The construct of information systems (IS) use is among the most central constructs examined in the IS discipline (Straub and del Guidice 2012). It is arguably the most consequential construct in our field (Cordoba et al. 2012), for the nature, modalities and extents of information systems use significantly impact outcomes at individual, group, organization, network, society and country levels. *MISQ* has taken a lead role in advancing knowledge of it.

1. Focus of the Research Curation

This curation focuses on research on IS use published in *MISQ*. IS use connotes an actor’s employment of an information system to perform an activity, where an actor refers to the individual, group, organization, or other collective using the system (Burton-Jones and Gallivan 2007). We found 107 articles on IS use published in *MISQ* from the journal’s inception through to Dec 2019, inclusive.

We faced two main challenges creating this curation. First, authors tend to use the word “use” in many ways in an article other than as a construct (e.g., “we used theory x”). Further complicating matters is the fact that authors also use other concepts to refer to use (e.g., adopt, appropriate). Second, almost all effects of information systems depend somewhat on use, so at the extreme, almost every *MISQ* article touches on use, at least indirectly. These challenges meant that we had to be creative in searching for articles, finding all relevant ones, and summarizing them meaningfully.

We used two strategies to address these challenges. First, we distinguished between two time periods, an older period (1977-1999) and a contemporary one (2000-2019). Because scientific ideas naturally accumulate and evolve, we found that rather than reviewing all studies in equal depth, it was more instructive to focus in depth on the contemporary set while reviewing the older set to understand where newer ideas originated and to keep an eye out for older ideas still relevant today. The two periods were split at the year 2000 partly as a natural mid-point between the two periods and partly because it was around that time that more in-depth case studies of IS use began to appear (Majchrzak et al. 2000).

Second, we used a broad set of search terms, particularly for the contemporary articles. For the older articles, our search terms were: use, utilize, usage, and utilization. For the contemporary articles, our search terms were: use, utilize, usage, utilization, appropriation, adopt, assimilation, infusion, routinization, implementation, adoption, diffusion, acceptance, continuance, addiction, and trying. Even though some of these keywords do not appear to relate strongly to use, we included them because we were aware of research on IS use that used these terms and we wanted to find all relevant articles. We manually examined the full text of all the articles we retrieved and engaged in several rounds of coding, leveraging our varied backgrounds to triangulate on the most relevant articles on IS use.

Given the large number of studies we retrieved, we necessarily had to exclude some very interesting papers. We used two main criteria for exclusion. First, we excluded articles that did not study actual use of IS, and instead focused purely on users’ intentions, attitudes, or beliefs, or on behaviors related to but different from use, such as ‘trying to innovate’ (e.g., Ahuja and Thatcher 2005). This involved excluding many TAM-related papers that did not have IS use as the dependent variable. This decision was necessary because IS use is the focus of this curation (and we still included many

**MISQ Research Curation on IS Use**

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Mari-Klara Stein (Copenhagen Business School)
Abhay Mishra (Iowa State University)
TAM studies because IS use is its dependent variable, per Davis (1989). Second, we excluded articles that focused on forms of IS misuse, abuse, and addiction (e.g., Turel et al. 2011). In our view, such constructs, while related to IS use, are fundamentally different from it, with different antecedents, processes and outcomes, thus, requiring a separate analysis. For borderline papers, we used our collective judgment to include or exclude them on an individual basis. For instance, while we excluded papers on misuse, we included one award-winning paper on resistance (Lapointe and Rivard 2005) because we felt that particular paper provided an important perspective on IS use.

Third, we split the articles into three subsets (107 articles in total), each one summarized differently:

1. **Older articles that contributed to our historical understanding of IS use** (see Table 1). This subset includes 20 articles that have proven important (e.g., through citations) or that we believe will prove important in the long run (e.g., because of the originality of their ideas). For each article, we summarize its relevance. We did not include all older articles on use in this subset because our aim is to highlight the most important ones.

2. **Contemporary articles that contributed to our understandings of IS use** (see Table 2). This subset highlights 34 articles that contributed to a deeper understanding of IS use itself. That is, rather than take the IS use construct as given (Straub and del Guidice 2012), these articles scrutinized it in depth. We offer detailed summaries of these articles.

3. **Additional contemporary articles that studied IS use** (see Table 3). This subset highlights 53 articles that have contributed towards our understanding of use through studying its relationship with other antecedents or consequences but with less focus on use itself (relative to those in the second set of articles). We summarize these articles briefly.

2. **Progression of Research in MISQ**

*MISQ* publications on IS use show conceptual stability as well as both revolutionary change and evolutionary change. The publications show stability in that ideas stressed in the earliest articles remain accepted today. For instance, the two earliest studies on IS use in *MISQ* (Hamilton and Chervany 1981; Srinivasan 1985) both stressed the importance and complexity of IS use, given that it is the lynchpin through which systems have their effects. These themes of importance and complexity remain emphasized today (Bayerl et al. 2016; Schmitz et al. 2016). Another stable theme has been that IS use is ultimately a behavior or activity (Compeau et al. 1999; Srinivasan 1985). While later papers added to this view (as noted below), the behavioral actions or the ‘doings’ of use are still considered of central importance (Ortiz de Guinea and Webster 2014, Gaskin et al. 2014).

The main revolutionary change involved the development of a robust theory of IT acceptance, bookended by Davis (1989) and Venkatesh et al. (2003), two of the most cited articles in the IS discipline. It is hard to overstate the importance and influence of that work across many fields (e.g., Davis 1989 currently has over 49,000 citations on Google Scholar). As would be expected, the level of conceptual and empirical rigor required to advance this stream became extremely high (see, e.g., Kim 2009), but advances still continue (Venkatesh et al. 2012).

The main evolutionary change has involved the gradual increase in sophistication with which researchers define, theorize, and empirically account for the nature of IS use. For many years, researchers treated IS use quite simply (Straub and del Guidice 2012), defining it as a behavior alone (Compeau et al. 1999; Srinivasan 1985). This view gradually gave way to a richer view encompassing users’ cognition, emotion, and behavior in use (Burton-Jones and Gallivan 2007) and researchers began to consider each of its elements more closely (e.g., users, features, tasks, and time). As Subraman (2004) noted, the behavioral view alone was simply too descriptive and incomplete.

