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Conceptualizing Workarounds: Meanings and Manifestations in Information Systems Research

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Abstract:

We reviewed papers in core IS outlets that defined the term workaround or presented an example of a workaround. In the analysis, we used Ogden and Richard's triangle of reference as a theoretical framework to analyze the relationship between 1) the term workaround; 2) theories, definitions, and use of the term; and 3) their empirical basis and empirical workaround behavior that the papers describe. First, we summarize the existing theoretical insights regarding workarounds and investigate their validity. Second, we show that studies have defined and used the term workaround differently to the extent that they have not always applied it to the same empirical phenomena, which raises questions about some theoretical insights' validity. Third, we suggest a definition for workarounds that we inductively derived from empirical accounts of workaround behavior and, therefore, that adequately describes how researchers commonly use the term and makes it possible to distinguish workarounds from other similar phenomena.

Keywords: Workarounds, Review, Information Systems, Triangle of Reference.

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1 Introduction

Workarounds refer to unexpected user behaviors that researchers have reported to create hazards, inefficiency, and even illegal actions (Alter, 2014; Murphy, Reddy, & Xu, 2014) and frequently cited in relation to serious patient safety issues (Halbesleben, Wakefield, & Wakefield, 2008; Patterson, Rogers, Chapman, & Render, 2006). However, researchers have also acknowledged workarounds as beneficial and, in fact, necessary in hospitals (Ash, Berg, & Coiera, 2004; Parks, Xu, Chu, & Lowry, 2017) and other settings (Button, Mason, & Sharrock, 2003; Ferneley & Sobreperez, 2006). Several studies have viewed workarounds as expressing resistance (Ferneley & Sobreperez, 2006; Choudrie & Zamani, 2016), whereas others question this view (Button et al., 2003; Azad & King, 2012). As a complex phenomenon, workarounds have both positive and negative effects. Although researchers have discussed workarounds in many different situations, they ‘‘remain for the most part surprisingly underinvestigated and [under] theorized’’ (Pollock, 2005, p. 497).

To summarize the current theoretical insights and their validity, we used Ogden and Richard’s (1923) triangle of reference as an analytical framework to review papers in core IS outlets that defined the term workaround or presented an example of a workaround. With the review as a basis, we overview this emerging research area as a starting point for problematizing and defining the workaround concept. We see our work as an “interim struggle” (Weick, 1995) towards a theory of workarounds that provides a roadmap for future research. Accordingly, we address the following research question (RQ):

RQ: What theoretical insights has IS research discovered about workarounds?

With this paper, we make three contributions. First, we summarize the existing theoretical insights regarding workarounds and investigate their validity. Second, we show that studies have defined and used the term workaround differently to the extent that they have not always applied it to the same empirical phenomena, which raises questions about some theoretical insights’ validity. Third, we suggest a definition for workarounds that we inductively derived from empirical accounts of workaround behavior and, therefore, that adequately describes how researchers commonly use the term. In doing so, we ultimately provide a roadmap for future research on workarounds. We need more research that uses a wide variety of data-collection methods and that defines and uses the workaround concept in concert with how researchers commonly understand it. An emerging research area such as the one on workarounds requires shared definitions and researchers to use terms in an informed way to develop common ground on which new research can build (Gregor, 2006).

This paper proceeds as follows. In Section 2, we present the triangle of reference and how we used it to analyze papers on workarounds. In Section 3, we describe how we designed our literature review, which includes the criteria we used to select journals and papers. In Section 4, we summarize the existing theoretical insights regarding workarounds. In Section 5, we analyze the relationship between the term workaround, theoretical knowledge regarding workarounds, and their empirical base to assess this knowledge’s validity. In Section 6, we investigate how the papers we identified define the term workaround. In Section 7, we conceptualize workarounds based on empirical accounts of workaround behavior. In Section 8, we discuss our findings and propose a definition for the term workaround. Finally, in Section 9, we discuss our study’s implications and how our study can inform future research and theorizing.

2 The Triangle of Reference

Inspired by Feldman and Orlikowski (2011), we acknowledge that empirical phenomena and the way in which individuals form and use concepts and terms mutually constitute each other, which suggests that how we perceive empirically observable workaround behavior forms what we call a workaround. At the same time, empirically observable behavior that conforms to how we perceive a workaround shapes how we use the term, which suggests that we can best understand the workaround phenomenon as a triad. Thus, for our study, we adopted a semiotic approach using Ogden and Richard’s (1923) triangle of reference (also known as the “triangle of meaning” and the “semiotic triangle”). The oft-cited triangle of reference describes the relationship between a symbol (e.g., a word), a thought or reference (the meaning of the symbol), and a referent (the actual thing or phenomenon). IS research has widely adopted the triangle of reference (in slight variations) to study specific topics, such as language practice in information systems development (Ferreira, Crossler, & Haggard, 2007; Charaf, Rosenkranz, & Holten, 2010) and

data-interchange standards (Mead, 2006), and to establish a solid theoretical foundation for the field as a whole (Falkenberg et al., 1998; Mingers & Willcocks, 2014).

Figure 1 (left) shows the original model with symbol, referent, and thought or reference in the triangle's corners (Ogden & Richards, 1923, p. 11). A causal relationship exists between symbols and thoughts or references: if someone says cat (symbol), it will cause most people to picture a domestic, agile, and furry mammal (thought or reference). Looking at an actual cat (referent) or thinking about a particular cat (another referent) establishes a relationship between a thought or reference and referent. The dotted line at the triangle's base indicates that the relationship between symbol and referent differs from the other two relationships. The word cat (symbol) and a particular cat (referent) share no direct connection to each other beyond the fact that someone uses the word (reference) to stand for the specific animal (referent).

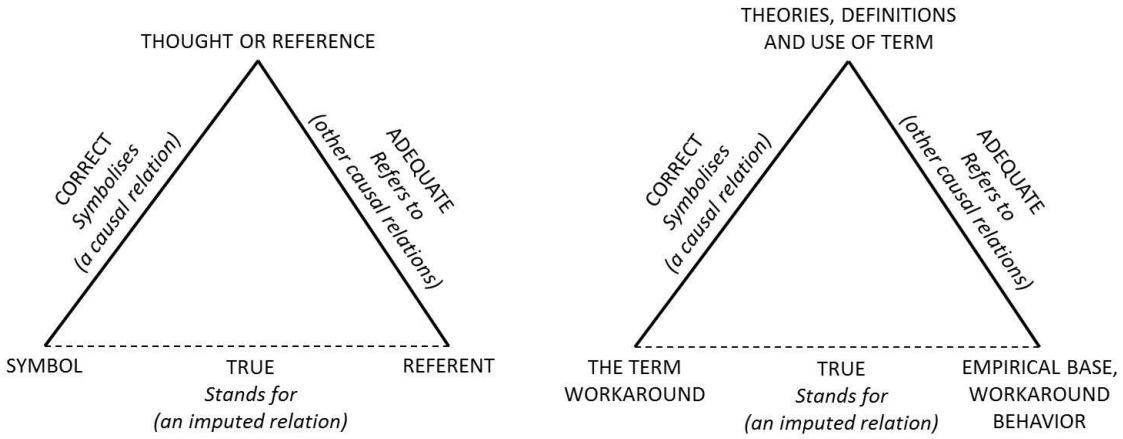

Figure 1. Ogden and Richards' (1923, p. 11) Original Triangle of Reference (Left); Our Modified Version (Right)

