or method) within a single paper or manuscript. Typically, these approaches are directed toward addressing one primary research goal.[1]

Before proceeding further, we clarify our use of the term "multimethod" rather than the more frequently used term "mixed methods." Mixed methods research is defined as research inquiries involving both qualitative and quantitative approaches (Tashakkori and Teddlie 1998; Venkatesh et al. 2013, 2023; Creswell and Plano Clark 2018). The changing nature of data and methods used in IS and adjacent disciplines and the blurring of what may be considered qualitative and quantitative data and methods prompted us to use a broader label for this genre of research. To avoid confusion associated with redefining the term "mixed methods," we use the term "multimethod" (e.g., Mingers 2001, Hunter and Brewer 2015, Wellman et al. 2023), which encompasses but is not limited to the use of qualitative and quantitative methods as implied by the widely accepted definition of mixed methods research. Indeed, many papers appearing in *ISR* and similar journals and currently being developed by

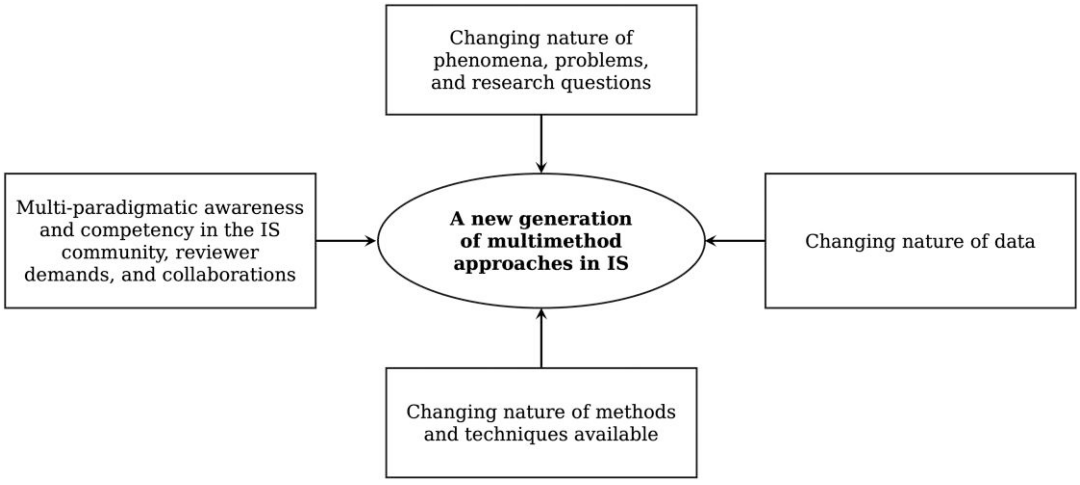
researchers across the globe seek to combine multiple methods (sometimes belonging to diverse methodological traditions), such as design science, analytical modeling, laboratory and field experiments, surveys, econometrics, computational methods, interpretive and other qualitative approaches, including content analysis, qualitative comparative analysis, grounded theory methodology, discourse analysis, and action research.

There are several reasons for the growth of multimethod research in the IS literature (see Figure 1). First, the sociotechnical phenomena that IS scholars seek to investigate are increasingly recognized as complex and multidimensional, holding different meanings for diverse stakeholder groups. Significant research questions about managing artificial intelligence (AI), for example, are difficult to address using one methodological perspective. As a case in point, in order to elucidate the complementarities between AI and human knowledge in human–AI decision environments, Fügener et al. (2021) conducted a multimethod research project. They developed hypotheses about the impacts of AI advice on unique human knowledge and its consequences through analytical modeling. Next, they tested these hypotheses through experiments and simulations to understand the phenomenon. As another example, in the emerging domain of linking digital technologies and social justice (Pang et al. 2024), Danatzis et al. (2024) employed a design science approach combining technical with qualitative methods to develop a design theory, providing insights into how digital platforms can be designed for social justice by empowering end users. Digital platforms and related transformations present a complex landscape that can benefit from using multiple investigative tools available to researchers. In other words, as the complexity and ubiquity of IS phenomena increase, many researchers believe that multimethod research offers them greater opportunities to study such phenomena holistically and generate impactful contributions.

Second, the sources of data are now manifold. In contrast with interviews and surveys that were used in a large proportion of studies in the past, IS researchers now have the option of using many secondary data sources. There is also the ever-increasing variety of digital trace data, including digital exhaust data (Johnson et al. 2019), and more recently, synthetic data from generative AI tools, such as ChatGPT, have been added to the mix (Rossi et al. 2024). Synthetic data can enrich coverage, but they also introduce validity and integration challenges that need to be considered. The varied data sources and formats, for example, audio, video, image, and text, are naturally related to the third driver, that is, the changing set of methods, finding their way into researchers' basket of tools (Tarafdar et al. 2022). For instance, the abundant availability of trace data and online talk has heightened the use of computational methods, such as clustering and natural language processing (NLP) (Padmanabhan et al. 2022). In the recent literature, Mousavi and Gu (2024) use NLP techniques to quantify the resilience content in leaders' communications based on an analysis of their tweets during the Covid-19 pandemic.

Fourth, whereas the IS discipline has derived its inspiration and research practices from various disciplines since its inception, it is becoming even more diverse in embracing multiple research traditions. IS researchers frequently engage in boundary spanning with many other disciplines (e.g., computer science, operations research, psychology, economics, and sociology), resulting in the recognition and adoption of methods that are new to the field but increasingly seen as valuable and feasible for IS research. The paradigm wars of the 1980s and 1990s among IS scholars in different methodological traditions documented in the literature (e.g., Lee 1991, Fitzgerald and Howcroft 1998) have

Figure 1. Recent Drivers of Multimethod IS Research



largely given way to curiosity, openness, and mutual respect. Indeed, quantitative behavioral IS research, originally the staple of the discipline, is expanding in scope and being used in conjunction with various methods from other traditions (Maruping et al. 2025). Given the emerging strengths and limitations of an individual method for a given investigation, many IS researchers are actively considering the use of multiple methods from diverse research traditions in their studies. In many cases, reviewers and editors are also demanding the use of multiple methods, and consequently, a number of the papers appearing in our flagship journals are the result of multimethod projects or have add-on methods because of the requests posed by editorial teams.

The changing nature of the multimethod research landscape explicated above prompted us to write this editorial. We acknowledge that there is a well-developed body of literature on mixed methods research in IS (e.g., Venkatesh et al. 2013, 2023; Zachariadis et al. 2013; Polyviou et al. 2024), and many of the lessons/guidelines apply to this new generation of multimethod research. However, we felt that a closer examination of the emerging trends and possibilities (and challenges) associated with the expanding range of method combinations could be helpful for those considering future engagement with multimethod papers at *ISR* and similar journals. Specifically, we seek to increase IS scholars' awareness of the emerging variety of multimethod research undertaken in the discipline and highlight its potential. We provide a framework for classifying multimethod research, recognizing the increasing reach and scope. We illustrate the framework with examples from the literature. Based on our framework and its discussion, we provide awareness of potential pitfalls of multimethod research and recommendations to authors in helping them conduct, craft, and defend such work. Finally, we offer suggestions for reviewers and editors who may be involved in assessing multimethod manuscripts for *ISR* and other journals.

2. Review of the Multimethod Literature[2]

The scholarly literature on multimethod research has flourished over the past three decades, producing a rich body of methodological discourse. Whereas this editorial does not attempt to review this expansive body of work comprehensively, it offers a high-level overview that points to seminal contributions for readers seeking further depth and relevance to current trends. Recent publications—such as the comprehensive treatments by Tashakkori et al. (2020), Creswell and Plano Clark (2018), and Venkatesh et al. (2023) as well as the Wellman et al. (2023) editorial on enhancing the boldness and rigor of multimethod research—reflect the state-of-the-art discourse. These developments highlight four core dimensions that underpin effective multimethod research: philosophical foundations that support multimethod work, a rationale for employing multiple methods, design strategies that accommodate methodological rigor, and integration techniques that synthesize insights from inquiries employing multiple methods.

2.1. Philosophical Foundations Supporting Methodological Pluralism

The philosophical foundations underpinning multimethod research are notably diverse, marking a significant shift from traditional adherence to singular research paradigms exclusively aligned with individual methodological approaches.

Pragmatism frequently emerges as a central philosophical foundation for multimethod research, emphasizing practical outcomes and advocating for methodological pluralism based on what effectively addresses the research questions (Mingers 2001, Johnson and Onwuegbuzie 2004). Rather than committing rigidly to specific philosophical positions, pragmatists prioritize research's real-world applicability and problem-solving capability, recognizing that the ultimate criterion for methodological choice lies in its usefulness and effectiveness. Critical realism provides another supportive philosophical framework, endorsing methodological diversity by acknowledging various objects of knowledge: physical, social, and conceptual (Mingers et al. 2013). It presents "a productive stance" for research using multiple methods because of an "integration of realist ontology … with a constructivist epistemology" (Creswell and Plano Clark 2018, p. 40), and it advocates integrating multiple methods to attain a comprehensive understanding and deeper insights into complex phenomena (Zachariadis et al. 2013). Finally, dialectical pluralism introduces a dynamic philosophical conversation among diverse epistemological paradigms, encouraging respectful and intentional integration of multiple methods (e.g., Lee 1991) to meaningfully explore the differences and complexities inherent in research questions related to contemporary phenomena (Creswell and Plano Clark 2018). Ultimately, the philosophical basis for multimethod research underscores a commitment (and justification) to employing diverse methodological tools to effectively comprehend and navigate the multidimensional sociotechnical world.

