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Leveraging and Fostering Diversity in the IS Discipline: *Intra*disciplinary Knowledge Building via the IT View-IS Phenomenon (VP) Matrix

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ABSTRACT

*Intra*disciplinary research refers to research that integrates ideas often associated with different research domains in a discipline. Such cross-fertilization leverages abundant diversity present in the IS discipline to tackle increasingly complex IS problems and grand challenges. Despite its importance and recent attention, a concerted, sustained effort toward intradisciplinary research is lagging. A fundamental issue we see is a lack of an elaborate IS research map that effectively shows similarities and differences among research domains and demonstrates types of ideas that may travel and integrate into different domains. We thus aim to propose an elaborate IS research map and compile research elements that can be tried and combined across research domains. To do so, we utilize two IS classics (i.e., IT views and IS phenomena), identify their complementarity, and interweave the two disparate ways of portraying the IS research field. The resultant view-phenomenon (VP) matrix specifies research domains based on two consistent, comprehensive criteria and helps researchers discern similarities and differences among research domains more effectively. The VP matrix also sheds light on a variety of research elements that can flow across research domains. The VP matrix along with the research elements together facilitate intradisciplinary efforts and, more broadly, help the IS discipline to prosper. The VP matrix is particularly helpful for doctoral students and young scholars.

Keywords: IS Discipline, Intellectual Diversity, IT Views, Is Phenomenon, Research Domains

Ⅰ. Introduction

Let's consider the following scenario:

John is a junior IS scholar. He has been examining organizational IS impacts by using interpretive approaches. John comes across an editorial (Goes, 2013b) and decides to take a bold step into intradisciplinary research, which he understood as integrating ideas from different IS traditions. He thinks

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he first needs to understand IS traditions to be able to cross the boundaries. It appears challenging. He feels like the traditions are big and fuzzy and more importantly is not quite sure how the traditions are related to one another or what could be integrated across them. He goes to a conference. A colleague working in the same area tells John that her work is behavioral (she means technical vs. behavioral), but John thinks to himself that his and her work both is organizational. With much confusion, John decides to stick to what he has been doing all along, at least for now.

The above scenario is not too much of a stretch if a doctoral student or young IS scholar envisions or attempts *intra*disciplinary research, especially given that "graduate students are often trained well in one of the streams but lack the perspective of the other IS approaches" (Goes, 2013b, p. 3). Intradisciplinary research refers to research that integrates ideas often associated with different research areas in a discipline (Goes, 2013b). Unlike *inter*disciplinary research where IS researchers "import" ideas from other disciplines, intradisciplinary knowledge building entails both importing ideas from other IS domains and exporting ideas from one's home to other IS domains.

The key promise of intradisciplinary research is that we can be more efficient and effective in tackling grand challenges and increasingly complex IS problems when we actually look closely into our own cumulative knowledge (mature enough to influence other disciplines (Yoo, 2013)) and leverage the abundant diversity that IS researchers have built for decades (Burton-Jones et al., 2023; Goes, 2013b). Despite this importance and calls for intradisciplinary knowledge building (Goes, 2013b; Rai, 2018), a concerted, sustained effort toward such type of research is lagging (Rai, 2018; Tarafdar et al., 2022).

A fundamental issue we see is that previous studies do not provide an elaborate *IS research map*. Intradisciplinary research hinges on the premise that researchers are mindful of other domains alongside their home domain, invest diligently in those "foreign" domains within the discipline, and appreciate and recognize the knowledge and expertise accumulated in those domains. These activities all bank on a research map that effectively informs researchers of similarities and differences among diverse IS research domains and demonstrates types of ideas that may travel and be integrated across those domains. A clear, elaborate IS research map thus demonstrates what is possible when one attempts and conducts intradisciplinary research. Also, an IS research map charting enduring IS research domains is critical in evaluating intradisciplinary knowledge at different points in time.

In this paper, we thus aim to propose *an elaborate IS research map that captures diverse enduring domains in the IS discipline, highlights similarities and differences among them, and sheds light on various research elements that can flow across research domains.*

To create such a map, we heed the importance of a cumulative tradition in advancing science (Tiwana and Kim, 2019) and utilize two seemingly unrelated IS classics: the IT views by Orlikowski and Iacono (2001), hereafter O&I, and the IS phenomena by Benbasat and Zmud (2003), hereafter B&Z. The views and phenomena are enduring, which facilitates a cumulative tradition, and are IS disciplinary, which helps portray diverse IS research domains for intradisciplinary knowledge building. Though comprehensive in its own, neither perspective alone is complete nor detailed enough to map the IS research field. O&I only describes views taken by studies;

B&Z only describes phenomena typically studied in the IS discipline. We thus identity their complementarity and interweave them to facilitate intradisciplinary knowledge building.

The resultant view-phenomenon (VP) matrix specifies research domains based on two consistent, comprehensive criteria and helps researchers discern similarities and differences among research domains more easily. The VP matrix also sheds light on a variety of research elements that can flow across research domains and serves as a foundation for strategic suggestions.

Ⅱ. Conceptual Backgrounds

2.1. Intradisciplinary Knowledge Building and its Foundational Problem

Intradisciplinary research finds its roots in the long tradition of fostering diversity in the IS discipline. Diversity has been fostered in the form of variety, which highlights generating new types of research and incorporating ideas from reference disciplines (Benbasat and Weber, 1996; Robey, 1996; Rowe, 2012). Diversity has been fostered in the form of pluralism, which highlights utilizing multiple types of (often seemingly conflicting) research elements—e.g., using different methods in a study (Ågerfalk, 2013; Mingers, 2001; Müller et al., 2020; Venkatesh et al., 2013). Diversity has been fostered in the form of balancing, which highlights recognizing a lack of existing certain types of research and promoting them—e.g., promoting more interpretive research (Boland, 1985; Burgess et al., 2017; Clarke and Davison, 2020).

Incorporating the ideals of variety, pluralism, and balancing, intradisciplinary research started gaining attention (Goes, 2013b; Rai, 2018). Unlike the other forms, however, intradisciplinarity highlights being mindful of various *research domains* within a discipline and leverages the accumulated knowledge and expertise through cross-fertilization. Intradisciplinary research thus promotes a *variety of research* within each research domain often through *pluralistic approaches*, ideally resulting in *balanced knowledge across different research domains*.

Intradisciplinary knowledge may be facilitated based on different types of a research "map"—a collection of categories describing research domains. The IS research field has been mapped based on traditions/paradigms/research streams, hereafter simply traditions, (Banker and Kauffman, 2004; Rai, 2018); based on topics (Nevo et al., 2009; Sidorova et al., 2008; Tarafdar and Davison, 2018); based on IT views (Grover and Lyytinen, 2015; Orlikowski and Iacono, 2001; Sarker et al., 2013); and based on IS phenomena (Ayanso et al., 2007; Benbasat and Zmud, 2003; Ives et al., 1980). Goes (2013b) and Rai (2018) in their editorials illustrate intradisciplinary research through the common lens of traditions (<Table 1>).

These traditions may be useful in conveying the notion of intradisciplinary research and illustrating its implications. They, however, have limitations as a foundation for intradisciplinary research. First, grasping the traditions themselves and their boundaries can be challenging—especially for doctoral students and junior scholars.[1] The challenges and confusion stem (1) from the fact that one tradition is categorized based on a paradigm (i.e., design science)

1) Intradisciplinary knowledge building without a clear map might still be possible. However, such an approach could easily result in overflowing intradisciplinary insights only in a few areas, as illustrated by a heavy concentration of effort in Technology Acceptance Model (TAM) related research (Lucas et al., 2007) and by a dominant script that primarily churns out middle-range theories to the detriment of the IS discipline (Grover and Lyytinen, 2015).

<Table 1> Four Traditions (source: Rai, 2018, p.3)

Tradition	Description
Behavioral IS	Behavioral IS researchers investigated research questions related to micro- or meso-level IS phenomena (e.g., IS use, decision making, trust), informed their work by drawing on theories from reference disciplines such as psychology and social psychology, and used social science research methods such as surveys, lab experiments, field studies, and qualitative approaches.
Organizational IS	Organizational IS research (e.g., IS capabilities, governance) informed their work by relevant macro-level theories in strategy, economics, industrial-organizational psychology, and organizational sociology, and used a combination of social science and economics related methods.
IS Economics	IS economics researchers investigated research questions related to value of IS (e.g., IT business value), informed their work by drawing on theories from economics and used economics research methods such as analytical modeling and econometrics.
IS Design Science	IS design science researchers informed their work with kernel theories and created and evaluated IS artifacts to solve problems and establish new (better) realities.

and the rest based on topics/themes or levels of analysis (e.g., if a study develops an IT governance mechanism—an IT artifact according to Hevner et al. (2004)—through an inductive case study, does it fall under design science or organizational IS?); (2) from the usage of the same term in different manners (the behavioral tradition also encompasses all three behavioral, organizational, and economics of IS (Hevner et al., 2004; Stewart et al., 2017)); and (3) from the common belief that a certain topic or construct mainly operates in a certain tradition (e.g., trust mainly discussed in behavioral IS (Gefen et al., 2008; Rai, 2018)), when it can actually operate in others.

The second limitation is that seeing IS research through traditions invokes the deeply-ingrained mental model emphasizing differences among the traditions, and this constrains recognizing possibilities of idea flows across the IS discipline. For example, although much of the technology adoption and diffusion research addresses the same phenomenon, i.e., how and why technology is adopted and used and how much (Williams et al., 2009), they seem to be recognized in different IS traditions, with the former in behavioral IS and the latter in organizational IS, mainly based on the level of analysis. As a result, some theories potentially applicable in multiple traditions remain in one tradition, e.g., organizing vision theory in organizational IS (Kim and Miranda, 2018).

The third limitation is that even though many different elements constitute research, the current guidance has only highlighted integrating theories and methods as a way to conduct intradisciplinary research. That is partially because seeing the IS discipline through the traditions lens limits researchers' world view (Rai, 2018) and thus hinders a fluid flow of certain research elements—e.g., rarely examining organizational IS topics in IS Economics. To foster diversity through intradisciplinary research, it would thus be helpful to bring awareness to many different research elements—e.g., topics (Liu et al., 2016) and paper genres (Avital et al., 2017)—and demonstrate possibilities of idea flow across different research domains.