Figure 1 (right) shows the model with the terms we use in this paper. In our review, we use the triangle of reference to analyze the relationship between 1) the term workaround (symbol), 2) what theories the relevant research has used for the term and how the term has been defined and used (thought or reference), and 3) the empirical base of the relevant research and the described empirical workaround behavior (referent). We do so in two steps. First, we start from the term workaround (symbol) and then investigate theoretical knowledge regarding workarounds (thought or reference). We then relate these theoretical insights to their empirical base (referent) to assess their validity. Second, we again start from the term workaround (symbol) and then investigate how research has defined and used the term workaround (thought or reference) based on empirical accounts of workaround behavior (referent) that the research describes to elucidate if different studies on workarounds investigate the same empirical phenomena.

Although one needs to understand the three aspects in the triangle of reference as a whole, one must start inquiring somewhere, and we decided to start with the term workaround and survey how research had conceptualized and studied it. Since we focused on clarifying the terms that research in the field has used, starting with the term made sense. We thus approach this question from a linguistic perspective: what people talk about when they talk about workarounds. With this approach, one might argue that we could have potentially missed important research that investigated the workaround concept but used other terms to describe the phenomenon. However, since the three aspects in the triangle of reference mutually constitute each other, a behavior by another name would have actually fallen outside our scope here (i.e., it would not have influenced the research practice of understanding workarounds as we define it). While such research could uncover important insights, we defer such exploration to future efforts.

3 Research Approach

Since we focus on analyzing research in the IS field that uses the term workaround, we performed a concept-centric literature review (Webster & Watson, 2002) based on the AIS Senior Scholars' basket of eight journals and official AIS conferences. In the review, we focused on understanding theoretical insights (Rowe, 2014) and their validity by using the triangle of reference as an analytical framework. We conducted a search with the following terms: workaround, workarounds, work-around, and work-arounds.

We performed the initial full-text search in November, 2017, across the AIS Senior Scholars' basket of eight, which one can arguably see to represent the core of the IS field. The search resulted in 280 papers. Of those papers, we included 47 since they defined (thought or reference) or presented at least one empirical example of a workaround (referent). The excluded papers used the term in passing or in general without providing an empirical example, used the term only in their references, or used the term in expressions such as "working around the clock". We categorized ten of the 47 papers as central since they included the term either in their title, abstract, or keywords. In a second search, we scanned all literature cited in the ten central papers with the same search terms and identified another 18 papers with titles, abstracts, or keywords that contained the term. Since research regarding workarounds seems to be an emerging area in the IS field, which one can see in the fact that six of ten central papers from basket of eight appeared in 2016 or later, we decided to also include papers in proceedings from the official AIS conferences that appeared in 2016 and 2017. Although papers in conference proceedings do not undergo as rigorous a review process as journal papers do, their timely publication makes them a good source of knowledge in emerging research areas such as workarounds (Whitley & Galliers, 2007). Therefore, we performed a full-text search on the proceedings of the four official AIS conferences, which resulted in 95 papers. Of those 95 papers, we included 19 since they defined or presented at least one empirical example of a workaround. The three searches resulted in 84 papers in total: 60 journal papers, and 24 conference papers. We chose these 84 papers since they represent the basis and core of the workaround literature in the IS field. We summarize our review methodology in Figure 2.

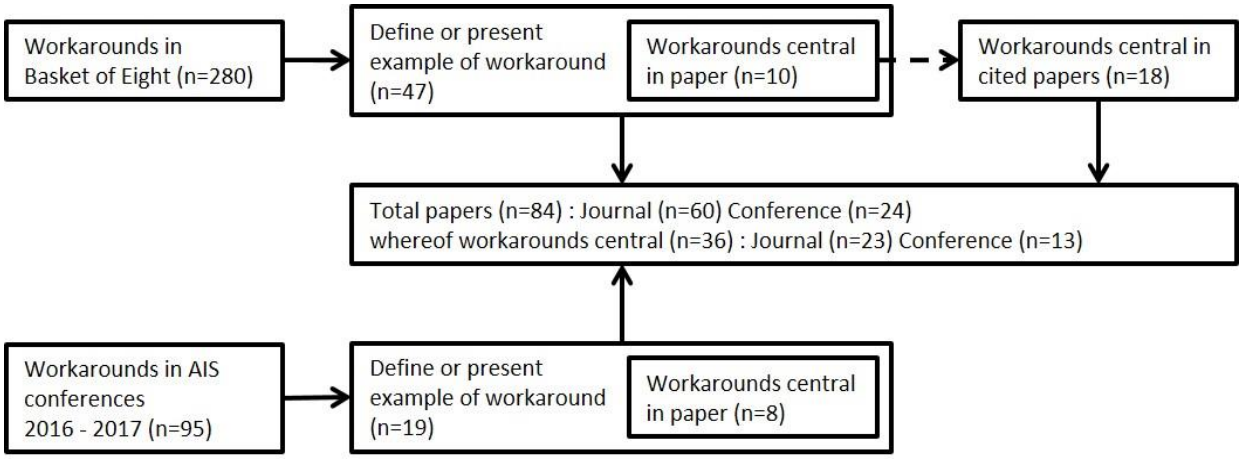

Figure 2. Review Methodology

We read each paper with the triangle of reference as an analytic framework and coded each paper based on theoretical insights, definitions, empirical base, and described empirical workaround behaviors. We then analyzed each of these parts with an inductive approach (Thomas, 2006) using open coding (Glaser & Strauss, 1967; Wolfswinkel, Furtmueller-Ettinger, & Wilderom, 2013) by observing patterns. During the analysis, we also derived a generative conceptualization of workarounds (thought or reference) from described empirical workaround behavior (referent). We performed the analysis iteratively until we reached theoretical saturation (i.e., until further iterations did not change the structure).

