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EMPIRICAL RESEARCH

Information quality, user satisfaction, and the manifestation of workarounds: a qualitative and quantitative study of enterprise content management system users

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Abstract
In this paper, we focus on a critical aspect of work in organizations: using information in work tasks which is provided by information systems (IS) such as enterprise content management (ECM) systems. Our study based on the IS success model, 34 interviews, and an empirical study of 247 ECM system users at a financial service provider indicates that it is appropriate to differentiate between contextual and representational information quality as two information quality dimensions. Furthermore, we reveal that in addition to system quality, the two information quality dimensions are important in determining end-user satisfaction, which in turn influences the manifestation of workarounds. Our study also finds that employees using workarounds to avoid an ECM system implemented several years is negatively related to individual net benefits of the ECM system. Hence, we conclude that when investigating large-scale IS such as ECM systems, it is important to differentiate among information quality dimensions to more deeply understand end-user satisfaction and the resulting manifestation of workarounds. Moreover, this research guides organizations in implementing the most appropriate countermeasures based on the importance of either contextual or representational information quality.
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Introduction

About 80% of information in organizations is unstructured and found in websites, textual documents, spreadsheets, presentation slides, and many other forms (Alalwan, 2012). Many organizations neglect their information assets and employees have to search extensively for information; they do not know what information is available, where to find it, and what information is consistent, up-to-date, and correct. Organizations indicate that employees searching for information often experience information chaos or information overload (Beath *et al,* 2012; vom Brocke *et al,* 2011). In response, enterprise content management (ECM) systems designed to deal with unstructured information have become increasingly popular

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(Grahlmann *et al*, 2011; Tyrväinen *et al*, 2006) and many organization have implemented ECM systems to address information chaos and information overload (Nordheim and Päivärinta 2006; vom Brocke *et al*, 2014).

Unfortunately, employees often avoid using these ECM systems. A study identifies that about one in two organizations highlights non-adoption of ECM systems as a major challenge, reflecting the fact that up to 40 % of employees surveyed (Koplowitz *et al*, 2013) prefer and use other means of managing unstructured information. These manifested workarounds to using an ECM system might have a wide range of negative consequences for employees and lead to challenges at the organizational level as well. On the individual level, employees using workarounds take longer to access information and are less well-informed (Boudreau & Robey, 2005; Cvach, 2012); the information remains unstructured and non-transparent; and collaboration across departments is more difficult (Gasparas & Monteiro, 2009). On the organizational level, the benefits an organization expects by implementing an IS diminish when workarounds are established (Petrides, 2004). To address these challenges, our paper explores ECM users' manifestation of workarounds in more depth.

The manifestation of workarounds indicates that organizations are still challenged by a lack of user satisfaction (Polites & Karahanna, 2012), one of the most intense researched fields in the area of IS research (Petter *et al*, 2012). Research focusing on user satisfaction generally defines an IS as a technical artifact, meaning the users treat an IS as "a thing that is used" (Alter, 2013, p. 73). This definition restricts the user satisfaction perspective as only the technical aspects of an IS are considered (Alter, 2013) and other aspects of IS are ignored. Petter *et al* (2012, p. 354) highlight the importance of information quality in today's information age: *"[I]t is not just the technical quality of the system that will drive benefits to the organization or society, but the information that is produced by the system."* Nonetheless, information quality has not been focused on extensively even though it is a key component in explaining user satisfaction (Petter *et al*, 2012).

Building on Petter *et al*'s (2012) identification of the importance of information quality, we argue that if users perceive the format or the presentation of information as a threat, this will lower the benefits of the information for their organizations and organizations should redesign the format of the information. Similarly, if users perceive the usability of the information as a threat to their task, organizations should better align the usability of the information with users' tasks. In other words, the interventions an organization would implement to improve information quality differ along these two dimensions. Hence, this paper identifies and analyzes different dimensions of information quality to better guide organizations in improving information quality to increase user satisfaction and to avoid the manifestation of workarounds. With our focus on ECM systems, which are a technology-based solution used to make information accessible to employees, we focus on an IS that provides information to employees as a suitable context for investigating the influence of information quality dimensions on the manifestation of workarounds. Hence, our research question is:

What are dimensions of information quality and how do they influence the manifestation of workarounds?

To answer our research question, our research model relies on the IS success model (DeLone & McLean, 2003) and assumes an effect of information, system, and service quality mediated by user satisfaction on the manifestation of workarounds, which in turn influences individual net benefits. In a first step, we focus on the information quality dimension by conducting a qualitative study, which indicates the benefit of breaking down information quality into a representational quality and a contextual quality dimension. In a second step, we validate the revised research model with a quantitative study of 247 ECM users at a financial service provider. Our results reveal a distinct influence of representational and contextual information quality on user satisfaction and the manifestation of workarounds.

The remainder of the paper is organized as follows: First, we describe the theoretical background in terms of IS success, workarounds, and information quality research. Afterward, we present the method and results of our qualitative study followed by the development of our research model. Then, we present the results of our quantitative study. The paper concludes with a discussion of implications for theory and practice.

Theoretical background

Information system success

According to the IS success model (DeLone & McLean, 1992, 2003), the success of an IS can be evaluated in terms of information, system, and services quality, which subsequently affect user satisfaction and system use, which will in turn result in certain benefits for the individual or the organization (DeLone & McLean, 2003). Hence, generally speaking, the model assumes that employees behavior in relation to an IS is influenced by several factors and has consequences for both the organization and the employee.

From a technology point of view, the IS success model proposes two quality dimensions. System quality constitutes the desirable characteristics of the technology itself. It focuses on usability aspects such as ease of use, efficiency, navigation, and reliability (Petter *et al*, 2013). Service quality represents the quality of the support the users receive from the IS department and IT support personnel in using the IS, such as training, a hotline, or a helpdesk (Petter *et al*, 2013).

The IS success model only proposes one dimension of information quality, which refers to the desirable characteristics of information as the output of an IS. It includes measures such as information accuracy, completeness, consistency, precision, or relevance (DeLone &

McLean, 2003). In their discussion of the past, present, and future of IS success, Petter *et al* (2012, p. 355) highlight the importance of information quality: "*while often understudied, the importance of information quality remains important as a key component of IS success*".

In this model, system use represents the degree and manner to which an IS is utilized by its users and user satisfaction reflects the user's level of satisfaction when using an IS (Petter *et al*, 2013). Finally, net benefits reflect the extent to which an IS contributes to the success of the stakeholders. It also reflects the impact of an IS on a user's job performance (Iivari, 2005; Rai *et al*, 2002). One of the key propositions of the IS success model is that actual system use is a strong predictor of net benefits (DeLone & McLean, 2003).

The IS success model will be used in this paper to argue that perceptions about various quality dimensions of an IS influence user satisfaction, which in turn influence the behavioral reaction of employees in terms of the manifestation of workarounds, which we argue is negatively related to individual net benefits.

Workarounds

Although workarounds have been discussed in many situations, they "*remain for the most part surprisingly under-investigated and theorized*" (Pollock, 2005, p. 497). Broadly speaking, workarounds are conscious adaptations of work activities that are not expected or specified to be changed in this manner. They are implemented to address constraints perceived by employees as challenging for their work (Alter, 2014).

The literature discusses workarounds both positively and negatively (see Table 1). According to the more positive views, workarounds are necessary activities in everyday life to make a technology work in practice (Gasparas & Monteiro, 2009). They are also creative acts (Ash *et al*, 2004). According to the more negative views, workarounds are considered add-ons or shadow systems because systems (e.g., spreadsheets) outside the intended IS are used (Ignatiadis & Nandhakumar, 2009). Moreover, they are discussed as facades of compliance (Ash *et al*, 2004; Azad & King, 2008; Halbesleben *et al*, 2010; Patterson *et al*, 2006). Others treat them as resistance, distortions, or subterfuge (Ferneley & Sobreperez, 2006; Pollock, 2005). In addition, they are viewed as instances of bricolage and/or improvisation (McGann & Lyytinen, 2008), as a way of handling exceptions, or as deviations from routines, processes, and methods (Truex *et al*, 2000).

Moreover, there are various consequences of workarounds. On the positive side, workarounds might enable employees to continue to work, despite obstacles, mishaps, or anomalies (Koppel *et al*, 2008; Russell, 2007). They are considered a normal part of an IS implementation process and, as such, sources of future improvements (Safadi & Faraj, 2010). On the negative side, workarounds might create hazards, inefficiency, or errors and might have an impact on subsequent work activities, for instance, when errors are handed over (Boudreau & Robey, 2005; Cvach, 2012; Gasparas & Monteiro, 2009). Prior research indicates that workarounds are rather positive in the implementation phase of an IS because they help employees continue working and they help IS designers derive needed improvements. However, initial research results also indicate that when the system is in use, the impact is rather negative. The negative form of workarounds diminishes the positive effect an organization expects from an IS because it is not used the way it was intended and designed (Boudreau & Robey, 2005; Gasparas & Monteiro, 2009). Even though the impact of workarounds during the usage phase has been revealed as negative, it has been understated in the previous literature (Alter, 2014).

In addition, research has focused on the causes of the manifestation of workarounds (Petrides, 2004). In some situations, shadow systems are implemented to feign compliance with management goals, regulations, or behavioral expectations (Brazel & Dang, 2008; Broadhurst *et al*, 2009). It has also been mentioned that users who perceive a technology as a threat to their work performance resort to a workaround to respond to a loss of self-esteem, social prestige, and social power (Pfaffenberger, 1992). Such situations are therefore management-related causes for the manifestation of workarounds. In addition, many workarounds occur because technology does not fit the realities and contingencies of day-to-day work (Alter, 2014). Such situations include when specific functions or capabilities are lacking (Davison & Ou, 2013; Strong & Volkoff, 2010) or when routines and processes are poorly designed (Gasser, 1986; Koppel *et al*, 2008; Strong & Miller, 1995; Vogelsmeier *et al*, 2007).