We believe that these three challenges together have contributed to the little discussion, guidance, or systematic evaluation of intradisciplinary research. To help address this, we propose an elaborate enduring IS research map based on two IS classics: O&I and B&Z.

2.2. IT Views by Orlikowski and Iacono (2001) – Clarification and Elaboration

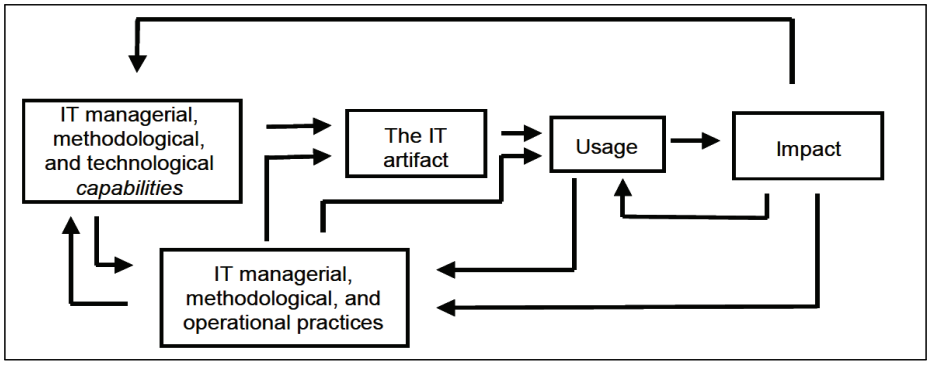
IS classics refer to studies (to be exact, their ideas) that stood test of time, proving themselves relevant and useful across an extended period of time (Rowe and Markus, 2018). O&I's IT views have been repeatedly applied to describe and evaluate the IS research field, showing its usefulness and relevance over and over (Akhlaghpour et al., 2013; Grover and Lyytinen, 2015; Grover et al., 2020; Roberts et al., 2012; Sarker et al., 2013). Because of this timeless nature and its effectiveness, we build on O&I's IT views. Applying O&I, some studies refined the original ideas while others misinterpret them. Below, we provide clarifications and elaborations based on a close reading of O&I and its ensuing studies. <Appendix A> provides more details with much specificity.

The IT view perspective consists of tool, proxy, ensemble, computational, nominal views. From the *tool* view, technology is projected as a set of features, functionalities, and black boxes that are created and settled by the technology designer. As settled artifacts, technologies produce in general what the designer intends them to produce regardless of the social, cultural, and political context in which they are embedded. Articles adopting this view typically examine the effectiveness of technologies because the technologies in the tool view are already settled. For example, Lee et al. (2015) examine how the Like feature on Facebook affects product sales. Srivardhana and Pawlowski (2007) examine how ERP leads to sustained business process innovation.

From the proxy view, technology is projected as its surrogates that embody the technology. Those surrogates include (1) technology attributes—e.g., usefulness (Moore and Benbasat, 1991), mobile application usability (Hoehle and Venkatesh, 2015), and reliability (Ayyagari et al., 2011); (2) financial, physical, emotional technology investments (Chatterjee et al., 2002); (3) magnitude and quality of activities involved in technology life cycle (e.g., IT planning sophistication, implementation success, usage rate, diffusion of IT across companies); (4) types of activities involved in technology life cycle (e.g., IT governance mechanism choice, IT operation tactics, database conceptual models); and (5) user ability and cognition involved in technology life cycle (e.g., ability to use ERP effectively, intention to use). For instance, Krasnova et al. (2010) examine how various technology attributes of social media (e.g., convenience of technology, perceived control) have an impact on self-disclosure of users. Turel and Qahri-Saremi (2016) examine how problematic use of social media (e.g., using Facebook in class) influences academic performance.

From the *ensemble* view, technology is projected as unsettled and dynamic shaped by the actors and by the given time and space where the technology is planned, developed, implemented, used, and maintained. That is, a technology is a part of a larger environment, or ensemble, constituted by different actors as well as by different social and organizational norms, values, belief, and protocols—which are also shaped by the technology. To illustrate, Kietzmann (2008) examines how an innovation manufacturer implemented, or shaped, RFID readers in a patrolling company through a practice of interactive interactions between mobile security guards (i.e., the actual end users), their managers, and the RFID manufacturer. The practice helped the managers and manufacturer discover context-specific demands and challenges, which were addressed and incorporated into the technology.

From the *computation* view, technology is pro-



<Figure 1> Benbasat and Zmud (2003)'s Nomological Net of IS Phenomena

jected as engineered optimal computing solutions. Adopting this view, studies focus on developing new higher-performing features and functionalities of technology. For instance, Li et al. (2016) develop the AZSecure texting mining system for detecting underground economy sellers. Adopting the computation view, studies also build optimization models for computing solutions to technology-related problems. For example, through an agent-based modeling, Hauser et al. (2017) examine how organizations can manage online public conflict and firestorms—an issue significantly exacerbated by social media.

Lastly, adopting the *nominal* view, studies tend to take the focus off the technology and instead sees technology as a research or business background. Here, the constructs, relationships, or processes are hardly enabled or facilitated by technology. Even if there is a seemingly technology-related construct, technology is mentioned in name only. For example, Shaw and Edwards (2005) discovered ideal characteristics of action plans that ensure employees' commitment to knowledge management: "The action plan should be achievable, focused on relevant issues, appropriate for the breadth of the situation, prioritised, and informed by the right disciplines" (p. 985). In this study, technology (assumed to be knowledge management system) is incidental and in name only.

2.3. IS Phenomena by Benbasat and Zmud (2003) – Clarification and Elaboration

Along with O&I, we see B&Z as a foundational IS classic. B&Z's network of IS phenomena[2] consists of the IT artifact and its closely associated constructs—namely, IT capabilities, IT practices, usage, and impact (<Figure 1>). Although B&Z's way of presenting the IS discipline is not without critics (e.g., Robey, 2003), their nomological net does reflect the broad IS research field socially constructed for decades since its inception.

To illustrate, by utilizing MIS dissertations from 1973 to 1979, Ives et al. (1980) showed that "MIS research is the systematic investigation of the *development, operation, use and/or impact of an information (sub)system* in an organizational environment" (p. 910). By examining submissions to *Information Systems Research (ISR)* between 1987 and 1992, Swanson and Ramiller (1993) also made a similar

2) To minimize confusion, we emphasize early on here that the nomological net by B&Z is primarily concerned with IS phenomena, not IS topics (granted, some overlap exists). The nomological net contains "the phenomena studied by IS scholars" (Benbasat and Zmud, 2003, p. 186), or "the phenomenological silo" (Benbasat and Zmud, 2006, p. 300). A topic (e.g., social media, fake news) can occur across many different phenomena. Topics tend to come and go, too.

observation: "If there is any unity to the research stream, it may be in its consistent attention to the basic issue of how *IT may best be organized, directed, and applied*" (p. 326). Moreover, by analyzing all papers published in *MIS Quarterly* and *ISR* between 1977 and 2008, Nevo et al. (2009) came to a similar conclusion: "our academic identity can be described as the scientific study of the *design, development, and management of information technologies*, as well as their *use* by and *impact* on individuals, groups, and organizations." Finally, Goes (2013a, p. 3) notes the enduring nature of the IS discipline and explains how it expanded (and will also expand) over time: "IS research is still about the *development, use, operation (management), and impact of IT*. The difference [between 1970s and now] is that the boundaries have broadened, from *inside the organization to society and everything in between, from mainframe computing to the current world of networked economies, social graphs, and the web of things*."

Indeed, B&Z succinctly captures these timeless IS phenomena. Not surprisingly, their nomological

<Table 2> Description and Elaboration of IT Capabilities and Practices

Construct		
IT Capabilities	Description	IT capabilities[a] reflect an agent's "ability to sustain IT innovation and respond to changing market conditions through focused IT applications" (Bharadwaj et al., 1999, p. 381). B&Z specify IT capabilities as IT managerial, methodological, and technological capabilities involved in IT artifact planning, development/adoption, implementation, usage, and maintenance—i.e., the technology life cycle.
	Illustration	- Managerial capabilities: agents' ability to manage members, teams, organizations, and processes during the technology life cycle - Methodological capabilities: agents' ability to utilize methods (e.g., Bera et al., 2011), such as an entity relationship diagrams (ERD) - Technological capabilities: agents' ability to leverage technologies (e.g., Microsoft Visio and LucidChart) in planning, developing, and implementing new technology (e.g., a database), and in using and maintaining the technology (e.g., SQL statement writing and database optimization).
IT Practices	Description	Practices[b] are an agent's "particular ways of working" (Aral and Weill, 2007, p. 767) as opposed to ability to work. Practices are also often referred to as policies, procedures, routines, and rules depending on the context (Dosi et al., 2001). B&Z specify IT practices as "IT managerial, methodological, and operational practices" involved in planning, developing/adopting, implementing, using, and maintaining technologies.
	Illustration	- Managerial practices: ways of managing individuals, teams, organizations, and processes (e.g., agile development) during the technology life cycle. - Methodological practices: ways of utilizing a method (e.g., crow's foot notation vs. Chen's notation in drawing an ERD). - Operational practices: ways of running and maintaining technology (e.g., in-house vs. cloud).

Note: [a] Capabilities in organizational settings are referred to as an agent's ability to produce their "characteristic output actions—particularly, the creation of a tangible product or the provision of a service" (Dosi et al., 2001, p. 1). An agent can be an individual, team, unit, organization, or community. This notion of capabilities has also been widely used in the IS literature, often also referred to as competencies and skills (e.g., Aral and Weill, 2007; Santhanam and Hartono, 2003; Saraf et al., 2007).

[b] Although entwined with capabilities sometimes, practices are nonetheless a distinct concept, referred to as a set of activities or routines undertaken to achieve organizational goals (Aral and Weill, 2007; Dosi et al., 2000; Guler et al., 2002).