4 Theorizing Workarounds

Studies most commonly theoretically explained workarounds as resulting from a misfit between systems and work practices. We found that the theory of organization-enterprise system fit (Strong & Volkoff, 2010) constituted the most formalized theory in the research we studied. This theory identifies six misfit domains (functionality, data, usability, role, control, and organizational culture) and, in each domain, two types of misfit: deficiencies (problems that arise from features that systems lack but that users need) and impositions (problems that arise from the system's characteristics). Strong and Volkoff (2010), Beijsterveld and Groenendaal (2016), and van den Hooff and Hafkamp (2017) linked workarounds to functionality misfits (both deficiencies and impositions). We also found earlier theories about organization-enterprise system misalignment (Soh & Sia, 2004) and several other studies, such as Spierings, Kerr, and Houghton (2017) and Gasser (1986), that described workarounds as resulting from a misfit between systems and work practices without referring to the theory of organization-enterprise system fit or similar theories. While

most of these studies described workarounds that individuals or groups of individuals devise, Beijsterveld and Groenendaal (2016) described workarounds as a solution for companies when they cannot affordably or practically change.

Studies also commonly explained workarounds as resulting from conflict between top-down pressure and bottom-up constraints from day-to-day operational work. Top-down pressure can include company rules and policies (Choudrie & Zamani, 2016), enterprise systems requirements from headquarters (Malaurent & Avison, 2016), or external pressure from regulations or accrediting (Azad & King, 2012; Huuskonen & Vakkari, 2013). Bottom-up constraints can include material constraints, work ethos, and staff's lack of interest in IS (Azad & King, 2012; Choudrie & Zamani, 2016). Studies that explained workarounds as resulting from top-down pressure and bottom-up constraints used different approaches, such as institutional theory (Azad & King, 2012; Choudrie & Zamani, 2016), negotiated order (Azad & King, 2008), process theory (Huuskonen & Vakkari, 2013), and activity theory (Malaurent & Avison, 2016). However, Malaurent and Avison (2016) not only explained what causes workarounds but also used business process management (Becker, Rosemann, & von Uthmann, 2000) to design solutions that reconcile top-down pressure with bottom-up constraints.

Alter (2014) focused more on the actor in his theory of workarounds, which combines ideas from the theory of planned behavior (Ajzen, 1991), concepts related to improvisation and bricolage (Levi-Strauss, 1966; Weick, 1993), agency theory (Eisenhardt, 1989), and work system theory (Alter, 2013). In Alter's theory—a process theory that includes several steps with related factors—rational actors create workarounds by identifying obstacles and deciding what to do about them. Thus, the theory explains workarounds as resulting from individual factors such as intentions, structural factors such as policies, the perceived need for a workaround, and the ability to design a workaround. Several papers, such as Arduin and Vieru (2017) and Li, Haake, and Mueller (2017) cited Alter's (2014) definition for workarounds, but none used the theory.

Laumer, Maier, and Weitzel (2017) extended the IS success model (DeLone & McLean, 1992, 2003) with workarounds as a construct and concluded that user satisfaction negatively relates to workarounds and that both system quality and information quality play an important role in determining user satisfaction. Laumer et al. (2017) also concluded that workarounds negatively relate to net benefit.

Parks et al. (2017) developed the unintended consequences of privacy safeguard enactment (UCPSE) framework to explain how individuals evaluate the consequences that may arise from enacting privacy safeguards. If they perceive the negative unintended consequences to outweigh the positive intended consequences, they will use a workaround to bypass these privacy safeguards. If, for example, policy regarding login causes workflow disruptions that individuals perceive as hindering how they treat patients, staff will work around that policy. Their framework focuses on the consequences that individuals perceive will occur before enacting a workaround; thus, their perceived consequences do not need to match real ones.

Li et al. (2017) argued that workarounds constitute educated adaptations that capable individuals make and that help them effectively use a system. Safadi and Faraj (2010) conceptualized workarounds as a knowledge-creation and -integration process and showed how workarounds can have positive consequences when used as feedback for improving systems during their implementation. Ignatiadis and Nandhakumar (2009) showed that, while employees may use workarounds that involve an enterprise system to create viable organizational processes, they often decrease organizational control. While several other studies also concluded that workarounds may have negative consequences—even medical errors (Halbesleben et al., 2008; Koppel, Wetterneck, Telles, & Karsh, 2008)—they seldom focused on or theorized about such consequences. Since several studies contributed workarounds to bad technology or dysfunctional routines, these workarounds may have prevented even more medical errors than they caused.

Workarounds also theoretically relate to resistance. For example, Ferneley and Sobreperez (2006) viewed workarounds as separate, distinct, and subsequent phenomena that result from resistance and, thereby, connected all workarounds to resistance. This resistance can be either positive or negative, and the subsequent workarounds can have both positive and negative consequences. Avoiding inappropriate procedures exemplifies positive resistance that can lead to workarounds that individuals require to effectively complete work, while deception exemplifies negative resistance that can lead to workarounds such as sabotage or indolence. Alvarez (2008) also connected workarounds to resistance and showed how an enterprise system caused individuals to lose control and power and, thereby, directly challenged

their existing professional identities and roles. As a result, individuals resisted the enterprise system by devising creative workarounds that produced a sense of reskilling to counter the deskilling that the new system produced. Choudrie and Zamani (2016) further connected workarounds to resistance and concluded that the workarounds they found illustrate positive resistance since individuals had organizational reasons for resisting. Patel, Poston, and Dhaliwal (2017) and Reiz and Gewald (2017) also connected workarounds to resistance, but they did not theorize further on the relationship between resistance and workarounds. Azad and King (2012) did not focus on the connection between workarounds and resistance. They stated that workarounds do not necessarily involve resisting rules or not complying with system use but to making rules and systems workable based on material constraints and work ethos. However, most papers that theorized about workarounds did not even mention resistance or only mentioned it without connecting it to workarounds.

We summarize the theoretical insights about workarounds' causes and consequences in Figure 3. We found at least some consensus about workarounds in a theoretical sense. Particularly, conflicting top-down pressure and bottom-up constraints have a lot in common with the theory of organization-enterprise system fit since enterprise systems requirements can represent top-down pressure (Choudrie & Zamani, 2016; Malaurent & Avison, 2016). However, we found fewer studies that investigated the theoretical connections between workarounds and their consequences and how workarounds relate to resistance.