In summary, previous workaround research has mainly focused on the positive effect of workarounds during an IS implementation and on technology-related issues causing their manifestation. The negative side of workarounds once a system has been available for a while and the impact of information characteristics on the manifestation of workarounds have been neglected in IS research so far, even though their importance has been recognized. This study focuses on workarounds as an employee behavior that prevents both the organization and the employee from realizing the benefits provided by an IS. From this perspective, workarounds can be considered as a user resistance behavior as it is a conscious adaptation of the expected behavior in relation to an IS.

Information quality

Generally, employees perform work by following work routines and by using information, technology, and other resources to produce products or services for customers (Alter, 2013). Hence, information needs to be aligned with work routines if employees require that information to produce a product or service for customers (Alter, 2013). The fundamental core of IS is to manage information and to provide employees the information they need in their daily work (Petter *et al*, 2012). In this context, the importance of information as an aspect of IS success has been identified as one of the

Table 1 Causes, forms, and consequences of workarounds

Causes	*Workaround behavior*	*Consequences*
Management • Loss of self-esteem, social prestige, or social power (Pfaffenberger, 1992) • To feign compliance with management goals, regulations, or behavioral expectations (Brazel & Dang, 2008; Broadhurst *et al*, 2009) • To prevent mishaps (Petrides, 2004) *User satisfaction* • A given technology does not fit the realities and contingencies of day-to-day work (Alter, 2014) • Conditions that prevent users from achieving a desired level of efficiency, effectiveness, or other goals (Alter, 2014) • Lack of specific functions or capabilities (Davison and Ou 2013; Strong & Volkoff, 2010) • Routines and processes used are not well designed (Gasser, 1986; Koppel *et al*, 2008; Strong and Miller, 1995; Vogelsmeier *et al*, 2007)	*Positive* • Creative acts (Ash *et al*, 2004) • Methods of handling exceptions (Truex *et al*, 2000) • Improvisation (Alter 2014) • Response to obstacles, expectations, or mishaps (Alter 2014) *Negative* • Bricolage (McGann & Lyytinen, 2008) • Deviations from routines, processes, and methods (Truex *et al*, 2000) • Distortions (Pollock, 2005) • Facades of compliance (Ash *et al*, 2004; Azad & King, 2011; Halbesleben *et al*, 2010; Patterson *et al*, 2006) • Resistance (Ferneley & Sobreperez, 2006) Subterfuge (Pollock, 2005) • Usage of shadow systems (Ignatiadis & Nandhakumar, 2009)	*Positive* • Enables employees to continue working (Koppel *et al*, 2008; Russell, 2007) • Leads to improvements during implementation (Safadi & Faraj, 2010) *Negative* • Creates errors (Boudreau & Robey, 2005; Cvach, 2012; Gasparas and Monteiro 2009) • Creates hazards (Boudreau & Robey, 2005; Cvach, 2012; Gasparas & Monteiro, 2009) • Creates inefficiency (Boudreau & Robey, 2005; Cvach, 2012; Gasparas & Monteiro, 2009) • Negative impact on subsequent work activities (Boudreau & Robey, 2005; Cvach, 2012; Gasparas & Monteiro, 2009)

major aspects of future IS success research (Petter *et al*, 2012, p. 354): "*We can consider the potential of information systems to provide information for value creation, rather than just system efficiency*".

The IS success model argues that the quality of information as an output of an IS is one of the major components explaining user satisfaction. It is defined as "*a measure of the quality of (the IS) outputs: namely, the quality of the information the system produces in reports and on-screen*" (Gable *et al*, 2008, p. 389). In prior research studies, information quality was measured in terms of accuracy, completeness, consistency, ease of understanding, personalization, relevance, security, and timeliness (Gable *et al*, 2008; Petter *et al*, 2012). Researchers focus primarily on information quality as a single construct when conducting research on user satisfaction and have not included further dimensions of information quality (e.g., Gable *et al*, 2008). Nonetheless, some approaches have indicated that there are additional dimensions of information quality. For example, Lee *et al* (2002) have suggested a methodology for information quality assessment that contains four dimensions of information quality: intrinsic, contextual, representational, and accessibility. Their methodology includes a measurement model and analysis technique but they do not apply it to explain a dependent variable such as user satisfaction or the manifestation of workarounds. In addition, Alter (2006) indicates in his work system theory that the information element of a work system needs to be analyzed along five different dimensions. Hence, prior research indicates that information quality should be assessed along different dimensions, which we will further analyze in this paper, revealing the impact of two dimensions on the manifestation of workarounds.

Qualitative and quantitative study: target ECM system and organization

Our research observes and evaluates phenomena occurring related to an ECM system at a financial service provider. In general, ECM is considered a new class of IS, opening up a new field in IS research (Grahlmann *et al*, 2011). Employees use ECM systems to access mainly unstructured information they need for work tasks and to perform work that directly or indirectly provides a product or service to a customer (Laumer *et al*, 2013). From a practical point of view, the market for ECM systems is complex (Böhn, 2014, see Table A8). ECM systems provide an information backbone for the entire organization, but the areas of application and how the systems are used and handled vary across organizations (Böhn, 2014). According to a classification of ECM systems (Gilbert *et al*, 2013), the leading vendors of holistic ECM systems are Microsoft and IBM, but several additional solutions exist that support one or more partial aspects of ECM (see Appendix E for more details, Böhn, 2014).

Table 2 Examples of workarounds at the observed financial service provider

Workaround	*Description*
Calling	Employees call experts by phone when they have any a question instead of searching for the information they need in the ECM system.
E-mail	If experts do not respond by phone, employees write an e-mail requesting help and information.
Hey, Joe	Employees ask their co-workers for help instead of searching for information. If co-workers cannot provide the information, they call experts in the organization.
Shadow systems	Employees use their own local file systems to share information within a group of people.
Tickets	Instead of using the information provided that might solve an IT issue, employees open tickets to get help from the IT department.

The financial service provider we investigated in our study has approximately 900 employees and total assets of EUR 3.2 billion. The organization has implemented a web-based ECM system to support organizational processes and employees' work routines, providing information not covered by the core IS (e.g., core banking system) but required to support sales talks and other work routines. The workarounds we identified while interviewing employees and observing their daily work include hotlines, calls, and personal contacts within the organization (see next section for details). For example, if information is required on how to use the core banking system, users call the IT department instead of using the information provided by the ECM system (see Table 2 for a summary of workarounds). The range and scope of workarounds used by users makes this case suitable for investigating the determinants and consequences of the manifestation of workarounds.

To investigate why employees are dissatisfied with an ECM system, why they manifest workarounds to avoid using it, and what the negative consequences of workarounds for employees are, we undertook a qualitative and a quantitative study. First, we conducted interviews to better understand information quality and used the results of the interviews to develop a research model. Second, we conducted a survey to validate the research model. The following describes our qualitative study and its results, our research model, and the design and results of our quantitative study.

Qualitative study on information quality

In order to measure information quality as part of the IS success model (DeLone & McLean, 2003), we conducted a qualitative study at the financial service provider. The following section provides detail about the data collection and analysis procedure and the results of the interviews.

Data collection and analysis

To investigate why employees are less satisfied with the ECM system, we conducted interviews which lasted between one and three hours, following a two-step approach. We used the critical incident technique (Flanagan, 1954) to capture employees' beliefs about the ECM system they were interviewed about and we followed the five steps of applying critical incident technique as provided by Gremler (2004).

In a first step, we defined our problem and research question. In our study, we focus on information quality as a determinant of user satisfaction and the manifestation of workarounds. Hence, our objective is to identify critical incidents related to the information quality of an ECM system that explains why ECM system users are rather dissatisfied and manifest workarounds to avoid using the ECM system. Based on prior research (Alter, 2006; Lee *et al*, 2002), we wanted to identify different dimensions of information quality that are relevant when using an ECM system.

In a second step, we designed our study. We focused on major positive or negative reactions to and critical occurrences related to an ECM system. Hence, our unit of analysis are ECM system users and we used a survey instrument that contains question like "What are your three most important positive and negative experiences with the ECM system?". We also asked followed up questions to identify how and why these critical incidents happened and how the organization and employees behaved in the circumstances.

In a third step, we conducted the interviews with 34 employees of the financial service provider. The interviews were conducted by at least one member of the research team of this paper and lasted between 30 and 90 minutes. Besides the CEO and his two deputies, we interviewed the head of sales, the process manager of the organization, the CIO, and two managers of back office departments. From the back office departments, we interviewed six employees in total. We also interviewed three branch managers and seven sales employees. Our interview partners were aged between 22 and 65 years and most have a business or banking educational background.

In a fourth step, we analyzed the data. We systematically categorized the statements about different characteristics of the ECM system provided by our interviewees according to system, information, or service quality as proposed by the IS success model (DeLone & McLean, 2003). This step revealed that information quality is one of the major threats employees reported on in our

Table 3 Representational information quality and its characteristics (*N* = 34)

Characteristic	*Exemplary quotation*
Conciseness 26 (76.5%)	*The way information is presented is not succinct. I always believe it could be expressed with the half of the words they use.*
Presentation 24 (70.6%)	*Information is presented in an inexplicable way.*
Understandability 14 (41.2%)	*The information I need for my work is formatted such that it requires extra effort to understand it.*

Note: Total number of interviews the characteristic was mentioned in percentage in relation to $N = 34$).

interviews. The most common complaint was about the format or the usability of the information. To more deeply understand these two patterns of information quality, all statements related to information quality were structured and assigned to an information quality characteristic (e.g., relevance, usability, presentation). In this step, we grouped them according to the characteristics already investigated by prior research and, if no assignment was possible, we assigned them to newly defined characteristics. Hence, we developed a classification scheme for the incidents related to information quality of the ECM system. Afterward, each member of our research team was asked to assign the different information quality characteristics identified in our interviews to one or more dimensions, name and describe each dimension, and justify why different characteristics were subsumed into one dimension. This technique enabled us to identify the information quality characteristics mentioned by employees in their interviews about the organization's ECM system and to group information quality characteristics into different information quality dimensions.

