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CONTEXTUAL EXPLANATION: ALTERNATIVE APPROACHES AND PERSISTENT CHALLENGES[1]

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This paper identifies challenges facing the development of contextual theory in Information Systems research. The IS literature is examined to identify the variation of approaches through which IS research accounts for contextual influences in the formation of IS phenomena. The literature review reveals issues that require methodological and theoretical attention. These concern the generalization of context-specific research findings; the partiality of theory due to trade-offs of scale and detail; the development of sociomaterial perspectives of contextual influences on IS phenomena; and the challenge posed to contextual explanation from ontologies that give primacy to processes of continuous change over existing entities. From the exploration of these issues, comparative research is suggested as a promising approach to generalization; an argument is made for research framing with explicit consideration of scale of the context domain under inquiry to allow for the comparison and complementarity of research findings; alternative theoretical perspectives of context related with theories of technology and theories of action are identified; and directions toward the development of a sociomaterial perspective of context are suggested.

Keywords: Context, contextual explanation, contextualization, conditions of possibility, sociomaterial context

Introduction

Disagreement about the extent to which the context of information systems (IS) phenomena is adequately accounted for in IS research and theory has repeatedly manifested in the IS literature. Indicatively, Orlikowski and Iacono (2001) premise their commentary about research in the IS field on the observation that researchers have given central theoretical significance to context and have not adequately theorized the nature of the information technology (IT) artefact. In contrast to this view, Lamb and Kling (2003) argue that most theoretical models on IT use are "contextually underdeveloped, leaving nearly all of the organizational and environmental context outside the model" (p. 198). A few years later, in their search for the "intellectual core of the information systems discipline," Sidorova et al. (2008) found that, from 1985 to 2007, IS research evolved toward focusing "less on technology development and more on the social context in which information technologies are designed and used" (p. 467). More recently, Davison and Martinsons (2016) triggered discussion (Cheng et al. 2016; Fernández 2016; Sarker 2016; Urquhart 2016) by noting that, despite a growing tendency in IS research to study specific phenomena and particular cases, "it is rare to see explicit consideration of the context and its key characteristics" (p. 242).

Disagreement about whether IS research adequately accounts for context reflects more fundamental questions about contextual research and theory. To begin with, it is not clear what is taken as relevant context in the study of IS phenomena. Theories that account for certain contexts or aspects of context are often judged inadequately contextualized by scholars who take a different view of context (see, for example, Avgerou 2002; Pollock and Williams 2009).

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The appendix for this paper is located in the "Online Supplements" section of *MIS Quarterly*'s website (https://misq.org).

The question of relevance is particularly important at this point in the development of the IS field because the social and technological domains studied in IS research have been changing. The IS field has historically been formed as an *organization discipline* (Davis 2006) and continues to devote a great deal of research to IT innovation and its consequences for business firms and government agencies. Increasingly, however, IS research extends beyond the organization. Indicatively, it examines IS phenomena in relation to ethnic and online communities (Agarwal et al. 2009; Cranefield et al. 2015; Ma and Agarwal 2007), industries (Chiasson and Davidson 2004; Marett et al. 2013; Thorén et al. 2014); networks of individuals collaborating in open source software development (Iivari 2010), communities formed through digital social media (Germonprez and Hovorka 2013; Wang et al. 2013), or spaces of everyday life (Lyytinen and Yoo 2002; Yoo 2010). The formal organization can no longer be taken for granted as the setting of IS research and the identification of context in relation to which IS phenomena unfold requires explicit research attention (Winter et al. 2014).

Contextual research is also confronted with fundamental theoretical questions. Theories about the sociomaterial nature of IS phenomena (Leonardi et al. 2012; Orlikowski 2007) challenge the notion of context as the social setting that shapes the technologies of information systems that is often taken in IS research (Benbasat and Zmud 2003). Some influential theorists of the sociotechnical or sociomaterial nature of IS phenomena have taken a more radical stance and questioned the validity of the very notion of context (Callon and Law 1989; Faik and Walsham 2013; Latour 2005; Lea et al. 1999).

Another key question concerns the way contextual research addresses the trade-off between particularism and universalism (Cheng et al. 2016; Davison and Martinsons 2016). Research that does not account for contextual conditions that bring about IS phenomena may be making false claims of universal validity of its findings, but context-specific research is confronted with the methodological challenge of the production of theory that is valid in different contexts.

This paper reviews the IS literature to discover how IS researchers account for context and to identify the specific theoretical and methodological issues that require closer attention. It then investigates these issues in order to derive and juxtapose alternative approaches for the development of contextual theory.

The diverse objects of IS research are referred to by the term *IS phenomena*, meaning certain observed aspects of IS innovation (design, development, deployment, and use of IT artefacts). At the outset, this study adopts a broad definition of context given by the philosopher Scharfstein, which conveys the conventional meaning of this concept in IS research:

> That which environs the object of our interest and helps by its relevance to explain it. The environing may be temporal, geographical, cultural, cognitive, emotional—of any sort at all. Synonyms for context, each with its own associations, are words such as *environment*, *milieu*, *setting*, and *background* (Scharfstein 1989, p. 1).

The definition of context as an environing domain, the investigation of which helps to explain a phenomenon, entails important assumptions about the nature of causality in contextual explanation. Markus and Rowe's (2018) framework of causal structure suggests three dimensions for the analysis of researchers' assumptions about causality: *causal ontology*, defined as views about whether causality is real; *causal trajectory*, defined as movement of causal effects on an affected entity; and *causal autonomy*, defined as movement of causal effects between human or social actors and technology. The definition of context as a domain environing an IS phenomenon does not imply *a priori* assumptions about causal autonomy. The assumptions IS researchers make about causal relationships between human or social actors and technology, and the consequences of such assumptions for contextual IS theory, are investigated in this paper in the analysis of foundational theoretical issues that emerge from the literature review.

Regarding causal ontology, we take the position that conditions in domains environing an IS phenomenon exert real influences and create the possibility for its occurrence, but they do not directly cause its occurrence. The notion of conditions of possibility has its origin in philosophy (Monod 2004) and refers to circumstances that influence the occurrence of a phenomenon and allow it to unfold, but do not create it (Elwick 2012; Foucault 1972; Hacking 2002). Thinking about context as a domain of conditions of possibility acknowledges people's agency in the making of IS phenomena: the occurrence of a phenomenon depends on, but is not determined by, conditions of its context. For example, contextual conditions such as organizing visions (Swanson and Ramiller 1997) about IT-enabled transformation of services in the health care sector do not cause IT innovation in health care organizations. Hospital managers, doctors, and nurses have to act to bring about new information systems and concomitant organizational changes, and often their actions fail to realize the transformative vision (Currie and Guah 2007).

Regarding causal trajectory, the view of context as an environing domain implies a movement of causal effects

across a boundary that delineates an IS phenomenon. We assume a two-directional movement of causal effects, albeit the focus of this paper is on the effects of domains of context on IS phenomena. Domains of entities beyond the boundaries of IS phenomena create conditions of their possibility, and these domains are affected by and change from the unfolding of IS phenomena.

Contextual research varies by the domain of inquiry chosen to be studied as context (i.e., the part of the infinitely large environment of a phenomenon considered in a specific study). Decisions about a domain of inquiry concern questions such as which temporal period, which geographic or cultural setting, or which social collective should be investigated. Also, Scharfstein's definition suggests that a variety of categories of conditions in the environment of a phenomenon may be included in contextual theory. He indicates temporal, geographical, cultural, cognitive, and emotional as relevant categories. Relevant in IS research are various other categories as well, such as social, economic, and technological conditions. Thus, contextual inquiry has two dimensions: *scope* and *scale*. Scope refers to the variety of categories of environmental conditions implicated in the formation of a phenomenon (variety of conditions of possibility) and scale refers to the magnitude of the domain studied to identify them (magnitude of the domain of inquiry).

In the following sections, we first seek to understand how IS researchers develop contextual theory. We then examine what categories of contextual conditions are factored into IS theory and what mechanisms are evoked to associate contextual conditions with IS phenomena. This is followed by a review of the way IS researchers identify domains of inquiry as relevant context.

Four issues requiring further attention emerge from the literature review. First, the generalization of findings of context-specific research. Second, the trade-off between magnitude of scale and detail in contextual research. Third, the predominant view of context as a social domain, in contrast to the field's theoretical development of socio-technical and sociomaterial perspectives of IS phenomena. Fourth, the challenge posed to contextual research from ontologies that give primacy to processes of continuous change and therefore do not define IS phenomena in terms of stable entities to allow for clear delineation of their environment.

The issues of generalization and scale are examined in two consecutive sections following the literature review. Then, we turn our attention to ongoing theoretical debates on technology, human action and social structure to understand the ontological challenge to contextual research. From this exploration, we derive alternative theoretical perspectives of context and explore how IS research can move toward socio-material contextual theory. In the conclusions, the findings of this research are highlighted as a research agenda to further develop the explanatory capacity of IS theory.

Method

This study is grounded mainly on the IS literature. A critical literature review seeking was conducted, with the aim to identify the variation of contextual research and to reveal weaknesses, discrepancies, controversies, and issues that require closer investigation (Paré et al. 2015). Initial guidance was taken from publications in IS and in the field of management that explicitly argue for contextual research and problematize the notion of context. In IS, Walsham (1993, 2001) highlighted the importance of context in interpretive research and suggested relevant theoretical approaches to account for it. Arguments for the need to consider contextual conditions were put forward by Avgerou (2001, 2002) and Davison and Martinsons (2016). Chiasson and Davidson (2004, 2005) argued for industry-specific research. Hayes and Westrup (2012) discussed the notion of context in the research domain of information and communication technology for development (ICT4D), and Hong et al (2014) argued the importance of accounting for context in theories of IT adoption. In the kindred field of management, journal editors and influential scholars repeatedly argue for contextual research and suggest appropriate research approaches (Bamberger 2008; Johns 2006; Rousseau and Fried 2001; Whetten 2009). While all of these articles argue for contextual research, they do not share a common view of what "context" should be accounted for in contextual theory, nor how. They thus provide a first indication of the variation and inconsistencies of contextual research to be explored by the critical literature review.

This critical review involved a sequence of searches for articles that consider factors and processes other than the internal constitutive elements of IS pheonmena (i.e., they account for conditions of possibility formed in their environment). Articles that explain IS phenomena by the relationships of their constitutive elements only were deemed to be a-contextual.

We searched for contextual articles in the eight journals identified by the AIS senior scholars, namely, *European Journal of Information Systems*, *Information Systems Journal*, *Information Systems Research*, *Journal of the Association for Information Systems*, *Journal of Information Technology, Journal of Management Information Systems*, *Journal of*

Strategic Information Systems, and *MIS Quarterly*. The search covers publications from 2000 until the completion of this paper in 2018, a period during which studies of web-enabled phenomena that transcend the formal organization became widespread in IS research. An initial search of abstracts and keywords for the word "context" produced over 1,000 articles. A closer look at a random sample of 80 articles from this large pool suggested that many authors make casual uses of the term "in the context of," for example to refer to their empirical cases. This data pool was narrowed to articles declared as contextual by their authors, searching for "context" in the abstract AND "contextual" in the article text. This search produced 353 articles, of which 211 accounted for, or at least acknowledged, factors and processes of the environment of IS phenomena and were therefore relevant for this review. Appendix A lists the contextual articles identified from this search and indicates the focal phenomenon of the reported research and what authors refer to as context.

From this set of articles, three questions about contextual research were derived. The variation of answers to these questions forms the overall profile of contextual research in IS (Table 1). Thereafter, more targeted searches were conducted to identify how authors deal with each of these questions. Additional publications not declared "contextual" by the authors but including influences from the environment of the phenomena they study in their analysis and offering significant contextual insights (for example, Dennis et al. 2001; Edwards et al. 2009; Orlikowski 2000; Tiwana et al. 2010) were identified by backward tracing the literature referenced in the articles produced by the searches.

Neither the initial general review of contextual literature nor the literature reviews for the study of the four identified questions are exhaustive. The aim is not to provide a complete account of contextual research articles in IS journals but to achieve an adequate understanding of the way authors deal with context to theorize IS phenomena. The condition of adequacy was deemed reached when reading additional papers stopped adding new insights about the characteristics of contextual IS research.

As relevant analytical themes emerged from the review, further targeted searches of the same journals were conducted for various terms, such as "contingency," "framing," and "structuration." Backward reference tracing on theoretical themes led to drawing from the literature of several other disciplines, including science and technology studies (STS), sociology, and anthropology. The study of theoretical aspects often led to reconsideration of the descriptive account of contextual research, challenging the interim adequacy of the literature reviews and leading to their reinterpretation or seeking more data on context-related literature with more issue-specific searches. In short, this study was conducted in iterations of analysis and data collection from the literature of IS and other relevant fields. This involved increasingly more specific searches to describe, substantiate, or clarify the emerging analytical themes. The iteration of data collection and theoretical analysis that was followed belongs to the approach known as abduction, which is considered appropriate when research aims at forming an understanding of meanings and relations of qualitative data (Peirce 1903; Timmermans and Tavory 2012).