2.2. Rationale for Employing Multiple Methods

The rationale for employing multimethod approaches in research is understandably diverse, encompassing theoretical and practical considerations. Researchers might seek to triangulate evidence across the methods, to complement other method(s) by "discovering paradoxes, contradictions, and fresh perspectives" (Tashakkori and Teddlie 1998, p. 43). They can use one method to inform the use of the second method, and they can even use multiple methods to expand the

"breadth and scope" of understanding the phenomenon of interest (p. 43). Furthermore, researchers use multiple methods to compensate for the limitations of a method in the context of an investigation, "thereby reducing the skepticism about the research results or, conversely, increasing … credibility" (Hunter and Brewer 2015, p. 187). Even though as many as seven objectives for using multiple methods in a single research project/inquiry have been identified,[3] two overarching ones evident in multimethod IS research are corroboration/confirmation and complementarity. Indeed, Small (2011, p. 63) argues that most purposes can be "subsumed under one of two categories, confirmation or complementarity." The confirmation objective focuses on verifying and/or corroborating findings from one method with those derived from another (Small 2011, Schwandt and Lichty 2015). The complementarity objective involves using one method to address the limitations or weaknesses of another (referred to as compensation); it may also include leveraging unique strengths of different methods to provide a novel, nuanced, and even divergent understanding of the research problem (i.e., expansion and diversity purposes). There is an increasing trend of using complementarity as the primary objective of conducting multimethod research in various disciplines (Small 2011, Schwandt and Lichty 2015). Overall, multimethod research can offer distinct advantages by enabling a more comprehensive and nuanced exploration of phenomena than any single method can independently achieve. It facilitates engaged scholarship, enabling a research context and findings to be understood from multiple perspectives (Van de Ven 2007, Rai 2019). The diversity inherent in multimethod research allows scholars to leverage multiple perspectives to gain a holistic understanding of a phenomenon and generate robust meta-inferences (i.e., "statements, narratives, or a story inferred from an integration of findings" from two or more methodological strands, as per Venkatesh et al. 2013, p. 38).

2.3. Design Strategies for Methodological Rigor

The literature addressing design frameworks for multimethod research has evolved considerably, increasingly acknowledging the complexity and nuanced diversity of methodological integration beyond traditional classifications. Early scholarly dialogues centered around establishing systematic frameworks and typologies, notably by introducing concurrent and sequential designs (Morse 2003; Venkatesh et al. 2013, 2016b). Concurrent designs entail the simultaneous execution of research phases—that is, conceptualization, experiential, and inferential (Teddlie and Tashakkori 2009)—across multiple methods and subsequently merging findings/insights from each method. Sequential designs, conversely, adopt phased approaches in which studies employing different methods are executed in succession. Recent scholarly discussions have advanced beyond these foundational typologies, proposing more intricate and flexible frameworks reflective of multimethod research's inherent complexity and evolution.

2.4. Integration Across Multiple Methods

The integration of findings from diverse methodological traditions constitutes an essential, albeit challenging, component of multimethod research. Effective integration extends beyond merely presenting findings from two or more methods; it requires carefully synthesizing insights to generate deeper, more nuanced understandings. Historically, scholars have approached integration through various techniques, such as linking, connecting, and dialoging between methods, and have employed early typological frameworks that guide integration based on study design structures and objectives. Advanced integration such as meta-inferences involves the synthesis of findings from inquiries employing different methods to produce insights surpassing those achievable through a single method (Venkatesh et al. 2013, 2016b). Additional integrative techniques include the use of joint displays to visually represent integrated results; theoretical integration to logically unify diverse explanatory frameworks; relational algorithms utilizing connector strategies; and deliberate methodological actions such as comparing, contrasting, infusing, linking, and blending insights across methods. Contemporary discourse and recent frameworks further emphasize the necessity of achieving genuine integration, a concept that Bryman (2007) underscored, whereby findings from individual methods mutually enrich each other in a meaningful dialogue. Recent contributions, such as the synergistic partnership-based framework, advocate cyclical and comprehensive approaches that foster collaboration, methodological synergy, and responsiveness to complex real-world issues (Nastasi et al. 2010, Maxwell et al. 2015). Collectively, these frameworks and guidelines reinforce the critical point that effective integration in multimethod research is neither simplistic nor mechanical; rather, it necessitates thoughtful alignment of methodological choices with theoretical foundations (if applicable), research questions, and contextual demands to produce rigorous, insightful, and valid meta-inferences.

Although our position in this editorial is that a multimethod research paper should ideally integrate the findings and inferences across the different methods employed (i.e., meta-inferences) and present "an integrative view of findings" (Venkatesh et al. 2016b, p. 436), we acknowledge that the nature and extent of such an integrative view depends on research objectives and the types of methods used.

2.5. Multimethod Research in IS

There are several noteworthy reviews of mixed-methods and multimethod research in IS. Mingers (2001, 2003), in an early review, identifies a scarcity of multimethod research in IS. A decade later, Venkatesh et al. (2013) conducted a comprehensive review of mixed methods research and report that only approximately 3% of papers published in leading IS journals employed such an approach. Polyviou et al. (2024) recently reviewed papers published between 2017 and 2022 in major IS journals focusing on the research design aspects. Taking a broader perspective that included multimethod research, they identified 9 papers employing some form of concurrent design and 23 papers using sequential designs.

Tarafdar et al. (2022) reviewed 575 articles published in *ISR* between 2012 and 2021, identifying 74 papers (13%) that used multiple methods—a finding that is encouraging for those interested in multimethod work. Among these, 15 papers (20%) combined machine learning (ML) with econometrics, whereas 10 papers (14%) integrated qualitative and quantitative approaches. Other frequently observed methodological pairings included experiments with econometrics, game theory with econometrics, and computational modeling with econometrics. They also documented other unique methodological combinations, suggesting the emergence of novel research approaches that could shape the next generation of multimethod research.

To understand the methodological landscape in IS in the last two decades, we scanned leading IS journals for mixed methods or multimethod research.[4] Our goal, however, was not to provide an exhaustive review of multimethod research in the field. Instead, we sought to offer a high-level understanding of the nature and evolution of methodological combinations in IS research since 2013 when Venkatesh et al. (2013) published their impactful paper providing guidance for mixed methods research in IS.[5]

Online Appendix A presents papers published between 2013 and 2019, whereas Online Appendix B focuses on those published between 2020 and 2025. Although the division between these two periods is somewhat arbitrary, chosen primarily to highlight developments in the past five years, we observe a discernible increase in the number and sophistication of methodological combinations employed post-2020. For example, Sahaym et al. (2023) integrate two seemingly incommensurable approaches—an interpretive case study method and an analytical modeling approach—to develop a theoretical understanding of value destruction in information technology ecosystems. We also find examples of computational methods being combined with qualitative studies (e.g., Yu et al. 2024) and field experiments (e.g., Zhang et al. 2021), analytical modeling integrated with online experiments (e.g., Qiu et al. 2021, Chen et al. 2022), and design science research paired with computational methods (e.g., Dickhaut et al. 2024) and field experiments (e.g., Li et al. 2020). Our review of International Conference on Information Systems (ICIS) papers between 2020 and 2025 also suggests an increasing trajectory of multimethod research combining diverse methods in the premier IS academic conference.

In contrast, the earlier papers (2013 through 2019) were predominantly based on the combinations of a qualitative inquiry (e.g., focus group, interviews, case studies) and a quantitative study (e.g., surveys). Nevertheless, there were a few exceptions. For example, Benthaus et al. (2016) combine a qualitative approach with econometrics, and Vance et al. (2018) combine a NeuroIS approach with a field experiment. Some papers combining econometrics approaches with laboratory/online experiments were also published during this period.

Recent methodological discourse and our review of multimethod research in IS lead us to two reflexive observations pertinent to this editorial. First, although we see an increasing number of papers published in major IS journals that employ multiple methods, we speculate that some of these papers perhaps missed an opportunity to shine as a high-impact multimethod paper because the team (i.e., authors, reviewers, and editors) did not push the paper toward a direction that highlights and takes advantage of the synergy between multiple methods. We note that a mere use of two or more methods in a paper does not necessarily result in the theoretical and methodological elegance (and superior contribution outcomes) that a multimethod paper can offer. Second, although the number of papers employing multiple methods is increasing, the proportion is still less than 15% of the papers published at *ISR* (Tarafdar et al. 2022). This percentage is perhaps similar in other major journals,[6] suggesting that, we, as a discipline, may be missing opportunities to study important technology-related phenomena using a methodologically pluralistic approach (Mingers 2001, Mingers et al. 2013), develop contextually rich theories using the power of triangulation (Cornelissen 2025, Venkatesh 2025), and offer holistic guidance to practitioners through engaged scholarship incorporating different perspectives that multimethod research naturally brings (Rai 2019). Challenges, opportunities, and recommendations underscored in recent editorials focusing on specific methodologies and domains (Abbasi et al. 2024, Gopal et al. 2024, Bardhan et al. 2025) can potentially be viewed and addressed through the lens of multimethod research, benefiting future generations of IS research.

3. A Framework for Organizing Multimethod Research

We now introduce a framework to classify multimethod research, which we felt was needed given the variety of combinations beginning to appear in the literature. Our proposed framework is intended to be parsimonious, while extending earlier classification of concurrent, sequential, and iterative design strategies and broadening the scope beyond the quantitative–qualitative mix of methods to include next-generation combinations.

The framework has two key dimensions: *methodological distance* and *nature of integration*. The first dimension characterizes the set of methods employed in a research inquiry/project, whereas the second dimension reflects how these methods are combined. We summarize the framework in Figure 2,[7] elaborate on each dimension next, and illustrate the associated cells with examples in Section 4.