The fifth step as recommended by Gremler (2004) is the presentation of the results, which follows in the next section.

Results

In 32 out of 34 of our interviews, at least one aspect of information quality was mentioned. Moreover, almost all interviewee mentioned challenges related to system quality, whereas only 14 participants expressed service quality as a concern.

Our more in-depth discussions of information quality revealed two dimensions. The first is *representational information quality*. Our analysis of the interviews indicates that the format of information is an important influencing factor for user satisfaction and a unique dimension in our additional analysis. This dimension reflects the way information is presented to the user and subsumes related characteristics of information including conciseness, presentation ,and understandability. *Conciseness* reflects the rigor and the sententiousness of information, *presentation* refers to the format and the way information is designed to make it understandable to users, and *understandability* is the extent to which information is clear, unambiguous, and easily comprehensible (see Table 3). All these characteristics have in common that they focus on the way information is presented to the user and reflect the requirement that information needs to be represented in an appropriate format that accentuates its meaning. They are independent of the use of information in a specific context.

The second dimension we identified in our interview analysis was *contextual information quality*, an important influencing factor for user satisfaction. This dimension reflects the extent to which information fits the needs of the task the information is used in. In our analysis, we identified completeness, relevance, timeliness, and usability as information characteristics which we subsumed into the contextual information quality dimension (see Table 4). *Completeness* is the extent to which the stated requirements of specific information required for a specific task are fulfilled. *Relevance* focuses on the extent to which information can be used to perform a task and to produce a qualitative outcome. *Timeliness* focuses on whether information is available in time to complete a specific task. *Usefulness* reflects how applicable information is to a specific task. All these characteristics have in common that they focus on the use of information for a specific task such that they are subsumed in our analysis into one dimension of information quality. They are independent of the characteristics of the format of information.

In summary, our interviews revealed system quality and two dimensions of information quality as important determinants of user satisfaction. Furthermore, our interviews indicate that employees who are less satisfied with the ECM system manifest workarounds to avoid using it. In addition, employees who avoid using the ECM system also complain about their overall work performance. The implications of these results will be discussed in the following to develop our research model.

Research model development

Based on the IS success model (DeLone & McLean, 2003) and the results of our qualitative research study, the research model assumes that the manifestation of workarounds reduces individual net benefits and that user satisfaction predicts the manifestation of workarounds and mediates the impacts of two information quality dimensions, system and service quality, on the manifestation of workarounds.

Table 4 Contextual information quality and its characteristics ($N = 34$)

Characteristic	*Exemplified quotation*
Completeness 15 (44.1%)	*The information provided is not complete. I lack explicit information that helps me to prepare my sales talks.*
Relevance 27 (79.4%)	*The information provided is not relevant to my task. It does not make it easier for me to decide which steps to follow and which department I should forward the customer request to.*
Timeliness 12 (35.3%)	*I believe the information is not provided in time. We need to answer customer questions about new products but we are not provided with the information when the new product is launched.*
Usefulness 28 (82.4%)	*The information is simply not usable for our task as there is so much information presented that we cannot use it.*

Note: Total number of interviews the characteristic was mentioned in percentage in relation to $N = 34$).

The impact of manifestation of workarounds on net benefits

Building on the IS success model (DeLone & McLean, 2003), we focus on net benefits as a consequence of employee behavior. When users use workarounds, the positive effects of an implemented ECM system are diminished because workarounds can create hazards, inefficiency, or errors and have an impact on subsequent work activities (Boudreau & Robey, 2005; Gasparas & Monteiro, 2009). The premise is that workarounds are undesirable deviations from standard processes which reduce the efficiency of organizational processes (Azad & King, 2008; Halbesleben *et al*, 2010; Koppel *et al*, 2008). These negative forms of workarounds diminish the positive effect an organization expects from an IS (Azad & King, 2008; Boudreau & Robey, 2005; Gasparas & Monteiro, 2009; Halbesleben *et al*, 2010; Koppel *et al*, 2008). Hence, using workarounds decreases the productivity of the individual user, which, according to the IS success model (DeLone & McLean, 2003), is reflected by net benefits. Therefore, we hypothesize

H1: *The higher the prevalence of workarounds to avoid using an IS, the lower the net benefits of the IS for the employee.*

The impact of user satisfaction on the manifestation of workarounds

Our model focuses on the well-established construct of user satisfaction from the IS success model (Petter *et al*, 2012). Research in this context has revealed that employees respond behaviorally when they are not satisfied (Zeelenberg & Pieters, 2004). Most IS research studies focus on intention to use as a behavioral consequence of user satisfaction (Petter *et al*, 2013). However, from a negative point of view, if a user is not satisfied with an IS, he or she will look for ways to avoid using the system, resulting in alternative work routines (Koopman & Hoffman, 2003) or in a switch to ways of performing a task other than the intended one (Richins, 1987). With the manifestation of workarounds, system usage declines. Hence, when users are less satisfied, system usage decreases and workarounds occur. Consequently, we hypothesize:

H2: *The lower the satisfaction with an IS, the higher the prevalence of workarounds to avoid using the IS.*

The impact of system quality on user satisfaction

System quality focuses on the technical characteristics of IS and the corresponding ease of using the IS (DeLone & McLean, 2003). We expect that when employees perceive the technological characteristics of an IS as negative, they are less satisfied with the system (Petter *et al*, 2008; Rai *et al*, 2002). This relationship is well established in IS success research (Petter *et al*, 2008, 2012), such that we hypothesize

H3: *The lower the system quality, the lower the user satisfaction with an IS.*

The impact of service quality on user satisfaction

Service quality has been included as a new variable in the updated DeLone and McLean IS success model (DeLone & McLean, 2003). It focuses on the quality of the support provided to use an IS (Pitt *et al*, 1995). If the service does not provide the expected degree of accuracy, dependability, or consistency, satisfaction with the service and consequently with the IS decreases (Petter *et al*, 2008). Consequently, we hypothesize based on the updated IS success model (Gable *et al*, 2008)

H4: *The lower the service quality, the lower the user satisfaction with an IS.*

The impact of information quality on user satisfaction

By comparing the results of our qualitative study with the recent literature (e.g., Alter, 2013), we can conclude that employees perform work by following work routines and by using information, technology, and other resources to produce products or services for customers. Hence, information needs to be aligned with employees' work routines because employees require information to produce a product or service for customers (Alter, 2013). The fundamental core of IS is to manage information and to provide employees the information they need for their daily work (Petter *et al*, 2012). In this context, the importance of information as an aspect of IS success has been identified

as one of the major aspects of future IS success research (Petter *et al*, 2012). The IS success model argues that the quality of information as an output of an IS is one of the major components explaining user satisfaction and that among the different dimensions of information quality, "*the key to information value is relevance, and relevance differs across users and their circumstances*" (Petter *et al*, 2012, p. 354). While the IS success model does not distinguish between different information quality dimensions, Lee *et al* (2002) propose four dimensions of information quality and Alter (2006) proposes five.

Our interviews indicate that if information is not easily interpretable, difficult to understand, or inconsistent, employees may avoid using the information and look for other ways to receive this information. That is, when representational quality is perceived as a threat to their task completion and workarounds are manifested, organizations should redesign the format of the information to make it easier to understand, more concise, and more consistent (Alter, 2006). Representational information quality focuses on the characteristics of the information itself (Lee *et al*, 2002). These characteristics are related to the way the information is presented (Alter, 2006; Lee *et al*, 2002), independent of how information is used for a particular task. Information might be useful for a particular task, but if it is not presented in an interpretable way, it is useless for an employee. Consequently, when employees perceive the representational information characteristics as negative or threatening, their satisfaction with an IS providing this kind of information is low (Petter *et al*, 2008; Rai *et al*, 2002). Hence, we hypothesize

H5a: *The lower the representational information quality provided by an IS, the lower the user satisfaction with the IS.*

In addition, our interviews indicate that if information is not relevant for a task, the availability of the information in relation to the task is inappropriate; the information is not complete for a particular task, or it is simply not useful to perform a particular task, employees might stop using an IS providing this kind of information and might look for other ways to obtain the information required for their tasks. In this case, workarounds are manifested based on the contextual quality of the information. Information can be relevant in one context and irrelevant in another context (Volkoff *et al*, 2007). For example, as was reported in our interviews, information about a particular product is relevant when a salesperson needs to prepare a presentation for a customer interested in the product, whereas it is irrelevant for employees who are not allowed to sell this product. Thus, the quality of information has a contextual dimensions in terms of the extent to which information fits the work routines (Alter, 2013). Information only provides benefits to employees when it supports an individual's productivity (Gable *et al*, 2008; Petter *et al*, 2012). Therefore, access to a huge volume of well-formatted information may have no impact if the information is not aligned with employees' work routines. As Alter (2006) put it, "better information may not matter" as information needs always to be aligned with the tasks an employee has to perform. Hence, contextual information quality focuses on the extent to which information fits the needs of work routines (Alter, 2006; Lee *et al*, 2002). For a given context, when the information as an output of an IS is not well aligned with working routines or processes in this context, employees are less satisfied with an IS because the quality of the task-information fit is low (Strong & Volkoff, 2010). Information might be presented appropriately, understandably, and consistently, but if it is not relevant for a specific task, employees cannot use it (Alter, 2013). In this case, although the IS provides well-formatted information, employees can be dissatisfied if the information does not fit their tasks. In work system theory, this fact is represented by the two components of a work system: information and task-information fit (Alter, 2013). Hence, to better guide organizations in improving the information quality as an important dimension of IS success, our model reflects this differentiation. Thus, we hypothesize

H5b: *The lower the contextual information quality provided by an IS, the lower the user satisfaction with the IS.*

The resulting revised research model based on the IS success model and our interviews is illustrated in Figure 1 and will be evaluated using a quantitative study as described below.