Critical Literature Review

In this section, the profile of contextual IS research is drawn by seeking answers to three questions: How does IS research develop contextual theory? What conditions of the environment of IS phenomena are included in contextual theory and through what mechanisms are they associated with the phenomena under study? How is a domain of inquiry identified as relevant context? Table 1 shows a summary of these literature review questions and the main relevant findings. Descriptions of these findings in the following subsections provide the basis for a critique of the current state of contextual research in the IS field, revealing issues which require further investigation.

How Contextual Theory Is Developed

Contextual IS theory can belong to of any of the five categories identified by Gregor (2006), namely analyzing, explaining, predicting, or designing components of IS phenomena. We assume that theory development is an incremental process of empirically derived contributions that enhance existing theoretical knowledge. IS research combines foundational theories (such as on the relationship of technology and society) and middle range theories, frequently drawing from theories developed in other disciplines, such as organizational or economic theories.

Two approaches to contextual theory development are discernible in IS research, as shown in Table 2. The first enhances theories of IS phenomena that account for their internal constituent parts and relationships by adding factors that represent contextual conditions. It thus produces theory applicable across multiple contexts. The second approach studies the formation of phenomena in their context and develops context-specific theory.

Table 1. Questions Investigated and Identified Distinctions

Question		Identified Distinctions	Explanatory Comments and Indicative Examples
How does IS research develop contextual theory?		By adding contextual factors to existing a-contextual theories.	Researchers extend general a-contextual models of IS phenomena with context-related factors to increase their explanatory capacity
		By deriving theory from the study of IS phenomena in a specific context.	Conext-specific theorizing includes: • interpretive research that traces the source of meanings and actions • sector-specific IS studies • studies in specific historically formed conditions, such as in developing countries
What conditions of the environment of IS phenomena are included in contextual theory and through what mechanisms are they associated with the phenomena under study?	Conditions	Economic	Conditions of demand and supply, labor and production costs, transaction costs, and markets
		Organizational/ managerial	These include organizational structures and processes; management features and decision making approaches
		Institutional/cultural	Social orders with which IS phenomena comply or which they challenge Norms and values in organizations and other social collectives influencing the formation of IS phenomena
		Material/spatial/ temporal	Technology infrastructures Material conditions of life in the environment of IS phenomena Time related features Physical features of geographic location
	Mechanisms	Functional relations	IS phenomena are explained as fulfilling functions in their environment
		Behavioral influence	Contextual conditions shape behavior of individuals involved in IS phenomena
		Power-based influence	Power structures and coercion mechanisms in the environment of IS phenomena affect their occurrence
How is a domain of inquiry identified as relevant context? (contextualization approach)		Layered approach	Locates IS phenomena on a systemic hierarchy of enduring social collectives and associates them with same level or higher level conditions and processes
		Relational approach	Identifies relevant context of IS phenomena by tracing links of their constituent parts with other entities that influence their emergence and sustenance

Table 2. How Does IS Research Develop Contextual Theory?

Approach	Examples
By adding factors that represent contextual conditions in IS theories that account only for the conditions and relationship of the constituent parts of IS phenomena	Adding factors representing national conditions to theories of organizational factors, such as theories of IS development and implementation (Korpela et al. 2000; Soh and Sia 2004) or e-commerce (Gefen 2006)
By studying the formation of IS phenomena in the specific contextual conditions of their occurrence	Theory building by interpretive research (Dickey et al. 2007; Walsham 1993); theory building for IS in specific industrial sectors (Bannister 2001; Bjørn et al. 2009; Marett et al. 2013) or in developing countries (Madon 2009; Sahay 1998)

The rationale of the first approach, adding context-related factors to a-contextual IS theory, is elaborated by Hong et al. (2014) with reference to the theory of IT acceptance (TAM). They advocate the development of context sensitive versions of the general theory of technology acceptance to improve the consistency of the results produced by the use of the theory across research domains. Their illustration of the creation of conext-specific variations of TAM considers factors of the micro-setting of IT use. Others have sought to enhance the TAM theory of individuals' use of IT with factors representing aspects of broader domains of context, for example national culture (Srite and Karahanna 2006; Veiga et al. 2001). Another example is the stream of research on IT-mediated services that developed models with variables of the social context of consumers that affect their trust in online services, consequently affecting the economic performance of the organizations that offer the services (Ba and Pavlou 2002; McKnight et al. 2002; Pavlou and Dimoka 2006).

The second approach, of developing contextual theory for specific settings, is followed in interpretive research (Klein and Myers 1999; Orlikowski and Baroudi 1991; Walsham 1993, 1995). In the interpretive epistemology, the researcher aims to construct explanations of IS phenomena by unraveling the meanings that give rise to participants' action in specific situations (Dickey et al. 2007; Watson and Wood-Harper 1996). This "requires that the subject matter be set in its social and historical context so that the intended audience can see how the current situation under investigation emerged" (Klein and Myers 1999, p. 73).

Also, context-specific theory is developed for phenomena taking place in specific categories of settings. Two such efforts are prominent in IS research: studies of IS in industrial sectors (Iacono and Wigand 2005), such as health care (Chiasson and Davidson 2005) or government (Danziger et al. 1982; Kraemer and King 2006), and research in developing countries (Avgerou 2008; Walsham 2001; Walsham et al. 2007).

Emerging Issues

The two ways of developing contextual theory, namely by enhancing a-contextual theories with factors representing conditions of context and by building theory from studies of IS phenomena in the specificity of their context, are confronted with different challenges. Theories developed by the incorporation of contextual factors into general a-contextual theories are generalizable across contexts, but they tend to simplify the particularities of contextual influences. They provide limited contextual insight (Bamberger 2008; Hong et al. 2014; Johns 2006; Rousseau and Fried 2001; Whetten 2009) because they do not account for the dynamic ways of the formation of IS phenomena in their contexts (Gephart 2004). Writing about research in management, Bamberger (2008) advocates qualitative research that directly accounts for context

> to build situational and/or temporal conditions into theory and, just as importantly, to explicate the mechanisms either linking these situational and temporal conditions to embedded phenomena, or governing the conditioning of relationships between phenomena by these situational and temporal conditions (p. 841).

But context-specific research raises the issue of generalization of empirical findings (Cheng et al. 2016). How does an explanation of an instance of a phenomenon in relation to its situational and temporal conditions produce theory that explains instances of the phenomenon in other settings? So far, the generalization of contextual research has received relatively little attention in the debates of the IS field (Lee and Baskerville 2003, 2012; Seddon and Scheepers 2015; Tsang and Williams 2012).

Conditions and Mechanisms Included in Contextual Theory

Contextual research is always partial in scope: each study investigates only some of the multiple conditions of the environment of IS phenomena. A helpful metaphor for the inevitably limited contextual scope is that of looking at

> an image where the eye cannot take in every element in detail of a picture at once, but must foreground some elements of the image at some points, foregrounding others later (Townley 2008, p. 113).

Such foregrounding involves two aspects: (1) the conditions of the environment of IS phenomena that are factored in IS theory, and (2) the mechanisms through which contextual conditions affect the occurrence of a phenomenon (i.e., the relations that associate an IS phenomenon with conditions of its context).

Foregrounded Contextual Conditions

IS research is rarely purely inductive. The contextual conditions factored in IS theory are identified through middle range theories that the researcher adopts as a lens to view a phenomenon in its context. Different theories adopted for the same phenomenon guide attention to different categories of context-

Table 3. Categories of Foregrounded Conditions of Context, with Examples of Conditions Factored in Explanations of IT Outsourcing and E-Commerce

Categories of Contextual Conditions and Associated Theories	Examples of Contextual Conditions Derived in Research on IT Outsourcing and E-Commerce
Economic: Derived from micro or macro-economic theories, such as economic performance of the firm, ICT and productivity at the firm, industry and national levels; transaction costs; market competition; network economics	**Outsourcing:** • Transaction costs (Dibbern et al. 2008; Watjatrakal 2005) • Operating/labor costs (Dedrick et al. 2011) **E-Commerce:** • Transaction costs (Kauffman and Walden 2001) • Financial investment (Gibbs and Kraemer 2004) • Intermediation and market competition (Zhu et al. 2006)
Organizational/Managerial: Derived from organization theories such as on strategy; resource-based view of the firm; organizational behavior; organizational structures and forms; organizational institutionalism	**Outsourcing:** • Client and vendor management capability (Levina and Ross 2003; Willcocks et al. 2007) • Alignment of outsourcing strategy with business strategy (McLellan et al. 1995) • Top management support (Lee and Kim 1999) • Organization size (Koh et al. 2004) • Centralization of IT department (Sobol and Apte 1995) • Determinants of outsourcing (Loh and Venkatraman 1992) **E-Commerce:** • Management competency/capabilities (Daniel and Wilson 2003; Eikebrokk and Olsen 2007) • Firm size (Kshetri and Dholakia 2002; Zhu et al. 2006) • Top management support (Chatterjee et al. 2002; Kshetri and Dholakia 2002)
Social/Cultural: Derived from theories of culture; theories of politics; diffusion of innovation theory; theories of trust	**Outsourcing:** • Culture and politics (Allen et al. 2002; Barrett and Walsham 1995; Sahay et al. 2003) • Social capital (Rottman 2008) • Trust (Sahay et al. 2003) **E-Commerce:** • Policy and regulation (Gibbs and Kraemer 2004; Kshetri and Dholakia 2002) • Culture and politics (Gefen 2006; Kshetri and Dholakia 2002; Pavlou and Chai 2002)
Material/Spatial/Temporal: Usually lacking theoretical guidance from middle range theories	**Outsourcing:** • Technology standards (Sahay et al. 2003) • Geographic dispersion (O'Leary and Cummings 2007) • Time zones (Sahay et al. 2003) **E-Commerce:** • Back-end IT and telecommunications infrastructure (Zhu 2004) • History (Heng 2003)

ual conditions, thus generating a variety of explanations (Robey and Boudreau 1999). Because the same theories guide research across IS phenomena, the overall variety of conditions considered in IS research is contained to a relatively small number of categories.

Consider, for example, the conditions foregrounded in research on two topics that have been widely studied in IS, outsourcing and e-commerce, summarized on Table 3. The overlap in the contextual conditions studied in these two themes results from common theoretical perspectives. Most research on IT outsourcing and on e-commerce is guided by a relatively small number of middle range theories drawn from more established fields of the social sciences (Dibbern et al. 2004). They include theories of economics, such as on productivity, transaction costs, market competition, and networks; theories of organizations and management, such as on strategy, resource-based view of the firm, organizational

behavior, organizational structures and forms, and organizational institutionalism; theories of society at large, such as culture, politics and power, and diffusion of innovation. These categories are common in the IS literature as a whole, not only on IT outsourcing and e-commerce. Some empirical research on IT outsourcing and e-commerce also considers aspects of space, time, and technology but without discernible guidance from middle range theory. Other material conditions of the environment of IS phenomena are rarely considered.

Foregrounded Relations of IS Phenomena with Context

In IS research, mechanisms through which contextual conditions are understood to contribute to the formation of IS phenomena fall mainly into three categories: functional, behavioral, and power-related. From the articles in the literature sample of this review, 60% elaborate on behavioral processes, 28% on functional connections, and 12% on power influences. Table 4 shows these three types of logical connection, with brief definitions and indicative examples.

In functional explanation, contextual conditions affect the goals that information systems serve, provide resources necessary for their emergence and continuity, or set restrictions and obstacles to that end (Hovorka 2005). A functional view underpins the design tradition of the field, in which information systems as well as work or business processes are purposefully designed to serve the needs of organizations. Functional relations are invoked in research on the strategic role of IT in organizations which assumes that IT serves survival needs of organizations in conditions of competition, as well as in economic studies of IT as the means for improving the organizational performance or lowering transaction costs.

Behavioral explanation associates contextual conditions with the shaping of cognitive and affective states of individuals participating in IS phenomena as developers, users, customers, community members, etc. Impetus for behavior-focused contextual IS research stems from theoretical perspectives across the social and economic sciences. For example, behavioral mechanisms are often invoked in research that foregrounds culture, which is understood to provide shared beliefs, values and meanings that form persistent ways of ordering action through time (Swidler 1986). Indicatively, research that draws from Hofstede's (1981) notion of culture, which is frequently used in IS, portrays cultural influence as programming of the mind (Veiga et al. 2001).