This trend of growing sophistication is evident in the progression of research at the individual level (Bhattacherjee and Premkumar 2004; Goodhue and Thompson 1995; Ortiz de Guinea and Webster
group level (Bartelt and Dennis 2014; Dennis 1996; Sarker and Valacich 2010), organizational level (Iyengar et al. 2015; Massetti and Zmud 1996; Rai et al. 2012), and across levels (Burton-Jones and Gallivan 2007; Lapointe and Rivard 2005; Maruping and Magni 2015; Romanow et al. 2018). This trend has also been supported by innovative conceptual studies (Barrett et al. 2013; Jaspersen et al. 2005; Kappos and Rivard 2008; Neguia et al. 2018; Ortiz de Guinea and Markus 2009), in-depth case studies (Beaudry and Pinsonneault 2005; da Cunha 2013; Essen and Värlander 2019; Leonardi 2013; Majchrzak et al. 2000; Stein et al. 2015), and new methods (Gaskin et al. 2014; Nan 2011).

Summing up the progression of research on IS use in MISQ, it could be said that while interest in the complexity of use has continued through the decades, researchers have gradually devised ways to account for that complexity in both their theoretical and empirical work.

3. Thematic Advances in Knowledge

The first major thematic advance involved the application, refinement, and integration of various social psychological explanations of IT acceptance (Bandura 1977; Fishbein and Ajzen 1975; Triandis 1971). This was a particularly strong theme in the 1990s and early 2000s, spurred on from Davis (1989), and many of the most-cited papers in IS fall into this category. Venkatesh et al. (2003) provides the seminal treatment of this line of work.

The second major thematic advance has involved the development of theories to account for the dynamics of use. Because of the complexity of these dynamics, researchers have not sought one unifying theory, but instead have used different theories to account for different characteristics of these dynamics.

For instance, some researchers have focused on characteristics of systems in use, such as emergence (the fact that benefits from use take time to emerge) and interdependence (the fact that use of a given system may be impacted by or relate to other internal or external systems). Such ideas have been tackled using theories of adaptation and affordances at the individual and group levels (Leonardi 2013; Majchrzak et al. 2000; Nevo et al. 2016; Schmitz et al. 2016), theories of sociomateriality or institutional theory at the community and practice levels (Essen and Värlander 2019; Gaskin et al. 2014; Venters et al. 2014), and theories of capabilities at the organizational and plant levels (Banker et al. 2006; Gattiker and Goodhue 2005; Rai et al. 2012; Ray et al. 2005; Subramani 2004).

Meanwhile, other researchers have focused more on the human aspects of use, developing new theory to understand human coping (Beaudry and Pinsonneault 2005), emotion (Stein et al. 2015), unconscious cognition (Bartelt and Dennis 2014; Limayem et al. 2007; Polites and Karahanna 2013), habit (Ortiz de Guinea and Markus 2009; Polites and Karahanna 2013), culture (Kappos and Rivard 2008), mindfulness (Thatcher et al. 2018), and manifestations of power (Oreglia and Srinivasan 2016), in IS use.

The third major thematic advance has been the development of richer measurement and methodological approaches that allow researchers to capture the complexity of the usage process more accurately and provide a clearer explanation of how IS use relates to a host of other phenomena. This is evident in the use of multiple methods (Gaskin et al. 2014; Ortiz de Guinea and Webster 2014), mediation analyses (Subramani 2004), configurational analyses (Rai et al. 2012), detailed ethnographies (da Cunha 2013), and simulations (Nan 2011).

The fourth major thematic advance has been the continuing expansion of the broader network of constructs of interest in the study of IS use (see, e.g., the studies cited in Table 3). For instance,
MISQ articles have shown how IS use can affect a wide array of outcomes, from traditional ones such as performance (Kim et al. 2016), to many others such as individual and organizational innovativeness (Gray et al. 2011, Trantopoulos et al. 2017), learning (Leonardi, 2015), community equality (Goh et al. 2016), and national well-being (Ganju et al. 2016). MISQ articles have also revealed the expanding universe of antecedents that influence IS use, such as social influence and support (Sykes et al. 2009; Wang et al. 2013), institutional pressures (Chatterjee et al. 2002; Liang et al. 2007), and personality (McElroy et al. 2007), among others. Other articles have improved our understanding of how IS use is embedded in processes in practice (Davidson and Chismar 2007; Essen and Värlander 2019; Levina and Vaast 2005; Serrano and Karahanna 2016; Venters et al. 2014).

Conclusion
IS use has long been a central construct in the field and this is unlikely to change. MISQ has published many of the seminal papers on the topic. We expect MISQ will continue to take the leadership role in publishing research on IS use. Through the pages of MISQ, we have learned the importance and complexity of IS use, how to address these challenges in our research, and seen clues for how to develop these ideas further in the future.

Acknowledgments

For helpful comments on earlier drafts, we thank Ashley Bush, Arun Rai, Xiao Xiao, and Rebekah Eden. The first author benefited from support from the Australian Research Council (FT130100942, LP170101154).
Table 1: Important Historical Articles that Contributed to our Understandings of IS Use (1977-1999)