Quantitative study: research model validation

To validate the revised research model and especially the distinct influence of contextual and representational information quality on the manifestation of workarounds, we conducted an empirical study at the financial service provider. The study and its results will be presented in the following section.

Survey instrument

A survey instrument was developed based on the revised research model and, as far as possible, based on prior research studies (e.g., DeLone & McLean, 2003; Lee *et al*, 2002; Petter *et al*, 2008, 2013). The measurement items were adapted to the ECM context of the organization and assessed using a seven-point Likert scale (strongly agree to strongly disagree). Since the survey was taken in German, the items were translated and adjusted to meet the requirements of the German language (Brislin, 1970). In making the adjustments, the survey instrument for well-studied constructs was discussed intensively with employees of the organization, as well as with the steering committee and the IT managers responsible for the ECM system. In total, 20 employees were involved in the pre-test of the survey instrument.

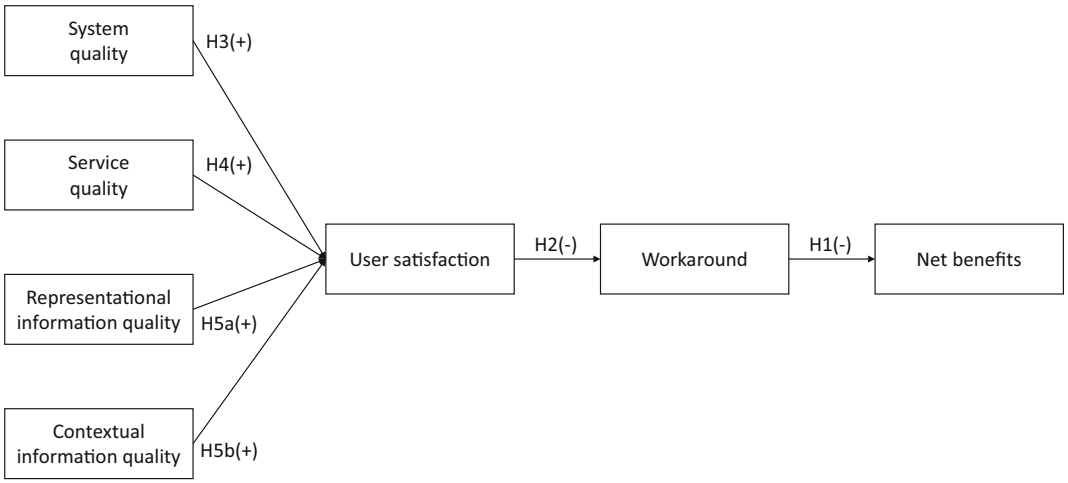

Figure 1 Research model.

Individual net benefits were captured based on items used when applying the IS success model (Iivari, 2005). Items include statements such as "The ECM system helps me to improve my job performance".

No models for measuring workarounds could be identified in prior research, so new measures were developed. The development of the new measurement models is described in Appendix A. The validity and reliability of these measures were evaluated to ensure that only reliable and valid measurement instruments were used. The resulting survey instrument is illustrated in Table A5 in the Appendix and includes statements such as "I always look for ways to avoid using the ECM system".

For user satisfaction, we rely on well-established measurement models used by prior research studies. We only used positive satisfaction items like "Overall, I am very satisfied with the ECM system" (Bhattacherjee, 2001; McKinney *et al*, 2002; Wixom & Todd, 2005).

System, service, representational, and contextual information quality are conceptualized as first-order reflective, second-order formative constructs (based on Gable *et al*, 2008). Therefore, we included several characteristics of each quality dimension into our survey instrument (see Table A4 in Appendix C for a definition of each characteristic).

System quality is represented by various characteristics of the system. Hence, based on prior research (Gable *et al*, 2008; McKinney *et al*, 2002), we include items of complexity, flexibility, navigation, and usability as characteristics of system quality in our survey instrument.

The quality of the service provided can be characterized by the ability to perform the promised service dependably and accurately (Pitt *et al*, 1995). Therefore, based on prior research, we include service reliability and responsiveness as service quality characteristics in our survey instrument.

Prior research has identified several characteristics of representational information quality (Alter, 2006; Lee *et al*, 2002). In our survey instrument, we include those dimensions which we have identified in our interview-based research in the organization our survey will be conducted: presentation, understandability, and consistency.

Prior literature has also identified characteristics of contextual information quality (see Alter, 2006; Lee *et al*, 2002; McKinney *et al*, 2002). We include completeness, relevance, timeliness, and usefulness of information in our survey instrument as they were identified in our interview-based research at the organization our survey will be conducted.

In the context of the IS success model, several variables have been used to control for the impact of additional factors besides those discussed above. In this study, we also control following prior research for the impact of age, gender, and system usage frequency on the manifestation of workarounds and net benefits (Kim, 2009; Venkatesh *et al*, 2003).

Data collection

In order to validate the proposed research model, we collected data within the observed financial service provider by conducting an online survey in July 2012. Eight hundred and thirteen employees and managers of the organization who use the ECM system were invited by e-mail to take part in the survey. As an incentive to participate, the organization raffled dinner vouchers among survey participants. Within a period of three weeks, 247 employees (response rate 30%) filled out the survey. The demographics of the survey participants are illustrated in Table 5. In order to control for non-response bias, we compared the demographics of the participants with those of the entire organization. This test reveals that the participants are a representative sample of the employees working at the organization.

Results

To validate the proposed research model, we transferred it into a structural equation model and used the partial least squares (PLS) method calculated using SmartPLS

Table 5 Demographics of survey participants (*N* = 247)

Age					*Gender*		*Field of activity*		
<21	*21–30*	*31–40*	*41–50*	*>50*	*Male*	*Female*	*Front office (sales)*	*Back office*	*Administration*
11.4%	29.0%	23.7%	22.0%	13.9%	43.0%	57.0%	64.3%	13.2%	22.5%

3.2.1 software (Ringle *et al*, 2015). We used the pairwise replace algorithm to compensate for missing values. The results of the study are presented in the following.

Common method bias Common method bias (CMB) is a widely discussed problem when using self-reported data (Podsakoff *et al*, 2003). In order to identify the extent of CMB, we conducted several statistical analyses. First, we used Harman's single factor test (Harman, 1976). The first factor accounted for only 34.3 % of the variance. As our items significantly loaded on more than one factor, the likelihood of a single dominant factor in the dataset is low (Harman, 1976). Second, we used the procedure of examining the correlation matrix as specified by Pavlou *et al*, (2007). Extremely high correlation ($r > 0.90$) is an indicator of CMB and our correlation matrix did not indicate high correlation. Third, we added a CMB factor into the PLS model (Podsakoff *et al*, 2003; Williams *et al*, 2003) that contains every indicator of the origin model. Then, each remaining origin factor was transformed into a single-item construct. Finally, the ratio of R^2 with the CMB factor was compared to the ratio of R^2 without the CMB factor. Since the method factor explains a delta of R^2 of 0.004 and the R^2 without this factor is 0.612, the resulting ratio was 1:153. Furthermore, we compared the path coefficients from the CMB factor and the original construct and revealed a ratio of 1:223. In comparing these results with prior research investigating CMB (Liang *et al*, 2007), we do not observe signs of CMB influence using post-survey CMB tests.

Measurement model Our model contains both first-order and second-order constructs. All first-order constructs (user satisfaction, workarounds, net benefits) were measured using reflective indicators, so that content validity, indicator validity, construct reliability, and discriminant validity have to be assessed to validate the measurement model (Bagozzi, 1979). Contextual information quality, representational information quality, system quality, and service quality were modeled as first-order reflective, second-order formative constructs (based on Gable *et al*, 2008). We assessed our second-order constructs by evaluating first the item loadings, reliability, AVEs, and correlation of constructs for the first-order reflective model and second the second-order factor model (Wright *et al*, 2012).

Content validity As discussed above, the items used have proven to be robust in prior research approaches and are thus suitable measurement items. We simply adapted the items to fit the ECM context where necessary based on a discussion with managers and employees of the organization. New items were proposed only following a rigorous process for item development (see *Survey instrument* section and the appendix for details).

Indicator reliability The rate of variance of an indicator that comes from the latent variables is indicated by indicator reliability. In order to explain more than 50% of the variance of a latent variable by the indicators, each value has to be above 0.707 (Carmines & Zeller, 1979), except for two loadings. However, as they are loadings for our newly developed construct, we keep these items as they still fulfill the recommended threshold for factor loadings for newly developed construct, above 0.6 (Hair, 2010). Hence, the reliability condition is fulfilled for all indicators. Moreover, each loading has a significance level of at least 0.001 and is thus significant (see Table A5). We tested this using a bootstrap method with 500 samples.

Concerning the second-order constructs, all first-order reflective items had loading above the recommended threshold of 0.707 and their respective second-order formative weights are illustrated in Figure 2.

Construct reliability Composite reliability (CR) and average variance extracted (AVE) are used to specify quality at the construct level (Fornell & Larcker, 1981), whereby CR has to be at least 0.7 and AVE has to be higher than 0.5 (see Table 12). Both criteria are fulfilled in our study.

Discriminant validity Discriminant validity describes the extent to which measurement items differ from one another (Campbell & Fiske, 1959). For this purpose, the square root of AVE is included on the diagonal of latent variable correlation (see Table A3). Since these values are greater than the corresponding construct correlations (Fornell & Larcker, 1981; Hulland, 1999), we can state that the measurement model is valid. Moreover, as the heterotrait–monotrait (HTMT) ratio of correlations criterion detects a lack of discriminant validity more reliably than the Fornell–Larcker criterion, we used it to assess discriminant validity (Henseler *et al*, 2015). Using the absolute $HTMT_{0.85}$ criterion indicates that discriminant validity is not an issue in our research (highest value is 0.687). To further test the discriminant validity of contextual and representational information quality, additional efforts were conducted (see Appendix B) that support our conclusion that the measurement model is valid.