Power-based explanation associates IS phenomena with circumstances of domination which stem from asymmetries in the distribution of material resources and authority. Thus, research following the critical theoretical tradition of social sciences (Howcroft and Trauth 2005) has examined IS phenomena in relation to power structures in broader social contexts, which may involve gender or class distinctions. Some studies of IT in developing countries have shown that changes of government often have disruptive effects on IS projects in the public sector (Constantinides and Barrett 2006; Sahay et al. 2009; Silva and Hirschheim 2007; Standing et al. 2009). Also, coercion-related explanations are often put forward by research that adopts institutional theory and pays attention to the role of regulation (Gozman and Currie 2014; Rajão and Hayes 2009).

Emerging Issues

In the reviewed IS literature, contextual research predominantly foregrounds social conditions (organizational/managerial, social/cultural, political, and economic) and social mechanisms (managerial and economic functional explanation, behavioral, power-related). Less attention is given to material aspects of the environment of IS phenomena. Relatively few articles consider influences from the materiality of large-scale technological conditions, such as telecommunications, electricity, and transportation; the physical or architectural aspects of the locations where individuals interact with digital artefacts; or the material conditions of people's lives within which IS activities are accommodated. Also, there are relatively few historical accounts of the formation of conditions of possibility of IS phenomena over long periods of time (such as Avgerou and McGrath 2007; Ribes and Finholt 2009; Yates 2005). Indicatively, all 211 articles identified in the search of the 8 IS journals as contextual according to their authors' description consider social conditions of the environment of their focal phenomenon, 22 of them include or acknowledge technology-related factors of the environment, 10 acknowledge physical aspects, 11 consider or acknowledge the history of some aspects of the environment, and 9 consider or acknowledge other temporal aspects.

To be clear, the materiality of technology as well as aspects of time and space are often considered as intrinsic aspects of IS phenomena (Leonardi et al. 2012; Saunders 2007; Schultze and Boland 2000b; Shen et al. 2015). IS research has developed theoretical perspectives that explain IS phenomena as sociotechnical or sociomaterial processes (i.e., as being formed by the interactions of their material and social components). Studies that take as their focal phenomenon the

Table 4. Relations of IS Phenomena with Context

Type of Relation	Examples
Functional: Information systems fulfil functions required by their context; context also provides resources for their construction and use	• Design research (Brown and Magill 1998; Hammer 1990; Hevner et al. 2004; Mumford 1996) • Strategic (Bergeron et al. 2004; Butler 2001; Kettinger et al. 1994; Klein and Rai 2009; Levy et al. 2001) and economic studies of IT (Benoit et al. 1996; Brynjolfsson and Hitt 2000; Carmel and Nicholson 2005; Malone et al. 1987)
Behavioural: Context shapes the cognitive and affective state of systems developers, managers and users	• Studies that identify contextual influence on individuals' perception of the value of information systems and shape their decisions and actions on IS development and use (Davidson 2002; Jarvenpaa et al. 2004; Majchrzak et al. 2005; Polites and Karahanna 2013; Schultze and Boland 2000b)
Power based: IS phenomena are formed in conditions of asymmetric distribution of material resources and authority; they are subject to coercive pressures of policy and regulation	• Research elaborating on the political nature of IS phenomena (Danziger et al. 1982; Hart and Saunders 1997; Markus 1983; Markus and Bjørn-Andersen 1987) • Effects of national politics and regulation (Constantinides and Barrett 2006; Gozman and Currie 2014; Rajão and Hayes 2009; Sahay et al. 2009; Silva and Hirschheim 2007; Standing et al. 2009).

development of large-scale technology infrastructures often consider them as resulting from the intertwining of material and social constituent components (Ciborra and Associates 2000; Hanseth and Lyytinen 2010; Monteiro and Hanseth 1996; Monteiro and Rolland 2012; Starosielki 2015). But the sociomateriality of technology infrastructures does not often receive attention as a condition of the environment of small-scale IS phenomena, such as those manifested in teams, organizations, or communities. Moreover, IS research has not sought to explain IS phenomena with mechanisms that associate their internal sociomaterial constitution with socio-material contextual conditions of possibility.

Even less attention is given to material conditions of life surrounding IS phenomena, such as housing, transportation, or features of urban or rural settings. An example that exposes the significance of this limitation is the difficulty to explain phenomena of the "digital divide." The term digital divide was initially used to refer to lack of access to computers and communication technology. The central concern of this notion of the divide is that existing socio-economic inequalities within and among countries are exacerbated by limited access to the internet, through which much economic and social activity now occurs. It was thought that providing internet connectivity would accelerate socio-economic development. Nevertheless, studies of initiatives that provided internet connectivity showed that this is not enough to make a difference (Kvasny and Keil 2006; Madon et al. 2009; van Dijk 2003). The capability to engage in the virtual communication of cyberspace is rooted in people's experiences with the physical locations and material aspects of their lives (Graham 2011). IS research has yet to develop the theoretical capability to understand the developmental effects of virtual flows of information in relation to the context of the socio-material conditions of people's lives.

Contextualization Approaches

Given that IS research is concerned mostly with social contextual conditions, in this section we examine the contextualization approaches by which researchers identify relevant social collectives as domains of contextual inquiry. We examine first what social collectives are studied as context and then how IS researchers identify them and determine the scale of their contextual studies.

Social Collectives Considered as Context of IS Phenomena

Since its early formation, the IS field has studied primarily IT-related phenomena in formal organizations. Indicatively, in their elaboration on the characteristics of the MIS field in 1973, Mason and Mitroff suggested an IS research program concerned with the information needs of a problem solving individual within an "organizational context." Indeed, IS studies have predominantly focused on IT in organizations, their subunits, or interorganizational partnerships (see the appendix; also see Crowston and Myers 2004; Sidorova et al. 2008; Vessey et al. 2002). The analysis of articles published in *MIS Quarterly*, *Information Systems Research*, and *Journal*

of Management Information Systems over 22 years by Sidorova et al. (2008) found that there has also been a constant stream of research on IT and groups within and across organizations and on IT and markets.

This literature review suggests that, in addition to these, IS research studies phenomena understood to take place in the context of industries (Chiasson and Davidson 2005; Cho and Mathiassen 2007; Crowston and Myers 2004; Danziger et al. 1982; Forman et al. 2005; Marett et al. 2013; Thorén et al. 2014), countries or regions (Gao 2005; Kumar et al. 1998; Nicholson and Sahay 2009; Rajão and Hayes 2009; Straub 1994), communities of people bonded by shared territory and history (Agarwal et al. 2009; Dickey et al. 2007) or shared knowledge and practice (Cranefield et al. 2015; Vaast and Walsham 2009), and the boundary space between organizations and communities (Cranefield et al. 2015; Eaton et al. 2015; Levina and Vaast 2008).

As IS research increasingly studies phenomena enabled by the internet and mobile technologies, it accounts for contexts that do not match existing categories of social collectives. Examples include phenomena of the use of ubiquitous computing (Bouwman and van de Wijngaert 2009; Ferneley and Light 2006; Henfridsson and Lindgren 2005; Lyytinen and Yoo 2002; Sørensen and Pica 2005), open source software (Singh 2011), or social media (Kane et al. 2014; Spagnoletti et al. 2015; Tow et al. 2010). These involve individuals engaging online in tasks that cannot be positioned in organizations or other *a priori* assumed social collectives (Bach and Carroll 2010; Iivari 2010). Their study requires empirical tracing of the individuals participating in them, thus delineating the focal phenomenon and, consequently identifying relevant contexts. For example, an important part of Bach and Carroll's (2010) study of the activities and practices of the design of interactive software systems in open source projects is tracing the developer community and user communities of practice.

Identifying Domains of Inquiry as Relevant Context

Contextualization is the identification of domains beyond the constituent parts of a focal phenomenon that contribute conditions enabling or constraining its formation. In IS, contextualization is achieved in two different approaches, layered and relational, shown in Table 5.

Layered Contextualization. The layered view of social collectives is underpinned by a systems theory view of the world, according to which social collectives emerge from the interaction of their constituent subsystems and, subsequently, influence the interactions among them (Morgeson and Hofmann 1999). Such research involves cross-level methodological strategies if the "level of theory" is incongruent to the "level of analysis" (see examples on Table 6).

Level of theory refers to the social collective which researchers assume to be the setting of the phenomenon they wish to explain. For example, the economic performance effects of IS innovation may be studied as an organizational phenomenon or, alternatively, as an industry or national phenomenon (Brynjolfsson and Hitt 2000). Level of analysis refers to the social collectives that the researcher studies as the domain of factors and processes that explain the occurrence of the phenomenon. For example, IS innovation in organizations may be explained by individual-level factors, such as the behaviors of individuals using IT, by organizational-level factors such as organizational culture and structure, or by characteristics of industries that in various ways influence the use of IT by their organizational members (Klein et al. 1994).

As the examples in Table 6 show, not all cross-level research in IS contributes to the development of contextual theory. Often researchers explain IS phenomena manifested in organizations with factors representing psychological characteristics of their individual member. Contextual research identifies influences from conditions at the level of the manifestation of a phenomenon or higher levels. Such cross-level contextual research adopts an "out-contextualization" research strategy and searches for conditions of possibility in larger scale (i.e., broader and more complex social systems) (Hayes and Westrup 2012). An example of this is research that adopts Pettigrew's (1985) "contextualist" approach to study IS development and impact as a process of change that unfolds through time under organizational and national influences (Madon 1992; Walsham 1993). Walsham's (1993) case studies of IS development explain key decisions and actions of IS development by conditions of the culture and politics of the organization, which in turn are related to national socio-economic and political conditions. Similarly, Madon's (1992) case study of the introduction of computer-based information systems in local administration offices in India explains their limited impact by showing how officers' understanding and attitude toward that innovation was shaped by national culture and social stratification.

Relational Contextualization. Relational contextualization is achieved by tracing connections of the internal participants of an IS phenomenon with other individuals, social collectives, or, sometimes, artefacts that exert influence on their actions. This approach does not assume systemically differ-

Table 5. Approaches of Contextualization

Approaches	Examples
Layered contexts: Domains of contextual inquiry are social collectives at the same or higher level of aggregation to that where the phenomenon is understood to take place. It assumes systemic hierarchy of social collectives.	Explanation of IS phenomena in organizations by organizational factors and processes (Häkkinen and Hilmola 2008) or by factors representing national conditions, such as culture, legislation or power structures (Davison et al. 2009; Njihia and Merali 2013; Rai et al. 2009; Soh and Sia 2004; Yayla and Hu 2012)
Relational contexts: Domains of contextual inquiry are networks with which the constitutive parts of a phenomenon are connected.	Empirical research traces connections of the constituent parts of a phenomenon with other individuals, artefacts, and social collectives that contribute toward or inhibit the occurrence of the phenomenon (Hayes and Westrup 2012; Mitev 1996; Monteiro 2000)

Table 6. Levels of Analysis of Research Contributing Theory for IS Development, Systems Adoption, and Use, and IT and Organizational Performance

IS Development	
Individual level of analysis	Performance of software development studied as a matter of individuals' motivation (Rasch and Tosi 1992).
Organizational level of analysis	Systems requirements determination involves conflict stemming from socio-cognitive differences of project participants that are formed in the practice of their organizational roles (Davidson 2002).
Macro-social level of analysis	The effectiveness of systems development methodical practice depends on the socio-economic conditions of a country (Heeks 2002; Korpela et al. 2000).
Systems Adoption and Use	
Task performing Individual level of analysis	Systems usage measured and evaluated in terms of users' employment and use of a system in the performance of a task (Burton-Jones and Straub 2006).
Organizational level of analysis	Systems usage and adaptation result from individuals' embeddedness in the organizations' social networks (Sykes et al. 2009).
Macro-social level of analysis	Individuals' attitude toward technologies and their use of technologies depend on national culture characteristics (Dinev et al. 2009).
IT and Organizational Performance	
Individual level of analysis	The impact of IT on organizational performance is explained in terms of extent of systems usage by individuals (Devaraj and Kohli 2003).
Organizational level of analysis	Actions that produce observed organizational outcomes of IT innovation are explained in terms of the actors' social embeddedness in the institutional arrangements of the organization (Ciborra and Lanzara 1994).
Macro-social level of analysis	Strategic organizational effects of IT are achieved by action that addresses aspects of the national setting of the firm (Jarvenpaa and Leidner 1998).

entiated levels of analysis. It was first proposed in the 1980s by Kling and his colleagues, who argued that the study of computer-based information systems should be located not in *a priori* discrete entities, such as formal organizations, but in "web models" constructed by analysis of the interdependent networks of production and consumption upon which information systems rely (Kling 1987; Kling and Scacchi 1982). In web model analysis, relevant context is identified empirically by tracing stakeholder groups in the adoption, development, and use of computer-based systems and key groups with whom they interact. Web model analysis extends the study of IS phenomena beyond their participants in a user organization to include social actors such as professional associations, funders, auditors, regulators, etc.