3.1. Methodological Distance

The notion of methodological distance captures the extent to which the methodological approaches (or methods) used within the same research inquiry/project are distinct in terms of one or more of the characteristics such as paradigmatic assumptions or philosophical foundations, purposes/goals, techniques, data and/or artifacts involved, and evaluative approaches. Given the various characteristics on which methods can differ, methodological distance is inherently a complex concept. Nonetheless, we believe it is an important concept, particularly in light of the growing prevalence of and interest in using diverse methods in multimethod research in IS.

With respect to paradigmatic assumptions, which is often the predominant aspect of methodological distance, one might consider the differences in the philosophical foundations, specifically the ontological (concerning the nature of reality) and epistemological (concerning the nature of knowledge) assumptions. Approaches characterized as positivist (or postpositivist) versus constructivist are seen to have very different ontological and epistemological assumptions (e.g., Walsham 1995, Creswell and Plano Clark 2018). Our premise is that the more these foundational assumptions among the methodological approaches used in a study diverge, the more pronounced the methodological distance tends to be. An example of two methods with low distance (*proximate*) might be laboratory experiments and explanatory surveys, and those with high distance (*distant*) might be interpretive case studies and analytical modeling.

Methodological distance may also be associated with the nature of the technique. Some differences might be quantitative (frequently characterized as objectivist) versus qualitative (frequently characterized as subjectivist) and deductive versus inductive[8] (or even abductive). These two differences are commonly associated with positivist (or postpositivist) and constructivist (or interpretivist) paradigms. The former group may employ mathematical models to develop analytical solutions, use statistical tests on data gathered through surveys or experiments to verify hypotheses in a structured setting, or apply machine learning techniques to make predictions. The latter group of research methods might include data sources such as interviews, ethnographies, and case studies and might delve into detailed coding to discern patterns and deeper meanings and provide more contextual understanding of the subject matter using a hermeneutic circle (e.g., Klein and Myers 1999, Sarker and Lee 2006). Another aspect of methodological distance is related to their purpose and time orientation. Many empirical methods seek to understand/explain phenomena by looking to the past or by considering the present; however, prediction-oriented research tends to look at the future (Shmueli 2010), whereas design research seeks to shape the future (Sein et al. 2011). Our field is an applied one, and thus, as engaged scholars, researchers need to not only understand or explain the past but also predict and shape the future through design and prescriptive studies. An example of pursuing these goals simultaneously can be found in a paper that proposed principles for safe AI development (Herath Pathirannehelage et al. 2025). Obviously, these varied approaches

Figure 2. A Framework for Classifying Multimethod Research

		Nature of Integration	
		Interlayered	Intertwined
Methodological Distance	Proximate	*Assembly*	*Blend*
	Distant	*Bridge*	*Fusion*

would have very different criteria of evaluation associated with them.

To summarize, when paired methods in a project are proximate (e.g., econometric analysis and experimental design), they can be applied concurrently or sequentially, leveraging each other's strengths to offset limitations. Such proximate method combinations typically aim to reach convergent conclusions, simplifying the interpretation and integration of the findings. In contrast, highly distant methods may yield a broader set of conclusions. Although integration is less straightforward in these cases, distant methods offer greater potential for novel insights by approaching the phenomenon from fundamentally different perspectives.

3.2. Nature of Integration

The notion of integration in the multimethod research context is complex because, as in the case of methodological distance, various facets of methods are subject to integration. A key question is whether integration is even needed for multimethod research and, if so, to what extent these multiple methods, particularly those with high methodological distance, should be integrated. For this editorial, we take the position that integration is what differentiates a multimethod research project from a monomethod project or the use of two or more disjointed methods within a project; thus, some level of integration should be readily evident in the research manuscript that claims to be multimethod in nature.

The question of what aspects of two or more research methods should be integrated in a multimethod paper is difficult to answer without considering the specifics of a research inquiry/project, and reviews such as those by Maxwell et al. (2015) highlight the lack of agreement on integration in multimethod research. Phases of a method employed in a research inquiry/project can be simplified into design, execution, and interpretation (similar to research stages such as conceptualization, experiential, and inferential suggested by Teddlie and Tashakkori 2009). Methodological integration in multimethod research can occur in all (or some) of the three phases.[9] In this editorial, we limit our discussion of methodological integration to an overall integration across methods and do not focus on the integration within and between phases of multiple methods for simplicity.

To capture the nature and extent of methodological integration, we categorize multimethod research as *interlayered* and *intertwined*. We elaborate on the two terms below.

3.2.1. Interlayered Integration. We draw inspiration from interlayered design approaches and the notion of coupling of layers in product, systems, and organization design (Orton and Weick 1990, Sanchez and Mahoney 1996) and particularly in software engineering (Salvador 2007), in which different layers manage specific tasks, such as business logics, data management, and user interface. We conceptualize the nature of integration in multimethod papers as interlayered if distinct methods are being used in separate layers. Interlayered design allows for a degree of separation and autonomy between the layers because of a loose coupling of these layers.

In multimethod research employing interlayered integration, each methodological approach could function more or less independently but jointly contributes to more enhanced knowledge regarding the research question. Notable characteristics associated with interlayered integration include the following:

- Well-demarcated boundaries across layers: Each method typically explores distinct aspects of the research question with defined boundaries between them. For instance, econometric analysis might quantify behaviors observed in real-world settings, whereas controlled experiments might explore the causality behind these observations and the mechanisms underlying those effects.
- Well-defined, narrow, and unidirectional connectivity: The methods largely operate independently (illustrated with two methods for simplicity), but they are connected in specific ways, giving rise to three forms of interlayering:
  - Juxtaposed interlayering: The two strands employing different methods run in parallel and provide triangulation.[10] The first strand (M1) does not inform the second strand (M2) substantively, but meta-inferences might be generated based on the two strands (see Figure 3). For example, the first strand may involve econometric analysis and the other a laboratory experiment. And the results from both strands converge to a conclusion (i.e., meta-inference).
  - Sequential interlayering: The first strand informs the design or execution of the second strand with potential further integration at the interpretation phase (see Figure 4). For example, the first strand may involve machine learning followed by a field experiment strand; a design science strand

Figure 3. A Visualization for Juxtaposed Interlayering

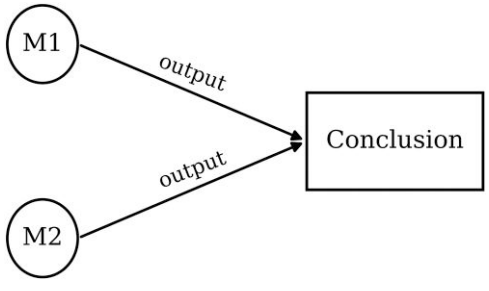
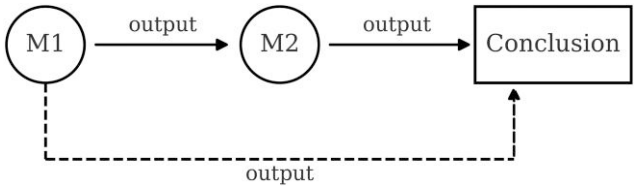


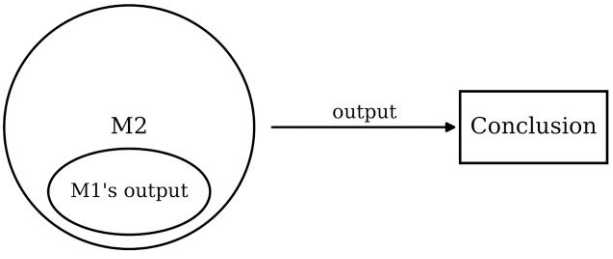
Figure 4. A Visualization for Sequential Interlayering



followed by a field study strand; or, most commonly, a strand with interviews followed by a strand reporting on a survey. These multimethod projects often follow a predominantly sequential design in which the two methods are applied deliberately. Typically, the output of M1—such as theoretical predictions derived from formal modeling or qualitative interviews—informs the design, scope, or execution of M2, which may involve, for example, empirical testing or experimental validation. Either strand can assume a dominant role in shaping the overall narrative of the paper and may jointly deliver the conclusion.

- Embedded interlayering: The first strand generates output that becomes a part of the second strand (see Figure 5). For example, machine learning–generated constructs (as dependent or independent variables) from the first strand may be plugged into a second strand utilizing econometric or experimental methods. In this type of interlayering, M1 typically provides pertinent elements, such as the operationalization of key constructs, whereas M2 carries out the main study with either econometric analysis or experiments. Although either strand of methods may take a more prominent role in shaping the overall contribution of the paper, the conclusions are often primarily, if not exclusively, derived from M2. Because M1 and M2 are designed to fulfill distinct purposes—for example, operationalizing abstract constructs through computational or prediction model-based techniques in M1 and then using those constructs for hypothesis testing or causal inference in M2—they are often not methodologically proximate, differing to some degree in paradigmatic assumptions, objectives, and technical orientation (Shmueli 2010).

Figure 5. A Visualization for Embedded Interlayering



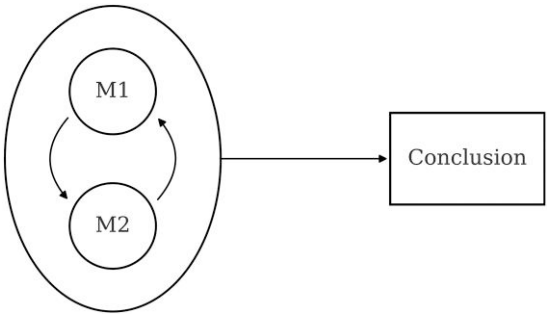
In summary, interlayered multimethod research represents a research inquiry in which individual methods are loosely integrated. However, the findings from one strand inform or serve as an input to the other strand of the project. The relative independence of each method in the strands allows for greater flexibility, permitting adjustments to or replacements of any methodological strand with minimal effect on the design and execution of the other.