Structural model In order to evaluate the structural model, coefficient of determination (R^2) and significance levels of each path coefficient are used

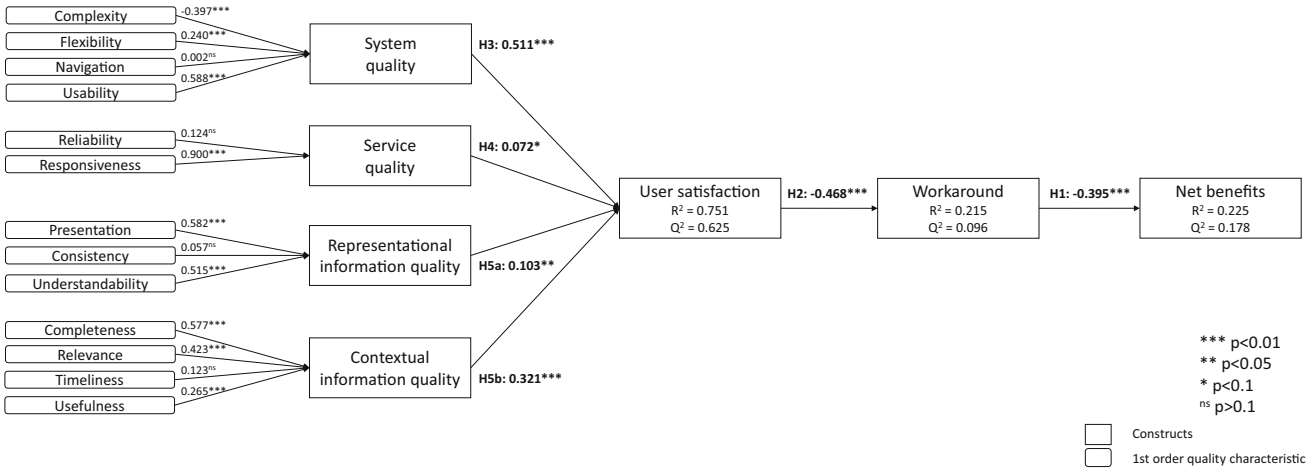

Figure 2 Structural model validation for the second-order factor model. The four quality constructs are conceptualized as superordinate constructs as suggested by Gable *et al* (2008) [reflective first-order and formative second-order constructs; Polites *et al* (2012) and evaluated as suggested by Wright *et al* (2012)].

(Chin, 1998a, 1998b). Figure 2 indicates that 21.5% of users' workaround behavior is explained by satisfaction and the control variables and 22.5% of net benefits. Moreover, 75.1% of the variance of satisfaction is explained by system quality, service quality, and the two information quality dimensions as well as by the control variables. Moreover, we examine the Q^2 value which is an indicator of the model's predictive relevance (omission distance $d = 7$). Q^2 values larger than zero for a specific reflective endogenous latent variable indicate the path model's predictive relevance for a particular construct (Hair, 2014). This is fulfilled in our model.

All hypotheses concerning the path coefficients were supported (see Figure 2). Regarding hypothesis 1, we can confirm a significant relationship between workarounds and net benefits (H1 supported, $\beta = -0.395$, $p < 0.001$). Furthermore, we also reveal a significant relationship between user satisfaction and workarounds (H2 supported, $\beta = -0.468$, $p < 0.001$). In terms of the antecedents of user satisfaction, we find a significant relationship for representational information quality (H3a supported, $\beta = 0.103$, $p < 0.05$), contextual information quality (H3b supported, $\beta = 0.321$, $p < 0.01$), system quality (H4 supported, $\beta = 0.511$, $p < 0.01$), and service quality (H5 supported, $\beta = 0.072$, $p < 0.1$). Furthermore, we observe a significant relationship between usage behavior and net benefits ($\beta = 0.193$, $p < 0.01$); however, no significant relationship exits for age (net benefits: $\beta = -0.03$, $p > 0.62$; workarounds: $\beta = 0.016$, $p > 0.81$) and gender (net benefits: $\beta = -0.04$, $p > 0.94$; workarounds: $\beta = 0.066$, $p > 0.30$).

Regarding the two information quality dimensions, we observe that contextual information quality has an effect size (f^2) of 0.336 and representational information quality of 0.137. Hence, contextual information quality has a greater effect size than representational information quality. Compared to the other determinants of user satisfaction, the two information quality constructs have an effect size (f^2) of 0.341, system quality of 0.550, and service quality of 0.016. According to Cohen's effect size data analysis categories (1988), the two information quality dimensions and system quality have a large and service quality has no effect. The effect size of user satisfaction is 0.260 and of workarounds is 0.187.

In our model, we specified a mediation effect of contextual and representational information quality as well as system and service quality via user satisfaction on the manifestation of workarounds. To explicitly test for these mediation effects, we used the Baron and Kenny (1986) test. A mediating effect exists if the independent variable is a significant direct antecedent of the mediator, the independent variable is also a direct significant antecedent of the dependent variable, and the predictive power decreases when the mediator is entered into the relation between the independent and the dependent variables.

The mediation tests for our model are illustrated in Table 6 and explained for the effect of contextual information quality in the following. The same rational holds for the remaining effects; however, they are only illustrated in Table 6 and not further described in the text below.

Contextual information quality has a significant direct influence on the manifestation of workarounds (step 1; $\beta = -0.421$, $p < 0.001$) and on the mediator user satisfaction (step 2; $\beta = 0.729$, $p < 0.001$). Also the mediator has a significant direct influence on the manifestation of workarounds ($\beta = -0.468$, $p < 0.001$). Moreover, the predictive power of contextual informational quality on the manifestation of workarounds decreases (step 3; $\beta = -0.421$, $p < 0.001$ decreases to $\beta = -0.139$, $p < 0.10$) when the mediator is included in the model. Hence, in terms of contextual information quality, we support the assumption that the effects on the manifestation of workarounds

Table 6 Mediation tests

Influence of … on ….	*Step 1*	*Step 2*	*Step 3*	
	Manifestation of workarounds	*User satisfaction*	*User satisfaction*	*Manifestation of workarounds* (Delta to step 1)
Contextual information quality	−0.421***	0.729***	0.728***	−0.169* (0.252)
Representational information quality	−0.319***	0.672***	0.671***	−0.003ns (0.316)
System quality	−0.495***	0.774***	0.772***	−0.345*** (0.150)
Service quality	−0.312***	0.500***	0.498***	−0.111ns (0.201)

Note: For all tests, the influence of user satisfaction on the manifestation of workarounds is −0.468***.

*** $p < 0.001$; ns $p > 0.1$.

are mediated by user satisfaction. These effects can also be confirmed for the three additional quality constructs as proposed by our research model (see Table 6).

Discussion, implications, and future research

In order to explain ECM users' manifestations of workarounds, a research model was developed and evaluated. The results of our combined qualitative and quantitative study of an ECM system in operation at a specific organization reveal that user satisfaction is a significant predictor of the manifestation of workarounds. In addition, the manifestation of workarounds is negatively related to individual net benefits. Moreover, the results indicate that the variance of user satisfaction can be explained by contextual information quality, representational information quality, system quality and, to a lesser degree, service quality. Based on these results, we can answer our research question as follows: What are dimensions of information quality and how do they influence the manifestation of workarounds?

Employees are less satisfied with an ECM system when the ECM system does not ensure contextual information quality and representational information quality. Hence, in our research, we identified two dimensions of information quality and we could reveal that the strength of effect of the two information quality dimension differ (in our study the f^2 for contextual information quality is 0.336 and for representational information quality 0.132). Moreover, the manifestation of workarounds is negatively related to net benefits ($\beta = -0.395$, $p < 0.001$).

These results have several implications for research and practice which will be discussed in the following.

The negative side of workarounds

Workarounds have been identified as one possible user resistance behavior (Ferneley & Sobreperez, 2006; Klaus *et al*, 2010). Prior research has discussed 'technological design' and 'failure to reengineer related processes' as the main drivers for the manifestation of workarounds (Petrides, 2004) and evaluated their positive and negative consequences (see Table 1). In the organization observed in this study, employees manifested workarounds to avoid using the ECM system and used alternatives to accomplish their work. Hence, our research contributes to research on workarounds in three ways. First, it provides an empirically observable variable to capture employees' workarounds related to an IS, which can be used in future research to investigate the drivers and consequences of workarounds. Second, it reveals user satisfaction as a significant determinant of the manifestation of workarounds and illustrates that user satisfaction mediates the impact of information and system characteristics on the manifestation of workarounds. Third, it reveals that workarounds are negatively related to the net individual benefits of using a well-established, but not inadequate IS.

In general, prior literature has identified several different types of workarounds, such as employees performing jobs differently than intended (Klaus *et al*, 2010), trying to use the old system (Klaus & Blanton, 2010), and persisting in using a former system alongside the new system (Rivard & Lapointe, 2012). In order to capture whether employees have manifested workarounds to avoid using an IS we have developed a measurement model that focuses on user behavior, involving looking for ways to avoid using an IS. This measurement model was pre-tested and developed following a rigorous and well-established approach for new constructs and its validity and reliability were also evaluated in the empirical study conducted in our main ECM study.

Moreover, prior literature has identified the lack of specific functions or capabilities (Davison & Ou, 2013; Strong & Volkoff, 2010) or ill-designed routines and processes used (Gasser, 1986; Koppel *et al*, 2008; Strong & Miller, 1995; Vogelsmeier *et al*, 2007) as major drivers of the manifestation of workarounds. We add *user*

satisfaction to this list, providing evidence that less satisfied users more frequently manifest workarounds. Furthermore, we provide evidence that this satisfaction is based on contextual information quality, representational information quality, system quality and service quality. Our analysis shows that the perceptions of these four quality dimensions have a mediating impact on the manifestation of workarounds via user satisfaction. Hence, not only the lack of functions or ill-designed routines influence the manifestation of workarounds, but also the quality of an IS in terms of information. From this point of view, we conclude that not only process design is a breeding ground for workarounds, but also the lack of alignment of the information, as an output of an IS, with work routines. In other words, it is not only the poor design of technology, the information itself, or processes that leads to the manifestation of workarounds, but also the alignment between information and work routines is important. This aspect has been highlighted by work system theory (Alter, 2013) and our study contributes by differentiating between these two aspects of information quality and by analyzing their influence on the manifestation of workarounds.