<table>
<thead>
<tr>
<th>Paper</th>
<th>Historically important insight</th>
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<tbody>
<tr>
<td>(Hamilton and Chervany 1981)</td>
<td>Emphasized that IS use is integral to achieving organizational objectives, and highlighted complexities of measurement</td>
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<tr>
<td>(Srinivasan 1985)</td>
<td>Highlighted the presence of mixed results when studying IS use and the need to account for the nature of the system and task</td>
</tr>
<tr>
<td>(Watson et al. 1988)</td>
<td>Highlighted how unintended consequences can arise from use when different users have different preferences</td>
</tr>
<tr>
<td>(DeLone 1988)</td>
<td>Showed that small businesses use IT more effectively if they have onsite infrastructure and a CEO with greater IT knowledge</td>
</tr>
<tr>
<td>(Davis 1989)</td>
<td>The seminal study of IT acceptance; ushered in a new way of theorizing and testing models IS use</td>
</tr>
<tr>
<td>(Thompson et al. 1991)</td>
<td>Demonstrated the value of using another theory of behavior (Triandis 1971) to predict IS use rather than the one used in Davis (1989)</td>
</tr>
<tr>
<td>(Adams et al. 1992)</td>
<td>One of the first concerted replications of Davis (1989), largely validating its findings</td>
</tr>
<tr>
<td>(Lee 1994)</td>
<td>Demonstrated the power of interpretive research by revealing how properties attributed to IT are actually properties of its use</td>
</tr>
<tr>
<td>(Boynton et al. 1994)</td>
<td>Used the concept of absorptive capacity to explain how organizations’ use of IT depended on their managers’ level of knowledge</td>
</tr>
<tr>
<td>(Iacovou et al. 1995)</td>
<td>Showed how additional variables are important when studying use of integrated systems, i.e., external forces and internal integration</td>
</tr>
<tr>
<td>(Taylor and Todd 1995)</td>
<td>Showed how the relationships in TAM vary substantially when studying experienced vis-à-vis inexperienced users</td>
</tr>
<tr>
<td>(Goodhue and Thompson 1995)</td>
<td>Integrated prior discussions of fit and use by devising a new model of the antecedents and outcomes of use and the role of fit</td>
</tr>
<tr>
<td>(Compeau and Higgins 1995)</td>
<td>Like Davis (1989) and Thompson et al. (1991), showed the value of applying another social-psychological theory (Bandura 1977) to IS use</td>
</tr>
<tr>
<td>(Massetti and Zmud 1996)</td>
<td>Showed how researchers can decompose a firm’s overall use of an IS into tactical dimensions that can differentially explain outcomes</td>
</tr>
<tr>
<td>(Dennis 1996)</td>
<td>Revealed the importance of distinguishing between the use of the system per se, and the use of information from the system</td>
</tr>
<tr>
<td>(Gefen and Straub 1997)</td>
<td>Demonstrated how gender influences individuals’ use of communication systems (e.g., email) by shaping how they perceive them</td>
</tr>
<tr>
<td>(Pinsonneault and Rivard 1998)</td>
<td>Revealed how the impact of IS use in firms can be derailed if managers let it shape their work roles rather than using it mindfully</td>
</tr>
<tr>
<td>(Choudhury et al. 1998)</td>
<td>Revealed that theories of the effects of interorganizational IT can be improved by attending closer to how systems are actually used</td>
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<tr>
<td>(Zigurs and Buckland 1998)</td>
<td>Proposed that a key principle of the effective use of group support systems is how well the technology fits the task</td>
</tr>
<tr>
<td>(Compeau et al. 1999)</td>
<td>Extended the work of Compeau et al. (1995) to show how individual IT usage can be predicted in longitudinal settings</td>
</tr>
</tbody>
</table>