3.2.2. Intertwined Integration. Intertwined design embodies a concept of various components or elements being intricately connected, creating a complex but unified relationship (e.g., Ahlberg and Shneiderman 1994). This is consistent with the notion of tight coupling of various components in software engineering. This approach highlights the importance of the components' interdependence and interactive relationship(s). In the context of multimethod research, intertwined integration involves a seamless and iterative use of different methods mutually informing or shaping each other, leading to a highly integrative conclusion (i.e., meta-inferences). This might involve the following:

- Interplay: The results from one strand could shape the structure or model of the subsequent strand, which may have further implications for the use of the first strand. An example of this is deploying a design research artifact to a field test through a longitudinal case study that leads to changes in the theoretical grounding of the original design and the subsequent need to carry out another cycle of design research.
- Iterative refinement: In some cases, this interdependence unfolds in an adaptive, iterative manner with the analysis in each strand adjusted in response to emerging findings or tentative conclusions from the other strand (see Figure 6). For instance, insights from a preliminary case study might prompt refinements in the analytical models used later, which then prompt a search for different patterns or assumptions in the case data, which can lead to another round of analytical model refinement.

In summary, an intertwined multimethod project represents a research inquiry in which individual

Figure 6. A Visualization for Intertwined Integration



methods are tightly coupled. That is, there is a high degree of methodological connectivity, bidirectional influence, mutual shaping, and occasionally iteration, often leading to substantive and novel meta-inferences (Venkatesh et al. 2013).

With the above discussion in mind, we believe that the nature of integration between a pair (or among a set) of methods is a potentially valuable way to characterize a multimethod project, and it has a number of implications. Results from a project that uses multiple methods with interlayered integration may be easier to decompose into manageable parts and allocate to subteams with relevant resources and expertise. Interlayered integration can be valuable for confirmatory as well as complementary (particularly, compensatory) purposes. In contrast, the intertwined approach has the distinct advantage of the methods informing each other, thereby contributing to cohesion among the methods and potentially resulting in transparency showing how the final results were achieved. The intertwined approach can be more open and responsive to circumstances or patterns discovered during the research process within one strand and adjusting the other strand. At the same time, the intertwined approach is riskier as the interdependencies might lead to significant changes in multiple parts of the research project.

Indeed, the implications of the nature of integration may be dependent on several factors, such as the relative dominance of the methods used in a project and the extent to which the use of different methods was preplanned or emergent as the paper evolved or during the review process. Finally, the nature of integration may also impact the research team's work process. Whereas interlayered research can be done in parallel with different team members focusing on one of the strands, intertwined research requires a stronger level of coordination across members with expertise in different methods.

4. Definition of and Illustrative Examples for Each Type

To enhance memorability, we assign descriptive labels to each cell of the framework presented in Figure 2: *assembly*, *blend*, *bridge*, and *fusion*. In the following sections, we elaborate on each classification and illustrate it with representative examples.

4.1. Proximate and Interlayered: Assembly

Assembly refers to multimethod research that employs methods with low methodological distance and integrates them in an interlayered manner. We use the label "assembly" to describe this approach because, regardless of how (e.g., dominant versus nondominant) or when (e.g., concurrent versus sequential) these homogenous (i.e., proximate) methods are applied, they remain loosely connected, maintaining their distinct presence in a multimethod inquiry. Until synthesis, each methodological strand remains relatively independent. Given the low methodological iteration and inferential integration and the proximity of methods used, an assembly style of multimethod research primarily aims for corroboration or confirmation. However, researchers can pursue other multimethod objectives depending on their research questions and designs. For instance, complementarity may be achieved by addressing the limitations of one method (compensation) and generating insights that enhance or expand those provided by the other method, producing valuable meta-inferences (Schwandt and Lichty 2015).

Lei et al. (2021) study the impact of online reviews' two-sidedness on review helpfulness using a juxtaposed interlayered design with proximate methods. Although the findings were primarily confirmatory/corroborative, this paper also achieved a complementarity goal (e.g., compensation). As noted by the authors, the econometric analysis provided external validity but "could not provide direct insights for the causal impact of a reviewer's attentional focus on review helpfulness" (p. 805). Here, both empirical methods independently stand with the econometric study motivating the experiment by demonstrating the phenomenon's real-world presence. This type of multimethod research employs juxtaposed interlayering with different strands operating independently even if sequentially. Each strand yields distinct findings, combined through triangulation into meta-inferences. These papers typically use proximate methods sharing similar assumptions or epistemologies, facilitating unified interpretations.

Zhao et al. (2024) exemplify a multimethod paper interlayering several proximate methods sequentially to examine the effect of direct buyer–seller communication on two-sided matching quality in peer-to-peer rental platforms. An observational econometric study established external validity, a field survey clarified underlying motives, and randomized experiments confirmed causality. Each method's strengths compensated for the others' limitations, providing comprehensive evidence. Similarly, other papers employ multiple methods to enable replication, triangulation, mechanism testing, and boundary condition identification (e.g., Bar-Gill et al. 2021, Huang et al. 2024). As shown in Figure 4, this multimethod type employs strands sequentially with M1 informing M2's design or execution. Although one strand may dominate analytically, both jointly shape conclusions—a hallmark of assembly-type research. Even when two strands are sequentially conducted, each could distinctly contribute to the findings. This joint contribution reflects a proximate methodological relationship, aligning methods to converge toward a shared conclusion. Unlike juxtaposed interlayering, which emphasizes confirmation, this configuration further enriches interpretation by having M1

influence M2, indicating deeper integration. Thus, methods remain proximate enough for confirmation yet sufficiently distinct to enable complementarity through compensation.

4.2. Proximate and Intertwined: Blend

The blend type of multimethod research emerges when researchers employ proximate methods in a highly intertwined and iterative manner. Unlike assembly, where strands remain separate until triangulation, blended designs involve frequent cross-referencing, refinement, and mutual shaping throughout the research process. Although the strands are methodologically proximate, their iterative integration enables richer insights with each strand informing and refining the other, facilitating more sophisticated inferences and theory development.

For example, Haag et al. (2022) examine deviant affordances using qualitative (interviews) and quantitative (experiment) methods. Though typically considered distant, these methods were aligned through a single paradigmatic stance based on critical realism, thereby lowering the methodological distance. Because of their iterative nature, this paper exemplifies blended multimethod research. Interviews (strand 1) initially informed theory building and mechanism identification. Experiments (strand 2) systematically validated these causal mechanisms. Post hoc interviews (strand 3) then expanded and refined contextual insights. Integration occurred through iterative cycles of qualitative theory development, experimental validation, and qualitative contextual verification.

The design by Haag et al. (2022) partly achieves compensation. Similar to Lei et al. (2021), method proximity enabled robust triangulation and validation: interviews provided real-world grounding, whereas experiments offered internal validity. Additionally, qualitative and quantitative methods complemented each other with insights clarifying organizational conditions and experiments identifying precise causal relationships.

Another example is Venkatesh et al. (2016a), who develop a process model for information and communication technology (ICT) implementation outcomes in developing countries using qualitative and quantitative methods within a positivist paradigmatic stance. Here, quantitative analyses confirm the impacts of ICT implementation, whereas qualitative analyses explored the underlying reasons. Alternating between quantitative data on outcomes and qualitative interviews across implementation phases revealed the mechanisms behind these outcomes. Intertwining was characterized as interplay rather than iteration, reducing constraints from tight method integration in iterative blending.

There are relatively few examples of the blend type of multimethod research. In general, intertwining is a complex and effortful process of coordinating how the different methods inform each other, and this could explain why it is less common. Nonetheless, adopting a single paradigmatic stance reduces the challenges of integrating different ontological and epistemological perspectives and intertwining strands, as compared to intertwining distant strands.

4.3. Distant and Interlayered: Bridge

Research employing distant methods in a noniterative manner and presenting findings that are loosely integrated is classified as the bridge type of multimethod research. We use the label "bridge" because this approach brings together two or more distant strands to offer an integrative perspective, while preserving their distinct methodological and inferential nuances (e.g., Sarker et al. 2018). This type of multimethod research is particularly suited for complementarity (e.g., compensation and expansion) purposes. Researchers typically aim to achieve complementarity by employing distant methods to explore different dimensions of the same phenomenon. In other words, distant methods are not only intended to compensate for each other's limitations in pursuit of a shared goal but also to generate complementary insights, leading to richer meta-inferences. Rather than merely offsetting weaknesses, the bridge approach seeks to leverage the best of both strands.

Of particular note are papers that combine analytical modeling (e.g., game theoretical models) and an empirical method (e.g., Bapna et al. 2010, Liang et al. 2025). For example, Liang et al. (2025) first present a stylized analytical model that characterizes how workers join an online labor market with monitoring and reputation systems. They then use econometric analysis of archival data from a major online job platform to analyze how these systems affect new workers and identify their effects on hiring trends, wages, and project success. This analytical–empirical combination seems to hold great promise of bridging theory with empirical evidence. Specifically, it draws on the strengths of each method, yielding empirical insights that are theoretically grounded. Furthermore, the empirical findings can support or refute theoretical assumptions and analytically derived predictions. Appealing as it may seem, there are challenges to such combinations. As the analytical model is required to abstract from reality (particularly for stylized models), it may not fully capture the factors and nuances contained in empirical data. When inconsistency is observed across the theoretical predictions and empirical analysis, attributing the inconsistency may be difficult given the lack of perfect alignment between the two.

Another set of papers combines data science methods (e.g., machine learning and prediction models) with empirical methods such as econometrics or experiments (e.g., Geva et al. 2019, Wu et al. 2021).