In addition, the consequences of the manifestation of workarounds remain rather unclear (Alter, 2014). While our study provides evidence that workarounds are negatively related to net benefits, the literature discusses whether workarounds are positive or negative (see Table 1). Our results indicate that when a system is in place for a while, workarounds are negatively related to net benefits. Especially the negative form of workarounds diminishes the positive effect an organization expects from an IS when it is not used as intended and designed (Boudreau & Robey, 2005; Gasparas & Monteiro, 2009). However, several researchers have revealed the positive effects of workarounds, identifying workarounds as a necessary activity in everyday life to make a technology work in practice (Gasparas & Monteiro, 2009) and a normal part of an IS implementation process (Safadi & Faraj, 2010). These approaches show that workaround can be positive in the implementation or early usage phases of an IS lifecycle. Our approach does not contradict these approaches, but do indicate that when a system is in place for a while, workarounds are negatively related to individual net benefits. Hence, we contribute to workaround literature by showing that workarounds have a negative effect when an IS has already been implemented and used for a while.

Contextual and representational information quality as an antecedent of user satisfaction

In terms of drivers of user satisfaction we focus on the well-known constructs of information, system and service quality (Petter *et al*, 2013). In addition, based on our interview-based study and in line with work system theory (Alter, 2006, 2013), we differentiate between the *representational information quality* and *contextual information quality* dimension of information quality aspects.

From an IS literature point of view the phenomena of less satisfied employees manifesting workarounds might be explained by research focusing on the IS success model (Petter *et al*, 2013), as discussed in the theoretical background section. The IS success model focuses on the usage of or satisfaction with IT by individuals and, hence, certainly helps explain the manifestation of workarounds. Nonetheless, it uses a widely accepted definition of IS as technical artifacts. As Alter (2013) highlights, the DeLone and McLean IS success model treats an IS as a technical artifact or, as Alter (2013, p. 73) puts it, as "*a thing that is used*". This definition to some extent restricts the scope of major IS research topics to how ISs operate in organizations, how they are implemented, what determines their success or failure (Alter, 2013). Hence, a "*system-as-technical-artifact and use-of-technology*" (Alter, 2013, p. 73) perspective shifts the focus away from essential, non-technical aspects that might be the cause of IS success or failure. The sources of end-user satisfaction with an IS are either related to the technology or to the information used in work routines within a work system. Hence, the contribution of this research is to explain end-user satisfaction and workarounds in the context of ECM by suggesting that information quality should be differentiated into the representational quality in terms of the information itself and the contextual quality in terms of the task-information fit representing the usage of information in work routines within a work system.

For the organization our study targeted, we conclude that contextual and representational information quality has a strong impact on workaround prevalence. In our study we reveal that user satisfaction is driven more strongly by how well the information can be used within organizational processes and individual working routines than by representational characteristics of the information itself. Therefore, in addition to a technology focus on end-user acceptance or resistance as provided by many research studies (e.g., Petter *et al*, 2012; Williams *et al*, 2009), the acceptance of technology in organizations requires a focus on how well the information fits organizational processes and working routines. This is in line with general research analyzing the fit of corporate practices with several aspects of an organization (Ansari *et al*, 2010). In this context adaptation behavior is explained as a response to a lack of fit, especially including technical, cultural, and political fit (Ansari *et al*, 2010). We contribute to this discussion that the fit of information with work routines is also important in preventing employees from using workarounds to avoid using an IS. It is also in line with prior research that proposes different dimensions of information quality (Alter, 2006; Lee *et al*, 2002). In this context, we reveal through our empirical study that the effect of different information quality dimensions can be different for user

satisfaction, such that differentiating between different dimensions is appropriate to identify the most important one for the respective context.

Future studies focusing on IS in organizations should consider this aspect to extend the understanding of success and failure of IS (Dwivedi *et al*, 2014). Moreover, also organizations can benefit from this differentiation. Based on our results, organizations confronted with less satisfied employees using workarounds can analyze to what degree the representational or the contextual information quality are contributing to this behavior. If the representational quality is perceived as a threat and workarounds are manifested, organizations should redesign the format of the information to make it easier to understand or improve its consistency (Alter, 2006). However, if contextual information quality is perceived as negative, as in this case, organizations should instead improve the fit of information provided with work routines. In the case observed in this study, contextual information quality and system quality were the two major determinants of the manifestation of workarounds. Hence, based on our analysis, we recommended to the organization where we did our study to alter the design of their ECM system to fit implemented organizational processes.

Designing and managing ECM systems in organizations

Besides contributing to IS research in general, our study also contributes to a new stream of research on ECM, the empirical domain of our research. Research focusing on ECM has identified a need for a comprehensive conceptualization of ECM and a lack of studies on ECM users' perceptions of these systems (Alalwan, 2012; Grahlmann *et al*, 2011; Paivarinta & Munkvold, 2005; Tyrväinen *et al*, 2006).

Regarding the management of ECM in an organization, our results reveal the manifestation of workarounds are associated with less net benefits. Hence, an organization should focus on diminishing the workarounds and fostering the usage of the ECM system. Measures to increase ECM system usage can help derive positive effects in terms of individual net benefits and avoid the net negative impact of workarounds on the benefits for the individual.

Moreover, the lack of studies on users' perceptions of ECM leaves organizations without any advice on how to ensure the acceptance and continuous usage of ECM systems by target ECM users. Our results shed light on the frequently neglected user perspective in ECM research (Alalwan, 2012; Grahlmann *et al*, 2011), providing an empirically based explanation of the factors that trigger ECM user satisfaction and, in its absence, the manifestation of workarounds. As summarized above, end-user satisfaction can be explained in relation to various characteristics of ECM in terms of contextual information quality, representational information quality, system quality, and service quality. The evaluated significant factors can guide organizations as they (re)design ECM to focus on the characteristics that influence end-user satisfaction and workaround behavior the most. By differentiating contextual and representational information quality in order to explain ECM user satisfaction, we can conclude that contextual information quality is critical. For organizations designing ECM, this implies that efforts must be made to ensure that the information provided by an ECM system is aligned with organizational elements. The dimensions of information quality which are important in an organization need to be analyzed first before interventions are implemented. Our results provide the foundation for this analysis as organizations are able to differentiate between the different information quality dimensions and consequently can implemented appropriate interventions to increase user satisfaction and to avoid the manifestation of workarounds.

In the context of the financial service provider, contextual information quality has been revealed as more important than representational information quality. Based on the results of our analysis, a process-oriented approach to designing ECM to structure previously unstructured information for each organizational process or working routine has been implemented. In order to align information with work routines, the newly ECM system has implemented a dynamic information delivery model based on the process architecture of the organization or, in the case of the sales-orientated organizational structure of the financial service provider, on the different products and the corresponding processes. Hence, a process-oriented ECM approach has been developed to align information with the business processes of an organization as the distinction between two dimensions of information quality and the resulting empirical results have revealed contextual information quality as one of the major threats for ECM system users (for details of the implemented information delivery approach see Laumer *et al*, 2015b).

Limitations and future research

Our approach is limited by several factors. First of all, the implications are derived from a single study of one system in one particular organization at one point in time. Hence, the results of the empirical study only represent a snapshot of employees' perceptions at the point of time the study was conducted. However, we spent several months within the organization collecting insights following qualitative research methods to deepen our understanding of the empirical results. We are therefore confident that the snapshot represents a broad employee point of view. Furthermore, conclusions can only be drawn for the observed IS and organization. Additional studies are needed to determine whether the results can be transferred to other systems in different organizational settings. The results might be different for other IS in industry organizations or at organizations of different sizes in different cultural settings. Furthermore, the results might also differ with more authors providing

information compared to small number of authors in the organization we focused on. For example, we only identified contextual and representational information quality as dimensions of information quality. Depending on the context, there might be additional dimensions of information quality which we were not able to identify based on our single case study. Second, our study is limited by the selection of dimensions of contextual and representational information, system, and service quality. Based on our several-month survey period and intensive literature analysis, we selected several dimensions for each quality construct that we considered most appropriate based on the evidence available from our interview-based study. Nonetheless, there might be additional factors which are also important which were not included in our research model. Future research might identify further characteristics for the four quality constructs to provide an extended measurement model for contextual and information quality. Nevertheless, the R^2 of our dependent variable indicates that the selected characteristics explain employee satisfaction to a significant extent. Third, we only focused on ECM characteristics within our model and neglected factors related to the environment or the individual, such as social influence. Future research might control for these factors in additional studies. Fourth, the R^2 of workarounds and net benefits is rather low, indicating that there may be additional explanations for these variables. Hence, we are limited by not controlling for different factors influencing these variables. However, as we were more interested in whether satisfaction is a determinant of workarounds and whether workarounds are associated with net benefits, we focused on the evaluated path coefficients (β-values). Nonetheless, we would like to encourage future research to identify additional drivers for the manifestation of workarounds and control their impact using the newly proposed variable and comparing it to the observed effect of satisfaction. Fifth, we only applied perceptual measures for the variables of our research model. Especially for the newly proposed measurement model of the manifestation of workarounds, additional psychometric validity might extend the development of this measurement model for future research studies. Sixth, we only assumed linear relationships between our constructs and did not test for non-linear relationships. This might limit our results as there might be interaction effects between different constructs not theorized and tested in this paper. Seventh, from a methodology perspective, our approach is limited as we have only used two-item constructs for some of our second-order variables. This fact is based on the discussion of the questionnaire with managers of the organization. As some items of the constructs used are very similar, the organization asked us to remove these to avoid participant confusion. Eighth, we only used post-survey methods to identify the extent of CMB. We acknowledge the critique by Chin *et al* (2012) of the CMB test we used and the recommendation to use additional approaches to avoid CMB. With our approach, we not only tested for CMB with the methods used, but we also used additional qualitative methods like interviews to better understand the results of our empirical work. The results of the interviews are in line with the observed results of our empirical study. Although the tests we used did not reveal any signs indicating CMB in our dataset, Chin *et al* (2012) conclude that some probability remains that our results might be affected by CMB.