Table 1A: Links for Articles in Table 1

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ananth Srinivasan</td>
<td>1985</td>
<td>Alternative Measures of System Effectiveness: Associations and Implications</td>
</tr>
<tr>
<td>Richard Watson, Gerardine DeSanctis, Marshall Poole</td>
<td>1988</td>
<td>Using a GDSS to Facilitate Group Consensus: Some Intended and Unintended Consequences</td>
</tr>
<tr>
<td>William DeLone</td>
<td>1988</td>
<td>Determinants of Success for Computer Usage in Small Business</td>
</tr>
<tr>
<td>Fred Davis</td>
<td>1989</td>
<td>Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology</td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Title</td>
</tr>
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<td>----------------------------------------------</td>
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<td>-------------------------------------------------------------------------------------------</td>
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<tr>
<td>Ronald Thompson, Christopher Higgins, Jane Howell</td>
<td>1991</td>
<td>Personal Computing Toward a Conceptual Model of Utilization</td>
</tr>
<tr>
<td>Dennis Adams, R. Nelson, Peter Todd</td>
<td>1992</td>
<td>&quot;Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication</td>
</tr>
<tr>
<td>Andrew Boynont, Robert Zmud, Gerry Jacobs</td>
<td>1994</td>
<td>The Influence of IT Management Practice on IT Use in Large Organizations</td>
</tr>
<tr>
<td>Charalambos Iacovou, Izak Benbasat, Albert Dexter</td>
<td>1995</td>
<td>Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology</td>
</tr>
<tr>
<td>Shirley Taylor, Peter Todd</td>
<td>1995</td>
<td>Assessing IT Usage: The Role of Prior Experience</td>
</tr>
<tr>
<td>Dale Goodhue, Ronald Thompson</td>
<td>1995</td>
<td>Task-Technology Fit and Individual Performance</td>
</tr>
<tr>
<td>Deborah Compeau, Christopher Higgins</td>
<td>1995</td>
<td>Computer Self Efficacy: Development of a Measure and Initial Test</td>
</tr>
<tr>
<td>Brenda Massetti, Robert Zmud</td>
<td>1996</td>
<td>Measuring the Extent of EDI Usage in Complex Organizations: Strategies and Illustrative Examples</td>
</tr>
<tr>
<td>Alan Dennis</td>
<td>1996</td>
<td>Information Exchange and Use in Group Decision Making: You Can Lead a Group to Information, but You Can't Make It Think</td>
</tr>
<tr>
<td>David Gefen, Detmar Straub</td>
<td>1997</td>
<td>Gender Differences in the Perception and Use of E-Mail: An Extension to the Technology Acceptance Model</td>
</tr>
<tr>
<td>Alain Pinsonneault, Suzanne Rivard</td>
<td>1998</td>
<td>Information Technology and the Nature of Managerial Work: From the Productivity Paradox to the Icarus Paradox?</td>
</tr>
<tr>
<td>Deborah Compeau, Christopher Higgins, Sid Huff</td>
<td>1999</td>
<td>Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study</td>
</tr>
<tr>
<td>Paper</td>
<td>Contribution to our understanding of IT use</td>
<td>How use was studied or conceptualized</td>
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<tr>
<td>(Majchrzak et al. 2000)</td>
<td>Suggests that technology adaptation is a process of achieving alignment. Adaptations appear to be neither discontinuous nor continuous, but sporadic. Adaptations yield increased alignment, followed by an almost continuous array of discrepant events indicating that new structures are needed.</td>
<td>Focus on adaptation as a process of modifying existing conditions to achieve alignment.</td>
</tr>
<tr>
<td>(Subramani 2004)</td>
<td>Suggests that to understand how firms’ use of IT can affect competitive performance, researchers need to identify patterns of use that reflect the firm’s strategic intent (rather than use mere descriptive measures). It also highlights the mediated pathways through which use leads to downstream benefits.</td>
<td>Focus on two patterns of use, namely use for exploitation (to improve operational efficiencies) and use for exploration (to explore new possibilities), and how these patterns provide the conditions that enable improved investments and performance.</td>
</tr>
<tr>
<td>(Lapointe and Rivard 2005)</td>
<td>Suggests that use can be negative, as in resistance behaviors, and these behaviors can evolve over time and across levels of analysis.</td>
<td>Focus on the observed usage behavior patterns (from apathy to aggressive resistance) and how they change over time and across levels. At a unit level, the behaviors resemble compilation (independent use) or composition (a convergence across the collective).</td>
</tr>
<tr>
<td>(Beaudry and Pinsonneault 2005)</td>
<td>Suggests that the antecedents and processes of user adaptations must be considered together (rather than separately as typically done in past research). User adaptation can be viewed as coping with disruptive technology events.</td>
<td>Focus on emotion- and problem-focused adaptation. Emotion-focused adaptation includes self-deception and avoidance, minimization of the consequences of the IT event, selective attention, positive comparison, and passive acceptance. Problem-focused adaptation manages issues associated with the IT event by 1) adapting one’s self such as adjusting personal habits, learning new skills, and adjusting work commitment; 2) adapting the work by modifying procedures and routines; and/or</td>
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<td>(Jasperson et al. 2005)</td>
<td>Suggests that post-adoptive behaviors are influenced by unique factors including use history and work system. Recommends that IT use (post-adoptive) should be studied at the feature level, with feature adoption, use, and extension as distinct stages.</td>
<td>Focus on post-adoptive behavior as the set of feature adoption decisions, feature use behaviors, and feature extension behaviors made by a user after an IT application has been installed and made available for work activities. Examine two levels of analysis: individual’s cognitions and behaviors regarding feature adoption, use, and extension, and the organizational context.</td>
</tr>
<tr>
<td>(Ray et al. 2005)</td>
<td>Suggests that the benefit of IT for a firm does not stem from the amount of IT used or spent, but rather from how effectively the IT is used in business processes, as this is a valuable, rare, and inimitable capability. This is among the first papers to apply RVB to study performance at the level of a business process.</td>
<td>Focus on amount of IT implemented and spent in particular business processes and the extent to which line managers and IT managers share knowledge about how to best use the potential offered by IT. The authors do not measure use but theorize it strongly.</td>
</tr>
<tr>
<td>(Burton-Jones and Gallivan 2007)</td>
<td>Suggests that use does not exist separately at different levels of analysis; rather, use is a multilevel phenomenon and researchers need to understand how individual and collective use relate to each other.</td>
<td>Focus on use as a multilevel activity, which involves understanding the function of use, the structure of use (interdependencies-in-use and form of collective use), and the context of use (user, task, system, and time).</td>
</tr>
<tr>
<td>(Limayem et al. 2007)</td>
<td>Suggests that continued use is different to initial use because it involves repeated decisions to use a system and this repetition can engender a habit. Therefore, when habits are strong, the predictors of initial use (such as intention) have less effect on use.</td>
<td>Focus on use as an antecedent (usage comprehensiveness and frequency influence habit formation) and outcome (IS continuance, measured by frequency and duration of use). Emphasize that using many parts of a system for many different purposes is influential in habit formation.</td>
</tr>
<tr>
<td>(Venkatesh et al. 2008)</td>
<td>Suggests that researchers need to move from studying use as a unidimensional construct to viewing it as a multidimensional construct, with its dimensions driven differently by expectations, intentions, and facilitating conditions</td>
<td>Focus on the differences between the duration, frequency, and intensity of individuals’ use of systems, and how these three aspects of use are predicted differently by behavioral intention, behavioral</td>