Again, these distant methods (i.e., to predict versus to explain) combine to leverage each method's strength, yielding insights resulting from the complementarity of the methods. Specifically, the data science prediction methods hold great promise to leverage unstructured data (e.g., text, images, videos) to capture abstract concepts methodologically soundly (e.g., sentiment, novelty) that are difficult to measure with other methods. Moreover, the econometric or experimental methods allow for causal interpretations of the findings. Thus, such combinations provide researchers with great opportunities for explanatory research that involves novel constructs and requires causal interpretations. For example, Wu et al. (2021) first built a deep learning model to process natural language texts and predict customer misbehavior. The customer behavior construct then served as the target dependent variable in the second study employing the field experiment method. The field experiment explored alternative policy interventions to reduce customer misbehavior. Geva et al. (2019) adopted a slightly different approach to use a latent Dirichlet allocation model to characterize Twitter users' tweets and retweets. The authors then utilized concepts from econometrics to rule out alternative explanations and provide insights into the drivers of the phenomenon. Other multimethod papers of this sort have built machine learning models to create independent variables used in the second study. For example, Mousavi and Gu (2024) first used bidirectional encoder representations from transformers (BERT) and long short-term memory (LSTM) to predict whether a tweet contains resilience content, and this was later used as the key independent variable in an econometric study to examine how resilience messaging in governors' social media postings affects the change in time people spent at residential, retail, and grocery locations during the Covid-19 pandemic.

The value of these combinations lies in their ability to leverage the capability of data science methods for creating or improving measurement of concepts that are not readily available in the literature because trace data that reflect human behavior have only become abundantly available over the past decade.[11] These multimethod papers often adopt an embedded design. The use of fairly distant methods in an embedded, purpose-driven sequence enables researchers to explore questions and data in ways that complement each method. This approach is particularly valuable in today's research landscape, where novel and diverse data sources are increasingly accessible and where advances in data science techniques—including natural language processing, computer vision, and audio and video analytics—are rapidly expanding our ability to extract meaningful concepts from unstructured textual, visual, and auditory data. In such contexts, embedded designs offer powerful method combinations for leveraging methodological diversity, maintaining coherence and clarity in the research process.

There are, of course, pitfalls of combining data science methods with empirical methods in this manner. For example, Yang et al. (2018) show that, as data mining generates variables (e.g., sentiment) subsequently used in econometric models as independent variables, prediction errors from the data mining methods (e.g., machine learning predictions) can introduce measurement bias and compromise inference if left unaddressed. Qiao and Huang (2021) further illustrate potential issues for independent and dependent variables in linear and nonlinear regressions. Both papers provide useful guidelines for evaluating and mitigating these issues from this method combination.

4.4. Distant and Intertwined: Fusion

The final classification, fusion, represents papers that employ strands with high methodological distance and integrate them in a mutually informing and (often) iterative manner, making such work relatively complex and, consequently, less common in the literature. We label this type of multimethod research "fusion" because researchers use two or more distant strands in a highly integrative way, which is expected to yield substantially novel findings and/or interpretations. The strength of combinations, involving tightly coupled strands that differ significantly in epistemological—and, in some cases, ontological—stance and/or the nature of techniques, lies in their potential to address calls for IS research to tackle grand challenges (Nambisan and George 2024). These grand challenges are often wicked problems that cannot be solved by applying a single (or similar) research method or theory but instead require approaches that transcend disciplinary and paradigmatic boundaries. The interplay between methods in fusion tends to be cyclical and highly iterative as illustrated in Figure 6. Different methodological strands feed into and challenge each other, working in short cycles to ensure integration that may validate, refine, or broaden the resulting insights. Recent design approaches, such as action design research (Sein et al. 2011), emphasize the importance of continuous, iterative integration between design and evaluation (whether qualitative or quantitative) to address the last mile problem, namely, the premature conclusion of design research before it is deployed in the field for use by stakeholders in real-world settings (Nunamaker et al. 2015).

An illustrative example of distant interlayered multimethod research is Sahaym et al. (2023). The paper uses an interpretive case study method in conjunction with analytical modeling to develop an understanding of "the behavioral contingencies and underlying mechanisms that might lead to value destruction [in the

ecosystem] over time instead" (p. 508) in the context of a hub firm that was leveraging heterogeneous complementors in its ecosystem to sell its enterprise resource planning (ERP) systems to clients as well as to enhance its ERP product through the efforts of the complementors. The interpretive strand enabled the researchers to undertake a longitudinal, in-depth, and experience-near examination of organizations in the field (Walsham 1995). On the other hand, the analytical modeling (game theory) strand provided a theoretical scaffolding and a methodological approach "to analytically formalize the assumptions and findings from the case study … " (p. 510). Indeed, such use of distant methods provided advantages of complementarity. The analytical modeling strand in the paper offered a theoretically and mathematically rigorous approach but was based on assumptions that did not reflect reality initially. The interpretive research strand, on the other hand, whereas messy and tentative, offered a window to the experience of the participants in the field and helped unearth appropriate assumptions iteratively, which were, in turn, utilized in the analytical modeling strand. The mechanism for integration was an iterative approach (Agar 1986) guided by the hermeneutic circle, in which the two strands interacted (and fed into each other) over multiple passes eventually reaching a state in which there were no significant apparent anomalies in the understanding (Sarker and Lee 2006).

To some degree, the strength of the paper was in its ability to harness the advantages of analytical modeling (e.g., the abstract scientific rigor) and the interpretive method (e.g., the ability to capture human experience and meanings and reflecting the "reality" of the field), which was valuable. However, the challenges to developing and publishing such papers cannot be underestimated. In particular, the work had to be undertaken by a team in which the qualitative researchers had little or no expertise in analytical modeling and, likewise, the team members engaged in analytical modeling lacked expertise in qualitative research. The intertwined approach was based on an adaptation of the hermeneutic circle with which some team members were unfamiliar. Thus, bringing the paper together required much coordinating, educating, and trusting. Presumably, the editors also had to rely on a review team adept in analytical modeling but not interpretive methods or vice versa, and had to make judgment calls based on the somewhat disjointed inputs, particularly regarding methods.

Faik and Sengupta (2024) is another notable example of the fusion type of multimethod research. The authors use a variety of qualitative methods (including interviews, focus groups, and elements of grounded theory methodology), broadly adopting an interpretive approach in conjunction with design research to develop mobile apps for agricultural communities in India and China, where digital inclusion was seen as a major design challenge. The qualitative and design methods are unquestionably distant, the former geared toward inductive understanding of the stakeholders' life worlds and the latter geared toward developing a technical artifact. The nature of integration can be characterized as intertwined given that the qualitative fieldwork and analysis was an integral part of the design process. The design process (and the quality of the artifact) was enhanced by findings from the qualitative work, and prototypes (intermediate artifacts resulting from design activity) were used as boundary objects in subsequent fieldwork, contributing to the intertwined nature of integration.

Through the careful use of narrative, pictorial techniques, and workshops, the authors were able to gain a much deeper understanding of the issues faced by the farmers and their needs for the design; in fact, the authors noted that the understanding of the farmers' thought processes was instrumental in developing the designs. This integration of qualitative fieldwork and design might seem straightforward at the outset. However, it requires a high level of trust between the participants as the fieldwork can shed negative light on the design, and the design researchers can easily fall into the trap of imposing a solution they see fit. Thus, one of the clear strengths of this paper is that it avoids a top-down view of technology and does not try to explain away concerns regarding usage through common excuses such as change resistance or lack of training but, instead, looks at the capabilities and needs of the users.

Another interesting example of fusion is Te'eni et al. (2023). This paper takes a design science approach to explore how humans and ML systems can iteratively learn from each other to improve text classification tasks. The primary objective was to design and evaluate a novel reciprocal human–machine learning (RHML) configuration that keeps human experts actively involved in the machine learning loop. As such, RHML involves two distinct learning processes that feed into each other iteratively, and each learning process was studied with different methods. Human learning involved a qualitative analysis strand that identified themes based on specific texts in the data set and concepts that were independent of words in the data set. The machine learning strand, on the other hand, relied on feature extraction and text classification algorithms that were mostly black boxes revealed by their inputs and outputs.

In this case, the distance between the two strands was substantial, but at the same time, they were tightly coupled and processed a single data set. Human learning relied on quantitative feedback from the machine, and machine learning on qualitative feedback from the human. Further, the two strands were intertwined to create one unified framework as the two

processes iterated in a loop that continued to a point of saturation.[12]

This paper is unique because it employs a multimethod approach and suggests a framework that advocates using different methods at different stages of the process. Additionally, the authors discuss challenges in forming a team that could conduct such a project. The authors stated that they "formed a team of nine researchers composed of (I) a data science sub team responsible for developing ML algorithms; (II) domain experts who developed explicit representations of their knowledge and participated in user studies; (III) a qualitative research-methods expert and (IV) a design sub team that formalized the human-machine processes and oversaw the development of Fusion. In addition to the academic team, a collaboration was established with a cybersecurity software company specializing in analyzing communication in the Darknet, which anchored the real-world demands of our chosen problem domain" (p. 5).

It is worth noting that there are far fewer examples of distant and intertwined method combinations (i.e., fusion) in the identified multimethod literature than other types of multimethod research. This is to be expected as fusion projects invariably need diverse (and potentially larger) teams with a wide array of methods expertise at their disposal and a willingness to be open to distant methods and to adjust their own approach. The teams also need to be flexible in dealing with the contingencies of the research process and discovering unanticipated issues that force the rethinking of the research process and goals. This tight intertwining is obviously also a potential strength as it allows for the identification of issues with the original and perhaps totally new opportunities for findings given the significant complementarity (particularly, expansion) potential of distant methods. Thus, this kind of approach can be particularly fruitful when exploring problems that are not well understood and/or in which there is a high degree of uncertainty.