More recently, the relational approach has been followed in research of phenomena that involve the use of digital platforms and social media sites. Phenomena such as open source software development involve networks of large numbers of individuals, sometimes referred to as communities or populations (Agarwal et al. 2008; Singh 2011). Contextualization is achieved by examining the conditions that enabled a chain of events through which a network was formed (Kane and Alavi 2008; Trier 2008). Analysis of open source communities often trace their development to contextual conditions that influence the behavior of their participants (West and Gallagher 2006).

Advocating the relational approach for research on ICT and development, Hayes and Westrup (2012) propose tracing the relevant context by examining processes of socio-economic development. The context of an IS phenomenon is not taken as given but is understood to be formed as the phenomenon unfolds in relation to socio-economic development processes. They demonstrate this approach in their analysis of the case of M-Pesa, an innovative mobile banking application developed and widely used in Kenya. M-Pesa was initially conceived by the British development aid agency and the mobile phone operator Vodaphone as a micro-credit service for poor people without bank accounts. It gradually expanded to a money transfer service for those with existing bank accounts, thus addressing requirements stemming from the life conditions of a different population of potential users. Hayes and Westrup argue that the emergence of different understandings of M-Pesa and the gradual reconfiguration of the initially intended service were shaped by the emerging interests of different user populations. Their study traces the unfolding through time of the involvement of influential actors in the context of M-Pesa, including the Central Bank of Kenya, other banks, and finance regulators.

Emerging Issues

Two issues emerge from the review of social domains studied as context in IS research and require further attention. First, contextual research differs in terms of scale (i.e., the magnitude of the domain studied as context). Several contextual studies examine in detail the immediate setting of an IS phenomenon, such as the interpretive studies of situated practice (Orlikowski 2000). Others consider influences from larger scale domains, such as country or global economic conditions or institutions (Srite and Karahanna 2006; Veiga et al. 2001). Difference of scale is a source of tension in the IS field. Research that draws influences only from the immediate setting of IS phenomena has been criticized as inadequately contextualized (Kallinikos 2004a; Monteiro et al. 2013; Pollock and Williams 2009). Research that traces influences from large domains and long histories presents much less detail and often invokes reified abstract entities such as the market or the nation state (Knorr-Cetina 1981).

Second, the review of alternative approaches to contextualization reveals a fundamental difference about the notion of context. Both the layered and the relational contextualization approaches assume a delineation of a phenomenon from its context. However, Hayes and Westrup's discussion of relational contextualization summarized above points to a theoretical view that questions this assumption. The perspective they take highlights a dynamic formation of relations that reconfigures the boundaries of the phenomenon. As Hayes and Westrup explain, they draw from a theoretical perspective of social phenomena as continuous processes of change and formation, which is contrasted to the more commonly taken perspective of social phenomena composed by stable entities and having stable boundaries. There is a fundamental, ontological, difference in these two views of IS phenomena, the former known as proximal, the latter as distal (Cooper and Law 1995). From a proximal view of the world, Hayes and Westrup advocate a dynamic notion of context as being formed by the contextualizing moves of the participants of IS phenomena and responding actors in their environment. Other adherents to the proximal view, however, go a decisive step further and challenge the notion of context altogether. They argue that, if entities are ephemeral and transient and do not give rise to stable and long-lasting boundaries, context as a domain environing a phenomenon is a concept of questionable validity.

An anti-contextual position is advocated by some prominent proponents of actor network theory (ANT) (Latour 2005; Law 1991), a theoretical approach which is widely used in IS research. Many IS researchers ignore this anti-contextual position of ANT and use it as theoretical guidance for relational contextualization (Avgerou and Madon 2004; Cho et al. 2008), but others have adopted the anti-contextual position of this theory (Faik and Walsham 2013; Lea et al. 1999). This challenge to the notion of context deserves more attention in the IS field.

Summary of Theoretical Issues That Emerged from the Critical Literature Review

This literature review highlights the following issues requiring theoretical attention:

1. The generalization of contextual research findings. This issue concerns the transfer of findings of context-specific research to other contexts.

2. The tension between micro and macro research traditions that explain IS phenomena in relation to context domains of different scale. Beyond this controversy, awareness of scale is important for incremental theory building by comparison and synthesis of research findings.

3. The predominant view of context as a social domain. Such a view of context contrasts with the theoretical view of information systems as sociotechnical or sociomaterial phenomena. What would a sociotechnical or sociomaterial contextual IS theory look like?

4. The challenge to the very notion of context and contextual research posed by some proximal ontology of organizational and social phenomena.

The first two issues, on generalization and on scale, concern the development of middle-range IS theory. In the next two sections, these issues are explored in some depth and ways of addressing them indicated. The last two issues concerning the ontology of context and epistemology of contextual research are then addressed. We examine what notions of context are implied by the most commonly used foundational theories about the relationships of technology, human action, and social structure. Subsequently, possibilities for sociomaterial contextual research are examined.

Generalization of Context-Specific Research: Contingency Theories and Situated Approaches

Tsang and Williams (2012) identify contextual and temporal generalization as two distinct types of inductive inference: the former draws inferences from a sample of a population to another in a significantly different social context but within the same period of time, the latter draws inferences from a sample of a population at one point in time to the same or other populations at another point in time. They suggest caution in order to avoid misplaced cross context and time generalization.

Nevertheless, generalization is not unusual in context-specific IS research. Two alternative approaches integrate contextual contingency directly into theory of cross-context relevance and validity with different methods of generalization: the construction of contingency models of "fit" between IS artefacts and the context of their use (see, for example, Bouwman and van de Wijngaert 2009) and the construction of abstract concepts of contextual influence from case studies or ethnographies of the formation of IS phenomena in specific social and historical conditions (Lee and Baskerville 2003).

Contingency Theory of Fit

The contingency approach (Thompson and King 1997) was initially developed in organizational theory. It is based on the idea that organizational effectiveness requires a fit of various characteristics of an organization, such as its technology, structure, and leadership, to both the external environment of the organization and its internal conditions, such as size or strategy (Donaldson 2001; Drazin and Van de Ven 1985; Lawrence and Lorsch 1967). Accordingly, IS research has studied the fit between organizational conditions and technologies in several topics, including IS management (Bergeron et al. 2004; Fuller and Dennis 2009; Khazanchi 2005; Kim et al. 2005-06; Premkumar et al. 2005), mobile IT (Bouwman and van de Wijngaert 2009; Gebauer et al. 2010), distributed projects (Cummings et al. 2009), and information services (Mathiassen and Sørensen 2008).

The contingency approach proved useful for producing general theory that accounts for variations of conditions that are common across different settings of IS phenomena, as in research on the relationships between genres of IT, tasks, and group performance (Daft and Lengel 1986; Dennis et al. 2008; Dennis and Kinney 1998; Dennis et al. 2001; Galegher and Kraut 1994). Such research associates properties of communication media—namely, provision of timely feedback, conveyance of multiple cues, and tailorability to task circumstances—to the degree of ambiguity of a task. But the research on the fit of IT to tasks of groups also exemplifies the limitations of this approach. The resulting "information richness theory" initially predicted that electronic media, such as email, are appropriate for the tasks of lower management but not for tasks of senior managers that involve communication in relation to highly ambiguous matters of decision (Daft et al. 1987). Empirical evidence failed to support this prediction despite extending the contingencies to include influences from the context of the organization, such as a critical mass of other people using the information media and their attitudes toward them (Kraut et al. 1998).

Critics claim that contingency models are based on unfounded assumptions of rational choice, control and stability as desirable ends, the existence of an objective and measurable reality, and deterministic causality (Gopal and Prasad 2000; Lee 1994; Markus 1994; Ngwenyama and Lee 1997; Weill and Olson 1989). Indicatively, Weill and Olson (1989) called for more subjective, less functionalist, and less deterministic approaches for the inclusion of contextual influences. Research that follows these suggestions has taken contextual contingency a significant step further by placing emphasis on emergent interactions that bring about IS phenomena in situated practice.

The Situated Practice Approach

Situated IS studies of "actions taken in the context of particular, concrete circumstances" (Suchman 1987, p. viii) share the following three characteristics: they focus on local interpretations and reasoning in specific IS cases; each case is considered unique in its social and historical occurrence; and emphasis is placed on emergent consequences of individuals' encounters with IT artefacts in local cognitive, affective, and power conditions. An example of the difference of the situated IS research approach from the contingency theory approach in terms of their generalizability is Gopal and Prasad's (2000) study of group decision support systems (GDSS). Gopal and Prasad show how the GDSS they studied was shaped in the "arena of human interaction" through multiple meanings that stemmed from the multiplicity of actors' experiences. They critique the generalization objective of contingency research as follows:

> It may be less than useful to compare the experiences of educators in a private school working on a task which has meaning only in relation to their own historicity to the experiences of, say, senior oil company executives attempting to manage their imagined futures in a global economy (p. 538).

Context-specific research such as Gopal and Prasad's study produces abstract conceptual statements, or "templates" (Jones 2014), thus generalizing from case studies to theory (Lee and Baskerville 2003; Seddon and Scheepers 2015). These theoretical templates can subsequently be used in other settings, subject to empirical testing of their validity in each new setting or with the researchers' judgement that there is sufficient similarity between the setting in relation to which the template was produced and the setting within which it is applied (Lee and Baskerville 2012).

The degree of generalization from context-specific research can improve incrementally through comparative case studies (George and Bennett 2005). In comparative research, the definition of the domains of inquiry considered as a source of contextual influence is an important determinant of similarity that needs to be made explicit to allow for comparison of research findings. Pettigrew's (1990) multilevel contextualist approach provides methodological guidance to that effect. Nevertheless, despite producing mostly middle range theory, the IS field has not fostered a tradition of comparative contextual case studies.

It has to be recognized, however, that there is a trade-off between generalization and context specificity. The more abstract the concepts of the theoretical templates the more general its relevance to IS phenomena but the less it captures the concrete conditions of possibility and mechanisms that bring about a phenomenon in its context.

The Choice of Scale as Research Framing

Contextual research entails decisions on scope and scale of inquiry. Scale concerns both the focal phenomenon (i.e., the boundary of what is studied as the focal phenomenon) and the domains of influence from the environment of the phenomenon. The discussion of scale in this paper concerns the latter. As noted in the review of IS literature regarding the scope of contextual research, the range of conditions included in IS theory tends to be derived with guidance from adopted middle range theories. Choices of scale of the domain of contextual inquiry, however, rarely benefit from theoretical guidance.

The identification of relevant domains of context is akin to Goffman's (1974) search for explanation of people's achievement of common understanding of specific situations. Goffman acknowledges that such situated common understanding and action rely on shared understanding of the larger setting in which the situation occurs. He uses the notion of *frame* to refer to the extension of people's awareness of a broader context. In his discussion of Goffman's theory of frames, Scheff (2005) oserves that Goffman advances a notion of context as frames within frames. People make sense of an incident through an assembly of multiple frames, with some frames fitted within others.

Tensions surrounding the choice of narrower or broader frames are manifested in critiques of the situated practice research stream (Feldman and Pentland 2003; Pentland and Rueter 1994). Practice research focuses on people's work places or the microcosm of their domesticity, but assumes a collective sense making and influence on what people do. As Schultze and Orlikowski (2004, p.88) explain, "practices can be understood as clusters of recurrent human activity informed by shared institutional meanings." Practice studies produce rich in detail analyses of a phenomenon in relation to its immediate organizational setting, but they do not reveal the origin of the shared meanings and the conditions that render possible the interactions taking place in this micro-context.

In their study of the development and widespread use of packaged ERP systems, Pollock and Williams (2009) critique the IS research traditions that produce such narrowly contextualized analyses. They argue that explanations in terms of local action and contingency cannot adequately account for the way "the pathways of technological innovation are patterned by their history and context" (p. 11). Detail and depth

are achieved at a cost of accounting for conditions and processes in extended domains of action and long-term historical time scales. Similar critiques of narrowly situated analyses of IS innovation have been made by researchers studying IS in developing countries (Avgerou 2002; Avgerou and Madon 2004; Walsham 2001) and by scholars taking a feminist perspective (Star 1991).

But the broadening of research frames entails loss of detail and analytical compromises (Strathern 2004). Layered contextualization that extends the domain of inquiry beyond the immediate setting of a phenomenon to account for macro-level conditions of possibility often makes unhelpful simplifications such as reification of social institutions, understating the fluidity of collective human action. The challenge of complementing detailed micro-level analyses with macro-level conditions of possibility was recognized in sociology 35 years ago (Knorr-Cetina 1981) and has not yet been adequately addressed in social theory.

Similarly, relational contextualization involves decisions about the extent of the network of connections to be studied and the degree of detail in the analysis of the contextual network. Such decisions imply differences of detail and depth, given that "one can always discover networks within networks; this is the fractal logic that renders any length a multiple of other lengths, or a link in a chain a chain of further links" (Strathern 1996, p. 523).