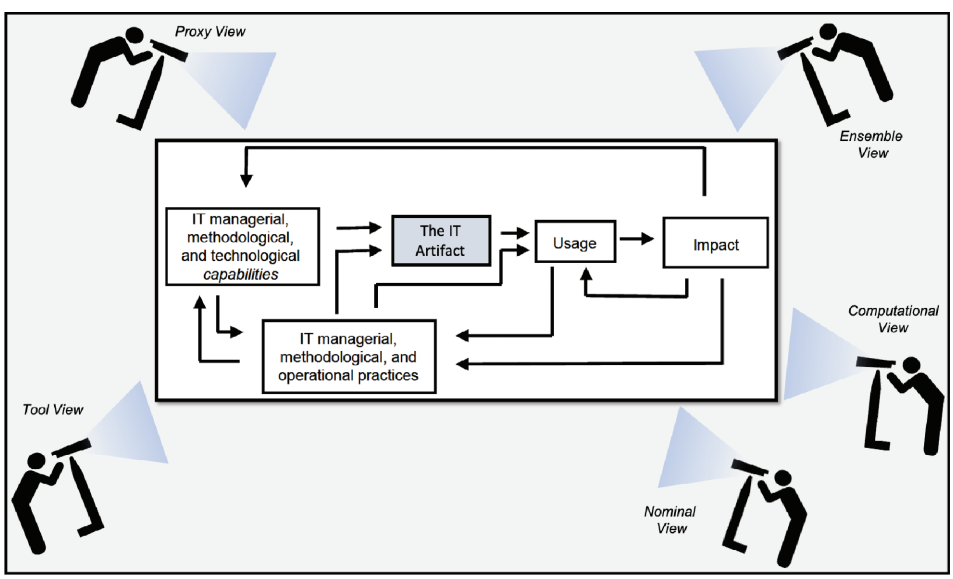
net is still widely noted to understand and describe the IS research field (Aynaso et al., 2007; Hassan et al., 2022; Nguyen et al., 2022; Tarafdar et al., 2022), revealing its classic nature. Again, applying B&Z, some studies refined the original network while others misinterpreted it. Below, we provide clarifications and elaborations based on a close reading of B&Z and its ensuing studies. <Appendix A> provides more details with much specificity.

The five constructs and their relationships with one another in the nomological net represent IS phenomena at an abstract level. For example, research investigating "impacts of social media functionalities on firm performance" can be abstracted to the "IT artifact and its impact" phenomenon. "Habitual use of social media and individuals' loneliness" can be abstracted to the "IT usage and its impact" phenomenon. Research investigating "gender differences in social media use" can be abstracted to the "IT Usage" phenomenon; it contains only a single construct, usage, from the nomological net. <Table 2> elaborates IT capabilities and practices, which particularly require further explanations to promote more consistent understandings.

In the next section, we describe how the IT views and IS phenomena perspectives can be integrated to serve as a research map for intradisciplinary knowledge building.

2.4. Complementarity between IT Views and IS Phenomena

B&Z define the IT artifact as "the application of IT to enable or support some task(s) embedded within a structure(s) that itself is embedded within a context(s)" (p. 186). The key limitation of utilizing B&Z's IS phenomena alone is that the IT artifact recognized by B&Z is from the ensemble view (Alter, 2002) unnecessarily leaving out the other views of technology and thus limiting IS research. Unlike B&Z, O&I provide views of the technology, and those views cast different light on B&Z's IS phenomena with



<Figure 2> Illustration of IT Artifact and its Related Phenomena *seen* from Different IT Views

the IT artifact at the center of the nomological net (<Figure 2>). That is, depending on one's view of technology (e.g., tool view), the meaning of the technology and the manifestation of its related phenomena change (Land, 2010).

To illustrate, an artifact is "an object made or modified by human workmanship, as opposed to one formed by natural processes" (Oxford University, 2023). A simple artifact, for instance, is chopsticks, or simply sticks depending on one's world view (Fiske and Taylor, 1991). They are an object not just physically but also mentally created by humans. To many people outside Asia, especially the young children, chopsticks are simply weird-looking smooth "sticks". In Asia, chopsticks are a "versatile tool" for eating and cooking (Zheng and Yu, 2016).

Likewise, in IS research *the same technology* is manifested as *different artifacts*. The five IT views aptly represent this. For example, from the tool view, the social media technology Facebook is a collection of settled features and functionalities that produces certain outcomes regardless of the context (e.g., Lee et al., 2015). From the ensemble view, Facebook is a collection of unsettled features and functionalities whose affordances and impacts emerge and differ depending on the context (e.g., Khan and Jarvenpaa, 2010). From the computation view, Facebook is composed of algorithms, computer code, and math equations that can be optimized for higher performance.

As can be seen from the above examples, the commonality across O&I's five IT views is hardware and/or software. In fact, O&I's definition of IT artifacts, "those bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software" (Orlikowski and Iacono, 2001, p. 121), is actually the manifestation of technology from the ensemble view—a view O&I themselves are "most sympathetic with" (Alter, 2002, p. 497). In this paper, we thus treat *technology* as hardware and/or software (Goldkuhl, 2013; Matook and Brown, 2017) and treat *IT artifacts* as *manifestations of technology according to the IT views* (<Table A3> contains examples of IT artifacts from different views).

Along with technology itself, the roles, functionalities, and impacts can be manifested differently depending on the IT view. Again, chopsticks are manifested as a versatile cooking tool in many Asian countries, whereas they are not seen as such in many others. Similarly, the same IS phenomenon can be viewed differently depending on the IT view (Goldkuhl, 2013). Land (2010) states that "many more differences in the phenomenon studied are revealed by the use of different types of telescopes" (p. 389). On the flip side, the same IT view can also be utilized to examine multiple different technologies and IS phenomena. For example, the proxy view can examine technology usage or technology impact (Ayanso et al., 2007). <Figure 2> illustrates that the IT artifact and its related IS phenomena can be rendered from different IT views.

Taken together, the IT view and IS phenomenon perspectives can be interwoven, and the interweavement highlights a fuller understanding and a wider range of opportunities for intradisciplinary research than either provides alone.

Ⅲ. Methods

3.1. Constructing an IS Research Map

With the complementarity we established between the IT views and the IS phenomena, we embarked on creating an elaborate enduring IS research map. To find a way to do so, we first disintegrated each

perspective into meaningful yet still parsimonious units—what we call building blocks. Regarding O&I, the process was more straightforward. Though O&I specified sub-views under each of their five IT views, previous studies tend to focus on only the top-level five views (Akhlaghpour et al., 2013; Grover and Lyytinen, 2015). We followed those studies and took the five IT views as building blocks for our IS research map. Importantly, this approach ensured parsimony of our resultant map while still maintaining its meaningfulness.

Regarding B&Z, the process was less straightforward—B&Z's nomological net consists of multiple abstract phenomena that needed to be first meaningfully deconstructed into building blocks. To illustrate, research investigating "impacts of social media functionalities on firm performance" can be abstracted to the "IT artifact and its impact" phenomenon. Since many studies typically examine a "relationship" between constructs, as shown in the example above (Benbasat and Zmud, 2003), we took relational pairs of constructs (e.g., Usage − Impact) from the nomological net as building blocks. Additionally, we took single constructs from the nomological net as building blocks. Research investigating, for instance, "gender differences in smartwatch use" can be abstracted to the "IT Usage" phenomenon; it contains only one construct, usage, from the nomological net. Gender differences is not a part of the net. In total, we took 10 relational pairs and four single-construct building blocks from B&Z. We excluded Impact as a single-construct building block. Unlike the other four constructs, Impact cannot exist alone—it needs antecedents (e.g., Usage).

We experimented with the views and phenomena by creating different types of diagrams such as three-dimensional cubes and multiple separate visualizations (e.g., each diagram with one view projecting all phenomena). To achieve our aim laid out in Introduction, our map needed to provide an overview of the IS research field, a comprehensive view of research domains constituting it, and the relations among the identified domains. After much exploration, we determined that a single two-dimensional map would be as effective and useful. It could meet all three criteria listed above. It is simple and easy to understand. Visualization principles dictate that a simple visualization be chosen in such cases (Tufte, 2001).

To express the complementarity that an IS phenomenon can be viewed from different viewpoints, we put the IT views on the horizonal axis of the map and the IS phenomena on the vertical axis. This approach allowed each phenomenon to be intersected by the five views, creating a matrix of 70 intersections representing research domains. Together, they depicted the IS research field.

At this stage, we noticed that the 70-cell VP matrix was somewhat unorganized and needed further structuring. We saw an opportunity in grouping the relatively many 14 phenomena. We grouped them into four umbrella phenomena by the dependent construct. The umbrella phenomena include (1) Capabilities & Practices, (2) Planning, Development/Adoption, Implementation, Maintenance/Evolution (PDIM), (3) Usage, and (4) Impact. These umbrellas are also consistent with previously identified broader IS phenomena—e.g., IT development, deployment, and use; IT management and organization; and IT impacts (Jasperson et al., 2002). The phenomena in the Capabilities & Practices umbrella focus on capabilities and practices—in particular, their execution, development, choice, and quality, to name a few. The phenomena in the PDIM umbrella focus on cognition, ability, and behavior involved in those activities. The phenomena in the Usage umbrella

center around IT artifact usage. The phenomena in the Impact umbrella focus on the effectiveness and efficiency of IT artifacts.

3.2. Identifying Research Elements

A research study is comprised of multiple research elements. O&I's IT views and B&Z's IS phenomena are indeed two of them—i.e., an IS research study entails an IT view and an IS phenomenon. For intradisciplinary research we advocate in this paper, the views and the phenomena together serve as a foundation (i.e., a map). That is because they are enduring, which facilitates cumulative knowledge building,[3] and are also IS disciplinary, which can help portray diverse IS research domains for intradisciplinary knowledge building.

With the VP matrix in hand, we embarked on identifying other key research elements that research studies typically entail and thus can be used, developed, and accumulated in research domains over time. These elements can be considered as "ideas" (e.g., theory, genre, topic, methods) that may be rich in one domain but not in others. They could flow and be integrated across the VP matrix.