5. Discussion

As the examples in the previous section indicate, IS researchers are using a growing variety of methods in multimethod research. To allow an effective discussion of multimethod research and highlight key implications for authors and evaluators, we propose a two-dimensional framework that incorporates methodological distance (proximate versus distant) and nature of integration (interlayered and intertwined). These dimensions capture core characteristics that help differentiate between types of multimethod research. Given the complex nature of the two dimensions composed of several concepts, we do not claim that placing a project into one of the types of multimethod research is a trivial task or that there would be complete agreement among all researchers in classifying a multimethod research project (e.g., moderately high distant methods might be placed in either the proximate or distant type); however, we do believe the types in the 2×2 framework allow us to group multimethod research that have significant commonality in terms of their strengths, limitations, challenges they pose, and implications for authors and evaluators.

We summarize key implications for authors in Table 1 and for reviewers and editors in Table 2. We first elaborate on the general implications for authors and evaluators related to multimethod research as they relate to the overall framework. We follow this up with more specific suggestions for both stakeholders for each of the four types within the framework.

5.1. Overall Implications for Authors

We are aware that not all multimethod projects are planned and "fixed" from the beginning; some are emergent (Creswell and Plano Clark 2018) based on findings in the initial strand using a particular method or introduced as a result of the review process in response to reviewer or editor demands. Whether fixed or emergent, we have the following general advice for the authors.

First, it is essential for authors to clearly understand and articulate the specific role that each method plays within the overall project. This includes explaining how the methods relate to one another and the overall research objective. For instance, authors should consider whether the use of multiple methods is intended for triangulation—to validate and replicate findings and inferences across methodological approaches, compensation—to offset the limitations of one method with the strengths of another, or expansion and other forms of complementarity—to combine distinct capabilities of each method to generate richer, more nuanced, or broader insights. The relative weighting of each method within the overall design (e.g., dominant–less dominant versus balanced integration) must also be reflected upon and specified. Clarifying this up front in the paper not only strengthens the coherence of the research design but also helps evaluators assess the contribution of each strand within the overall paper. Furthermore, this would help the authors avoid the trap of thinking more is always better, that is, adding unnecessary methods and layers of complexity to the project (Wellman et al. 2023).

Second, authors should carefully consider the characteristics of the methods employed and the distance between the methods in the paper. This includes reflecting on the methods' paradigmatic assumptions, the nature of data and techniques used, and temporal orientation. Based on these and related characteristics, authors should assess the methodological distance

Table 1. Implications for Authors

Key issues	Some considerations for authors
1. Why is there a need to use multiple methods in the project?	• Authors need to clearly articulate the precise role and need for each method (e.g., confirmation and complementarity, including compensation and expansion). • A key point to keep in mind is that, whereas review teams often appreciate the use of multiple methods, each method is typically subjected to scrutiny by experts in that method. Whereas one method may compensate for the other in some way, the quality and rigor of how one method is used does not compensate for the weak use of the other method. • One could say that multimethod projects entail a higher risk but can garner higher returns. In particular, higher methodological distance and the intertwined nature of integration (i.e., the fusion type of multimethod research) can improve the appeal of the project in terms of innovativeness of the research process and outcome. However, this may be associated with higher complexity and risks.
2. How different are the methods used, and what are the implications?	• This pertains to the distance among the methods used in the paper. Authors are advised to discuss the key differences (with respect to ontology and epistemology and other assumptions, inductive or deductive nature, theory or data-driven, and other characteristics) and the limitations and advantages arising from the distance. • When appropriate, authors should reflect on the philosophical foundations associated with the use of the methods and their integration. • Ensure the right balance of methodological expertise in the team, and include members, particularly qualified for bridging roles when methodological distances are high.
3. How are the methods integrated?	• Beyond just classifying the work as interlayered or intertwined, authors are advised to be explicit about how exactly the methods work together, using a figure if appropriate (see, e.g., Venkatesh et al. 2016a, Haag et al. 2022, Sahaym et al. 2023, Polyviou et al. 2024). • Authors need to acknowledge and address the advantages and complexities associated with the nature of integration, given the methodological distance. • Authors should critically reflect on whether the output of the methods can be reasonably combined into a coherent/unified conclusion. Carefully considering the differences and similarities in assumptions, context, and other relevant issues may be necessary.
4. Aligning research question, data, theory, methods, and resources.	• The research question must align with the theories and methods that the authors plan to use. For example, Yin (2014) classifies the nature of research questions (how, why, who, what, where, how many, how much) that different methods can address. Additionally, research methods have different capabilities in terms of theory generation and testing though there could be nontraditional uses of methods (e.g., survey for theory generation; case study for theory testing). • The proposed author team, the research question, data, theory, and methods should be planned to make the project feasible and ensure appropriate resources are available. Ambitious goals can be pursued, but they must be balanced with feasibility. Boundary-spanning authors are particularly valuable for distant method projects.
5. Managing the presentation in a limited space.	• *ISR* and similar journals have rather stringent page-length restrictions, and including all the details in the paper is challenging. The authors should consider providing an overview of the multimethod aspect of research in the body of the paper (particularly focusing on the role of each method, the distance, which method is dominant, the design trade-offs, the integration approach, and the value addition in terms of contributions resulting from the use of multiple methods), and provide details in the appendix.
6. Managing reviewer and editor nominations (and inputs).	• Authors should consider nominating some reviewers and editors who have either undertaken multimethod research or have experience with multiple methods (it is not essential that they are experts in every method used in the paper but that they have some experience, and hopefully some appreciation, regarding the strengths and weaknesses of different methods). The other nominations can be based on topical expertise or interest.

between the methods, classifying them as proximate (closely aligned) or distant (substantially different).

In projects involving distant methods, several challenges arise along with associated opportunities. One challenge is that of incommensurability or, at minimum, substantial difficulty reconciling and integrating findings because of fundamentally different ontological and/or epistemological assumptions, analytical objectives, or even levels of analysis because of the nature of the theory used and the data analyzed. Another challenge is that such projects may require research teams with specialized expertise across a broad spectrum of methods and team members with overlapping or integrative skill sets capable of bridging the gap between the different traditions associated with the methods used. The impact of the distance

Table 2. Implications for Reviewers and Editors

Key issues	Some considerations for reviewers and editors
Is there a need for the use of multiple methods? Were they properly justified? Should more methods be added?	• Every method has limitations and boundaries. A key consideration for the review team is determining whether the use of a multimethod approach adds sufficient value to the paper. • Is more necessarily valuable? Reviewers should reflect carefully on whether a request to add another strand with a different method is necessary and/or critical to the goal of the paper.
How should reviewers approach multimethod manuscripts? On which methods should reviewers focus?	• Reviewers should be encouraged to reflect on their own knowledge and biases (and limits of their knowledge) about the methods used. A critical requirement is to be open and charitable. • If distant methods are being employed, the reviewers should be balanced regarding their expectations about different methods. Their in-depth critique should be about the method in which they have expertise and they should thoughtfully examine what the other (potentially distant) methods bring to the table, working together.

How were the methods integrated?	• Review teams may consider the following questions in their assessment:
	  • Which form of integration is used? Does this align with the research objectives and methods employed?
	  • Does the integration make the paper and its contributions more defensible or plausible? Is there a clear value addition because of the integration of the methods?
	  • Is there a well-grounded and credible reasoning or justification underlying the integration approach of the methods used?
	• Reviewers should understand that each method and various aspects of integration cannot be comprehensively discussed in a reasonably sized paper (not a book).

What are some editorial practices to keep in mind?	• Editors are required to make a judicious choice of members of review teams. Each reviewer may need to have expertise in at least one of the methods employed, preferably more than one. Furthermore, whenever possible, there should be at least one member in the review team to cover each method used in the paper. • Clear communication is needed in the review team so that reviewers understand who will focus more on which aspects of the paper. It is important to focus on the details but also the big picture of what is accomplished through the use of multiple methods. • Editors themselves should have a broad outlook. It can be beneficial for editors to have core expertise in the dominant method in the study (if any), and some familiarity with the other methods employed. • Most importantly, they must be open to considering the merits of combining methods, including those with which they are not familiar.

between the two methods is likely to be less critical when one method is significantly more dominant. It is also helpful for authors to consider how these issues may play out in the peer-review process. Nominating suitable editors and reviewers and alerting the editor about the nature of multimethod work could be helpful.

Third, authors should make the integration strategy employed in the paper explicit, when appropriate, to ensure that readers can see how the multiple methods work together in a coherent and practically meaningful way. This is especially important when the paper involves distant methods, which may be grounded in divergent epistemological and/or ontological assumptions. In such cases, it is critical to clarify how the methods are practically combined and how the process of combining them is theoretically and philosophically justifiable. To support this integration, authors may draw on established philosophical traditions that justify the combination. For instance, pragmatism emphasizes practical utility, allowing researchers to selectively employ methods based on their efficacy in addressing the research question. Critical realism offers a layered understanding of reality, accommodating distant methods by recognizing the interplay between observable phenomena and deeper theoretical mechanisms. Dialectical pluralism encourages intentional engagement with diverse paradigms and their productive tensions. It promotes an integration that draws from each method's contributions, striving for a higher order synthesis (Creswell and Plano Clark 2018). By clearly articulating the philosophical foundations and logic of integration, authors enhance the transparency and credibility of their multimethod design and help readers, reviewers, and editors appreciate the coherence and validity (as defined within each tradition) of their approach.