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<tr>
<td>Paper</td>
<td>Contribution to our understanding of IT use</td>
<td>How use was studied or conceptualized</td>
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<tr>
<td>(Kim 2009)</td>
<td>Suggests that an individual's decision to use a system is largely a product of four mechanisms (reason-oriented action, sequential updating, feedback, and habit). While past research has viewed them mostly independently, they need to be viewed in a unified way because they are all interrelated products of users' memory.</td>
<td>Focus on actual use by individuals, measured over three time-points. Measures included the average number of information queries made by each user and the average hours of use per week by each user.</td>
</tr>
<tr>
<td>(Ortiz de Guinea and Markus 2009)</td>
<td>Suggests that in contrast to the assumptions in most prior research, continued use is not primarily a planned and rational decision-making process. Even though it is goal directed, emotions and habits can play a major and direct role in usage behaviors quite apart from intentions and plans.</td>
<td>Focus on reconceptualizing IT use from a rational, planned and reasoned behavior to an emotional, unplanned and habitual behavior.</td>
</tr>
<tr>
<td>(Sarker and Valacich 2010)</td>
<td>Suggests that use by a group differs from use by a collection of individuals, and so it has different antecedents and consequences, i.e., we cannot assume methodological individualism.</td>
<td>Focus on comparing each group's strength of adoption of the technology to the average of the group members' individual intentions to use the technology.</td>
</tr>
<tr>
<td>(Nan 2011)</td>
<td>Suggests that use is not simple (as assumed and studied in past work) but instead is a complex adaptive system with multiple agents that interact and change over time and levels of analysis.</td>
<td>Focus on use as a complex adaptive system, involving eight elements: agents, attributes, behavioral rules, interaction, connection, flow, environment, and structure.</td>
</tr>
<tr>
<td>(Sun 2012)</td>
<td>Suggests that while past research has looked at adaptation of a system as a whole, revisions of system use actually occur at the feature level. Adaptive system use (ASU) includes: trying new features, feature substituting, feature combining, and feature repurposing.</td>
<td>Focus on features in use (FIU), as the basket of system features ready to be used by a user to accomplish his/her tasks. Adaptive system use has two dimensions: revising the content of feature in use (what is used) and revising the spirit of features in use (how they are used).</td>
</tr>
<tr>
<td>Paper</td>
<td>Contribution to our understanding of IT use</td>
<td>How use was studied or conceptualized</td>
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<td>(Rai et al. 2012)</td>
<td>Suggests that the implementation and use of IT by a supplier with its buyers can create interfirm logistics capabilities that offer relational value for both parties. This value can increase as more sophisticated IT functionalities are implemented and used (i.e., as the partners' relationship is defined by higher-level capability profiles).</td>
<td>Focus on the implementation and use of progressively more enhanced sets of IT functionalities to manage the flows of physical goods, information, and finances across locations in interfirm logistics processes. More sophisticated IT capabilities are created by implementing and using progressively more advanced IT functionalities to manage interdependencies.</td>
</tr>
<tr>
<td>(da Cunha 2013)</td>
<td>Suggests that use is strategic (rather than merely functional); workers use the system to impress others (sprucing desirable data and supressing undesirable data)</td>
<td>Focus on different user groups (employees, managers), how they interact through the system, the practices they engage in to spruce and supress data in the system, and the structuration process that explains why they engage in these practices.</td>
</tr>
<tr>
<td>(Polites and Karahanna 2013)</td>
<td>Suggests that continued use of IS over time is a function of habit rather than conscious intentions. IS habits develop within the context of organizational and individual level work routines. Incumbent system habits can also inhibit more effective system use. We need to know how to disrupt these habits and how to foster the development of new habits.</td>
<td>Focus on scripts, routines and habits (incumbent and new system habits) as well as habit disruption and habit development strategies.</td>
</tr>
<tr>
<td>(Leonardi 2013)</td>
<td>Suggests that a given technology can support multiple affordances that people enact differently, thus organizational level change is hard to predict and result in unintended consequences. We need to attend to how groups of users can converge on the</td>
<td>Focus on individual affordances, collective affordances, and shared affordances. Emphasizes how the use of a new technology within a collective can follow a shared or a configurational structure, and</td>
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<tr>
<td>Paper</td>
<td>Contribution to our understanding of IT use</td>
<td>How use was studied or conceptualized</td>
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<tr>
<td>(Bartelt and Dennis 2014)</td>
<td>enactment of a shared affordance to understand how organizational-level change occurs.</td>
<td>what it takes for shared affordances to be actualized.</td>
</tr>
<tr>
<td>(Ortiz de Guinea and Webster 2014)</td>
<td>Suggests that as group members use a system in a particular context, informal rules (genre rules) emerge which in turn shapes use in a structuration process. These rules can shape outcomes of use even more than the fit of the IT to the task (in contrast to the views of past research which emphasize tool features and task/technology fit).</td>
<td>Focus on the characteristics of different communication tools and their norms for use ('genre rules') that emerge over time.</td>
</tr>
<tr>
<td>(Gaskin et al. 2014)</td>
<td>Suggests a new way of studying use as part of an enacted routine. An enacted routine involves multiple actors conducting activities to produce outputs, where these activities involve leveraging the affordances offered by various tools. New insights can be gained by learning how such routines emerge and evolve.</td>
<td>Focus on conceptualizing the sociomaterial routines, which combine social and material elements for a purpose. The discussion emphasizes that digital technologies are entangled within routines and its variation and appropriated differently in different contexts.</td>
</tr>
<tr>
<td>(Stein et al. 2015)</td>
<td>Suggests that use is often driven by emotions and these emotions can have non-uniform rather than uniform effects (e.g., mixed emotions can have positive effects on use)</td>
<td>Focus on how cues trigger individuals’ affective responses which in turn trigger different use patterns. These patterns are defined by different aspects of the</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Paper</th>
<th>Contribution to our understanding of IT use</th>
<th>How use was studied or conceptualized</th>
<th>Theory</th>
<th>Empirical approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Iyengar et al. 2015)</td>
<td>Suggests that use is undertaken by organizations not only to achieve direct ends, but also to enable organizational learning, which has additional benefits</td>
<td>Focus on use as an organizational learning mechanism that has structural elements (as per structuration theory) and that enables the storage, collection, and dissemination of information and knowledge. Measured in the study as 'extent of use.'</td>
<td>Organizational learning theories</td>
<td>Survey questionnaire (independent variables), organizational records (dependent variable), and public data (control variable). Data analyzed with confirmatory factor analysis and covariance-based SEM.</td>
</tr>
<tr>
<td>(Oreglia and Srinivasan 2016)</td>