Some elements surfaced straightaway based on our own research experience. We then looked into editorials, commentaries, reviews, and issues & opinion papers in leading IS journals. They often propose new ideas and resurface old ones worth examining and considering. We also searched Management journals for further resources. Some innovations emerge earlier in that discipline, such as qualitative comparative analysis (QCA). Through this process, we complied 14 research elements along with their examples. Though we strove to be extensive with the list and to include many examples, the list is by no means the final—especially given the ingenuity of IS researchers. The list is meant to stimulate creativity and provide a starting point. We, as a community, should continue to refine and expand the list as we move forward.

3) A cumulative research tradition is also noted for practical importance: "Without such cumulative results, it becomes difficult, if not impossible, to develop and assess strong theoretical models such that *prescriptive actions can confidently be suggested for practice*." (Benbasat and Zmud, 1999, p.6; emphasis their own)

Ⅳ. Results

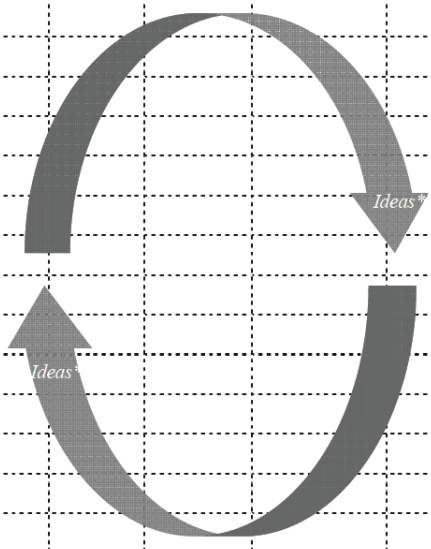
4.1. The View-Phenomenon (VP) Matrix

<Figure 3> shows the view-phenomenon (VP) matrix—a map depicting diverse enduring research domains in the IS discipline. When we refer to a domain, we use the following notation: View [Phenomenon]. For example, Tool [Artifact − Impact] indicates the intersection of the Tool view and the Artifact − Impact phenomenon.

The research domains—here, the intersections—can be understood by crossing a view over a phenomenon (or vice versa). That is, a firm grasp of views and phenomena is necessary to adequately understand the domains, hence to utilize the VP matrix effectively. The elaborations in Section 2 serve to provide such an understanding. For seasoned researchers, those may suffice. For juniors and doctoral students, more clarifications, detailed descriptions, and actual examples can be invaluable. <Appendix A> provides such detailed knowledge resources.

The VP matrix has two key characteristics that facilitate intradisciplinary research: it is inclusive and conducive to idea flows. First, the VP matrix incorporates the nominal view as an integral part of research in the IS discipline. Studies taking the nomi-

			IT View				
	Umbrella Phenomenon	Phenomenon	Tool	Proxy	Ensemble	Computation	Nominal
IS Phenomenon	Capabilities and Practices	Capabilities – Practices					
		Practices Only					
		Capabilities Only					
	Planning, Development/ adoption, Implementation, Maintenance (PDIM)	Capabilities – Artifact					
		Practices – Artifact					
		Artifact Only					
	Usage	Capabilities – Usage					
		Practices – Usage					
		Artifact – Usage					
		Usage Only					
	Impact	Capabilities – Impact					
		Practices – Impact					
		Artifact – Impact					
		Usage – Impact					



<Figure 3> The IT View-IS Phenomenon (VP) Matrix

Note: with arrows depicting possibilities of continuous idea flows across research domains
**Ideas are what we term research elements. See <Table 3> for examples.*

nal view tend to provoke debates about their fit with the IS discipline. Those studies, however, often represent boundary spanning research that even other disciplines do not see as a good fit (Whinston and Geng, 2004). Gupta in his *ISR* editorial shares his experience: "[A] particular area of challenge occurs for papers that apply non-traditional approaches in a functional domain. For example, trying to present computational or algorithmic solution to solve a problem in an operations area may not be welcome at operations management journals, as I found out by personal experience. In IS journals, often, the reaction of reviewers is that *ISR* or *MISQ* do not publish such papers" (Gupta, 2018, p. 782). Studies taking the nominal view thus can serve as "a supple and open-minded disciplinary boundary that can confidently engage with other disciplines" (Tarafdar and Davison, 2018, p. 544), contributing to a "flexibly stable discipline" (Tarafdar and Davison, 2018, p. 543). Another advantage of having the nominal view in an IS research map is that studies taking the nominal view can bring in more diversity and foster creativity that may prove essential in addressing increasingly complex IS problems (Bryant, 2008; Gupta, 2017).

Second, seeing the IS discipline from the VP perspective readily decouples researchers' minds from automatically linking certain research elements to a certain tradition, in effect allowing for a fluid idea flow across the IS discipline. Indeed, certain elements are often associated with a certain tradition. For instance, "econometrics" are associated with IS Economics. However, those analytical techniques can also be used in other traditions, such as organizational IS. Seeing the IS discipline from the VP perspective thus helps form a new mental model where many

research elements operate independently crossing domain borders.[4] For example, a topic and an article genre more common in one research domain can cross over and be applied in other domains. Also, a particular theory typically applied in one domain can cross over. To illustrate, organizing vision theory —theorizing how a community's idea of technology influences technology diffusion (e.g., Miranda et al., 2015)—is typically applied in Ensemble [Artifact-Usage]. However, the key notion of the theory, that a technology is shaped and interpreted by a community, can also be applied to other phenomena, such as how organizational capabilities play a role in shaping and evolving such a technology at a community level, enriching the Ensemble [Capabilities - Artifact] domain.

The hallmark of intradisciplinary research is that research domains integrate ideas from other domains —i.e., fluid idea flow. We discuss what may constitute those ideas.

4.2. Ideas that Can Flow across Research Domains in VP Matrix

<Table 3> compiles common research elements. They include not just theories and methods, but also topics, research subjects, and article genres, to name a few. To illustrate, while undertaking a research study, a researcher may choose to study health IT (topic) and build a prediction theory (theory type). He may take a critical realism perspective (epistemology) with a deductive approach (reasoning mode). He may aim for home disciplinary contributions (contribution type) and choose to write a pure conceptual paper (article type) in a French new novel format (article genre). <Appendix B> further illustrates how a research study can be understood with research elements.

For intradisciplinary research, researchers may take one or multiple research elements of the same kind (e.g., two theories) and assess whether and how the "foreign" idea(s) could be extended to their home domain(s), or vice versa. An intradisciplinary study may integrate only one new type of element (e.g., a new topic) or multiple types of elements (e.g., a new topic and a new method) at the same time. The resultant insights may naturally be interdisciplinary because the IS studies that the intradisciplinary research is built on may already be deeply rooted in other disciplines.

Through <Table 3> and <Figure 3>, we emphasize the possibility of ideas flowing from one domain to another. "IS concerns a set of multifaceted phenomena" (Rowe, 2012, p. 495), and each phenomenon can be deeply theorized by considering diverse research elements accumulated in other domains. Reaching a deep understanding of key subject matters is a fundamental activity in any academic discipline (Burton-Jones and Gallivan, 2007). Below, we now illustrate how the VP matrix together with research elements can facilitate intradisciplinary knowledge building.

Ⅴ. VP Matrix Application Strategies for Intradisciplinary Knowledge Building

5.1. VP Matrix Use Case Scenarios

4) The notion of research elements being independent is also gleaned from Mingers (2001) who argues, "The paradigm concept is useful as a shorthand for a particular constellation of assumptions, theories, and methods, but it is purely an heuristic device" (p .241). Similarly, Ågerfalk (2013, p. 253) argues that "Letting paradigmatic prejudices reduce the degrees of freedom … may well be counterproductive and lead to less interesting and less useful results."

<Table 3> Research Elements (i.e., ideas that can flow across domains. See <Figure 3>)

Elements	Examples
Topic	health IT, social movement, trust, identity, social media (see Grover et al. (2019) for frequent topics); eSports (Zhang et al., 2023); AI (Kim and Kim, 2022)
Theory	- types: analysis, explanation, prediction, explanation and prediction, design and action (Gregor, 2006) - structural components: means of representation, constructs, statements of relationship, scope (Gregor, 2006) - variance theory and process theory (Langley et al., 2013; Markus and Rowe, 2018); network theory and co-evolution theory (Niederman and March, 2019); configuration theory (Park and Mithas, 2020); systems theory (Burton-Jones et al., 2015)
Epistemology	positivism, interpretivism, pragmatism, critical realism (Goldkuhl, 2012; Klein and Myers, 1999; Orlikowski and Baroudi, 1991)
Reasoning mode	deductive, inductive, abductive (Golden-Biddle, 2020)
Contribution type	single-disciplinary[5], home-disciplinary, cross-disciplinary, interdisciplinary (i.e., fundamentally new contributions to all involved "disciplines") (Tarafdar and Davison, 2018)
Article type	conceptual (Rivard, 2014), empirical, review (Rowe, 2014), meta-analytic (Chong et al., 2022), essay
Article genre	conventional, conversation, French new novel, meditation, memoir, allegory, crowdsourced research (Avital et al., 2017)
Research subject	workers, non-profit sectors, society (Davison et al., 2012); elderly groups (Watson et al., 2019), indigenous groups (Radoll and Campbell, 2015), small- and medium-size businesses (Parker et al., 2015); governments (Jeong et al., 2022)
Level of analysis	society, profession, inter-organization, organization, project, group/team, individual, abstract concept, computing element, computing system (Vessey et al., 2002)
Context	economic, organizational/managerial, institutional/cultural, material/spatial/temporal (Avgerou, 2019, Kim et al., 2022)
Generalization	sample characteristic: representative, case-specific (Lee and Baskerville, 2003) level of abstraction: tactical vs. abstract (Lindberg, 2020)
Data type	- text, image, large data, longitudinal (Agarwal and Dhar, 2014; Teubner et al., 2021) - archrival, social media, interview, survey data - trace data (Zhang et al., 2023)
Empirical method	narrative, temporal bracketing, visual mapping, synthetic strategy, quantification (Langley, 1999; Pentland, 1999); computation intensive (Berente et al., 2018; Lee et al., 2022); econometrics (Adomavicius et al., 2012); qualitative comparative analysis (Anton et al., 2022); ethnography (Myers, 1999); lab experiment; action research; simulation; machine learning; content analysis; constant comparison
Research orientation	rigor oriented, relevance oriented (Benbasat and Zmud, 1999); relevance, practical significance, statistical significance (Mohajeri et al., 2020)

5) Tarafdar and Davison's (2018) usage of the term intradisciplinary or Intra-disciplinary is different from Goes' (2013b) and ours. Their terms represent contributions made solely *within* the IS discipline.