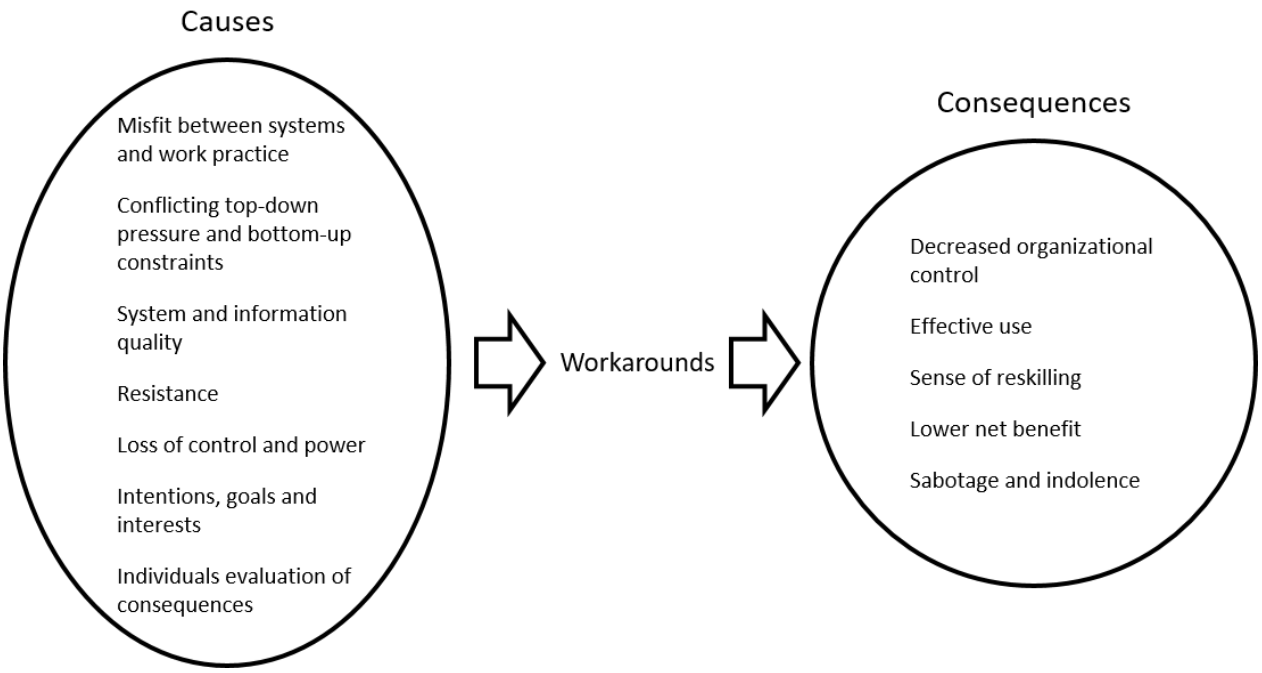

Figure 3. Theoretical Insights about Workarounds' Causes and Consequences

5 Empirical Base

To investigate the validity of the theoretical insights that we outline in Section 4, we matched the insights to the number of studies in which they appeared, the methods the studies used, and their publication outlets. We found that the studies used several data-collection methods in a variety of empirical settings (referent) that involved the term workaround (symbol). Studies most commonly used interviews to collect data (n = 30) followed by observations (n = 22) and documents (n = 9). Most studies that theorized about workarounds were exploratory in nature. Almost all papers that theorized about workarounds, excluding reviews, used both interviews and observations and several also included documents. Using several data-collection methods allows researchers to triangulate results, which can help them when investigating a phenomenon such as workarounds where discrepancies between what informants say they do and what they actually do can arise.

Alter (2014) developed his theory of workarounds by reviewing the literature and since no other studies used the theory to examine workarounds, we found no empirical accounts based on it. Parks et al. (2017)

developed the unintended consequences of privacy safeguard enactment (UCPSE) framework only with interviews. While they only used one data-collection method (i.e., interviews), they examined many different organizations (n = 21) through their informants. Almost all studies that theoretically explained workarounds used process theories. As an exception, Laumer et al. (2017) not only developed but also tested their model using surveys and statistics. They built their model on DeLone and McLean's (2003) IS success model with an added construct for measuring workarounds, which they developed when conducting interviews. We also found other studies that used quantitative methods, but they did not theorize about workarounds—they only used the term.

Table 1. Theoretical Insights Related to their Empirical Base

Theoretical insights	Number of studies	Data-collection methods	Publication outlet
Workarounds result from conflicting top-down pressure and bottom-up constraints (Azad & King, 2008, 2012; Huuskonen & Vakkari, 2013; Choudrie & Zamani, 2016; Malaurent & Avison, 2016)	5	Interviews Observations Documents	Journal
Workarounds result from organization-system misfit (Gasser, 1986; Soh & Sia, 2004; Safadi & Faraj, 2010; Strong & Volkoff, 2010; Beijsterveld & Groenendaal, 2016; van den Hooff & Hafkamp, 2017; Li et al., 2017; Spierings et al., 2017)	8	Interviews Observations Documents	Journal Conference
Theory of workarounds (Alter, 2014)	1	None	Journal
How to design solutions that reconcile top-down pressure with bottom-up constraints (Malaurent & Avison, 2016)	1	Interviews Observations Documents	Journal
Workarounds may be institutionalized (Soh & Sia, 2004; Azad & King, 2012; Choudrie & Zamani, 2016)	3	Interviews Observations Documents	Journal
Workarounds have negative consequences (Ferneley & Sobreperez, 2006; Ignatiadis & Nandhakumar, 2009; Laumer et al., 2017)	3	Interviews Observations Documents Surveys	Journal
Workarounds have positive consequences (Ferneley & Sobreperez, 2006; Safadi & Faraj, 2010; Li et al., 2017)	3	Interviews Observations Documents	Journal Conference
Unintended consequences of privacy safeguard enactment (UCPSE) framework (Parks et al., 2017)	1	Interviews	Journal
Workarounds connect to resistance (Ferneley & Sobreperez, 2006; Alvarez, 2008; Choudrie & Zamani, 2016; Patel et al., 2017; Reiz & Gewald, 2017)	5	Interviews Observations Documents	Journal Conference
Workarounds do not connect to resistance (Azad & King, 2012)	1	Interviews Observations Documents	Journal

We found that studies examined various empirical contexts that differed according to company size (small to multinational companies) and industry type (private companies and public companies, such as hospitals and government agencies). However, we found large differences in the number of studies connected to different theoretical insights (see Table 1); thus, some insights necessarily emerged from fewer contexts since fewer total studies identified them. We found that only three theoretical insights about workarounds attracted relatively considerable research attention in relation to the number of studies: 1) workarounds as resulting from organizational-system misfit, 2) workarounds as resulting from conflict between top-down pressures and bottom-up constraints, and 3) workarounds as connected to resistance.

Of the 84 papers in the review, 24 appeared in a conference's proceedings. However, conference proceedings contained a higher share of papers that focused on workarounds as their key topic (13 out of 36). Because papers in conference proceedings do not undergo as rigorous a review process as journal papers and have a much shorter length, they often do not thoroughly describe their data collection, analysis, and results. With that said, we found no significant differences between theoretical insights when it comes to publication outlets.

6 Definitions of Workarounds in the Literature

Since defining a term constitutes a common way to describe how one uses and conceptualizes it (thought or reference), we investigate how the papers we identified defined the term workaround. Most papers that focused on workarounds as their key topic (29/36) and three other papers defined the term. We found a wide variety of definitions, although several definitions resembled one another. Table 2 and Figure 4 lists and visualizes the definitions, respectively. Note that we do not reproduce the definitions exactly but group them according to their essence.