Conclusion

Based on the fact that information is a crucial aspect of work in organizations, this research suggests by focusing on ECM system providing information to employees that information quality as known from the IS success model should be divided into two dimensions: representational quality of information and contextual quality of information, i.e., the alignment of information with work routines. Based on our empirical analysis investigating an ECM system, we can conclude that both aspects are important in determining end-user satisfaction, which in turn influences the manifestation of workarounds. Hence, we conclude that when investigating large-scale IS like an ECM system, this differentiation should be considered to understand end-user satisfaction and the resulting manifestation of workarounds in more detail and to provide organizations the base for implementing the most appropriate countermeasures.

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References

Alalwan JA (2012) Enterprise content management research: a comprehensive review. *Journal of Enterprise Information Management* **25(5)**, 441–461, doi: 10.1108/17410391211265133.

Alter S (2006) The work system method: connecting people, processes, and IT for business results. Work System Press.

Alter S (2013) Work system theory: overview of core concepts, extensions, and challenges for the future. *Journal of the Association for Information Systems* **14(2)**, 1.

Alter S (2014) Theory of workarounds. *Communications of the Association for Information Systems* **34(1)**, 55.

Ansari SM, Fiss PC and Zajac EJ (2010) Made to fit: How practices vary as they diffuse. *Academy of Management Review* **35(1)**, 67–92.

Ash JS, Berg M and Coiera E (2004) Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. *Journal of the American Medical Informatics Association* **11(2)**, 104–112.

Azad B and King N (2008) Enacting computer workaround practices within a medication dispensing system. *European Journal of Information Systems* **17(3)**, 264–278, doi: 10.1057/ejis.2008.14.

Azad B and King N (2011) Institutionalized computer workaround practices in a Mediterranean country: an examination of two organizations. *European Journal of Information Systems* **21(4)**, 358–372, doi: 10.1057/ejis.2011.48.

Bagozzi RP (1979) The role of measurement in theory construction and hypothesis testing: toward a holistic model. *Conceptual and theoretical developments in marketing* **8**, 15–32.

Baron RM and Kenny DA (1986) The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* **51(6)**, 1173.

Beath C, Becerra-Fernandez I, Ross J and Short J (2012) Finding value in the information explosion. *MIT Sloan Management Review* **53(4)**, 18.

Bhattacherjee A (2001) Understanding information systems continuance: an expectation-confirmation model. *MIS Quarterly* **25(3)**, 351–370.

Bhattacherjee A and Hikmet N (2007) Physicians' resistance toward healthcare information technology: a theoretical model and empirical test. *European Journal of Information Systems* **16(6)**, 725–737.

Böhn M (2014) The market for ECM software. In *Enterprise Content Management in Information Systems Research* (Vom Brocke J and Simons A, Eds), pp. 23–36, Springer, Berlin.

Boudreau M-C and Robey D (2005) Enacting integrated information technology: a human agency perspective. *Organization Science* **16(1)**, 3–18.

Brazel JF and Dang L (2008) The effect of ERP system implementations on the management of earnings and earnings release dates. *Journal of Information Systems* **22(2)**, 1–21.

Brislin RW (1970) Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology* **1(3)**, 185–216, doi: 10.1177/135910457000100301.

Broadhurst K, Wastell D, White S, Hall C, Peckover S, Thompson K, Pithouse A and Davey D (2009) Performing 'initial assessment': identifying the latent conditions for error at the front-door of local authority children's services. *British journal of social work*.

Campbell DT and Fiske DW (1959) Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin* **56(2)**, 81–105, doi: 10.1037/h0046016.

Carmines EG and Zeller RA (1979) *Reliability and Validity Assessment*. Sage Publications, Beverly Hills, Calif.

Chang JC-J and King WR (2005) Measuring the Performance of Information Systems: A Functional Scorecard. *Journal of Management Information Systems* **22(1)**, 85.

Chin WW (1998a) Commentary: issues and opinion on structural equation modeling. *MIS Quarterly* **22(1)**, 7–16, doi: 10.2307/249674.

Chin WW (1998b) The partial least squares approach to structural equation modeling. In *Modern Methods for Business Research* (Marcoulides GA, Ed), pp. 295–336, Erlbaum, Mahwah, NJ.

Chin WW, Gopal A and Salisbury WD (1997) Advancing the Theory of adaptive structuration: the development of a scale to measure faithfulness of appropriation. *Information Systems Research* **8(4)**, 342–367, doi: 10.1287/isre.8.4.342.

Chin WW, Thatcher JB and Wright RT (2012) Assessing common method bias: problems with the ULMC technique. *MIS Quarterly* **36(3)**, 1003.

Cohen J (1988) *Statistical Power Analysis for the Behavioral Sciences*. L. Erlbaum Associates, Hillsdale, N.J.

Cvach M (2012) Monitor alarm fatigue: an integrative review. *Biomedical Instrumentation & Technology* **46(4)**, 268–277.

Davison RM and Ou CXJ (2013) Sharing knowledge in technology deficient environments: individual workarounds Amid corporate restrictions. *Proceedings of the 2013 European Conference on Information Systems*.

Delone W and Mclean E (1992) Information systems success: the quest for the dependent variable. *Information Systems Research* **3(1)**, 60–95, doi: 10.1287/isre.3.1.60.

Delone W and Mclean E (2003) The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems* **19(4)**, 9–30.

Dwivedi YK, Wastell D, Laumer S, Henriksen HZ, Myers MD, Bunker D, Elbanna A, Ravishankar MN and Srivastava SC (2014) Research on information systems failures and successes: status update and future directions. *Information Systems Frontiers,* doi: 10.1007/s10796-014-9500-y.

Eckhardt A, Laumer S and Weitzel T (2009) Who influences whom? Analyzing workplace referents' social influence on IT adoption and non-adoption. *Journal of Information Technology* **24(1)**, 11–24, doi: 10.1057/jit.2008.31.

Ferneley EH and Sobreperez P (2006) Resist, comply or workaround? An examination of different facets of user engagement with information systems. *European Journal of Information Systems* **15(4)**, 345–356, doi: 10.1057/palgrave.ejis.3000629.

Flanagan JC (1954) The critical incident technique. *Psychological Bulletin* **51(4)**, 327.

Fornell C and Larcker DF (1981) Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* **18(1)**, 39–50, doi: 10.2307/3151312.

Gable GG, Sedera D and Chan T (2008) Re-conceptualizing information system success: the IS-impact measurement model. *Journal of the Association for Information Systems* **9(7)**, 1–32.

Gasparas J and Monteiro E (2009) Cross-contextual use of integrated information systems. *Proceedings of the 2009 European Conference on Information Systems*.

Gasser L (1986) The integration of computing and routine work. *ACM Transactions on Information Systems* **4(3)**, 205–225, doi: 10.1145/214427.214429.

Gilbert MR, Shegda KM, Chin K, Tay G and Koehler-Kruener H (2013) Magic quadrant for enterprise content management.

Grahlmann KR, Helms RW, Hilhorst C, Brinkkemper S and Van Amerongen S (2011) Reviewing enterprise content management: a functional framework. *European Journal of Information Systems* **21(3)**, 268–286, doi: 10.1057/ejis.2011.41.

Gremler DD (2004) The critical incident technique in service research. *Journal of Service Research* **7(1)**, 65–89, doi: 10.1177/1094670504266138.

Hair JF (2010) *Multivariate Data Analysis*. Prentice Hall, Upper Saddle River, NJ.

Hair JF (2014) *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage, Thousand Oaks (California) [etc.].

Halbesleben JRB, Savage GT, Wakefield DS and Wakefield BJ (2010) Rework and workarounds in nurse medication administration process. *Health Care Management Review* **35(2)**, 124–133, doi: 10.1097/HMR.0b013e3181d116c2.

Harman HH (1976) *Modern Factor Analysis*. University of Chicago Press, Chicago.

Henseler J, Ringle CM and Sarstedt M (2015) A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 1–21.

Hulland J (1999) Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal* **20(2)**, 195–204, doi: 10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7.

Ignatiadis I and Nandhakumar J (2009) The effect of ERP system workarounds on organizational control: An interpretivist case study. *Scandinavian Journal of Information Systems* **21(2)**, 3.

Iivari J (2005) An empirical test of the DeLone-McLean model of information system success. *ACM SIGMIS Database* **36(2)**, 8–27, doi: 10.1145/1066149.1066152.

Joshi K (1991) A model of users' perspective on change: the case of information systems technology implementation. *MIS Quarterly* **15(2)**, 229, doi: 10.2307/249384.

Kim H-W and Kankanhalli A (2009) Investigating user resistance to information systems implementation: A status quo bias perspective. *MIS Quarterly* **33(3)**, 567–582.

Kim SS (2009) The integrative framework of technology use: an extension and test. *MIS Quarterly* **33(3)**, 513–538.

Klaus T and Blanton JE (2010) User resistance determinants and the psychological contract in enterprise system implementations. *European Journal of Information Systems* **19(6)**, 625–636, doi: 10.1057/ejis.2010.39.

Klaus T, Wingreen SC and Blanton JE (2010) Resistant groups in enterprise system implementations: a Q-methodology examination. *Journal of Information Technology* **25(1)**, 91–106, doi: 10.1057/jit.2009.7.