Many aspects of context remain unacknowledged and unaccounted for in middle range theory whether it is rich in detail, as in situated practice research, or large in scale as in multi-level and extended network analyses. With the caveat that all middle range theories are partial and incomplete, contextual research can increase its explanatory capacity by making explicit decisions about the scale of the domain of context they study to allow for complementary studies of different scale. In the same vein, Cecez-Kecmanovic et al. (2014) advocate comparative and extended longitudinal studies that zoom-in to examine the details of practice that bring about an IS phenomenon and zoom-out to study the dynamics of the emergence of practice through space and time.

Theoretical Theses on Context

To address the challenge to contextual research posed from proximal ways of thinking about social phenomena and to explore approaches that account for social as well as material conditions of context, this section examines two streams of highly abstract theories that provide conceptual foundations for IS research (Gregor 2006) and notes their theses on context. The first stream concerns the relationship of technology and social change, and the second the relationship of action and social structures. The former are referred to as theories of technology and the latter as theories of action. Theories of technology and theories of action are discussed in two consecutive sections, but included in both sections are actor network theory (ANT) and agential realism, which address the three-part relationship of human action, technology and society.

Theories of Technology

Although often only implicitly, all IS research involves theoretical assumptions about the causal relationship between IT artefacts and social change, which Markus and Rowe (2018) call causal autonomy. Most IS researchers are mindful to avoid technology deterministic and social deterministic arguments. This is achieved by theoretical perspectives that locate causality of IS phenomena at the interaction of individuals with technology artefacts (Markus and Robey 1988). Table 7 shows the most prevalent theories of technology in IS research, indicating how they deal with context and giving examples of studies that adopted them.

Sociotechnical Perspectives

A stream of sociotechnical systems research in IS since the 1970s decisively contributed to breaking with technology determinism by showing that IS phenomena are contingent upon organizational and broader social conditions (Griffith and Dougherty 2001; Trist and Bamforth 1951). Since the 1990s, sociotechnical research has extensively drawn from the interdisciplinary field of science, technology, and society (STS) studies (Bijker and Law 1992; Howcroft et al. 2004; Law 1991) to develop theoretical foundations about the way technology and human action are related in the formation of IS phenomena. But, by the mid to late 2000s, many felt that, with the influence of STS, IS research tilted toward elaborating the social and neglected the significance of the material properties of the IT artefact (Leonardi and Barley 2008). For example, one version of sociotechnical theory posits that technologies encapsulate the interests of influential social groups and, in use, they reflect the social structures and circumstances of their development (Akrich 1992). Another version emphasizes the interpretive flexibility of individuals in their association with technology (Howcroft et al. 2004; Kallinikos 2004b). Both versions underplay the capacity of IT artefacts to produce effects on the basis of their materiality.

Table 7. Context in Theories of Technology

Theory	Examples of Theory Use
Sociotechnical perspectives: IS phenomena result from the interaction of technology with socialized human actors; explicit consideration of context as the historically developed social structures that shape individual participants' perception and behavior in relation to IT artefacts.	Systems development approaches that include analyses of the work context (Clement 1994; Kyng 1998; Mumford and Weir 1979). Technology frames analyses of IS development and use (Davidson 2002; Orlikowski and Gash 1994).
Actor network theory: IS phenomena are constructed by networks of actors which comprise individuals, collectives, artefacts, and their hybrids; the notion of context is explicitly rejected.	Case studies of the construction of information systems and their consequences by tracing interactions of diverse actors, including IT, other artefacts, individuals, organizations, or institutions (Faik and Walsham 2013; Monteiro and Hepsø 2000).
Interaction perspective of socio-materiality: IS phenomena result from the interaction of ontologically distinct and epistemologically separable technology properties and human ability to act; IT/human actor interaction is a localized experience; broader context is sometimes acknowledged but does not receive analytical attention.	Analyses of work routines as the imbrication of human agency and material agency. They show that the capabilities afforded by technologies stem from their material features. People can alter afforded capabilities by altering the technology artefacts' material features (Leonardi 2011).
Intra-action perspective of socio-materiality: IS phenomena bring about ontologically and epistemologically inseparable technology and human entities; technology and social entities are enacted in localized practice.	Analyses of phenomena that are typically considered to be social, such as anonymity of content and ratings in social media, reveal their sociomaterial constitution in situated practice (Scott and Orlikowski 2014).

Actor Network Theory (ANT)

ANT is an STS theory that overcomes the risk of social determinism by recognizing technology artefacts as actors, indistinguishable from human actors as far as the formation of IS phenomena is concerned (Latour 2005; Law 1991; Law and Hassard 1999). For ANT, technology objects and humans, as well as techniques and abstract ideas and concepts, bear the capacity to act and make a difference. Actors do not produce effects autonomously but in relation with other actors. Thus, ANT foregrounds the performance of relations among heterogeneous entities, and views IS phenomena as being continuously assembled. It follows, therefore, the proximal way of thinking and focuses on the processes shaping social phenomena, considering them always incomplete and precarious (Alcadipani and Hassard 2010; Law 2009).

Sociomateriality as Human/Technology Interaction

Despite the popularity that ANT enjoyed in IS research since the late 1990s (for early examples, see Monteiro 2000; Walsham 1997), another stream of research, on sociomateriality, has gathered momentum more recently, with the aim to restore the importance of the IT artefact in IS theory (Cecez-Kecmanovic et al. 2014; Leonardi 2013; Leonardi et al. 2012; Markus and Silver 2008; Orlikowski 2007; Orlikowski and Scott 2008; Wagner et al. 2010; Zammuto et al. 2007). Two main positions have been crystallized in this literature: The first starts with a recognition of the independent existence of material and social entities and elaborates on the way they are related to bring about IS phenomena using concepts such as *affordances* (Faraj and Azad 2012; Markus and Silver 2008; Zammuto et al. 2007) and *imbrications* (Leonardi 2011). In this view, both the IT artefact and the human actor possess causal capacity in the formation of IS phenomena. They are ontologically independent (i.e., one may disappear and the other may still exist) and epistemologically separable (i.e., each of them can be studied and understood without studying the other). From this perspective, which we can call the interaction perspective of sociomateriality, explanation requires analytical attention to the properties of IT artefacts and the behavior of human actors in the interactions that bring about IS phenomena.

Sociomateriality as Intra-Action

The second theoretical position on sociomateriality takes its departure from actions (Orlikowski 2007; Orlikowski and Scott 2008; Pentland and Singh 2012; Scott and Orlikowski 2014). This perspective is underpinned by Barad's agential realism theory which invites us to see phenomena as relationships, called intra-actions, without preexisting stable separate entities (Barad 2007; Suchman 2007). Entities such as individuals and technology artefacts "emerge through and as part

of their entangled intrarelating" in a phenomenon (Barad 2007, p. ix). This view posits that it is the act of observation of the phenomenon that separates its component entities as well as what is included in and what is excluded from the phenomenon.

Like ANT, the intra-action perspective of sociomateriality is a proximal view of the world that assumes the primacy of processes of "becoming" of observed phenomena over the "being" of entities comprising them. ANT, however, attributes capacity to make a difference to the relationships of existing human and nonhuman entities, thus the slogan of ANT: follow the actors. In agential realism, entities do not preexist to be "followed" as constituents of observed phenomena; they emerge from the observed phenomena.

Lessons about Contextual Research from Theories of Technology

Overall, theories of technology converge on their rejection of the notion of context as the social components of the IS phenomenon that shape its technology components, which is often taken in the IS literature (Benbasat and Zmud 2003). Beyond agreement on this fundamental position, different theories of technology imply very different views on context. Research following the sociotechnical systems perspective tends to study IS phenomena in relation to organizations and their environment. Proponents of the interaction view of sociomateriality analyze relations of human action and technologies in the practice of their immediate organizational setting, often alluding to but not including in the analysis conditions of broader contexts (Cecez-Kecmanovic et al. 2014; Faraj and Azad 2012; Leonardi 2012). Both of these theories of technology are ontologically compatible with the notion of context as domain of conditions of possibility environing IS phenomena.

ANT and the intra-action view of sociomateriality are rooted in ontological positions that are incommensurable to this definition of context adopted in the introduction of this paper. In these proximal perspectives, there is no stable boundary and no stable division between internal constituent entities and external conditions of possibility.

Theories of Action

Theories of action provide insights about the association of IS phenomena with broader domains of context. Table 8 shows the theories of action outlined in this section, indicating their position on context, and gives examples of relevant IS literature.

Rational Action Perspective

A frequently taken view of action in IS research is goal-oriented rational activity. While formal rational choice studies are rare in IS, most common is research that assumes a bounded rationality (March and Simon 1958) in decisions that bring about IS phenomena by individuals pursuing goals that serve their interests (Cabantous and Gond 2011). Contextual aspects such as culture are often factored into models of rational action representing conditions to be considered in decisions about IT and concomitant organizational change (Loch et al. 2003; Polites and Karahanna 2013; Rai et al. 2009; Srite and Karahanna 2006).

The rational action perspective is prevalent in research on long-standing IS themes, including strategy, outsourcing, and organizational change (Chan and Reich 2007; Rivard et al. 2006). It produces findings with an instrumental value for managers, equipping them with an analytical basis for identifying alternatives and their relative merits. Critiques of the rational action perspective point out that people's action is often based on historically and socially formed tacit and unconscious motives and goals (Lawson 1997; Lounsbury 2008).

Structurational Perspectives

IS research has extensively drawn from theories of action which center on the concept of agency (Emirbayer and Mische 1998), that is, capacity to act that transcends purposive, instrumental, and calculative decisions, involving also acting on moral will, tacit consciousness, and impulse. From the vantage point of the concept of agency in social theory, what individuals do cannot be adequately explained as a series of episodes of rational, calculative decision making. Action needs to be studied as inextricably related with actors' experiences as members of social collectives.

There has been intense theoretical debate about the relationship of individuals' agency and the structure of social collectives of which individuals are members (or social structures, for short). The central concern is to avoid "falling into one of the twin poles of structuralism or individualism" (Mutch 2010, p. 509). Individualist theory seeks to explain social phenomena as the aggregate of actions of individuals. In structuralist theory the actions of individuals are determined by enduring social structures without due recognition of people's capacity for reasoning and acting in ways that divert from and challenge the norms of social collectives. It is in the theoretical spectrum between the under-socialized individualist and the over-socialized structuralist approaches that most insightful "structurational" discussions of social context are found.

Table 8. Theories of Action Used in IS Research and Their Position on Context

Theory	Examples
Rational action: Considers action based on calculated decisions. Contextual conditions are considered by rational managers as constraints or opportunities for their action. Supports a notion of context as the environment of IS phenomena.	IS phenomena result from managers' and users' actions following decisions that take into account factors representing conditions in a broader business, market or social context (Polites and Karahanna 2013).
Giddens' structuration: Considers human agency as enabled or constrained by individuals' perceptions of social structure. Knowledgeable actors reproduce or change social structures by continuing or altering routinized, habitual action in the situations within which they are embedded. Supports a notion of context as situated practice.	IS phenomena result from human action in the context of micro-situated practice (Orlikowski 2000).
Critical realism: Attributes primacy to social structures, albeit it accepts that these are changed by human agency. Supports a notion of context as broad social systems environing IS phenomena.	IS phenomena are the result of human action which is meaningful in relation to social structures within which actors are embedded (Njihia and Merali 2013).
Actor–network theory: Individual human actors and objects neither act on their sole agency, nor under the influence of abstract social structures such as class, gender or ethnicity. Action is attributed to associations of heterogeneous actors which researchers identify empirically. The notions of social structure and context are rejected by prominent ANT theorists.	IS innovation results from dynamic formation of relations of heterogeneous actors (Faik and Walsham 2013).
Agential realism: Agency is located at the intra-actions of a phenomenon which produce and configure/reconfigure structures such as class, gender, ethnicity. A different notion of context is suggested, as a topological space of ongoing configuration and reconfiguration of boundaries and connections among phenomena.	IS studies that draw from agential realism are framed in relation to practice (Jones 2014). In a study of production at an Indian jute mill shop floor, intra-actions of humans and machines reconfigure material conditions of production as well as workers' and managers' relations of class and other forms of cultural identity (see Fernandes (1997) cited in Barad (2007)).

IS researchers have drawn from a number of social theories elaborating a structurational relationship of human action and social context (Gopal and Prasad 2000; Levina and Vaast 2008; Nardi 1997; Schultze and Boland 2000a). In this section, two such theories of action which have had long lasting influence on IS research are examined: Giddens' (1984) structuration theory, and critical realism (Archer 1982).

In his theory of structuration, Giddens presents a thesis of mutual constitution of people's capacity to act and social structures. By structure, Giddens means rules and resources implicated in the production and reproduction of social systems (Sewell 1992). Individuals reproduce social structures by habitual, routinized action and they change them by altering patterns of action. This capacity to change structures stems from their explicit and tacit knowledge and their constant reflection on what they are doing in the situations within which they are embedded. Situation, in this sense, is the context that "connects the most intimate and detailed components of interaction to much broader properties of the institutionalization of social life" (Giddens 1984, p. 119).