Table 2. Definitions of the Term "Workaround"

#	Definition	Used by
1	Deviations from set procedures.	Petrides, McClelland, & Nodine (2004), Azad & King (2008, 2012), Koppel et al. (2008), Safadi & Faraj (2010), Choudrie & Zamani (2016), Fries, Wiesche, & Krcmar (2016), Zimmermann, Rentrop, & Felden (2016)
2	Action ensuing from resistance.	Ferneley & Sobreperez (2006)
3	Intentionally using computing in ways for which it was not designed or avoiding its use and relying on an alternative means of accomplishing work.	Gasser (1986), Pollock (2005), Bjørn, Burgoyne, Crompton, MacDonald, Pickering & Munro (2009), Gasparas & Monteiro (2009), Goh, Gao, & Agarwal (2011), Beijsterveld & Groenendaal (2016)
4	Alternative path to goal when path is blocked.	Koopman & Hoffman (2003), Kobayashi, Fussell, Xiao, & Seagull (2005), Halbesleben et al. (2008), Vogelsmeier, Halbesleben, & Scott-Cawiezell (2008), Halbesleben, Savage, Wakefield, & Wakefield (2010), Huuskonen & Vakkari (2013), Murphy et al. (2014), Tarkkanen & Harkke (2016), Laumer et al. (2017), Parks et al. (2017), Reiz & Gewald (2017)
5	A goal-driven adaptation, improvisation, or other change to one or more aspects of an existing work system in order to overcome, bypass, or minimize the impact of obstacles, exceptions, anomalies, mishaps, established practices, management expectations, or structural constraints that are perceived as preventing that work system or its participants from achieving a desired level of efficiency, effectiveness, or other organizational or personal goals.	Alter (2014), Arduin & Vieru (2017), van den Hooff & Hafkamp (2017), Kopper & Westner (2017), Li et al. (2017), Patel et al. (2017)
	No definition in papers that focused on workarounds as their key topic.	Hayes (2000), Patterson et al. (2006), Alvarez (2008), Ignatiadis & Nandhakumar (2009), Davison & Ou (2013), Malaurent & Avison (2016), Spierings et al. (2017)

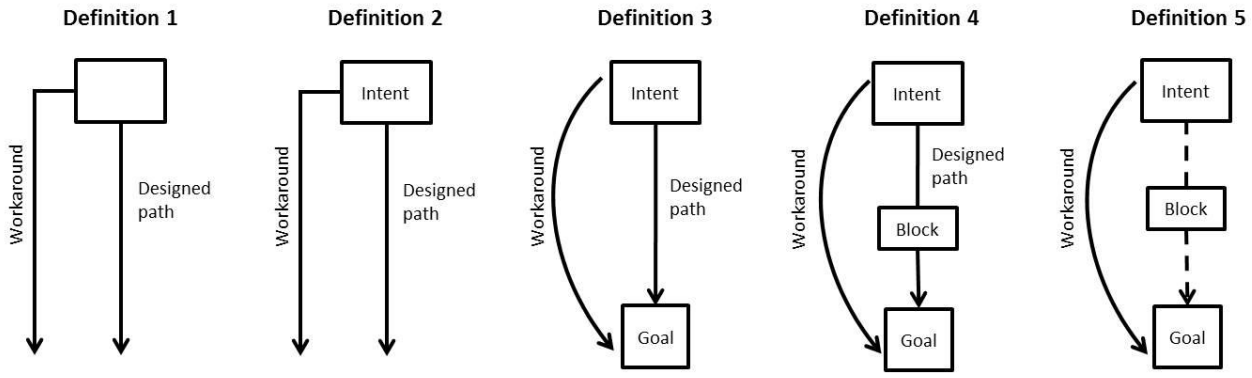

Figure 4. Visual Representation of Definition of the Term "Workaround" Found in the Literature

The definitions differ in many ways. For example, the third and fifth definitions state the workaround action in more detail using terms such as system or computing, whereas the other definitions use more general

concepts such as alternative path or procedures. Since IS research examines the intersection of (digital) technology and humans, it might only be natural to define the term workaround as being about system use if one has such a focus. Since the notion of workarounds grew out of the IT field (Gasser, 1986), it comes as no surprise that researchers have widely used it to describe technology even if the term has a wider application.

However, most importantly, the different definitions can impact how we conceptualize workarounds. Therefore, we visualize each definition in Table 2 in Figure 4 to clearly illustrate their differences. All definitions contain a notion of the workaround action, but the first definition lacks intentionality and, therefore, could also include unintentional acts such as mistakes. All definitions mention a designed path (i.e., the way it should be done) to some degree using terms such as set procedures, designed, or existing work system and that the workaround act differs from the designed path. Some definitions explicitly note this view, while others do so implicitly.

Because the first and second definitions do not contain any information about whether a workaround needs to have a goal, they are much broader since they can include all deviant actions, such as fraud or sabotage. Both the third and fourth definitions define a workaround as an alternative action with the same goal. One could also read the fifth definition as defining a workaround as an alternative action with the same goal, but one could also read it as defining a workaround as an act to overcome a block. Both the fourth and fifth definitions include a reference to a block that one works around, whereas the third definition could simply understand a workaround as a way that users perceive as a superior option. Table 3 shows how the different theoretical insights relate to how the studies defined workarounds, which provides a diverse picture about how the insights relate to two or more definitions that conceptualize workarounds in different ways.

Table 3. Theoretical Insights Related to Definitions of the Term "Workaround"

Theoretical insights	Definitions
Workarounds result from conflicting top-down pressure and bottom-up constraints	1, 4
Workarounds result from organization-system misfit	3, 5
Theory of workarounds	5
How to design solutions that reconcile top-down pressure with bottom-up constraints	N/A
Workarounds may be institutionalized	1
Workarounds have negative consequences	2, 4
Workarounds have positive consequences	1, 2, 5
Unintended consequences of privacy safeguard enactment (UCPSE) framework	4
Workarounds connect to resistance	1, 2, 4, 5

7 Conceptualization Based on Empirical Accounts of Workaround Behavior

As we show in Section 6, the papers we examined used several definitions for the term workaround. This semantic problem would have insignificant practical implications if papers consistently used the term to describe the same empirical behavior, which would indicate that the definitions do not impact our thought or reference. Figure 5 contains a model that we inductively derived from empirical accounts of workaround behavior that the papers we reviewed described. Researchers can see the model as a generative conceptualization that they can use to create or refine a definition for workarounds.