Our hypothetical cases are centered around digital materiality. It referred to "the incorporation of digital capabilities into objects that previously had a purely physical materiality. Examples would include adding software applications to a screwdriver or adding medical sensors to clothing" (Yoo et al., 2012, p. 1398). Digital materiality is often embodied in internet-connected technology, and recent examples include smartwatches and fitness trackers. As 5G is exponentially adopted in the years to come and as technology prices continue to fall, we will soon truly "live in" digital materiality (Yoo, 2010, p. 270). Below, we illustrate how a researcher—again, John—could utilize the VP matrix together with the research elements. It involves three key steps.

1. Engaging with the VP matrix and research elements: new mental model. Not satisfied by the big fuzzy traditions, John puts aside the tradition lens and puts on the VP lens. The VP matrix helps him see diverse research domains and recognize the fact that many research elements (e.g., topics, level of analysis, methods) are not necessarily tied to certain domains inherently. He also realizes that there is a remarkable variety in research elements, not just theory and method. John now has a mental model discerning many types of research element that he may bring into his home domain to advance his research program as well as others'. The VP matrix also helps him realize that the big traditions are not divided based on a clear mix of research elements, which creates confusion.

2. Understanding home (and foreign) domains to one's research program. John attempts to identify his home domain, in which he has expertise. He has conducted research projects trying to understand impacts of digital materiality. He particularly examined how firms embracing digital materiality achieve high performance. By taking stock of his own research and consulting the detailed descriptions of the IT views and IS phenomena in Section 2 and <Appendix A>, he recognizes that his main phenomenon of interest is Artifact – Impact. John also realizes that he tends to hold the ensemble view of technology, which is reflected in his research pursuit. He often aims to uncover why similar digital technologies (e.g., smart chairs) implemented by organizations lead to different organizational outcomes. For explanations, he typically focuses on organizational environments to which the technologies are embedded. John concludes that his home domain is Ensemble [Artifact – Impact].

3. Undertaking cross-fertilization. John again consults the VP matrix and research elements to identify research possibilities. From one's standpoint, cross-fertilization involves idea import from or export to "foreign" domains—domains that are outside of one's home domain in the VP matrix. John envisions multiple scenarios:

3-1. Exporting a single element into a domain that holds a different view (by oneself). Upon reviewing studies in a neighboring domain Tool[Artifact–Impact], John realizes that practitioners' bourgeoning interest in digital materiality (i.e., topic) is not much represented there. He considers integrating this research element into the domain holding the different IT view. John thus adopts the tool view while remaining in his original phenomenon. This time, he sees smart chair features (e.g., posture checking, idle time alert) as they were originally designed, i.e., artifacts as settle objects, and examines how those features increase employees' work performance, i.e., impacts.

3-2. Exporting a single element into a domain that holds a different view (via collaboration). With his main topic, John crosses over to the computation view, Computation[Artifact–Impact]. He considers collaborating with an IS colleague who has expertise in optimization modeling. They are planning to mathematically determine the optimal characteristics of smart bulbs (light strength, timing, color) for the maximum performance of organizational teams, i.e., artifacts as optimization models and impacts. John's expertise in digital materiality and the Artifact-Impact phenomenon provides key resources for research backgrounds, importance, and implications.

3-3. Exporting a single element into a domain that holds a different view and phenomenon. John makes a bold move by crossing both the view and phenomenon lines over to the domain of Proxy [Capabilities – Practices]. John is confident that his firm understanding of the topic digital materiality will help him to take on such a challenge. John will study how top management's knowledge about smart chair functionalities and security features, i.e., organizational IT capabilities, influences the organization's next governance policies on smart chairs—whether to centralize or decentralize the adoption, implementation, and maintenance, i.e., IT practices. He has much to read (e.g., literature on top management support), given that he crosses both the view and phenomenon lines. He has not decided whether to conduct a survey or a field study.

3-4. Exporting multiple elements into a domain that holds a different view. While monitoring a nearby domain (e.g., Proxy [Artifact – Impact]), John realizes that process theory, home-disciplinary contribution, and data analysis through machine-leaning (all of which are rich in his home domain) are not leveraged much there. John believes this is a missed opportunity. Those three research elements may offer revolutionary perspectives to the research domain that studies some persisting key IS problems. John joins forces with IS colleagues primarily working in that domain and brings his expertise into the collaboration.

3-5. Importing multiple elements from a domain that holds a different view. After keeping a tab on the latest developments in Nominal [Artifact – Impact] for a year, John learns that abductive reasoning (i.e., reasoning mode) is often used there to understand the unexpected impact of telework. He also realizes that a new theory of institutional environments is often applied there. John considers leveraging this new theory with his go-to theory (structuration theory) to shed, from his main IT view, some light on his surprising observation on smart desk impacts (Ensemble [Artifact – impact]). John sees Müller et al. (2020) will serve as good guidance for such multi-theory examination.

3-6. Importing a single element from a domain that examines a different phenomenon. John has been mindful of the latest developments on sociomateriality used to understand emerging social identities entangled with hedonic and habitual use of Instagram (Ensemble [Usage – Impact]). John studies upon sociomateriality and the way it is applied in that domain. He then extends it in his home domain to understand how smart desk functionalities are comprehended by employees and how such an emergent understanding is interwoven with the employees' eventual job performance (Ensemble [Artifact – Impact]).

These scenarios illustrate some use cases of the VP matrix and research elements. Certainly, countless such cases, or "combinative opportunities" (Rai, 2018,

p. 4), exist for intradisciplinary knowledge building. As mentioned in Section 2.1, however, a recent IS history suggests that without a conscious effort, intradisciplinary research could heavily concentrate on a few domains. Moreover, for effective intradisciplinary knowledge building, strategic guidelines can be helpful.

5.2. Suggestions for Advancing Intradisciplinary Knowledge at Discipline Level

First and foremost, intradisciplinary knowledge is more likely to develop when the discipline's culture values and promotes coexistence of diverse research domains. Although the IS discipline is now more open-minded in terms of non-mainstream IS research elements, such as broader research subjects (e.g., workers, marginalized groups (Davison et al., 2012; Gupta, 2017)), many research domains, particularly those under the nominal view, are still not welcomed, and researchers situated in some domains still feel that their accumulated knowledge and competences are under-valued for the enrichment of the discipline (Gupta, 2018). For effective intradisciplinary knowledge, the IS discipline should thus see research domains in different parts of the VP matrix as crucial pieces of a mosaic, where every piece may be different but integral for the whole.

Suggestion 1a (Seeing IS Research as a Mosaic): The IS discipline, ultimately reflected in IS journals, should espouse a culture that values and promotes research from all domains in the VP matrix.

Seeing IS research as a mosaic is not sufficient enough to foster intradisciplinary knowledge building in a discipline—it merely provides the cognitive foundation. The IS discipline should also actively promote intradisciplinary knowledge building. It can be done structurally and temporally. Structurally, the IS discipline can designate niche journals and conference tracks and awards for intradisciplinary research. Temporally, the IS discipline can also identify research domains where intradisciplinary work is particularly lagging and decide to concentrate knowledge building in those domains at a point in time, for instance, through journal special issues. When particular domains are focused on, it is crucial to specify how ideas from other domains can enrich those focal domains in order to increase scholarly participation.

Suggestion 1b (Promoting Intradisciplinary Research): The IS discipline should institutionalize structures for intradisciplinary knowledge building and proactively create awareness of the current state of intradisciplinary knowledge and promote neglected research domains.

The IS discipline should also actively develop intradisciplinary researchers, who have a keen understanding of diverse research domains in the discipline and engage with ideas and knowledge from those domains. An effective way would be through intradisciplinary programs covering a range of research domains. Those programs can be intradisciplinary doctoral programs, professional development workshops at major conferences, and specialized mini-conferences where participants recognize similarities and overcome differences, for example, by breaking into small groups, mapping research spaces, and focusing on how different research approaches fit into research agendas that encompass multiple research domains. Albeit still not common, such specialized workshops around the IS discipline are held to promote interactions among different disciplines (e.g., Digital Societies and Social Technologies Summer Institute[6]). Similar types of workshops for intradisciplinary knowledge building will be crucial

6) See Drobnis (2013) for a detailed description.

especially given the observation that many graduate students and researchers are still "often trained well in one of the streams but lack the perspective of the other IS approaches" (Goes, 2013b, p. 3).

Suggestion 1c (Developing Intradisciplinary Researchers): The IS discipline should value and develop researchers and reviewers who can be (simultaneously and temporally) intradisciplinary across the VP matrix.

Advancing intradisciplinary knowledge can only be possible when individual scholars contribute to the collective effort. Next, we provide suggestions about how individuals can participate.

5.3. Suggestions for Building Intradisciplinary Knowledge at Micro Level

5.3.1. Crossing Research Domains

From a researcher's perspective, intradisciplinary research can be accomplished by two ways: "importing" and "exporting" research elements across the domains in the VP matrix. Specifically, from a different domain in the VP matrix, a researcher can mindfully import ideas to her home domain to complement, strengthen, and verify the existing knowledge (see Illustrations 3.5 and 3.6 in Section 5.1). Alternatively, a researcher can export ideas to other domains to generate different insights about the phenomena examined in those domains (See Illustrations 3.1 through 3.4).

Suggestion 2a (Performing Idea Import and Export): IS researchers and reviewers should be mindful about diverse research domains in the VP matrix and bring and apply outside ideas to their home domains (idea import) and contribute their expertise and skills to the domains abroad (idea export).