<td>Suggests that use need not always occur through direct interaction with a device; instead, use can be mediated by an intermediary and the intermediary can gain power through his/her mediation.</td>
<td>Focus on users as social actors, the social context (including gender roles), the role of individuals as intermediaries in the use process, and the effects of usage practices on power and empowerment.</td>
<td>Theories of gender and empowerment</td>
<td>Ethnography involving interviews, passive observation, and participant observation over 7 years. Gender-focused analysis of the process of use in that setting.</td>
</tr>
<tr>
<td>(Leonardi et al. 2016)</td>
<td>Suggests that use involves more than using a system. In complex contexts, where systems have different features, user groups, and social settings, users may engage in multiplex appropriation, which goes beyond appropriating the system to include appropriations of other elements of the ecosystem at the same time (technical, role, usage, social, and policy appropriations).</td>
<td>Focus on appropriations and their many types: technical, role, usage, social, policy. Propose the concept of multiplex appropriation.</td>
<td>Adaptive structuration theory, complexity theory, and inductive elements</td>
<td>Qualitative case study of a Brazilian banking system at the individual and organizational levels, with multiple types of organizations. Data analysed within-cases and across-cases with grounded theory methods.</td>
</tr>
<tr>
<td>Paper</td>
<td>Contribution to our understanding of IT use</td>
<td>How use was studied or conceptualized</td>
<td>Theory</td>
<td>Empirical approach</td>
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<tr>
<td>(Bayerl et al. 2016)</td>
<td>Suggests that a group's continued use of a system is provisional because users may decide to change or cease use over time. A group's use is driven not only by the members' attitudes towards the system but also their rationales for using it, and especially the extent to which these attitudes and rationales are aligned across subgroups.</td>
<td>Focus on developing the concept of technology adoption states (TAS). These refer to attitude-rationale configurations among subgroups, where attitude is measured in terms of valence (a group's positive or negative orientation to the system) and rationale reflects the reason for that valence (e.g., two groups might like a system but for different reasons). The article outlines different attitude-rationale configurations and how and why they can change over time.</td>
<td>Inductively-built theory</td>
<td>Longitudinal, qualitative, multiple case study, of production teams in the oil and gas industry. Data analyzed with temporal bracketing and grounded-theory methods.</td>
</tr>
<tr>
<td>(Nevo et al. 2016)</td>
<td>Suggests that whereas adaptation involves changing one's use of a system to meet a changed goal or context, reinvention involves changing one's use of a system to achieve a new goal. The paper provides a new theory to explain what reinvention involves and two different patterns of reinvention that users can engage in.</td>
<td>Focused on patterns of temporal agency that describe the psychological and social processes that users engage in as they project themselves into a hypothetical future, imagine future outcomes, and take actions to achieve them. The authors distinguish two types of reinvention patterns: performance-oriented and mastery-oriented.</td>
<td>Temporally-situated theory of agency, and psychological theories of goal achievement</td>
<td>Conceptual paper</td>
</tr>
<tr>
<td>(Schmitz et al. 2016)</td>
<td>Suggests that adaptive structuration is a feature of individual use, not just group use. Adaptive structuration at the individual level is defined by the object being adapted (technology or task) and the approach towards the adaptation (exploitation or exploration).</td>
<td>Focus on a topology of adaptation behaviors: exploitive / exploratory technology adaptation, and exploitive / exploratory task adaptation.</td>
<td>Adaptive structuration theory</td>
<td>Quantitative survey of graduate business students in a large university. Data analysed with PLS, with moderation and non-linear relationship analysis.</td>
</tr>
<tr>
<td>(Romanow et al. 2018)</td>
<td>Demonstrates how measures of individual-level use (such as 'deep structure use') can be conceptualized and theorized at the collective/team level and how the effects of that team-level use depend on the context of use (e.g., the level of risk in a medical context).</td>
<td>Focus on use as a multilevel activity involving individual use and team use.</td>
<td>Coordination theory, adaptive structuration theory</td>
<td>Quantitative examination of a bespoke data set created by leveraging matched surveys and electronic medical records in a large health service.</td>
</tr>
<tr>
<td>Paper</td>
<td>Contribution to our understanding of IT use</td>
<td>How use was studied or conceptualized</td>
<td>Theory</td>
<td>Empirical approach</td>
</tr>
<tr>
<td>-------------------------------</td>
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<tr>
<td>(Karahanna et al. 2018)</td>
<td>Provides a framework for understanding the many ways by which humans can use social media to fulfil their human needs. The categories of use (each grounded in different affordances) can provide a framework to support future empirical and design-science studies.</td>
<td>Focus on different types of use associated with different affordances of social media.</td>
<td>Self-determination theory, psychological ownership theory, and affordance theory</td>
<td>Conceptual paper</td>
</tr>
<tr>
<td>(Negoita et al. 2018)</td>
<td>Extends the understanding of IT use as a multilevel phenomenon by outlining how emergence from the individual to the unit level is shaped by different configurations of task, user, and system interdependence between instances of individual-level IS use.</td>
<td>Collective IS use is a unit level construct, rooted in instances of individual-level IS use within the context of a common work process. A typology of typology of collective IS use comprises four ideal types, namely siloed use, processual use, coalesced use, and networked use.</td>
<td>Multilevel theory</td>
<td>Conceptual paper</td>
</tr>
<tr>
<td>(Thatcher et al. 2018)</td>
<td>Defines and proposes a scale for IT mindfulness: an IT-use specific trait that predicts active system use (deep structure usage).</td>
<td>IT mindfulness is a dynamic IT-specific trait, evident when working with IT, whereby the user focuses on the present, pays attention to detail, exhibits a willingness to consider other uses, and expresses genuine interest in investigating IT features and failures. A four-dimensional scale is developed.</td>
<td>Mindfulness theory</td>
<td>Three quantitative studies (cross-sectional survey, longitudinal experiment, and longitudinal survey).</td>
</tr>
<tr>
<td>(Essen and Värlander 2019)</td>
<td>Shows recursiveness between micro-level technology use and field-level structures, highlighting the role of technology in institutional change processes. One key mechanism of change: emergent use (humans’ variable hands-on deployment of the technological artifact in situ).</td>
<td>Evolving technology affordances and micro-level technology use (emergent use) can reshape how established logics are related on the field level, thus producing institutional change. Emergent use refers to parallel and “pioneering” technology- afforded behaviors that involve a minority of field members and challenge the relationships among logics as established at the field level.</td>
<td>Technology affordance theory; Institutional logics theory</td>
<td>Qualitative, intensive examination of the development and implementation of an e-health service in Sweden between 2000 and 2014.</td>
</tr>
</tbody>
</table>
(Jung et al. 2019) introduces social engagement as a key construct for mobile application use and the sustainability and profitability of mobile platforms. The paper introduces three mechanisms through which social engagement takes place: ubiquity, impulsivity and disinhibition.