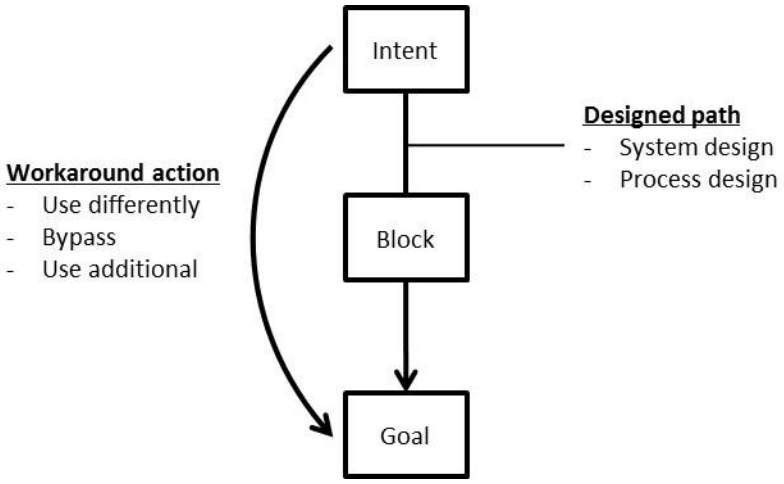

Figure 5. Common use of the Term "Workarounds" in the Reviewed Papers

The designed path comprises process design and system design. We use the word designed rather than (for instance) intended since processes and systems might have flaws that their designers did not intend but designed nonetheless. Management usually decides this designed path when it comes to policy and governments if it involves laws and regulations. Individual users cannot decide this path since, if they could design their own paths in all situations, they would not need workarounds. Process design comprises laws, regulations, rules, and policy that show how one should conduct work. Examples include privacy policies that regulate how users should log in to a system (Parks et al., 2017), guidelines for how users should handle enterprise social networks (Choudrie & Zamani, 2016), and work processes for administering medication (Halbesleben et al., 2010). System design refers to the rules built into an IS (i.e., how one can do work using the particular IS). Most of the reviewed papers studied workarounds in relation to enterprise resource planning systems (Beijsterveld & Groenendaal, 2016; Malaurent & Avison, 2016) or health information systems (Azad & King 2008; van den Hooff & Hafkamp, 2017), but other examples exist such as tax administration systems (Azad & King, 2012), service industry systems, fire service systems (Ferneley & Sobreperez, 2006), and social worker systems (Huuskonen & Vakkari, 2013). In most organizational settings, one can clearly recognize the designed path from the non-designed path, but, in some settings, one may find it more difficult to do so. Pollock (2005) investigated this grey zone in studying a group at a university who had to customize a pre-built computer system. In some situations, they adopted a user role towards the software company and, in another, the producer role towards the university. While we acknowledge that situations where one cannot easily determine a designed and worked-around path from redesigned and not-worked-around path, such situations did not emerge as a problem in this review.

A block refers to something that hinders a user from completing work in a satisfying way while following the designed path. The designed path may have a block for several reasons. For instance, blocks can arise due to flaws in the IS such as lack of features (Novak, Brooks, Gadd, Anders, & Lorenzi, 2012; Huuskonen & Vakkari, 2013) or a system design that does not support work practice (Azad & King, 2008; Laumer et al., 2017). However, in most cases, blocks occur in conjunction with a lack of resources (Ferneley & Sobreperez 2006; Parks et al., 2017). Interestingly, both intended and unintended blocks exist. Processes and systems for medical administration are often more time consuming, which can cause a block, but they are still used and intended since they can reduce medical administration errors. On the other hand, when an ERP system does not support work practices, it is usually unintended. Koppel et al. (2008) investigated barcode medication administration systems that were implemented to reduce medical administration errors. Users, however, often perceived them as a block due to bad technology (similar beeps for most functions, bad connection to WIFI, bad interface design, etc.), which became a block especially in relation to lack of time/staffing. Furthermore, the lack of time/staffing also affected processes not connected to the barcode system, such as the need to confirm high-risk medication with a second nurse. In addition, Ignatiadis and Nandhakumar (2009) found several blocks when investigating an enterprise resource planning system, for example, logging in and out. Policy regulated that users should log out after using a terminal but logging in and out of the systems was time consuming, which, together with a lack of time in general, made it a block.

The workaround action refers to an alternative path that has the same goal as the designed path and arises when the designed path is blocked. Importantly, the workaround action requires intent since no papers included unintended actions such as mistakes as workarounds. Workarounds could, of course, lead to an increase or decrease in mistakes, but a mistake per se differs from a workaround since mistakes lack intentionality. The reviewed papers also stressed that the designed path and the workaround need to have the same intended goal. As such, the workaround will provide a solution without lifting the block in the designed path. The reviewed papers described workarounds that one can categorize into three main themes: use differently, bypass, and use additional. The use differently category refers to not using the IS according to system design and process design. Almost all papers described at least one workaround from this category. Examples include sharing passwords (Parks et al., 2017), using text fields rather than numeric fields when reporting time (Ignatiadis & Nandhakumar, 2009), or documenting and administering medication before a patient ingests it (Vogelsmeier et al., 2008). The bypass category refers to not using the intended IS. Many papers also described a workaround from this category. Examples include physicians not reviewing the electronic system to verify medication (Koppel et al., 2008), replacing a technical safeguard (automatic timeout) with a human safeguard (physical proximity) (Murphy et al., 2014), or using paper rather than electronic health records (Safadi & Faraj, 2010). Finally, the use additional category refers to using the intended IS according to system design and process design while also using an additional system. A smaller number of papers described a workaround from this category compared to the first and second categories. Examples include conducting informal face-to-face meetings to avoid misunderstandings in the intended IS (Hayes (2002) or using Excel documents with links that duplicate the official documentation (Gasparas & Monteiro, 2009). This category resembles the bypass category; however, the workarounds from the latter do not result in missing information in the intended system, whereas bypass workarounds do.

Figure 5 illustrates common ground for how the research we examined has empirically described workaround behavior. This common ground resembles the fourth definition the most. The workaround may provide an acceptable solution (or, in some cases, a better solution), but it does not solve the underlying problem. If a bad process causes a block, one can often change that process more easily than a bad system design (although customization remains an option). Therefore, if managers recognize a bad process, they can change it, which would remove the block and, consequently, the need for a workaround. However, flaws regarding system design might be too costly to address and, if an acceptable workaround exists, management might instead prefer that over customization and might even endorse it. The reviewed papers did not provide any examples in which users worked around a process design with management's consent (perhaps since they instead changed the process), but we did find examples in which management gave consent to working around system design. Even if managers knew about and approved a system design workaround, it still represents a workaround since it did not fix the underlying problem (i.e., the perceived flaws in system design). Researchers often refer to these approved workarounds as formal workarounds (Davison & Ou, 2013; Malaurent & Avison, 2016).

However, some papers empirically described workaround behavior (referent) in ways that did not resonate with how research commonly used the term (symbol) as Figure 5 shows. They diverged in that the examples they provided all concerned actions with no designed path with the same goal as the workaround. Most of these papers also provided several examples that fit the term's common use.