With few exceptions (see, for example, Walsham 2002), IS research that draws from Giddens' structuration theory has formed a distinctive view of social context as the situation of action and provided theoretical underpinnings for research focus on micro-settings of practice (Leonardi 2013; Orlikowski 2000). In reviewing the use of this theory of action in IS, Jones and Karsten (2008) note this limited view of context, but they see it as a limitation of the way the IS research community adopted this structuration theory and not inherent to the theory itself.

Others disagree and explain the prevalence of micro-situated structuration studies as a consequence of this theory's position that social structure exists only in individuals' memory and through continuous acting (Mutch 2010; Volkoff et al. 2007). This is best argued in Archer's (1982) critique of Giddens' conflation of structure and action. Drawing from Archer's work, Mutch asserts that "structures emerge over time from human activity, but once in place form objective contexts for the exercise of agency" (2010, p. 510). From the philosophical stance of critical realism (Bhaskar 1979; Mingers

2004) that Archer and Mutch adopt, social structures comprise the circumstances (duties, rights, places, power, financial resources, etc.) "in which people must act and which motivate them to act in certain ways" (Porpora 1998, p. 344). Social structure logically predates the actions that may transform them. Critical realism thus postulates a "causal path that leads from structure to interests to motives to action and finally back to structure" (Porpora 1998, p. 344). Several critical realist studies in IS explain the course of IT innovation in specific contexts by considering influences from macro-level social structures (Dobson et al. 2013; Mutch 2010; Njihia and Merali 2013).

In short, both Giddens' structuration theory and critical realism support a notion of context as the social environment of IS phenomena. However, their difference regarding the primacy of social structures as conditioning human action has significant consequences for contextual IS research. Studies adopting Giddens' structuration theory tend to explain IS phenomena in situated performance of tasks and routines, while studies adopting critical realism tend to extend the scale of study, associating IS phenomena with influences from wider social collectives such as industries and nation states.

The Action Theory of ANT

ANT scholars propose a "flat ontology" of social phenomena that does away with entities represented by abstract notions such as organization, class, gender, or nation. Criticizing the layered view of associating micro and macro entities, ANT rejects the notion of social structures (Faik and Walsham 2013). While scholars in IS often derive from ANT a relational view of context (Cho et al. 2008; Hayes and Westrup 2012), some of its most influential proponents categorically reject the very notion of context (Latour 2005). They also dismiss questions of scale and distinctions of big and small, micro and macro, taking the view that all actors are heterogeneous and "the same relational logics apply at any scale" (Law 2009, p. 147).

Action and Structure in Agential Realism

From the intra-action perspective, agency is not an attribute either of individual human beings or technology artefacts. Agency is enacted (i.e., constituted in the practices that bring about a phenomenon). IS researchers that adopt this theory restrict their perspective of context to situated practice (Jones 2014; Orlikowski and Scott 2008; Scott and Orlikowski 2014). Still, a different view of context can be drawn from the description of agential realism by Karen Barad in her book *Meeting the Universe Halfway* (2007). Barad's view of the agency/structure relationship bear some resemblance to Giddens' structuration theory: structures are not

> rigidified social formations of power that foreclose agency and deterministically produce subjects of ideological formations. On the contrary, structures are to be understood as material-discursive phenomena that are iteratively (re)produced and (re)configured through ongoing material-discursive intra-actions" (p. 240).

There are, however, two major differences between the agential realist and the structurational views of the agency/structure relationship, with consequences for the implied notion of context. First, structures in agential realism are dynamic sociomaterial enactments rather than static social arrangements. Second, the relationship of agency of local practice with such dynamic sociomaterial structures is expressed in topological rather than geometrical space analogies. In the geometrical space analogy, which is exemplified in both the layered and the relational contextualization approaches, context is defined in terms of size of domains and distances among entities. In the topological space analogy of sociomaterial structures, what matters are boundaries, connections of position, and exclusions. Sociomaterial practices that bring about a phenomenon are associated with other sociomaterial structures through iterative reconfiguring of each other, a process which Barad calls "enfolding." For example, the power relations among workers of different class and gender identities in an organization materialize in relation to these structural categories beyond the boundaries of the practices in the organization (Fernandes 1997). The boundary of the context that contributes to the formation of workers' identities, in this view, is not static and connections are not linkages among preexisting categories, such as organization, nation state, or working class. Boundaries, connections, and the inclusion or exclusion they imply are dynamic enactments of worker power relations in multiple work places and constantly reconfigured.

Alternative Notions of Context

In combination, the theories of technology and the theories of action used in IS research suggest two different theses on what context is and how it can be studied, one associated with the distal ontology and the other with the proximal. These are summarized on Table 9.

The notion of context as a domain of conditions of possibility environing a phenomenon is supported by the sociotechnical systems theory and the interaction perspective of sociomateri-

Table 9. Two Alternative Ontological/Epistemological Positions on Context	
Distal perspectives, assuming a world made of interactions among stable material and social entities	***Theory of technology***: sociotechnical or interaction perspective of sociomateriality. ***Theory of action***: structurational or rational; different assumptions on primacy of agency or structure in the structurational relationship lead to differences of scale in the framing of contextual research. ***Notion of context***: context as domain of conditions of possibility environing a focal phenomenon. ***Contextualization strategy***: either layered, i.e., by reference to nested or stratified systems, or relational (i.e., by identifying network connections).
Proximal perspectives, assuming a world in a constant state of change giving rise to reconfigurations of sociomaterial entities	***Theory of technology***: intra-action perspective of sociomateriality. ***Theory of action:*** processes of enfolding of sociomaterial reconfigurations. ***Notion of context:*** ongoing configuration of connections of a phenomenon with other sociomaterial phenomena. A shift from a static notion of context as domains of entities to a dynamic notion of context as processes of sociomaterial reconfiguring. ***Contextualization strategies***: tracing the history of the formation of connections and transgressions of boundaries of an observed phenomenon and other interrelated phenomena.

ality in combination with the rational or the structurational perspectives of action. In such theoretical blending, different positions on social structure and its relation to individual agency have resulted in contextual IS research of different scales. IS phenomena are contextualized in relation to practice in their immediate setting in most research adopting Giddens' structuration theory while it is often contextualized in broader social domains in research adopting critical realism. In large scale contextual research, layered contextualization is the most common approach to define scale. Relational contextualization is also a valid strategy, placing a focal phenomenon on a broader network of human actor/technology interactions (Vaast and Walsham 2009).

A different notion of context, as a topological enfolding of phenomena at various scales, is suggested by agential realism. In this view boundaries delineating IS phenomena are constantly shifting and reconfigured, as connections are made between an observed phenomenon and multiple other sociomaterial phenomena. Scale in this perspective is not the breadth of the social domain beyond the boundaries of a focal phenomenon that is assumed to be the source of conditions of possibility for its occurrence, but the density of the connections of a phenomenon under study with multiple other phenomena. This perspective could be revealing of emerging roles of IT from phenomena that involve the striving for connections with various domains of action. An example could be the way social media and mobile phones are implicated in the movement of refugees from their original countries toward the country of their desired destination. At each particular moment of the refugees' journey, the context that affects their actions and refugee status is a manifold of sociomaterial intra-actions in various locations: the unfolding of war in the country they left, the struggle for survival of the family members they left behind or are trying to join in the country of destination, the political developments that give rise to asylum policies in a number of countries they need to cross to reach their desired destination, etc. In the unfolding refugees' journey, mobile phones and social media platforms emerge as the means for inclusion or exclusion in a variety of sociomaterial configurations.

The rejection of any notion of context by proponents of ANT should also be noted. This is the logical consequence of a flat ontology that does not distinguish among individual actors and social collectives of different scale (Huen 2009). ANT studies describe phenomena by tracing heterogeneous observed actors (human, material, abstract) and their connections without assumptions of scale or social structures.

Toward Sociomaterial Contextual Theory

In agential realism, context is an inherently sociomaterial notion. It refers to sociomaterial configurations of different scale that are constantly formed and reformed in relation to

each other. This view of context may prove insightful in the study of dynamic phenomena that cannot be adequately addressed by distal perspectives. But it is still conceptually obscure and underdeveloped and therefore has limited following in IS research.

Two areas of theoretical development are needed to form sociomaterial contextual theory in the much more commonly adopted distal perspectives. First, the elaboration of sociomaterial perspectives of large-scale entities that are often taken to be the context of IS phenomena, such as organizational networks, industries, nation states, institutions, and digital ecosystems. Second, the identification of mechanisms that associate sociomaterial IS phenomena with sociomaterial perspectives of contexts.

There have been several efforts to produce a sociomaterial theory of large-scale social or technology domains. For example, from a critical realist perspective, Volkoff and Strong (2013) take the concept of affordance to the organizational level and propose a multilayered account of how IT is associated with organizational change. Another example is research on technology infrastructures, such as Starosielski's (2015) study of cabled telecommunications that documents the material features of a communication system on which the internet relies and discusses related political interests and cultural considerations. IS research can also draw from sociomaterial perspectives of larger scale social structures developed in other fields of the social sciences, including sociomaterial views of institutions (Pinch 2008), sectors, and national systems of innovation (Fuenfschilling and Truffer 2014; Nelson 1994).

There is a need for more studies of large-scale sociomaterial phenomena. Contextual IS research would benefit from the development of sociomaterial perspectives of digital ecosystems (Eaton et al. 2015; Yoo et al. 2012) to shed light on the association of technology development trajectories and sociopolitical dynamics that result in the concentration of the most successful and most widely used digital platforms in a few regions of a few countries.

Less developed are mechanisms that associate sociomaterial perspectives of IS phenomena with sociomaterial perspectives of context. A sociomaterial contextual theory would be different from theories that consider relations of a focal phenomenon only with technology infrastructures or only with social structures, or with both but separate from each other as if they were unrelated. One possibility could be to seek to associate aspects of the sociomaterial status of a focal phenomenon with analogous sociomaterial configurations of its context. For example, gender differences in practices involving IT in organizations could be associated with a gender-based view of IT infrastructure development in society at large. An alternative possibility could be the development of perspectives of sociotechnical embeddedness by identifying mechanisms that link the unfolding of organizational IS innovation processes to sociomaterial conditions of its environment. For example, a sociotechnical contextual explanations of the development of digitally conducted entrepreneurial activity (Avgerou and Li 2013; Ou et al. 2014) might be formed by associating the formation of digital business (a sociomaterial phenomenon) with regulated digital platforms in the start-up's environment, and a population of technologically savvy customers who prefer to transact through social media technologies (a sociomaterial context).

Conclusions

The review of contextual research in the IS literature identifies the variety of ways IS scholars associate a phenomenon with its environment. It raises awareness of three dimensions of variation: whether contextual research builds on and enhances general a-contextual theories or produces context-specific theory, categories of contextual factors and types of explanatory mechanisms, and contextualization approaches. Awareness of these aspects of contextual research may improve research design and editorial judgement.

The review exposes theoretical or methodological issues, which are examined in this paper. The resulting suggestions should be understood as directions for a research agenda, each of them requiring further development. Two of the issues and related suggestions concern the development of middle range theory. First, the examination of generalization of context-specific research findings highlights comparative methods as a promising approach for incremental theory building from context-specific case studies. Comparative research is underdeveloped in IS and its development will need to overcome obstacles from existing publishing norms in the field. Comparative context-specific cases involve attention to detail in rich descriptions and therefore produce long papers which do not conform to journals' length limitations of research articles and editors' preferences for parsimonious research accounts. Research that aims at incremental theory building by comparing the findings of context-specific case studies with existing contextual theory also requires a moderation of reviewers' expectations of novelty and an appreciation of gradual refinement of prior research findings as valuable contributions meriting publication.

Second, the examination of existing critiques of contextual research of different scale (Avgerou 2002; Knorr-Cetina 1981; Pollock and Williams 2009) points out that contextual

research is inherently partial and involves trade-offs between detail of explanation and scale. Partiality is true for all IS research as any research effort only deals with a limited number of conditions and causal processes of the highly complex sociomaterial phenomena. The magnitude of the domain of contextual inquiry chosen by the researcher is a specific source of partiality. Explicit framing of a study by making the choice of domains of contextual inquiry a matter of research design would make clear the limits of the resulting theory. This would allow for the complementarity of theoretical insights from research of different scales and facilitate incremental theory building by comparative research.