Incorporating ideas from different domains can appear daunting because researchers may need to cross different "thought worlds" (Rai, 2018). However, the VP matrix specifies research domains by using two consistent criteria (i.e., view and phenomenon) and thus makes it easier to see similarities among some domains. More specifically, one's expertise and competencies (e.g., topic, theory, analytical technique, data type) as to a certain domain are likely to be more easily utilized in other domains in the same view (i.e., sliding vertically in the matrix) or in the same phenomenon (i.e., sliding horizontally in the matrix). Researchers interested in intradisciplinary research can thus identify their home research domain(s) in the VP matrix and apply and expand their knowledge and skills by sliding vertically or horizontally to other domains within the same view or phenomenon (See Illustrations 3.1 through 3.6, except 3.3 in Section 5.1).

Suggestion 2b (Performing Research Domain Sliding): IS researchers and reviewers should recognize the applicability of their expertise and competencies to other research domains within the same view or phenomenon and utilize them to ease the intradisciplinary crossings.

5.3.2. Navigating Idea Identification and Integration

Intradisciplinary knowledge building inherently involves integration of different ideas from research domains. Two types of fundamental tasks are involved in a successful intradisciplinary project: idea contribution and idea integration. Not everyone, however, prefers or is skilled at the two disparate cognitive tasks. Some researchers simply prefer or are better at contributing ideas, given their tendency to read broadly; others might prefer organization and synthesis of ideas given their strength in connect-

ing the "dots". For effective intradisciplinary knowledge building, thus, it is integral that a research team be comprised of both idea contributors and integrators.

Suggestion 3a (Creating Balanced Team): For effective intradisciplinary knowledge building, a research team should consist of both idea contributors and integrators.

Still, a single researcher might prefer playing both roles—identifying and integrating pieces—however challenging it might be. Much like a solo researcher who mindfully tries to switch hats between the author role and the reviewer role as she conducts research by herself, a similar "hat" trick can be performed (Venkatesh, 2011, p. 52) in solo intradisciplinary knowledge building. That is, a researcher may generate and gather ideas at one point in time (i.e., wearing the contributor hat) and switch hats later in order to synthesize those ideas (i.e., wearing the integrator hat).

Suggestion 3b (Performing Hat-trick): A solo researcher in intradisciplinary knowledge building should iteratively perform a hat-trick between the roles of idea contributor and idea integrator.

Ⅵ. Discussion and Implications

The main knowledge products this paper produces are the VP matrix and a compilation of research elements. They have implications not just for intradisciplinary research but also beyond it.

6.1. The VP Matrix

First and foremost, the VP matrix facilitates intradisciplinary efforts. It helps researchers form a new mental model of the IS field and see similarities and differences in research domains more effectively. The VP matrix also helps researchers recognize a variety of research elements (<Table 3>) that can flow across research domains. The VP matrix, together with the research elements, shows many intradisciplinary combinative opportunities (Rai, 2018). The VP matrix also helps generate insights that can tackle grand challenges. Breakthroughs for insurmountable problems often occur when ideas from different areas are tried and combined.

Second, the VP matrix serves as an enduring shared language to describe the IS field, thereby promoting and assessing a cumulative intradisciplinary tradition across the IS discipline. Benbasat and Zmud (1999) point out the criticality of a share language: "Being technophiles at heart, IS researchers would much rather invent than adopt! But without common tools and a shared language, it becomes difficult to evolve streams of research that build rich conceptualizations and understandings of the phenomena populating the IS domain" (p. 6). The VP matrix itself is built on two IS classics, thereby adding to the cumulative tradition. The VP matrix, as a shared language, can also help identify where the IS discipline is rich or thin in terms of cumulative tradition.

Lastly, the VP matrix helps the IS discipline to prosper. One may concern that the VP matrix confines IS research in a "box" and prevents it from growing. As we note in Section 2.3, however, the IS discipline has primarily been and still is about examining phenomena noted in B&Z. Goes (2013b) notes that the IS discipline evolves by incorporating and displacing *research elements* (<Table 3>), albeit he did not use the exact term. Similarly, Baskerville et al. (2020) note that "[f]rom a narrow focus on corporate IT use for task performance in the early days, IS research today includes broader societal issues as well as nontask related IT use" (p. 510).

In this regard, the VP matrix actually helps expand and enrich IS research by spotlighting diverse domains and sparking a fluid flow of research elements (e.g., topic, level of analysis) across them.

6.2. Research Elements

First, we have compiled a variety of research elements. A research study is comprised of many research elements, as illustrated in <Appendix B>. By surfacing and putting them together in one place along with key references (<Table 3>), we offer researchers a convenient way of envisioning what combinations and integrations are possible across research domains. This will help spark creative "mixes and matches" and facilitate intradisciplinary knowledge building.

Second, by identifying research elements including IT views and IS phenomena, we provide clarity to the common conflation of phenomena with topics—a confusion plaguing intradisciplinary efforts. As we noted earlier, B&Z's nomological net includes IS phenomena, not topics. Despite this, many studies regard them as such (Tarafdar et al., 2022). Making a clear distinction is important; IS phenomena are enduring, but topics are not necessarily so. Building knowledge based on the VP matrix thus ensures a robust cumulative tradition. From a topics perspective (e.g., AI), however, the distinction opens a door for building deep knowledge on a topic from every possible angle of the IT views and IS phenomena along with various research elements. IS knowledge can also be deepened from the perspectives of other research elements. A researcher can pick an article genre, for instance, and build serious IS knowledge within the genre. In it, he can conduct research by considering many difference angles such as various phenomena, research subjects, theories, and types of generalization. Overall, our compilation of research elements provides a useful starting point for deepening IS research.

Lastly, distinguishing IS phenomena from topics also offers clarity to the broader discussion about what might be the IS intellectual core (Sidorova et al., 2008). From a topics perspective, the IS core changes continuously and may appear wishy-washy to stakeholders outside and even inside the IS discipline (Robey, 2003). From a phenomenon perspective, the IS core is firm, stable, and consistent across time (see Section 2.3). Variations in IS research over time come from the addition and deletion of other research elements, such as topics, methods, and research subjects, which are also often found in other disciplines (e.g., social media, knowledge management).

6.3. Specific Implications for Doctoral Students and Junior Scholars

As we alluded in Introduction, the VP matrix can be particularly helpful for doctoral students and those who consider joining the IS discipline. It provides an overview of the IS research field and exposes them to diverse research possibilities. Doctoral students can also leverage research elements specified in <Table 3> to identify overlooked, yet still important research endeavors—be they intradisciplinary or not. The VP matrix can also be useful when a researcher considers expanding her portfolio (see Section 5.2). She may choose to extend her reach by joining a different domain. She may choose to deepen her knowledge by incorporating new research elements while remaining in the same domain.

6.4. Limitations and Future Research

The VP matrix and our suggestions should be

interpreted with the following caveats in mind. First, our emphasis on intradisciplinary research does not mean an isolated IS discipline ignoring its interdisciplinary nature. Our study is simply to encourage the critically overlooked type of knowledge building. Second, although uncommon, a study may focus on more than two constructs from the B&Z's nomological net (e.g., IT Capabilities − Usage − Impact). In the VP matrix, such complexity was reduced to the first and the last constructs (e.g., IT Capabilities − Impact). Future research could help capture such nuances in the VP matrix.

Third, we did not specify what is the right balance in intradisciplinary knowledge building across the VP matrix. Balance can be approached from different angles, for example, by impact, quality, or quantity of intradisciplinary research. The IS community as a whole should contemplate what is the right balance, if any, for a given time and place. Lastly, IS researchers, particularly doctoral students and young scholars, should bear in mind that the VP matrix is not the only way to define the IS research field. The field, for example, can be understood based on researcher demographics (Burgess et al., 2017). Intradisciplinary efforts should continue in all facets of the discipline.

Ⅶ. Conclusion

Intradisciplinary research leverages the abundant diversity present in the IS discipline to address grand challenges and increasingly complex IS problems, in effect further fostering diversity. Intradisciplinary knowledge building highlights being mindful of various research domains within a discipline and leverages the accumulated knowledge and expertise through cross-fertilization. The existing ways of seeing the IS field have key limitations, and we have endeavored to overcome those challenges and have provided an elaborate enduring IS research map along with an initial set of research elements. We hope the VP matrix, complied research elements, use cases, and strategic suggestions together facilitate a vibrant idea flow across research domains and help accumulate intradisciplinary knowledge in a consistent manner over time.

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<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines

We observed that there are still some misunderstandings in the application of O&I's IT views and B&Z's IS phenomena. We improved the two perspectives by heeding advice from Rowe and Markus (2018) who clarified a then 30-year-old classic, Markus and Robey (1988). They caution that "When divergent interpretations are never clearly articulated, miscommunication can follow and missed opportunities can result. If MandR88 and other frequently cited works become a Rorshach test, open to any and all interpretations, we as a field may fail to question assumptions and fail to direct our theorising mindfully in valuable new directions" (p. 625). To clarify and elaborate IT views and IS phenomena, we referenced other relevant articles written by the authors and other researchers while applying our refined understanding of the IT views and IS phenomena to two types of literatures: a literature on a technology (122 selected social media papers) and a literature on a construct, absorptive capacity (98 papers from Roberts et al., 2012). Two different types of literatures were selected so we could apply our understandings to as many different types of research as possible and, at the same time, to apply them to a sizable number of studies. The descriptions of IT views and IS phenomena in Section 2, as well as the clarifications, elaborations, and guidelines presented here, are the results of our improvement efforts.

A1. Understanding Research according to IT Views

Understanding research from the IT view perspective, we recommend focusing on the conceptualization of technology (i.e., construct), not the operationalization (i.e., measure). The five IT views represent how technology is viewed in a study, not how they are operationalized. We note, however, that there is some association between the views and the operationalizations used in the study. For example, many studies with perceptual measures indeed feature technology from the proxy view. In fact, this is natural because most times, humans attribute characteristics to technology (e.g., usefulness). That is, technology's attributes exist in one's perception.

When a study examines the impact of a technology proxy (e.g., IT investment)—a case where both the tool view and the proxy view are seemingly co-present (e.g., Chatterjee et al., 2002), we recommend categorizing it as a proxy view. We took a hint from O&I themselves who categorized capital investments in technology and its impact as a proxy view. One of their example research questions under the proxy view is also "[w]hat is the productivity impact of investing in information technology?" (Orlikowski and Iacono, 2001, p. 125).