Parks et al. (2017) studied privacy safeguards in healthcare settings and categorized workarounds that they encountered as legitimate, less legitimate, or illegitimate. They provided the following example of an illegitimate workaround:

> *An illegitimate example of workarounds was provided by the same chief privacy officer when he referred to the case of an Arizona congresswoman who was admitted to a hospital after being shot and how several employees lost their jobs for inappropriately looking up her medical records.* (Parks et al., 2017, p. 50)

In their study, Parks et al. (2017) found that hospital employees would bypass privacy safeguards when they perceived it necessary to do their job. This qualifies as workarounds according to the term's common use (see Figure 5). The quotation above, however, illustrates how employees looked up a congresswoman's medical records for no medical reason, which does not constitute a workaround since no designed path with the same goal existed. If someone wanted to look up someone's medical records inappropriately, then bypassing the privacy safeguards represents the designed path and not a workaround. Ferneley and Sobreperez (2006), who categorized workarounds as harmless, a hindrance, or essential, provided a similar example of a hindrance workaround:

> *Deliberate sabotage of both hardware and software was reported to researchers: 'I've brought viruses in from my kid's machine, it takes 2-3 days for the IT guys to come out and remove viruses from the Station's PC'.* (Ferneley & Sobreperez, 2006, p. 8)

Ferneley and Sobreperez (2006) also provided similar examples, such as "Computer mouse balls have been removed and keyboard keys pulled off" (p. 8), which they also categorized as a hindrance workaround. However, their categorizing sabotage as a workaround logically results from their defining workarounds as "[t]he action ensuing from resistance" (Ferneley & Sobreperez, 2006, p. 3), which includes all positive and negative divergences. However, these sabotage examples do not qualify as a workaround according to the term's common use (see Figure 5) for the same reason as the example in Parks et al. (2017): no designed path for the same goal existed. Alter (2014) also provided similar examples for workarounds: "coding of illnesses by doctors who would be paid based on those codes" (p. 1051) or "adding staffing during the week when audits occur" (p. 1051). While Alter (2014) did not elaborate on these empirical examples in any detail, it seems they also diverge from the term's common use (see Figure 5) since they involve situations with no designed paths with the same goal. However, all actions that Alter (2014), Ferneley and Sobreperez (2006), and Parks et al. (2017) provided fit in the definition that Alter (2014) provided.

The above examples apply the term to actions that cause a form of inclusion error in relation to the term's common use (see Figure 5) and, thus, do not constitute workarounds. However, we also found one example of an exclusion error in relation to the term's common use. Beijsterveld and Groenendaal (2016) studied system misfits in ERP implementations that featured four common solution strategies: customizing system, creating workaround, accepting misfit, and changing organization. Their empirical work also revealed another strategy: "In one instance, other software was implemented to resolve the misfit, a solution strategy not mentioned yet" (p. 384). However, according to the term's common use, bypassing a system's parts using other software constitutes a workaround.

8 Discussion

Research on workarounds represents an emerging research area in which researchers have developed interesting theories. However, most evidently, we found the need for more research on current theoretical insights, and several theories likely await researchers to create them or apply them to workarounds. We found that only three theoretical insights about workarounds attracted relatively considerable research attention in relation to the number of studies: 1) workarounds as resulting from organizational-system misfit, 2) workarounds as resulting from conflict between top-down pressures and bottom-up constraints, and 3) workarounds as connected to resistance. All other theoretical insights require more research, and the IS field seems ideal to conduct this research. Researchers should follow up on Malaurent and Avison's (2016) action research initiative by conducting design science research to provide more examples about how organizations can remove the need for workarounds, which would also allow researchers to theorize about which kind of workarounds organizations can remove more easily than others. Understanding workarounds' consequences constitutes another area that needs more research. The fact that current research provides conflicting results about workarounds' consequences has probably arisen due to the fact that workarounds are complex phenomena that can have both positive and negative effects. We need more research that measures and theorizes workarounds' consequences and especially research that captures and theorizes both the positive and negative effects that the same workaround has. Resistance represents an important area in IS research, and, while researchers have made efforts to theorize the relationship between workarounds and resistance, we need more research to examine it as well. Although five studies we reviewed theoretically connected workarounds with resistance, Azad and King (2012) provided conflicted results. We need more research here that engages with previous research in both workarounds and resistance to drive our theoretical knowledge about the connection between resistance and workarounds.

Since research on workarounds represents an emergent research area, we need further research that uses several data-collection methods to allow for more empirical accounts and theories. But we also need more quantitative research to measure and further theorize workarounds' causes and consequences and workaround behaviors. Of all the studies in the review, only Laumer et al. (2017) used quantitative methods. Since workaround behaviors can take different forms in different settings, we need to understand the context and phenomena before using quantitative data-collection methods, which makes studying workarounds ideal for multi-method research that combines qualitative and quantitative methods (Venkatesh, Brown, & Bala, 2013; Ågerfalk, 2013). Laumer et al. (2017) exemplifies such research. Both

surveys and system data could provide data that could strengthen or contradict existing findings and provide new theories that researchers can further explore using qualitative methods.

As we show in reviewing the workaround literature, the IS field does not agree on a definition for the term. We found several definitions that did not contain the notion that something is worked around unlike in the term's common use. Our review shows that research understood workarounds in a common way and further that, even if some diverged from such an understanding in their definitions, they shared it in how they used the term.

Arguably, the lack of an explicit definition for workarounds increases the risk that researchers unintentionally include or exclude actions, which reduces individual studies' precision and hinders cumulative theoretical development. However, in keeping with Wittgenstein (1953), we acknowledge that people will use the same words in a different way in different contexts. Hence, researchers likely cannot develop a universally accepted definition for workarounds or any other concept. Lexical meaning, or literal sentence meaning, plays only a part in practical language use since an individual will always have to interpret it in a particular context (which includes other words and sentences and communicators' intentions and pre-understanding). In other words, the same symbol can never invoke precisely the same thought or reference even if it stands for the same referent. Nevertheless, a commonly agreed-on definition can serve as a useful reference point to position studies and facilitate understanding. A common definition could also serve as an informed starting point for theorizing about workarounds (e.g., to develop a taxonomy of what workarounds are and how they differ from other similar constructs) (Gregor, 2006; Nickerson, Varshney, & Muntermann, 2013). Certainly, by "common", we do not suggest that researchers will universally (or that they even could) agree on a definition. It can, however, be something with which one can deliberately and argumentatively choose to disagree. Such a definition can establish the workaround concept so that it can serve as a boundary object that takes on different, well-informed meaning in different research settings (Bowker & Star, 1999). Although studies defined the term differently, the more recent papers appeared more coherent. One can see this development in the nine papers that appeared in 2017 in that five used Alter's (2014) definition. However, this extensive definition expands on the different workaround actions and blocks where a strong common understanding already seems to exist and also considers actions as workarounds, whereas the term's common use does not. Perhaps it would be better to use a parsimonious definition that matches the common use and focuses on the parts with most divergent examples. Based on previous definitions and our model, which we inductively derived from empirical accounts of workaround behavior in the papers we reviewed, we propose defining workarounds in the following way: "When the designed path is blocked, a workaround provides an alternative path to the same goal without completely removing the block".