Use was studied as social engagement. Three components of social engagement studied include: view sent, messages sent, and total matches attained.

None mentioned

Observational data from ~100,000 users of a dating website. Difference in difference with propensity score matching and falsification.

Table 2A: Links for Articles in Table 2

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ann Majchrzak, Ronald E. Rice, Arvind Malhotra, Sulin Ba</td>
<td>2000</td>
<td>Technology Adaptation: The Case of a Computer-Supported Inter-organizational Virtual Team</td>
</tr>
<tr>
<td>Mani R. Subramani</td>
<td>2004</td>
<td>How Do Suppliers Benefit from Information Technology Use in Supply Chain Relationships?</td>
</tr>
<tr>
<td>Liette Lapointe, Suzanne Rivard</td>
<td>2005</td>
<td>A Multilevel Model of Resistance to Information Technology Implementation</td>
</tr>
<tr>
<td>Anne Beaudry, Alain Pinsonneault</td>
<td>2005</td>
<td>Understanding User Responses to Information Technology: A Coping Model of User Adaptation</td>
</tr>
<tr>
<td>Andrew Burton-Jones, Michael Gallivan</td>
<td>2007</td>
<td>Toward a Deeper Understanding of System Usage in Organizations: A Multilevel Perspective</td>
</tr>
<tr>
<td>Viswanath Venkatesh, Susan A. Brown, Likoebe M. Maruping, Hillol Bala</td>
<td>2008</td>
<td>Predicting Different Conceptualizations of System Use: The Competing Roles of Behavioral Intention, Facilitating Conditions, and Behavioral Expectation</td>
</tr>
<tr>
<td>Sung S. Kim</td>
<td>2009</td>
<td>The Integrative Framework of Technology Use: An Extension and Test</td>
</tr>
<tr>
<td>Ana Ortiz de Guinea, M. Lynne Markus</td>
<td>2009</td>
<td>Why Break the Habit of a Lifetime? Rethinking the Roles of Intention, Habit, and Emotion in Continuing Information Technology Use</td>
</tr>
<tr>
<td>Saonee Sarker, Joseph S. Valacich</td>
<td>2010</td>
<td>An Alternative to Methodological Individualism: A Non-Reductionist Approach to Studying Technology Adoption by Groups</td>
</tr>
<tr>
<td>Ning Nan</td>
<td>2011</td>
<td>Capturing Bottom-Up Information Technology Use Processes: A Complex Adaptive Systems Model</td>
</tr>
<tr>
<td>Heshan Sun</td>
<td>2012</td>
<td>Understanding User Revisions When Using Information System Features: Adaptive System Use and Triggers</td>
</tr>
<tr>
<td>Arun Rai, Paul A. Pavlou, Ghiyoung Im, Steve Du</td>
<td>2012</td>
<td>Interfirm IT Capability Profiles and Communications for Cocreating Relational Value: Evidence from the Logistics Industry</td>
</tr>
<tr>
<td>João Vieira da Cunha</td>
<td>2013</td>
<td>A Dramaturgical Model of the Production of Performance Data</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Year</td>
<td>Title</td>
</tr>
<tr>
<td>-----------</td>
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</tr>
<tr>
<td>Greta L. Polites, Elena Karahanna</td>
<td>2013</td>
<td>The Embeddedness of Information Systems Habits in Organizational and Individual Level Routines: Development and Disruption</td>
</tr>
<tr>
<td>Paul M. Leonardi</td>
<td>2013</td>
<td>When Does Technology Use Enable Network Change in Organizations? A Comparative Study of Feature Use and Shared Affordances</td>
</tr>
<tr>
<td>Ana Ortiz de Guinea, Jane Webster</td>
<td>2014</td>
<td>An Investigation of Information Systems Use Patterns: Technological Events as Triggers, the Effect of Time, and Consequences for Performance</td>
</tr>
<tr>
<td>James Gaskin, Nicholas Berente, Kalle Lyytinen, Youngjin Yoo</td>
<td>2014</td>
<td>Toward Generalizable Sociomaterial Inquiry: A Computational Approach for Zooming In and Out of Sociomaterial Routines</td>
</tr>
<tr>
<td>Mari-Klara Stein, Sue Newell, Erica L. Wagner, Robert D. Galliers</td>
<td>2015</td>
<td>Coping with Information Technology: Mixed Emotions, Vacillation, and Nonconforming Use Patterns</td>
</tr>
<tr>
<td>Kishen Iyengar, Jeffrey R. Sweeney, Ramiro Montealegre</td>
<td>2015</td>
<td>Information Technology Use as a Learning Mechanism: The Impact of IT Use on Knowledge Transfer Effectiveness, Absorptive Capacity, and Franchisee Performance</td>
</tr>
<tr>
<td>Elisa Oreglia, Janaki Srinivasan</td>
<td>2016</td>
<td>ICT, Intermediaries, and the Transformation of Gendered Power Structures</td>
</tr>
<tr>
<td>Paul M. Leonardi, Diane E. Bailey, Eduardo Henrique Diniz, Dan Sholler, Bonnie A. Nardi</td>
<td>2016</td>
<td>Multiplex Appropriation in Complex Systems Implementation: The Case of Brazil’s Correspondent Banking System</td>
</tr>
<tr>
<td>Petra Saskia Bayerl, Kristina Lauche, Carolyn Astell</td>
<td>2016</td>
<td>Revisiting Group-Based Technology Adoption as a Dynamic Process: The Role of Changing Attitude-Rationale Configurations</td>
</tr>
<tr>
<td>Kurt Schmitz, James T. C. Teng, Kimberly J. Webb</td>
<td>2016</td>
<td>Capturing the Complexity of Malleable IT Use: Adaptive Structuration Theory for Individuals</td>
</tr>
<tr>
<td>Saggi Nevo, Dorit Nevo, Alain Pinsonneault</td>
<td>2016</td>
<td>A Temporally Situated Self-Agency Theory of Information Technology Reinvention</td>
</tr>
<tr>
<td>Elena Karahanna. Sean Xin Xu, Yan Xu, Nan (Andy) Zhang</td>
<td>2018</td>
<td>The Needs–Affordances–Features Perspective for the Use of Social Media</td>
</tr>
<tr>
<td>Bogdan Negoita, Liette Lapointe, and Suzanne Rivard</td>
<td>2018</td>
<td>Collective Information System Use: A Typological Theory</td>
</tr>
<tr>
<td>Jason Bennett Thatcher, Ryan T. Wright, Heshan Sun, Thomas J. Zagenczyk, Richard Klein</td>
<td>2018</td>
<td>Mindfulness in Information Technology Use: Definitions, Distinctions, and a New Measure</td>
</tr>
<tr>
<td>JaeHwuen Jung, Ravi Bapna, Jui Ramaprasad, and Akhmed Umyarov</td>
<td>2019</td>
<td>Love Unshackled: Identifying the Effect of Mobile App Adoption in Online Dating</td>
</tr>
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</table>
Table 3: Additional Contemporary Articles that Made Contributions to Concepts Surrounding IS Use