We have discussed two broad approaches for integration (interlayered and intertwined) and the variations within each type of integration. However, it may be useful for authors to go into more details beyond these general terms and provide more insight into the specific integration approach in the paper, possibly providing a figure that shows how the (two) methods interact (e.g., Polyviou et al. 2024 propose a helix model). Other papers that are explicit in showing the integration

approach include Sahaym et al. (2023), who use an adaptation of Agar's depiction of the hermeneutic circle, and Venkatesh et al. (2016a), who show the integration of methods through a timeline diagram.

5.2. Overall Reviewer and Editor Considerations

Editors may struggle to assemble a balanced review team that adequately represents constituent methodological domains, especially when the methods are distant and span distinct paradigms or when the editors are less familiar with one of the methods. This difficulty reinforces the importance of authors clearly articulating and justifying the rationale for using multiple methods and transparently explaining how the methods are integrated. Doing so not only strengthens the internal coherence of the paper but also facilitates a more informed and fair evaluation by reviewers with varied methodological expertise.

First, reviewers evaluating multimethod papers should critically consider the intended goal of using multiple methods (e.g., confirmation, complementarity, and other purposes listed in prior discussions such as Venkatesh et al. 2013). Specifically, they need to assess if and to what extent using another method and associated research design helps address the limitations of the preceding method, for example, in terms of causal interpretation, measurement precision, internal and external validity, mechanism exploration, alternative explanations, or adding to the broader or more nuanced understanding of the focal phenomenon. Furthermore, reviewers should assess the consistency between the executions of different methods. They might consider how the authors ensure that the conclusions drawn from confirmation and forms of complementarity, including compensation attempts, are valid for certain method combinations. In some instances, they need to be assured that differences in the research setting, stemming from methodological differences, do not introduce additional confounding issues. In other words, conducting a second study with a compensatory purpose may be beneficial if the setting of the second study represents a theoretically and contextually comparable setting as the first study. For example, a research project focusing on online reviews may allow an author team to create an experimental scenario that closely mirrors the real-world user experience initially examined through an econometric study's lens. Such replication may not be feasible in other domains, such as digital transformation in a healthcare organization. In other words, whereas a second study may replicate and extend the first study's findings, the authors must ensure that the methodological differences between the two approaches are reconciled theoretically and contextually. They should be able to attribute replication (or lack thereof or new findings) to the research design rather than to methodological artifacts (e.g., differences in realism leading to different observed effects). Similarly, field and laboratory experiment participants have different inherent motivations in their research settings. As laboratory participants are typically paid and lack the real-world drive for certain treatments, the authors should carefully discuss these differences and how they might affect observed differences (or consistency) between the results from different methods. In this regard, the idea and best practices of a "laboratory in the field" seem particularly appropriate (see Gneezy and Imas 2017).

A related question is whether and under what circumstances reviewers might request authors to add a new method to compensate for the limitations of the existing method. It is important to recognize that such additions are more appropriate in some contexts than others, and in some instances, it may not be feasible to add a strand using a different method. Reviewers should be mindful of the feasibility of such requests and the intended goal. For example, user-level studies are more conducive to certain methodological combinations than firm-level studies or those aiming to generate broad societal implications because of the greater difficulty in replicating the research setting and recruiting appropriate subjects. Another point worth emphasizing is that no research is perfect and complete, and one can always seek to gain more confidence in the results or gain broader and better insights by adding additional strands with similar (or dissimilar) methods. This makes it imperative for reviewers to carefully weigh the gains of requesting the addition of another method against the effort and risks involved for the authors.

Second, reviewers are often recruited for specific methods expertise. However, in evaluating multimethod papers, reviewers need to have a charitable perspective for methods that they are not experts (or believers) in. They are urged to evaluate such papers holistically and focus on what each method brings to the table rather than being unreflectively critical (or dismissive) of the unfamiliar method. In addition to subject experts and those with expertise to assess individual method(s) used, scholars with experience in spanning relevant methodological and disciplinary boundaries may be indispensable when evaluating multimethod research.

5.3. Implications for Research Within Each Type in the Framework

Beyond the general guidelines for authors and evaluators, we offer implications that may apply to specific types of multimethod research. Given the wide variety of papers in each type, we must acknowledge that the implications highlighted here represent some frequently observed patterns and tendencies rather than truisms.

We first discuss the implications for the *assembly type* of multimethod research (i.e., proximate methodological distance and interlayered integration). Authors should note that, whereas review teams often appreciate the use of multiple proximate methods in an interlayered way to enhance rigor and validity, each method is typically subjected to scrutiny by experts in that method. Whereas one method may compensate for the other in some way, the quality and rigor of how one method is used do not compensate for the weak use of the other method.

Authors using a juxtaposed interlayered design geared toward compensation of each method's limitation are advised to make the compensation contract explicit. They may consider including a table in the paper to list, side-by-side, specific limitations or threats to the validity of each method and identify the precise way the two methods mitigate/compensate for each limitation. Authors adopting a sequential interlayered design using the output of one method to inform the design or execution of another, are advised to indicate the hand-off logic between methods explicitly. When appropriate, authors should consider showing exactly how insights, measures, or parameter estimates from one method shaped the design or execution of another and identify the advantages over the traditional design or execution commonly used in a single-method approach. Authors are also advised to discuss epistemological alignment when possible. In other words, authors should consider devoting some text in the paper or the appendix to explaining to what degree the two proximate methods share compatible assumptions and where they differ. They also need to explain how the methodological differences between the two approaches are reconciled, especially when convergence is the goal. Some discussion on how potential confounds introduced with the second method was minimized, say, through the use of the same subjects or using as similar a context as possible, may prove helpful for certain method combinations.

With regard to the evaluation of multimethod papers, key considerations are the necessity and the adequacy of using multiple methods. For proximate methods, whereas it is relatively easier for the authors to conduct a study using another method, evaluators should assess whether it is necessary to use a multimethod approach either as a confirmatory or as a complementary (including compensatory) purpose. If the evaluator determines that a multimethod approach is necessary, evaluation should not only consider the appropriateness and rigor of the individual methods but also whether the integration of the methods is valid and achieves the goals stated by the authors. With regard to recommending the addition of a proximate method to authors, a few points may be worth considering. In some cases, evaluators may recommend that authors add a proximate method to address limitations of their original method. In doing so, evaluators should recognize that such designs are more appropriate in some contexts than others. For example, in certain cases, it may not be feasible to construct an experimental scenario corresponding to an econometric study. It may be very challenging to set up certain experimental manipulations (e.g., related to ethics), to achieve feasible realism, or to manage the cost of the study. In some cases, it may be reasonable to suggest a multimethod approach to compensate for shortcomings of the current method (for example, in the case of a field experiment that cannot be rerun, a laboratory experiment can be suggested by the review team). Yet, in doing so, evaluators must be conscious not to add to the workload of the authors unreasonably and without due gains from the additional methodological strand requested.

For the *blend type* of multimethod research (i.e., proximate methods with intertwined integration), authors should be aware of the possibility of utilizing proximate methods (either because of their inherent nature or because of their common paradigmatic stance) in a complementary fashion. Proximate methods usually pursue common research objectives and are used in a manner in which researchers seek to confirm (or disconfirm) findings from one method using another. However, complementary synergies from proximate methods can sometimes be obtained in an intertwined configuration. When adopting an intertwined design approach, authors can pursue an interplay configuration or an iterative combination of the constituent methods. The interplay configuration allows for the outputs of one method to shape the second, influencing the use of the first method. This contrasts with an iterative design in which the two methods mutually inform each other over multiple iterations. Both methods offer advantages pertaining to multiple aspects of complementarity, though richer insights can be expected from iterative intertwining. In both intertwining cases, authors may leverage the integration of proximate methods to obtain benefits beyond confirmation and simple compensatory uses. For intertwined integration papers, authors are advised to provide a detailed interactive figure (or interplay figure) and explicitly identify the value add in each iteration/interplay. When applicable, authors are also advised to harmonize constructs across methods and include a construct map that shows how the same construct is operationalized across different methods. In this type of multimethod research, authors must take into account the disadvantages of tight coupling for certain methods, such as ripple effects of changes or errors in one method on the other method during study execution. These interdependencies are likely to be less severe for interplay cases as compared with iterative designs.

Considering the range of method combinations that could be proximate in application (either because of

their inherent nature or their specific purpose of use, for example, theory generation or testing, and confirmatory or exploratory roles), the review team required for papers in this type often needs to have a level of diversity in expertise. Reviewers should also have an understanding of the nature of intertwining and the challenges and gains associated with it. Most reviewers may not be familiar with the possibilities and constraints afforded by interplay and iterative combinations of proximate methods, and this places a greater burden on authors to explain their designs.

Next, we discuss the implications of the *bridge type* of multimethod research (i.e., distant methods with interlayered integration). As distant methods can produce divergent results, authors using such methods may consider developing a divergence protocol. The protocol might state in advance how authors plan to address potential divergence and leverage the potential theoretical–empirical tension. Authors must understand that divergent findings may emerge from the different strands (e.g., when empirical findings do not fully align with analytical predictions) and be ready to reconcile the divergence meaningfully. When authors combine distant methods, the meaning of key concepts can shift across strands without them realizing it. For example, for a project with analytical modeling and experiments, authors should avoid creating a disconnect between analytical insights and experimental execution. In embedded designs, the plug-and-play approach has its caveats, for example, constructs operationalized through predictive modeling may carry measurement errors, which can interact with later regression models in econometrics and bias the estimations. For papers leveraging distant methods, the authors are advised to elaborate on the value add early in the study. Authors may consider articulating what could not have been learned without combining the two distant methods. They should also recognize that stacking multiple methods to artificially inflate contribution, particularly for distant methods that are interlayered, is usually not helpful and can be counterproductive. Whereas distant multimethod designs have the potential to produce novel insights, the inherent differences could result in contributions perceived as ambiguous and indefensible.