This research also contributes to the development of conceptual foundations for contextual theory. The notion of context as a domain beyond the boundaries if IS phenomena that fosters conditions of possibility for the occurrence of the phenomena, with which this exploration of contextual research started, is compatible with the main foundational theories of technology and of action that IS research draws upon. These include the combination of sociotechnical or sociomaterial theories of technology and the rational and structurational theories of action. But it is incommensurable with proximal theories of technology and action which give primacy to action processes over stable entities and direct research attention to an ever-changing world. An alternative sociomaterial perspective of context in the proximal ontological perspective of agential realism, which relates the formation of specific phenomena to unfolding phenomena elsewhere was identified. This alternative way of understanding phenomena that involve technology and social collectives is still too abstract and vague. Given the interest shown by the IS field in the intra-action perspective of socio-materiality, IS research may take up the challenge of developing more concrete ways of pursuing its ideas and develop a notion of sociomaterial context in the proximal way of thinking. In relation to research based on the commonly adopted distal ontologies, this paper argues for the development of sociomaterial perspectives of domains of context and sociomaterial mechanisms to account for their influence on IS phenomena.

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MIS Quarterly

THEORY AND REVIEW

CONTEXTUAL EXPLANATION: ALTERNATIVE APPROACHES AND PERSISTENT CHALLENGES

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Appendix

The articles in the table below were identified in searches of the EBSCOhost Business Source Complete Database for the *Information Systems Journal, Information Systems Research, Journal for the Association of Information Systems, Journal of Management Information Systems,* and *MIS Quarterly*; ProQuest ABI/INFORM Collection for *European Journal of Information Systems* and *Journal of Information Technology*; and Elsevier Science Direct Journals Complete for the *Journal of Strategic Information Systems*. The articles were searched by the word "context" in the abstract AND "contextual" in the article text, for the period 2000–2018.

Article	Focal Phenomenon	Context
European Journal of Information Systems		
Chua and Myers 2018	Control in IS development	Organization (legacy control mechanisms, employment contract, tradition)
Babaian et al. 2018	Usability of ERP systems	History of preceding tasks in a business process
Wright et al. 2017	SaaS assimilation in nonprofit sector	Organization (readiness, top management participation/beliefs satisfaction; innovativeness); nonprofit sector environment (social gains; revenue, years of operation, industry)
Jain and Ramesh 2015	Post-merger common platform development	Organization (IT infrastructures, history of IS implementation); industry (trends of mergers and acquisition, physical infrastructures); boundary-spanning activities
Shen et al. 2015	IT in teams	Linear time, socially constructed time in work organizations; team activities
Gregor et al. 2014	e-Government in least developed countries	Government sector in developing countries; sweet spot (a zone of GDP per capita within which social change across a wide range of individual life conditions is especially rapid in Hughes (2001))
Constantiou et al. 2014	Use of location-based services	Past user experience and knowledge; situation of use (static or dynamic)
Allen et al. 2014	Information sharing and interoperability in emergency incidents	Interorganizational activity
Karanasios and Allen 2014	Mobile technology-mediated work	Work practices
Leclercq-Vandelannoitte 2014	Identity and technology relationships	Organization (management discourses)

Article	Focal Phenomenon	Context
Ravishankar et al. 2013	IT offshoring	Colonial history, interorganizational relationship (power asymmetries)
Wilkin et al. 2013	Management of public/private-sector IT deployment	Interorganisational public/private sector IT project (stakeholders, organizational complexity, decision making culture, attitude to initiatives, learning and risk)
Yayla and Hu 2012	IT-business strategic alignment and firm performance	National business environment (uncertainty); business firm strategic orientation; national conditions affecting organizational IT (technology infrastructures, government policy, funding availability, consumer IT experience)
Bidan et al. 2012	IS integration architectures	SME (IT history)
Monteiro and Rolland 2012	Use of integrated information systems	Technologically mediated, geographically dispersed work practices
Bjørn et al. 2009	Configuration of electronic templates for healthcare professionals	Work practices in hospitals; boundaries among specialist practices (patient populations they deal with, specialist clinical work, spatial layout and coordinate artefacts)
Mourmant et al. 2009	IT turnover	IT industry (factors specific to a given firm, such as its IT strategy, size, structure, location in the organization life cycle, the IT work process; factors of a firm's external environment, including general technology trends, the IT labor market, legal issues, national culture, and the growing influence of globalization)
Payton and Kiwanuka-tondo 2009	User centred design of HIV/AIDS information portals	The population of black women targeted by government HIV/AIDS information portals (social and psychological experiences of race and ethnicity); HIV/AIDS social/medical service agencies
Cho et al. 2008	Health information systems implementation	Actor networks across hospital clinics and departments during IS implementation
Lyytinen and Newman 2008	Information Systems change	The immediate organizational environment of the IS building system (includes the resource, authority, culture, and political systems in which the IS change unfolds); the organization's social, economic, political, regulatory, and competitive environments
Kasi et al. 2008	Post mortem evaluation	Organization (ability to learn, incentives for learning from failure, structure, IT training)
Chu and Robey 2008	Online learning	Work practices; time (past, present future)
Cho and Mathiassen 2007	Industry innovation in telehealth innovation	Stakeholder groups of IT innovation in the healthcare sector; infrastructures for IT innovation in the healthcare sector (institutional, resource endowments; market mechanisms; proprietary activities involved in innovation for profit)
Hackney et al. 2007	e-Reverse auctions in public sector procurement	Industry sector; market characteristics (number of competitors)
Quaddus and Hofmeyer 2007	Adoption of B2B in small businesses	Organizational and external factors (manager/owner characteristics, vendors, competition, government, trading partners)
Scheepers et al. 2006	Mobile IT user satisfaction	Organization and extra-organizational environment (individual user as employee, as professional, and as member of society)

Article	Focal Phenomenon	Context
Andersen 2006	Activity-based design	Habitat (physical places where particular artefacts and information sources are available)
Scheepers 2006	Implementation of enterprise information portals	Internal market of potential portal users in the organization (groupings of users' information needs)
Lyytinen and Rose 2006	Agile IS development	Organizations involved in IT innovation (vendors and manufacturers, IS development organizations, IT deploying organizations)
Lin and Silva 2005	IT adoption	IT project (social and political processes)
Fitzgerald and Russo 2005	IS failure	IS development and implementation project and its organization environment
Randall et al. 2001	Organizational knowledge and memory	Workplace of organizations (everyday activities)
Information Systems Journal		
Althuizen 2018	Technology acceptance	Organization (social influences and facilitating conditions)
Kude et al. 2018	IT-based synergies in organizations	IT governance (regulation oriented and consensus oriented)
Mettler 2018	Professional social networks	Organization (linguistic, historical, political, professional and social conditions)
Simeonova 2018	Transactive memory in knowledge sharing	Activity system (trust, informal networks)
Lee et al. 2018	Email for conflict handling	Interorganizational conflict situation
Willison et al. 2018	Employee computer abuse intentions	Organization (procedural and distributed justice, sanctions)
Salo and Frank 2017	Mobile application user behaviour after critical incidents	Situation of use (task activity, physical place, sociality, technology characteristics)
Gizaw et al. 2017	Design and implementation of generis software	Software vendors and user organizations
Malaurent and Avison 2016	IS requirements	National setting (culture, regulation); organization (standards)
Tarafdar et al. 2015	The stress from using IT	Organization (employee role and tasks, social support and job control)
Zimmermann and Ravishankar 2014	Knowledge transfer processes from onshore to offshore teams	Social network infrastructure, organizational culture, national and social culture, employee and offshore team social ties
Hustad and Olsen 2014	Teaching enterprise systems skills	IS teaching organization
Subramaniam et al. 2013	Social media use for virtual collaboration	Dispersed organization (employee communication); enterprise systems
Stacey and Nandhakumar 2009	Development process of software games	Work practice, international and industry conditions
Larsen et al. 2009	Use of UML in organizations	Systems development practice; organization (multiple factors, including employee skills and knowledge base, culture, project management, leadership)
Oshri et al. 2008	The role of transactive memory in knowledge transfer	Globally distributed teams (memory of who knows what)
Lindgren et al. 2008	Boundary-spanning practices	Work practice, ubiquitous computing environment, sensor technologies
Westrup and Liu 2008	ICTs in joint ventures	Global firms, national culture
Yoo et al. 2007	Post-merger knowledge sharing	Organization (culture, routines, incentive systems); time as path dependency and time pressure

Article	Focal Phenomenon	Context
Gao 2007	Standardization in wireless local area networks	Actor network and counter networks in the development of wireless local area network standards (institutional, social and technological elements)
Sarkkinen and Karsten 2005	Visual and verbal representations in task redesign	Discourse surrounding task redesign as part of ISD in an organization
Gao 2005	Telecommunication strategy making	National economic conditions, national policies, regional industry competitiveness
Kautz and Nielsen 2004	Software process improvement	Organization (various factors, including size, departmental and task differentiation and complexity, history, distribution of power)
Lyytinen and Rose 2003	Disruptive information systems innovation	Long waves of ICT evolution
Lundell and Lings 2003	Evaluation of CASE tools	IS development companies (system development tool requirements); external requirements (e.g., ISO standards)
Detlor 2003	IS information seeking in organizations	Work/social setting in organizations (work situation influencing information needs, culture and structure as constrains to information seeking behavior, social norms and stakeholder interests influencing patterns of information use and perceptions of problem resolution)
Caldeira and Ward 2002	Adoption of IS in SMEs	Organization (various factors including financial resources, human resources, management approaches); external environment, including IT vendors, available technologies, competition, industry market services, government support.
Liu et al. 2001	Design of collaborative information systems	Cooperative work (norms, responsibilities and authorities)
Bannister 2001	Development of integrated information systems in public administration	Public sector organization (cultural, structural, resource and technical conditions, legacy systems)
Avgerou 2001	IT innovation and the social context	Organization (processes of change, technical rational decisions and institutional conditions); national and international (policies and institutional influences)
Henfridsson 2000	Ambiguity in organizations and the effect on IT adaptation	Social work organizations (history of IT, sense making of IT, institutional support structures)
Information Systems Research		
Breward et al. 2017	IT adoption	Conditions of trust in the organization introducing the technology; familiarity with the technology; perceived control over the technology
Lankton et al. 2016	Trust in technology	Expectation maturity (introductory period)
Ramesh et al. 2012	Agile distributed software development	Performance management and social factors as antecedents of organizational ambidexterity
Xu et al. 2012	Individuals' concerns for information privacy	Industry self-regulation and government legislation
Hsu et al. 2012	Organizations' information security management	Isomorphic institutional pressures, organizational economic considerations, organizational capability
Mishra et al. 2012	Information sharing in healthcare	Physicians' professional communities and working practices; government influences
Dennis et al. 2012	Trust in virtual teams	Organization (arrangements for monitoring and evaluation of work)

Article	Focal Phenomenon	Context
Kleis et al. 2012	The impact of IT on innovation productivity	IT producing and IT user industries
Anderson and Agarwal 2011	Individuals' willingness to disclose personal health data for digitization	Purpose for which information is requested and requesting stakeholders
Durcikova et al. 2011	Individuals' knowledge exploration and knowledge exploitation	Technology support organizations (climate for innovation and climate for autonomy; access to knowledge management systems)
Vannoy and Salam 2010	IS in competitive actions or responses and firm performance	Organization (competitive processes, culture, strategy, managerial perceptions).
Liu et al. 2010	Personalization in content delivery sites	Cost and revenue factors of content-delivery websites
Gopal and Gosain 2010	Software outsourcing performance	Organization (formal and informal controls), boundary spanning activities
Burton-Jones and Straub 2006	System usage	Task
Chidambaram and Tung 2005	Individuals' contribution to computer-supported group work	Group characteristics
Hong et al. 2004	Animation and online users' attention	Website interface design
Kirsch 2004	Control of the development of information systems that will be deployed globally	Organizational units (priorities, geographic, time and cultural differences)
Malhotra et al. 2004	Internet users' information privacy concerns	Organization (information collection practices)
Choudhury and Sabherwal 2003	Control in outsourced systems development projects	Organizations (vendor knowledge, vendor–client relationships)
Journal of the Association for Information Systems		
Holeman and Barrett 2017	Design and implementation of an Internet of things technology in health care	Social practices in health care organizations; material infrastructures
Park et al. 2017	IT and organizational agility	Organization (size, top management team energy); environmental velocity (speed of change, unpredictability)
Crossier and Posey 2017	Use of identity ecosystems	User activity on the web; user location; network type
Venkatesh et al. 2016	Technology acceptance and use	Eight dimensions of context: use, technology, task, time/event, (social) organization, (physical) environment, rationale
Young et al. 2016	IT-enabled change	Organization (groups' technology frames)
Cranefield et al. 2015	Lurking in online communities	Multiple online and offline spaces of engagement with learning and knowledge; the boundaries between them
Richardson et al. 2014	IT-enabled organizational agility	Social enterprise organization, social sector; digital platform
Strong et al. 2014	Electronic-health-record-associated organizational change	Health organization: goals, culture, roles
Thorén et al. 2014	IT-enabled open innovation	Practices in the newspaper industry
Bo and Wong 2013	Perceived usefulness of knowledge sharing mechanisms	Organizational climate