When a study examines how a technology proxy (e.g., usefulness) is actively shaped by users and its environments over time—a case where both the proxy view and the ensemble view are seemingly co-present, we recommend categorizing it as ensemble (e.g., Sun and Fang, 2016). Again, we took a hint from O&I who categorized technology development and use as ensemble (not as proxy) as long as the technology examined was viewed as unsettled and dynamic. Main research questions addressed from the ensemble view are "the ways in which technologies come to be developed" and "how technologies come to be used

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

in certain ways" (Orlikowski and Iacono, 2001, p. 126).

Affordances by nature emerge through the interaction between an actor and an object (Faraj and Azad 2012). In that sense, studies that examine technological "affordances" best fit the ensemble view. We note, however, that oftentimes the label affordance is used to refer to technology functionalities (Zheng and Yu, 2016). For example, Treem and Leonardi (2012) refer to a technology functionality as an affordance, suggesting that rehearsability, originally identified by Dennis et al. (2008), is an affordance that enables senders to compose messages with an intended meaning, despite the fact that Dennis et al. (2008) do not describe rehearsability as an affordance. The term functional affordances (e.g., Zheng and Yu, 2016) in Table A1 represent such technological functionalities.

IT managerial issues—i.e., IT practices and ability to carry out those—across the technology life cycle can easily be swept under the nominal view (Akhlaghpour et al., 2013). We thus recommend paying special attention when it comes to practices and capabilities as some of them might be technology specific. In fact, some of those studies, if not many, should not be nominal as O&I themselves also say, "IS personnel, IS outsourcing, and IS strategy are nonetheless different from the personnel, outsourcing, and strategy issues of other disciplines and functional areas in that they must engage with a changing and evolving set of IT artifacts" (p. 128). We thus recommend particularly checking whether the construct or relationship in an IT practice study is technology specific and whether it is explicitly discussed how, as also recommended by Agarwal and Lucas (2005) and Grover and Lyytinen (2015). Table A1 lists specific guidelines for understanding studies according to the IT views.

<Table A1> Guidelines for Understanding Studies according to IT Views

View	Conditions and Examples
Tool	Necessary Condition 1: Technology under examination is viewed static and consistent across different social and organizational settings and users. Necessary Condition 2: The study's focus is on the effectiveness of technology features, functionalities, affordances, and black boxes. ● Example features: Facebook's Like (Lee et al., 2015) ● Example functionalities: visual anonymity, coordination support, electronic trail (Carte and Chidambaram, 2004); transmission velocity, rehearsability, reprocessability (Dennis et al., 2008). ● If the focus is on "affordances": Necessary Condition 3: here, only "functional" affordances belong, which are in fact treated as settled technological functionalities in the paper (e.g., affordance for shaping knowledge (Majchrzak et al., 2013); visibility afforded by social media (Leonardi, 2015). Example studies: - Leonardi (2015) examines how the enterprise social media impacts employees' knowledge of "who knows what" and "who knows whom". - Srivardhana and Pawlowski (2007) examine how the organizational memory enabled by ERP and the best practices ingrained in ERP lead to sustained business process innovation.

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

<Table A1> Guidelines for Understanding Studies according to IT Views (Cont.)

View	Conditions and Examples
Proxy	Necessary Condition 1: Technology under examination is reflected in its surrogates embodying the technology. Necessary Condition 2: Technology under examination is viewed as static and consistent across different social settings and users. Otherwise, the study belongs to the ensemble view. Example surrogates: ● Technology attributes: usefulness, relative advantage, visibility (Davis, 1989; Moore and Benbasat, 1991); mobile application usability (Hoehle and Venkatesh, 2015); complexity, reliability (Ayyagari et al., 2011) ● Technology representations: financial, physical, emotional investments into technology (e.g., Chatterjee et al., 2002) ● Magnitude and quality of activities involved in technology life cycle (e.g., IT planning sophistication, implementation success, usage rate, diffusion of IT across companies) ● Types of activities involved in technology life cycle (e.g., IT governance mechanism choice, IT operation tactics, database conceptual models) ● User ability and cognition involved in technology life cycle (e.g., ability to use ERP effectively, intention to use) Example studies: - Sambamurthy and Zmud (1999) examine the role of line managers' IT capabilities in affecting the company's choice of IT governance form. - Dennis et al. (2016) examine how the operating practices of a blog is associated with visibility of the blog.
Ensemble	Necessary and Sufficient Condition: Technology under examination is assumed to be or is explicitly treated as unsettled and dynamic, shaped by the actor and by the given time and space where it is planned, developed, implemented, used, and maintained. ● Note: It is often necessary to understand and examine its environments in detail in a longitudinal manner in order to understand and examine a technology. Naturally, studies taking the ensemble view puts a significant emphasis on the context (e.g., material, symbolic, institutional, and historical) of technology planning, development, implementation, use, maintenance, and impact. Example studies: - Kietzmann (2008) examines how an innovation manufacturer implemented, or shaped, RFID readers in a patrolling company through a practice of interactive interactions between mobile security guards (i.e., the actual end users), their managers, and the RFID manufacturer. The practice helped the managers and manufacturer discover context-specific demands and challenges, which were addressed and incorporated into the technology. - Ling et al. (2015) examine how social media embedded in a particular context—here, a crisis situation—comes to have an impact. More specifically, they found that social media emerged as an empowerment tool during the Thailand flooding in 2011, affording structural, psychological, and resource empowerment for the victims.

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

<Table A1> Guidelines for Understanding Studies according to IT Views (Cont.)

View	Conditions and Examples
Computation	Necessary and Sufficient Condition: Technology under examination is algorithms (i.e., a set of sophisticated math equations) developed in the study. Example studies: - Li et al. (2016) develop the AZSecure texting mining system for detecting underground economy sellers. - Zhang et al. (2016) develop a target-customer selection framework that entails a set of machine-learning algorithms. Necessary and Sufficient Condition: Behavior involved in technology life cycle activities is mathematically modeled or simulated. ● Note: not all optimization/simulation studies belong to the computation view. For example, Ryu et al., (2005) model the optimal levels of employees' learning-by-investment, learning-by-doing, and learning-from-others for knowledge depth and breadth maximization. Here, the role of technology, enterprise information portals, is minimal primarily serving as the background to the phenomenon. Example studies: - Dou et al. (2013) examine how IT operation tactics are associated with individuals' technology acceptance—or more aptly put, initial use. More specifically, they determine the optimal number of social media features (e.g., review posting) on an ecommerce platform, along with a seeding strategy, for the maximum adoption of software by individuals. - Through mathematical modeling, Chen et al. (2011) examine the optimal moderation policy (i.e., optimal level of moderation resources) that leads to the highest quality of comments generated by users on an online forum. Such policies represent technology operation policies.
Nominal	Necessary and Sufficient Condition: Technology is mentioned or treated in name only or incidental background information. More specifically, even if technology is removed from the study, the phenomenon under examination would most likely still occur without major changes. Examples: - Gu et al. (2014) examine whether homophily behavior, defined as "people's propensity to seek interactions with similar others" (p. 604), also occurs in a stock investment context. They particularly examine how investor experience, an amount of information given to investors, and stock volatility are associated with invertors' homophily behavior. A virtual investment community was primarily a background to the research.

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

A2. Understanding Research according to IS Phenomena

B&Z articulate the possibility of multi-directional relationships between constructs within the nomological network. That is, a study might examine one direction, the other direction, or both. For parsimony, we recommend each domain cover all those three types of directions. For example, whether a study examines how IT capabilities influence IT practices or vice versa, the study would be categorized under Capabilities – Practices.

When a study examines a mediating relationship, we recommend using the independent and dependent variables to categorize the study to preclude unnecessary complexity. Specifically, a study may examine the impact of IT capabilities on usage and the effects of the usage on firm performance (e.g., Mishra et al., 2007). Such a study can be categorized under Capabilities – Impact. A study may also examine a moderating relationship. When the independent variable is from the nomological net, we recommend focusing on the relationship between the independent and the dependent variables. For example, a study may examine the impact of an inter-organizational system on firm performance moderated by generic environmental variables (e.g., Dong et al., 2017). Such a study can be categorized under IT Artifact – Impact. When the moderator is from the nomological net, we recommend focusing on how the moderator impacts the dependent variable. After all, moderators also impact dependent variables, and when a moderator is present, the main relationship alone is not so meaningful (Carte and Russell, 2003). For example, a study may examine how the relationship between spatial distances and coordination delay among employees is moderated by communication technologies (e.g., Cummings et al., 2009). Such a study can be categorized under IT Artifact – Impact.

We also note that the nomological net can and does cover diverse types of studies, such as process studies, qualitative studies, interpretative studies, and critical realism studies. B&Z's nomological net may be simply interpreted as representing only causal (i.e., variance) relationships (e.g., usage → impact) (Córdoba et al., 2012; Robey, 2003) when, in fact, those relationships also represent procedural relationships. For example, an IT artifact must be used to be able to have an impact. That is, usage is a step between an IT artifact and its impact (Seddon, 1997). In many studies we looked at that examine the relationship between the IT artifact and impact, IT usage was simply procedural—i.e., a non-specified step or construct (e.g., Lee et al., 2015; Leonardi, 2014).

For "qualitative" studies that do not necessarily provide a clear research model, we recommend identifying key constructs and the relationships between them. For example, a qualitative study by Argyris and Ransbotham (2016) examine how IT leadership (i.e., IT Practice) impacts institutionalization of a wiki within an organization (e.g., Usage). Robey and Sahay (1996), a qualitative interpretive study, examine how different IT implementation processes (i.e., IT practices) are associated with different organizational transformation consequences (i.e., impacts as a result of usage).

We also point out that the nomological net can aptly cover macro-level studies. A literal interpretation of Agarwal and Lucas (2005) may lead to the conclusion that it cannot. In fact, the changes that Agarwal

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

and Lucas (2005, pp. 392-393) mention nicely fit with IT impact in the nomological net. Also, there are many other macro-level studies aside from IT impact. For example, many papers we looked at in the absorptive capacity literature focus on organizational level adoption, use, and impacts of the IT artifact (Andersson et al., 2008; Swanson and Ramiller, 2004; Zhu et al., 2006).