Because the methods are loosely coupled and used in a modular fashion, editors may be able to recruit reviewers with deep expertise in each method for evaluation. Because distant methods are involved, reviewers likely will not possess expertise in all the methods employed. In such cases, editors' detailed guidance or a review coordination plan will be helpful. Distant methods are often integrated to complement each other. Evaluators must assess whether central insights could have been reached with a single method and ask authors to provide a detailed justification of the value of integrating distant methods. Suppose a new (and distant) method is added to the paper during review. In that case, the editors may want to onboard a new reviewer with pertinent expertise in the newly introduced method. The idea behind this is that the original review team may not have the expertise in and may even hold implicit bias against the new method introduced during the review process because of their research training and lack of familiarity with the method. Importantly, reviewers should be encouraged to reflect on their own knowledge and biases (and limits of their knowledge) about the methods used. If a reviewer is not well versed in one of the methods employed, disclosing such information to the editors and authors can be helpful, and the reviewer may focus on the method in which they have deep expertise and assess the others charitably based on what they add to the study.

Finally, we discuss implications relevant to the *fusion type* of multimethod research (i.e., distant methods with intertwined integration). This is the most complex type of multimethod research in our framework, and one that we believe holds much potential. Considering the challenges and opportunities of integrating distant methods in an intertwined fashion, authors need to be fully cognizant of the trade-offs involved in undertaking such projects. On the one hand, this combination allows for tackling ambitious problems in IS research with significant payoffs. On the other hand, the complexity of carrying out such designs in terms of team expertise, time, and other resources must be carefully weighed against the potential benefits. Combinations of highly distant methods (e.g., analytical modeling and interpretive case study) afford significant opportunities for authors. Such next-generation combinations are rare and could be highly valued for the unique insights they may generate. Many editors and review teams can also have a positive inclination toward such papers because of the novel combination. These designs require creative thinking and careful planning from author teams to bring together the diverse expertise needed and enable authors to communicate effectively around a common problem. As in the blend type of multimethod research, when adopting an intertwined design approach, authors may choose to pursue an interplay configuration or an iterative combination of the constituent methods. Whereas iterative intertwining offers the possibility of larger gains, it adds complexity because of tight coupling and also requires more time/resources to carry out multiple back-and-forth steps. This necessitates formulating clear stopping rules as in action research design to keep the complexity manageable. Research of this type (particularly those with distant and iterative intertwined characteristics) can radically change the theoretical foundations and even research questions during the project. Again, this

can be seen as an opportunity or a risk, depending on the research team's perspective.

From the editorial standpoint, this is a particularly challenging type of multimethod research for which to recruit reviewers. It is unlikely that a single reviewer has the expertise to span highly distant methods because such a range is not typically part of researchers' disciplinary training and interest. Considering the likely absence of overlapping expertise, the problem becomes one of combining the judgments of different reviewers, especially when the methods are similarly dominant in the design, but who have different strengths (and limitations). A charitable view on the method with which the reviewer may not be familiar is called for, with a focus on what this alien method seeks to achieve broadly and how the integration with the familiar method occurs. Editors need to focus on the appropriateness and rigor of each strand but, even more, on the holistic view of the contributions based on the reviewer evaluations, which could take very different perspectives based on the vantage points. When combined with distant methods, the different types of intertwining pose additional requirements on reviewer teams for papers in this type. In such cases, detailed editorial guidance and coordination is necessary. Reviewers are even less likely to be familiar with the possibilities and constraints afforded by interplay and iterative combinations of distant methods. This further increases the responsibility of authors to explain their design decisions and the way integration was carried out.

6. Concluding Remarks

In this editorial, we recognize the growing importance of multimethod research in IS and propose a framework to classify them. We hope that the framework can provide clarity and guidance for researchers, research project leaders, authors, and evaluators in assessing the value, trade-offs, and appropriate applications of combining multiple methods within a single research project or manuscript.

We believe that the ongoing digital transformation of nearly every aspect of society and the rapid advancement of artificial intelligence technologies compels information systems scholars to adopt more openness and flexibility in their approaches. Relying on a single methodological tradition is increasingly seen as insufficient for capturing the multifaceted nature of many new IS phenomena and problems. Whereas challenging, multimethod research presents an opportunity to grow and discover phenomena that would otherwise have escaped attention. For example, analytical modelers can benefit from a better understanding of how their formal models perform when implemented in real-world settings. At the same time, qualitative researchers can gain from developing a deeper (technical) knowledge of how AI systems are designed, trained, and deployed. Without a culture of valuing such mutual understanding among methodological traditions, the field risks becoming fragmented or missing important connections between theory, design, and practice discerned in different parts of the scholarly community.

Engaging in multimethod research, however, is not without pitfalls, especially in this new era marked by unprecedented data availability, a wide array of methodological tools, and rapidly evolving research contexts. Researchers need to be aware of potential issues, such as mismatched epistemological assumptions, difficulties in integrating findings, and practical challenges in team collaboration and the review processes. We believe it is crucial to reflect not only on the general challenges of multimethod work but also on those that pertain to the specific characteristics of the study. Understanding why these pitfalls occur—and, more importantly, how to navigate them—is essential for the continued advancement of rigorous and impactful IS research.

With the above discussions in mind, we issue a fervent call to the information systems community to wholeheartedly embrace multimethod research as a strategy for generating more valid inferences; richer insights; and, broadly, contributions that are theoretically grounded and practically relevant in line with the values of engaged scholarship (Van de Ven 2007). The advantages are clear: multimethod research can triangulate findings, and complement each singular method to elevate impacts beyond its siloed use, compensating for the limitations of individual methods, and expanding to new dimensions of scientific inquiry that would be missed if a single methodological lens were used. Multimethod research also breaks down paradigmatic walls and prejudice for alien methods, and that can lead to a more coherent research community in IS.

Our review of the recent multimethod research in IS provides compelling examples, ranging from machine learning paired with field experiments to case interview insights intertwined in analytical modeling, demonstrating the creative potential of well-integrated methods. Indeed, we believe that researchers are gradually moving toward the intertwined use of distant methods because of the potential and appeal of such projects from the more traditional interlayered integration of proximate or moderately distant methods. We encourage researchers to see multimethod research not as a compromise but as an opportunity to pursue bold and innovative methodological combinations, thereby connecting subcommunities, enhancing rigor, and expanding the boundaries of what IS research can achieve.

Acknowledgments

All authors contributed equally. The first three listed authors formulated and led the project. The authors are

grateful to a number of colleagues who provided feedback and encouragement. They include Sutirtha Chatterjee, Jennifer Claggett, Nina Huang, Akshat Lakhiwal, Abhay Mishra, Jeff Parsons, Saonee Sarker, Lanfei Shi, Chuan-Hoo Tan, and Lior Zalmanson. The authors interacted with a generative artificial intelligence (GenAI) application, ChatGPT, in the early phases of the project to get a sense of the literature and to refine initial ideas. However, the ideas presented in the editorial represent the contribution of the authors. The authors take full responsibility for the content and its accuracy.

Endnotes

[1] We acknowledge the fact that one could have multimethod research programs or conduct multimethod projects of which only a part involving one method is included in a manuscript. However, for this editorial, we focus on papers that embody the use of multiple methods within a single manuscript.

[2] Readers generally familiar with the development of mixed/multimethod research may wish to skip this section in their initial reading. We include this section in the editorial for the sake of completeness in covering the topic.

[3] These are complementarity, completeness, developmental, expansion, corroboration/confirmation, compensation, and diversity (see Venkatesh et al. 2013 for details).

[4] Our search included the following journals: *Information Systems Research*, *MIS Quarterly*, *Journal of Management Information Systems*, *Management Science* (limited to articles from the information systems department), *Journal of the Association for Information Systems*, *European Journal of Information Systems*, *Information Systems Journal*, *Journal of Information Technology*, and *Journal of Strategic Information Systems*. We also included accepted papers from ICIS.

[5] Note that the list of papers presented in Online Appendices A and B is not intended to be definitive or exhaustive. Many authors may have employed multiple methods without explicitly acknowledging their work as multimethod, perhaps because of a lack of familiarity with the conceptual nuances of such designs.

[6] A meta-review by Molina-Azorin and Cameron (2015) finds that the vast majority (as high as 87% in certain business disciplines) of empirical papers in business journals employ a single quantitative method. They find that the percentage of mixed methods papers ranges from 2% to 17% across different business disciplines. This range is likely to go up if we consider multimethod papers published in business journals.

[7] To help make the presentation less complicated, we make the simplifying assumption that a multimethod research inquiry/project involves two strands even though more methods can be involved. Most of the ideas presented can be extended to research projects or manuscripts with more than two strands.

[8] This is somewhat related to whether the approach is data-driven or theory-driven (Johnson et al. 2019).

[9] We do agree with the assertion of Maxwell et al. (2015) that some level of integration perhaps happens at all stages (including design and execution), but it may not be represented as such in a particular paper. We are concerned only with the situation when integration is evident in the paper.

[10] Whereas the term "strand" is used in different ways in the literature, we use it to represent different parts of the study involving different methods (e.g., Venkatesh et al. 2023).

[11] It is worth noting that novel methods might emerge by combining distant methods. One recent example is the development of counterfactual estimation methods and, notably, matrix completion (Athey et al. 2021), which combines data science (e.g., prediction) and econometrics to improve causal inference.

[12] This framework is then tested in a real-world based case study (strand 3), which operates somewhat independently as in interlayered integration.

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