<table>
<thead>
<tr>
<th>Articles</th>
<th>Position of IS Use in the Study</th>
<th>Level of Analysis</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Cooper et al. 2000)</td>
<td>Antecedent</td>
<td>Organization</td>
<td>Qualitative</td>
</tr>
<tr>
<td>(Chatterjee et al. 2002)</td>
<td>Outcome</td>
<td>Organization</td>
<td>Quantitative</td>
</tr>
<tr>
<td>(Christiaanse and Venkatraman 2002)</td>
<td>Antecedent</td>
<td>Interorganization</td>
<td>Qualitative, Quantitative</td>
</tr>
<tr>
<td>(Venkatesh et al. 2003)</td>
<td>Outcome</td>
<td>Individual</td>
<td>Quantitative</td>
</tr>
<tr>
<td>(Kohli and Kettinger 2004)</td>
<td>Process, Outcome</td>
<td>Individual, Group</td>
<td>Qualitative</td>
</tr>
<tr>
<td>(Bhattacherjee and Premkumar 2004)</td>
<td>Antecedent, Outcome</td>
<td>Individual</td>
<td>Quantitative</td>
</tr>
<tr>
<td>(Levina and Vaast 2005)</td>
<td>Process</td>
<td>Individual</td>
<td>Qualitative</td>
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<tr>
<td>(Wasko and Faraj 2005)</td>
<td>Outcome</td>
<td>Individual</td>
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<tr>
<td>(Gavittiker and Goodhue 2005)</td>
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<td>Plant</td>
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<td>(Karahanna et al. 2006)</td>
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<td>(Venkatesh and Ramesh 2006)</td>
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<td>(Arnold et al. 2006)</td>
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<td>(Tanriverdi 2006)</td>
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<td>(Watson-Manheim and Belanger 2007)</td>
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<tr>
<td>(McElroy et al. 2007)</td>
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<tr>
<td>(Davidson and Chismar 2007)</td>
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<td>(Kappos and Rivard 2008)</td>
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<td>(Dennis et al. 2008)</td>
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<td>(Strong and Volkoff 2010)</td>
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<td>Authors</td>
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<tr>
<td>(Venters et al. 2014)</td>
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<td>Process Practice Qualitative</td>
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<td>(Tsai and Bagozzi 2014)</td>
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<td>(Ou et al. 2014)</td>
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<tr>
<td>(Mazmanian et al. 2014)</td>
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<td>Process Practice Qualitative</td>
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<td>(Jones 2014)</td>
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<td>Process Practice Qualitative</td>
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<td>(Maruping and Magni 2015)</td>
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<td>Outcome Individual, Group Quantitative</td>
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<td>(Leonardi 2015)</td>
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<td>(Shen et al. 2015)</td>
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<td>(Tian and Xu 2015)</td>
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<td>Consequence Organization Quantitative</td>
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<td>(Han et al. 2016)</td>
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<tr>
<td>(Kim et al. 2016)</td>
<td></td>
<td>Antecedent Individual Quantitative</td>
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<tr>
<td>(Serrano and Karahanna 2016)</td>
<td></td>
<td>Antecedent, Process Individual Qualitative, Quantitative</td>
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<tr>
<td>(Ganju et al. 2016)</td>
<td></td>
<td>Antecedent Country Quantitative</td>
<td></td>
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<tr>
<td>(Leong et al. 2016)</td>
<td></td>
<td>Process Community Quantitative</td>
<td></td>
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<tr>
<td>(Goh et al. 2016)</td>
<td></td>
<td>Antecedent Individual, Community Quantitative</td>
<td></td>
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<tr>
<td>(Huang and Zhang 2016)</td>
<td></td>
<td>Antecedent Individual Quantitative</td>
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<tr>
<td>(Venkatesh et al. 2016)</td>
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<td>Antecedent, Outcome Individual Quantitative</td>
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<tr>
<td>(Trantopoulous et al. 2017)</td>
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<td>Antecedent Organization Quantitative</td>
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<tr>
<td>(Retana et al. 2018)</td>
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<td>Outcome Organization (buyer) Quantitative</td>
<td></td>
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<tr>
<td>(Overby and Ransbotham 2019)</td>
<td></td>
<td>Outcome Organization Quantitative</td>
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<tr>
<td>(James et al. 2019)</td>
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<td>Process, Outcome Individual Quantitative</td>
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Table 3A: Links for Articles in Table 3

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brian L. Cooper, Hugh J. Watson, Barbara H. Wixom, Dale L. Goodhue</td>
<td>2000</td>
<td>Data Warehousing Supports Corporate Strategy at First American Corporation</td>
</tr>
<tr>
<td>Debabroto Chatterjee, Rajdeep Grewal, V. Sambamurthy</td>
<td>2002</td>
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