Finally, it should be noted that the label of a construct (e.g., technology "use") does not necessarily reflect the construct it is actually associated with. For example, in a study examining technology "use" and performance, the label use may actually represent the "effectiveness of technology features and functionalities", which can only be materialized through use (e.g., Kuegler et al., 2015). On the other hand, a more faithful representation of the construct "use" focuses on rates, levels, and types of use (e.g., assimilation level, use rate, individuals' technology acceptance, hedonic use, problematic use, faithful use, mindful use, continuous use, frequent use, institutionalized use). Here, use can be the independent variable (e.g., Turel and Qahri-Saremi, 2016) or the dependent variable (e.g., Zhu et al., 2006). The focus of the study is on the use, not on the effectiveness of technology. Table A2 through A5 list specific guidelines for understanding studies based on the IS phenomena.

<Table A2> Guidelines for Understanding Research according to IS Phenomena: Capabilities and Practices

Relationships and Constructs	Conditions and Examples
IT Capabilities – IT Practices	The study examines how IT capabilities (e.g., development, change, choice, and quality of capabilities involved in activities across the technology life cycle) are associated with IT practices (e.g., development, change, choice, and, quality of practices involved in activities across the technology life cycle). Examples: - Bassellier et al. (2001) examine how business managers' IT competence (such as IT-specific tacit and explicit knowledge about technology, applications, systems development, and management) is associated with active participation in technology planning, development, and implementation. - Sambamurthy and Zmud (1999) examine the role of line managers' IT capabilities in affecting the company's choice of IT governance form.
IT Practices Only	In the study, IT practices are the only construct from the nomological net. Examples: - Tukana and Weber (1996) examine appropriateness of an IT planning method. - Lee (2001) examines IT outsourcing success with general organizational factors.
IT Capabilities Only	In the study, IT capabilities are the only construct from the nomological net. Examples: - Bassellier et al. (2003) examine how business managers' IT competence is associated with their championing IT. IT competence is comprised of IT knowledge and experience specific to technology. Please note, however, that we do not see championing IT here as a practice. They do not discuss how business managers' championing is in any way specific to technology. Business managers' championing IT is simply conceptualized as promoting and building partnership with IT people. - Tiwana and McLean (2005) examine how individual- and team-level capabilities (e.g., absorptive capability, expertise integration) are associated with team-level creativity in technology development.

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

<Table A3> Guidelines for Understanding Research according to IS Phenomena: Planning, Development/adoption, Implementation, and Maintenance (PDIM)

Relationships and Constructs	Conditions and Examples
IT Capabilities – IT Artifact	The study examines how IT capabilities are associated with an IT artifact (e.g., technology features, functionalities, and attributes; the rate, backlog, quality, speed, and range of activities across the technology life cycle) ● Note: The IT artifact can be different depending on the IT view the study takes. Examples: - Andersson et al. (2008) examine how firms' technology specific architectural knowledge helps implementation of industry-wide ubiquitous computing environment.
IT Practices – IT Artifact	The study examines how IT practices are associated with an IT artifact. Examples: - Dennis et al. (2016) examine how the operating practices of a blog is associated with visibility of the blog. - Nault et al. (1997) determine optimal supplier strategies—in particular, level of a supplier' adoption support—for fostering implementation of interorganizational technology.
IT Artifact Only	In the study, the IT artifact is the only construct from the nomological net. IT artifact examples: - Technology features and functionalities (from tool view) - Technology attributes (proxy view) - Technology affordances (i.e., emergent functionalities through a user engaging with the technology) (ensemble view) - Machine learning algorithms (computation view) - Artifacts seemingly from the other four views but in name only (nominal view) Example studies: - Studies that develop measures for technology attributes (e.g., Moore and Benbasat, 1991). - Studies that examine biological (e.g., gender) and psychological antecedents of technology features, functionality, and attributes. - Studies that examine biological and psychological antecedents of the backlog, quality, speed, and range of planning, development, implementation, and maintenance of technology. - Orlikowski and Scott (2015) demonstrate how services enacted by a user in a given temporal and spatial context are interwoven with technological materiality specific to the context. - Li et al. (2016) develop the AZSecure texting mining system for detecting underground economy sellers.

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

<Table A4> Guidelines for Understanding Research according to IS Phenomena: Usage

Relationships and Constructs	Conditions and Examples
IT Capabilities – Usage	The study examines how IT capabilities are associated with IT artifact usage. The existence of an IT artifact is embedded in the research context or simply assumed—i.e., IT artifact is a step in a process between IT capabilities and usage. Examples: - Chircu and Kauffman (2000) identify inhibitors of assimilation; some of those barriers represent IT capabilities such as necessary human capital and new skills for the adopted IT. - While understanding media selection and use during a knowledge conversion process, Massey and Montoya-Weiss (2006) examine how an individual sees utility of a communication technology differently depending on his/her capability for the technology. They also propose that technology use is a function of technology utility and that the individual's capability is a function of technology use.
IT Practices – Usage	The study examines how IT practices are associated with IT artifact usage. The existence of an IT artifact is embedded in the research context or simply assumed—i.e., IT artifact is a step in a process between IT practices and usage. Examples: - Cavusoglu et al. (2016) examine how a change in Facebook's privacy policy is associated with usage of Facebook's diverse features, such as wall-posting and sending private messages. - Dou et al. (2013) examine how IT operation tactics are associated with individuals' technology acceptance (i.e., initial use).
IT Artifact – Usage	The study examines how IT artifacts (e.g., functionalities, functional affordances, black boxes, attributes, proxies) are associated with IT artifact usage. Examples: - Hoehle et al. (2015) examine how the usability of mobile applications is associate with continuous use. - Seeing digitally enabled social networks (DESNs) as an artifact made possible through active user involvement, Germonprez and Hovorka (2013) examine how a new update to the IT artifact (i.e., functionality) led to less user involvement and the demise of a DESN.
Usage Only	IT artifact usage is the only B&Z construct examined in the study. ● Use examples: rates, levels, and types of use (e.g., assimilation level, use rate, individuals' technology acceptance, hedonic use, problematic use, faithful use, mindful use, continuous use, frequent use, institutionalized use) Examples: - Kuem et al. (2017) examine how diverse non-technology constructs (e.g., affective commitment) are associated with active social media use. - Tim et al. (2017) examine how social media use emerged as a boundary spanning object between the authorities and victims during the 2011 Thailand flooding incident.

<Appendix A> Understanding Research from the VP Perspective—More Clarifications, Elaborations, and Operationalization Guidelines (Cont.)

<Table A5> Guidelines for Understanding Research according to IS Phenomena: Impact

Relationships	Conditions and Examples
IT Capabilities – Impact	The study examines how IT capabilities are associated with the impact of IT artifact usage on users and their environments. Usage is assumed or explicitly modeled. Examples: - Pavlou and El Sawy (2006) examine how IT-leveraging competence in new product development teams is associated with competitive advantage of the firm. - Park et al. (2007) examine how individuals' absorptive capacity for enterprise resource planning (ERP) is associate with their job satisfaction and performance.
IT Practices – Impact	The study examines how IT practices are associated with the impact of IT artifact usage on users and their environments. Usage is assumed or explicitly modeled. Examples: - Robey and Sahay (1996) demonstrate that different implementation processes of technology embedded in idiosyncratic organizational structures and culture were associated with different organizational transformation consequences. - Through mathematical modeling, Chen et al. (2011) examine the optimal moderation policy (i.e., optimal level of moderation resources) that leads to the highest quality of comments generated by users on an online forum. Such policies represent technology operation policies.
IT Artifact – Impact	The study examines how IT artifacts are associated with the impact of IT artifact usage on users and their environments. Usage is assumed or explicitly modeled. Examples: - Leonardi (2015) examines how the enterprise social media impacts employees' knowledge of "who knows what" and "who knows whom". - Ling et al. (2015) examine how social media embedded in a particular context—here, a crisis situation—comes to have an impact.
Usage – Impact	The study examines how IT artifact usage (e.g., volume, rate, type) are associated with the impact on users and their environments. Examples: - Turel and Qahri-Saremi (2016) examine how problematic use of social media (e.g., using Facebook in class) influences academic performance. - Choe (2002) examines how the degree to which advanced manufacturing technology is assimilated within organizations is associated with production performance.

<Appendix B> Illustration of IS Research based on the VP Matrix and Select Research Elements

			Leonardi (2015)	Miranda et al. (2015)	Kietzman (2008)	Shaw and Edwards (2005)
VP Matrix	View		Tool	Ensemble	Ensemble	Nominal
	Phenomenon		Artifact – Impact	Artifact – Usage	Practices – Artifact	Artifact Only
Research Elements	Topic		Enterprise Social Media	Social Media	Mobile Innovation	Knowledge Management
	Theory	Theory Type	Explanation and Prediction	Explanation and Prediction	Explanation	Explanation
		Key Concept	IT-enabled ambient awareness	Organizing vision	Contradictions of interactive innovation	Knowledge management action plan
	Epistemology		Positivism	Positivism	Pragmatism	Interpretivism
	Reasoning mode		Deduction	Induction	Induction	Induction
	Contribution Type		Cross disciplinary	Cross disciplinary	Home disciplinary	IS contribution uncertain
	Article type		Empirical	Empirical	Empirical	Empirical
	Article genre		Conventional	Conventional	Conventional	Conventional
	Research subject		Office employees	Social media initiatives by firms	Tech manufacturer, organizational client, mobile workers	Employees holding diverse positions from various types of organizations
	Level of analysis		Individual	Community	Individual	Individual
	Sample characteristic		76 members from one large financial firm	Top 50 fortune firms	Single case	183 individuals from 16 various firms
	Data type		Survey	Text	Text, images, recordings	Text
	Empirical method		t-test, OLS, difference-in-differences	Relational class analysis, constant comparison	Action research	Qualitative content analysis
	Research orientation		Toward both rigor and relevance	Leaning toward rigor	Toward both rigor and relevance	Leaning toward relevance

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