Article	Focal Phenomenon	Context
Staehr et al. 2012	Achieving business benefits from ERP systems	Organization (management, finance, etc.); industry sector; government; IT sector; business environment; ERP project
Davern et al. 2012	IT and cognition	Task, team, organization, IT systems
Lim et al. 2011	IT project failure risk management	Social structures of IT development project
Bragge and Merisalo-Rantanen 2009	Web-based information systems development	User organization
Davison et al. 2009	IT professionals' ethics	National historically developed culture; national economic, social and institutional conditions; international professional norms
Pipek and Wulf 2009	Design and use of information technology	Organizational sociotechnical work conditions (including devices, tools, technologies, standards, conventions, and protocols)
Hespø et al. 2009	Development of e-infrastructures	Work practices and technologies related with the production history of the organization
Recker et al. 2009	Business process modeling	The organization in which the process is embedded; the broader setting of the organization; time, location, weather, market conditions, etc. for context aware systems
Davis et al. 2009	The use of metaverses in virtual team collaboration	Virtual world systems; virtual teams
Kudaravalli and Faraj 2008	Online collaboration	Conversation threads in electronic media
Sheng et al. 2008	Personalization and privacy concerns in ubiquitous commerce adoption	Physical, social, temporal, and task-related dimensions of a purchase process
Gable et al. 2008	Conceptualizing and measuring IS success	IT function capabilities and practices
Mehta and Hirschheim 2007	IS integration in mergers and acquisitions	Corporate business conditions, pre-merger organizational conditions; organizational IS infrastructures; industry conditions
Dickey et al. 2007	Computer mediated communication	Social linguistics of a discourse
Bergman et al. 2007	Boundary objects in systems analysis and design of information systems	Organization (functional and political aspects); projects and technical work of systems development
Truex et al. 2006	Adaptation of theory borrowed from another discipline	History of the development of a theory in an academic discipline
Rossi et al. 2004	Evolutionary ISD method engineering	ISD development and IS use; business changes and technology changes
Journal of Information Technology		
Rohde et al. 2017	IS design	Organization (social practices)
Nicholson et al. 2017	Corporate social responsibility in outsourcing	Social space "betwixt and between" organizations, where routines of the formal organizations are suspended
Davison and Martinsons 2016	Any IS research	Cultural and institutional aspects of the phenomenon under study
Mettler and Winter 2016	Information sharing in enterprise social systems	Organization (norms, social cohesion)
Poba-Nzaou and Raymond 2016	ERP implementation and risk management	Organization (structure and resources, existing organizational technology architecture); ERP project (stakeholders, supplier and solution alternatives)

Article	Focal Phenomenon	Context
Newell 2015	Managing knowledge and managing knowledge work	Organization; nation (social structure, culture); practice
Frisk et al. 2015	IS evaluation in public sector projects	Organization (culture and approach to value measurement of IT)
Lioliou and Zimmermann 2015	IT outsourcing	Vendor/client social ties (structural, cognitive, relational)
Constantiou and Kallinikos 2015	Big data in strategy and decision making	Structure of decision making process, business ecosystems; technology ecosystems
Hsu et al. 2014	The role of IT in risk management	Regulatory environment, industry conditions, organization (language and norms, training and structure)
Ravishankar 2013	Ambiguity in public ICT innovations	National institutional conditions
Selander et al. 2013	Peripheral actors role in digital ecosystems	Organization and business ecosystems (innovation capabilities within an organization; external innovation resources)
Taylor et al. 2012	Risk management practices in IT projects	Organizational maturity; existing IT systems
Blaskovich and Mintchik 2011	Decision making processes and outsourcing	Industry isomorphic influences
Gebauer et al. 2010	Design and management of IS for mobile workforces	Work tasks; mobile technology infrastructure (connectivity, geographic location, interference)
Tow et al. 2010	Information disclosure behavior by Facebook users	Online community
Bouwman and van de Wijngaert 2009	Adoption of mobile technologies	Physical environment; organization (structure); tasks
Jensen et al. 2009	Underlying influences of institutions and the effects on IT implementation	Organizational field, organization/group; situated practice
Uwizeyemungu and Raymond 2009	Measuring IT's contribution to organizational performance	Organization (processes and structures, information architecture)
Lyytinen et al. 2009	Implementation and institutionalization of ERP systems	Organization (structure, political climate, corporate culture); broader social, political and industry wide influences; technologies carrying institutions; history of IT and organizational change in the organization
Vega et al. 2008	E-business diffusion in SMEs	National system of innovation (economic, social, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovations); public programs for IT diffusion
Igira 2008	Health information systems adoption in developing countries	Organization (culture, norms and practices)
Mathiassen and Sørensen 2008	Information services within an organizations framework	Organization (employee practices and approaches to information handling and decision making)
Kawalek and Hart 2007	Management of e-learning	Communities of practice across organizations
Cho et al. 2007	Resilience capacity and adoption of telehealth innovations	Competing organizational interests, work practices, IT infrastructure, economic conditions, commercial pressures
Ågerfalk and Eriksson 2006	Usability of IT systems	Social norms that govern social action; social goals and values
Journal of Management Information Systems		
Baird et al. 2017	Post adoption technology assimilation	Small physician practice setting; interactions within a community that spans across these practice settings

Article	Focal Phenomenon	Context
Lai et al. 2016	Technology adoption and assimilation	National culture and business models
Sen and Borle 2015	Risk of data breach	Organization (location), industry, history of data breaches
Li et al. 2015	Financial market surveillance systems	Financial market (traders, platform and processes) and activity and market information (news and reports)
Huber et al. 2014	Contractual and relational governance in IS outsourcing	The outsourcing task, client and vendor organizations (goal conflict and goal misalignment)
Qiu et al. 2014	Prediction markets	Social network (structure)
Wan et al. 2012	Self-regulated e-learning	Job (intellectual demand) and the organization (cooperative group norms)
Chai et al. 2011-12	Bloggers' knowledge sharing	Blogging community (trust, reciprocity, social ties)
Suh et al. 2011	Virtuality and social networks	Virtual group (geographic/temporal dispersion and technological support); social network
Xu et al. 2010-11	Task and social information seeking	Network of people who provide employees with information for their tasks and for their social relations
Xu et al. 2009-10	Push-pull in privacy calculus	Industry (self-regulation); government (regulation about personal information disclosure)
Bostrom et al. 2009	Information systems as sociotechnical systems	Organizational work system (rules, resources, and capabilities available)
Zhang et al. 2007	Group decision making	National culture, group diversity, technology (the degree to which communication medium allows for awareness of presence of others)
Kim et al. 2005-06	Electronic information transfer in B2B supply channel relationships	Supply chain (uncertainty of demand concerning the products exchanged between the buyer and the supplier of a supply chain; technological uncertainty of the channel transaction)
Gallivan et al. 2005	Training and IT usage	Coworkers in the workplace (their perception of training quality and attitude towards IT)
Lee 2003-04	Context-reflective data quality problem solving	Situated practice; paradigms (disciplines-based rules), goals, roles (data collector, data user, data administrator, etc.)
Nidumolu et al. 2001	Knowledge management in situated learning	Communities of practice within organizations
Journal of Strategic Information Systems		
Aversa et al. 2018	Decision Support Systems failure	Social and material (decision making technologies) practice of decision making
Ravichandran 2018	IT and organizational agility	Organization (IT competence, innovation capacity)
Marjanovic and Cecez-Kecmanovic 2017	Datification in open government IS	Data producing and data using activities of government agents
Spagnoletti et al. 2015	Design for social media engagement	Network of patients, professionals and intermediaries; social media platform
Popovič et al. 2014	Use of information systems	Organization (information sharing values)
de Vaujany et al. 2013	The formation of organizing visions	Discourses, micro-practices and artefacts
Montazemi et al. 2012	Know-how transfer between MNC units	A MNC's social capital (embedded social ties between units, institutional shared vision of the units, interorganizational trust of the units)
Nolan 2012	Strategic IT leadership	Organizational structure, IT ecosystem, history of change and IT in an organization

Article	Focal Phenomenon	Context
Pillay et al. 2012	Organizational and information systems change	Organizational leadership, learning processes and culture
Cordella and Iannacci 2010	Information systems in the public sector	Government administration reforms
Petrini and Pozzebon 2009	Business intelligence systems in the management of sustainability	Organizational factors (business strategy, stakeholders, processes, and training and education) and economic, social and environmental indicators
Li et al. 2008	Initial trust formation in organizational information systems	Organizational and technology factors providing situation normality and structural assurance
Boonstra and de Vries 2008	Design and implementation of interorganizational information systems	Interorganizational network of stakeholders
Wastell 2006	GIS in evidence-based policy making	Micro-politics in multi-agency partnerships in government; outside pressures from NPM policy
Boersma and Kingma 2005	ERP transformation and organizational adaptation	Organizational culture, ERP technology
Nandhakumar et al. 2005	ERP implementation	Organization (political and cultural forces)
Soh and Sia 2004	ERP-organization misalignments	National and industry related institutional pressures; organizational structures
Wagner and Newell 2004	ERP and best practice transfer	Organization (epistemic cultures)
Hsiao 2003	Distrust in electronic marketplace	A society's culture of economic exchange
Urquhart 2001	Analyst-client interaction in systems development	Organization (culture, the history of the ISD project, professional relationships)
Merali 2000	Knowledge management process	Organization (socially situated activity of learning and doing; formal and informal structures for communication and coordination)
Fowler 2000	AI-based knowledge management	Organization (core business processes)
Kern and Willcocks 2000	IT outsourcing relationships	Organization (past experience of outsourcing; financial, business, technical and political expectations; objectives)
MIS Quarterly		
Mo et al. 2018	Matching solvers to tasks on crowdsourcing platforms	The crowdsourcing platform; a crowd of solvers
Srivastava and Chandra 2018	Trust in virtual collaboration	Virtual workplaces
Zhang 2017	Job performance with knowledge management systems	Task and organization (leadership)
Sykes and Venkatesh 2017	ERP use and job performance	Social network at the work place
Chen and Zahedi 2016	Individuals' internet security perception and behavior	Nation state (culture)
Andrade and Doolin 2016	IT use by refugees	Social setting in host country
Kim et al. 2016	Impact of knowledge manage systems usage	Task environment and knowledge sources
Lin et al. 2015	Developmental impact of IT	Organizational and socio-political setting of IT project
Su 2015	Intercultural sensemaking	Global IT outsourcing
Singh et al. 2015	Path of technological innovation	Organization (processes, opportunities)
Sykes 2015	Employee outcomes from the use of enterprise systems	Organizational setting (support structures, work peers)

Article	Focal Phenomenon	Context
Scherer et al. 2015	Self-service technology use. RQ: how IT-based self-service affects customer retention	The task of the service, customers (skills, preferences, abilities), time
Fang et al. 2014	Trust, satisfaction and online purchase intention	Institutional mechanisms safeguarding e-commerce
Marett et al. 2013	Use of bypass systems in long-haul trucking	Industry (competition, regulation) and organizational conditions (support
Njihia and Merali 2013	Public sector IT projects	National and global socio-economic and political conditions; long time period
Volkoff and Strong 2013	IT and organizational change	Social structures, preexisting agency; long time duration for the actualization of change
Polites and Karahanna 2013	Adoption of IS habits/routines	Organization (task sequences, work routines)
Sarker et al. 2012	Value cocreation in B2B	Alliance of software vendor and partners (governance, collective strength and power/politics)
Rai et al. 2012	IT-enabled inter-firm value cocreation	Supply chain process in the logistics industry
Lu and Ramamurthy 2011	IT and organizational agility	Organization (size, age investment in IT); industry
Nan 2011	IT use patterns	Social organizational setting
Smith et al. 2011	IS privacy	Type of information collected; sector; political situation; technology application
Gray et al. 2011	Social bookmarking and employee innovation	Social network of employees
Morris and Venkatesh 2010	IT and job satisfaction	Job arrangements in organizations (skill variety, autonomy, feedback)
Rai et al. 2009	Offshore IS projects	Organization (culture)
Xue et al. 2008	IT investment decision processes	Organizational characteristics (IT investment level, centralization, IT function power), external influence
Avgerou and McGrath 2007	IS and organizational change	Social environment of organizations
Ahuja et al. 2007	IT professionals' turnover	Work–family situations
Miranda and Kim 2006	IS outsourcing decisions	Professional and political institutional environment
Mårtensson and Lee 2004	Action research on IS	Domains of scientific knowledge; practitioners' professional knowledge and praxis
Subramani 2004	Supplier benefits from supply chain management systems	Interorganizational business processes and domain knowledge
Lamb and Kling 2003	IT use	Multiple social contexts
Sharma and Yetton 2003	IS implementation	Institutional setting of implementation
Orlikowski and Barley 2001	IT and organizational change	Institutional aspects of organizations
Lim and Benbasat 2000	Individual users' perceptions of information systems	Organization (individual members' knowledge and groups' norms, tasks and structure)
Cooper 2000	Creativity in IT and organizational change	Group characteristics

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