9 Conclusion

We used a concept-centric literature review (Webster & Watson, 2002) to analyze the theoretic insights regarding workarounds in IS research. We used Ogden and Richard's (1923) triangle of reference to illustrate the relationship between the term workaround (symbol); theories, definitions, and use of the term workaround (thought or reference), and their empirical basis and empirical workaround behavior (referent) that the papers described. We found some consensus on how researchers have theoretically explained workarounds (i.e., as either resulting from conflicting top-down pressure and bottom-up constraints or as a misfit between systems and work practices). The two explanations have a lot in common since enterprise systems requirements can represent top-down pressure. However, we found larger differences and fewer accounts of the theoretical connections between workarounds and their consequences and whether workarounds connect to resistance. But we also found that studies have defined and used the term workaround differently to the extent that they have not always applied the term to the same empirical phenomena, which questions some theoretical insights' validity. In our work, we developed and used a model that we inductively derived from empirical accounts of workaround behavior that captures how the current literature has commonly used the concept and propose a definition for workarounds based on that model.

Our workaround conceptualization makes it possible to distinguish workarounds from other similar phenomena. Since we start our inquiry with the term workaround to survey how research conceptualized and studied it, we excluded research that investigated workarounds without explicitly using the term. However, researchers could use our conceptualization and definition to identify those empirical phenomena that one could also consider workarounds. Researchers can use this terminological and conceptual clarification to not only strengthen research focused on workarounds but also identify and

connect to other research streams that currently investigate workarounds by other names. The block concept also needs further research regarding their cause and how one can solve them. While users perceive a block as hindering them, blocks that one may solve via some kind of learning compared differ greatly from blocks that one needs to redesign or where one needs to redesign the designed path.

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Appendix A. Papers Included in the Review

Table A1. Papers Included in the Review

Paper	Definition provided	Empirical example provided
Basket of Eight (workarounds central)		
Alvarez (2008)		X
Azad & King (2012)	X	X
Azad & King (2008)	X	X
Beijsterveld & Groenendaal (2016)	X	
Choudrie & Zamani (2016)	X	X
Ferneley & Sobreperez (2006)	X	X
Laumer, Maier, & Weitzel (2017)	X	X
Malaurent & Avison (2016)		X
Parks, Xu, Chu, & Lowry (2017)	X	X
Spierings, Kerr, & Houghton (2017)		X
Basket of Eight		
Alter (2015)		X
Baird, Davidson, & Mathiassen (2017)		X
Bhattacherjee & Hikmet (2007)		X
Bhattacherjee, Davis, Connolly, & Hikmet (2018)		X
Bjørn, Burgoyne, Crompton, MacDonald, Pickering, & Munro (2009)	X	
Clegg & Shaw (2008)		X
Custodio, Thorogood, & Yetton (2006)		X
Deng & Chi (2012)		X
Deng, Wang, & Galliers (2015)		X
Eason (2007)		X
Findikoglu & Watson-Manheim (2016)		X
Goh et al. (2011)	X	X
Gosain (2007)		X
Granados, Kauffman, Lai, & Lin (2011)		X
Hanseth & Lyytinen (2010)		X
Ignatiadis & Nandhakumar (2007)		X
Jørgensen (2001)		X
Kane & Labianca (2011)		X
Kang, Hahn, & De (2017)		X
Kuk & Janssen (2013)		X
Marabelli & Galliers (2017)		X
Mettler (2018)		X
Monteiro & Rolland (2012)		X
Nandhakumar, Rossi, & Talvinen (2005)		X
Novak, Brooks, Gadd, Anders, & Lorenzi (2012)		X
O'Callaghan (2007)		X
Recker, Indulska, Rosemann, & Green (2010)		X
Robey, Ross, & Boudreau (2002)		X

Paper	Definition provided	Empirical example provided
Sanner, Manda, & Nielsen (2014)		X
Seidel, Chandra Kruse, Szekely, Gau, & Stieger (2017)		X
Sherer (2014)		X
Shuraida & Barki (2013)		X
Soh & Sia (2004)		X
Strong & Volkoff (2010)		X
Thomas & Bostrom (2010)		X
Tiwana (2015)		X
Venkatesh, Bala, & Sambamurthy (2016)		X
Cited from basked of eight, workarounds central		
Alter (2014)	X	X
Davison & Ou (2013)		X
Gasparas & Monteiro (2009)	X	X
Gasser (1986)	X	X
Halbesleben, Savage, Wakefield, & Wakefield (2010)	X	X
Halbesleben, Wakefield, & Wakefield (2008)	X	X
Hayes (2000)		X
Huuskonen & Vakkari (2013)	X	X
Ignatiadis & Nandhakumar (2009)		X
Kobayashi, Fussell, Xiao, & Seagull (2005)	X	X
Koopman & Hoffman (2003)	X	X
Koppel, Wetterneck, Telles, & Karsh (2008)	X	X
Murphy, Reddy, & Xu (2014)	X	X
Patterson, Rogers, Chapman, & Render (2006)		X
Petrides, McClelland, & Nodine (2004)	X	X
Pollock (2005)	X	X
Safadi & Faraj (2010)	X	X
Vogelsmeier, Halbesleben, & Scott-Cawiezell (2008)	X	X
AIS conference, workarounds central		
Arduin & Vieru (2017)	X	X
Fries, Wiesche, & Krcmar (2016)	X	X
Kopper & Westner (2017)	X	
Li, Haake, & Mueller (2017)	X	X
Patel, Poston, & Dhaliwal (2017)	X	X
Reiz & Gewald (2017)	X	X
Tarkkanen & Harkke (2016)	X	X
van den Hooff & Hafkamp (2017)	X	X
AIS conference		
Beynon-Davies & Wang (2016)		X
Bunduchi (2017)		X
Chipidza (2016)		X
Kiely, Kiely, & Nolan (2017)		X
Lee (2017)		X

Paper	Definition provided	Empirical example provided
Mattke, Müller, & Maier (2017)		X
Muhammad, Paddle, Perera, Haddad, & Wickramasinghe (2017)		X
Wang, Pang, & Pavlou (2017)		X
Wiedemann (2017)		X
Wijnhoven, Beckers, & Amrit (2016)		X
Zimmermann, Rentrop, & Felden (2016)	X	X

About the Authors

Thomas Ejnefjäll is currently a PhD research student at Uppsala University. His research focuses on beliefs and practices during and after information systems implementation.

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