Koopman P and Hoffman R (2003) Work-arounds, make-work, and kludges. *IEEE Intelligent Systems* **18(6)**, 70–75, doi: 10.1109/MIS.2003.1249172.

Koplowitz R, Rymer JR, Hammond JS and Brown V (2013) SharePoint enters its awkward teenage years. Customer struggles with social, cloud, and mobile signal A transition.

Koppel R, Wetterneck T, Telles JL and Karsh B-T (2008) Workarounds to barcode medication administration systems: their occurrences, causes, and threats to patient safety. *Journal of the American Medical Informatics Association* **15(4)**, 408–423.

Landis JR and Koch GG (1977) The measurement of observer agreement for categorical data. *Biometrics* **33(1)**, 159, doi: 10.2307/2529310.

Lapointe L and Rivard S (2005) A multilevel model of resistance to information technology implementation. *MIS Quarterly* 29(3).

Laumer S (2016) Information quality dimensions: two exploratory case studies with enterprise content management system users. In *24th European Conference on Information Systems, Paper 141*, Istanbul, Turkey.

Laumer S, Beimborn D, Maier C and Weinert C (2013) Enterprise Content Management. *Business & Information Systems Engineering* **5(6)**, 449–452, doi: 10.1007/s12599-013-0291-3.

Laumer S, Maier C, Eckhardt A and Weitzel T (2014) Why are they grumbling about my new system? Theoretical foundation and empirical evidence of employee grumbling as a user resistance behavior. *Proceedings of the 2014 International Conference on Information Systems*.

Laumer S, Maier C, Eckhardt A and Weitzel T (2015a) User personality and resistance to mandatory information systems in organizations. A theoretical model and empirical test of dispositional resistance to change. *Journal of Information Technology* **31(1)**, 67–82, doi: 10.1057/jit.2015.17.

Laumer S, Maier C, Eckhardt A and Weitzel T (2016) Work routines as an object of resistance during information systems implementations. Theoretical foundation and empirical evidence. *European Journal of Information Systems* **25(4)**, 317–343, doi: 10.1057/ejis.2016.1.

Laumer S, Maier C and Weitzel T (2015b) Successfully implementing enterprise content management: lessons learnt from a financial service provider. In *Proceedings of the 36th International Conference on Information Systems* (ICIS 2015), Fort Worth, Tx, USA.

Lee YW, Strong DM, Kahn BK and Wang RY (2002) AIMQ: a methodology for information quality assessment. *Information & Management* **40(2)**, 133–146, doi:10.1016/S0378-7206(02)00043-5 .

Liang H, Saraf N, Hu Q and Xue Y (2007) Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. *MIS Q* **31(1)**, 59–87.

Maier C, Laumer S, Eckhardt A and Weitzel T (2013) Analyzing the impact of HRIS implementations on HR personnel's job satisfaction and turnover intention. *The Journal of Strategic Information Systems* **22(3)**, 193–207, doi: 10.1016/j.jsis.2012.10.003.

Maier C, Laumer S, Eckhardt A and Weitzel T (2015a) Giving too much social support: social overload on social networking sites. *European Journal of Information Systems* **24(5)**, 447–464, doi: 10.1057/ejis.2014.3.

Maier C, Laumer S, Weinert C and Weitzel T (2015b) The effects of technostress and switching stress on discontinued use of social networking services: a study of Facebook use. *Information Systems Journal* **25(3)**, 275–308, doi: 10.1111/isj.12068.

Marakas GM and Hornik S (1996) Passive resistance misuse: overt support and covert recalcitrance in IS implementation. *European Journal of Information Systems* **5(3)**, 208–219, doi: 10.1057/ejis.1996.26.

Markus ML (1983) Power, politics, and MIS implementation. *Communications of the ACM* **26(6)**, 430–444, doi: 10.1145/358141.358148.

Martinko MJ, Zmud RW and Henry JW (1996) An attributional explanation of individual resistance to the introduction of information technologies in the workplace. *Behaviour & Information Technology* **15(5)**, 313–330, doi: 10.1080/014492996120085a.

Mcgann ST and Lyytinen K (2008) The improvisation effect: a case study of user improvisation and its effects on information system evolution. *Proceedings of the 2008 International Conference on Information Systems*.

Mckinney V, Yoon K and Zahedi FM (2002) The measurement of web-customer satisfaction: an expectation and disconfirmation approach. *Information Systems Research* **13(3)**, 296–315, doi: 10.1287/isre.13.3.296.76.

Nahm AY, Rao SS, Solis-Galvan LE and Ragu-Nathan TS (2002) The Q-sort method: assessing reliability and construct validity of questionnaire items at a pre-testing stage. *Journal of Modern Applied Statistical Methods* 1(1 (Article 15)).

Nordheim S and Päivärinta T (2006) Implementing enterprise content management: from evolution through strategy to contradictions out-of-the-box. *European Journal of Information Systems* **15(6)**, 648–662, doi: 10.1057/palgrave.ejis.3000647.

Nunnally JC (1967) *Psychometric Theory*. McGraw-Hill, New York.

Paivarinta T and Munkvold B (2005) Enterprise content management: an integrated perspective on information management. In *Proceedings of*

the 38th Annual Hawaii International Conference on System Sciences, p. 96, IEEE.

Patterson ES, Rogers ML, Chapman RJ and Render ML (2006) Compliance with intended use of bar code medication administration in acute and long-term care: an observational study. *Human Factors: The Journal of the Human Factors and Ergonomics Society* **48(1)**, 15–22.

Pavlou PA, Liang H and Xue Y (2007) Understanding and mitigating uncertainty in online exchange relationships: a principal-agent perspective. *MIS Quarterly* **31(1)**, 105–136.

Petrides LA (2004) Costs and benefits of the workaround: inventive solution or costly alternative. *International Journal of Educational Management* **18(2)**, 100–108, doi: 10.1108/09513540410522234.

Petter S, Delone W and Mclean E (2008) Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems* **17(3)**, 236–263, doi: 10.1057/ejis.2008.15.

Petter S, Delone W and Mclean E (2012) The past, present, and future of "IS success". *Journal of the Association for Information Systems* **13(5)**, 341–362.

Petter S, Delone W and Mclean E (2013) Information systems success: the quest for the independent variables. *Journal of Management Information Systems* **29(4)**, 7–62, doi: 10.2753/MIS0742-1222290401.

Pfaffenberger B (1992) Technological dramas. *Science, Technology & Human Values* **17(3)**, 282–312.

Pitt LF, Watson RT and Kavan CB (1995) Service quality: a measure of information systems effectiveness. *MIS Quarterly* **19(2)**, 173, doi: 10.2307/249687.

Podsakoff PM, Mackenzie SB, Lee J-Y and Podsakoff NP (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology* **88(5)**, 879–903, doi: 10.1037/0021-9010.88.5.879.

Polites GL and Karahanna E (2012) Shackled to the status quo: the inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. *MIS Quarterly* **36(1)**, 21.

Polites GL, Roberts N and Thatcher J (2012) Conceptualizing models using multidimensional constructs: a review and guidelines for their use. *European Journal of Information Systems* **21(1)**, 22–48.

Pollock N (2005) When is a work-around? Conflict and negotiation in computer systems development. *Science, Technology & Human Values* **30(4)**, 496–514.

Ragu-Nathan TS, Tarafdar M, Ragu-Nathan BS and Tu Q (2008) The consequences of technostress for end users in organizations: conceptual development and empirical validation. *Information Systems Research* **19(4)**, 417–433, doi: 10.1287/isre.1070.0165.

Rai A, Lang SS and Welker RB (2002) Assessing the validity of IS success models: an empirical testand theoretical analysis. *Information Systems Research* **13(1)**, 50–69, doi: 10.1287/isre.13.1.50.96.

Richins ML (1987) A multivariate analysis of responses to dissatisfaction. *Journal of the Academy of Marketing Science* **15(3)**, 24–31.

Ringle CM, Wende S and Becker J-M (2015) SmartPLS 3. SmartPLS GmbH.

Rivard S and Lapointe L (2012) Information technology implementers' responses to user resistance: nature and effects. *MIS Quarterly* **36(3)**, 897.

Russell B (2007) 'You Gotta lie to IT': software applications and the management of technological change in a call centre. *New Technology, Work and Employment* **22(2)**, 132–145.

Safadi H and Faraj S (2010) The role of workarounds during an opensource electronic medical record system implementation. *Proceedings of the 2010 International Conference on Information Systems*.

Salisbury WD, Chin WW, Gopal A and Newsted PR (2002) Research report: Better theory through measurement-developing a scale to capture consensus on appropriation. *Information Systems Research* **13(1)**, 91–103, doi: 10.1287/isre.13.1.91.93.

Selander L and Henfridsson O (2012) Cynicism as user resistance in IT implementation. *Information Systems Journal* **22(4)**, 289–312, doi: 10.1111/j.1365-2575.2011.00386.x.

Strong DM and Miller SM (1995) Exceptions and exception handling in computerized information processes. *ACM Transactions on Information Systems (TOIS)* **13(2)**, 206–233.

Strong DM and Volkoff O (2010) Understanding organization-enterprise system fit: a path to theorizing the information technology artifact. *MIS Quarterly* **34(4)**, 731–756.

Truex D, Baskerville R and Travis J (2000) Amethodical systems development: the deferred meaning of systems development methods. *Accounting, management and information technologies* **10(1)**, 53–79.

Turel O (2014) Quitting the use of habituated hedonic information systems. *European Journal of Information Systems*.

Tyrväinen P, Päivärinta T, Salminen A and Iivari J (2006) Characterizing the evolving research on enterprise content management. *European Journal of Information Systems* **15(6)**, 627–634, doi: 10.1057/palgrave.ejis.3000648.

Venkatesh V, Morris M, Davis G and Davis FD (2003) User acceptance of information technology: toward a unified view. *MIS Quarterly* **27(3)**, 425–478.

Vogelsmeier AA, Halbesleben JR and Scott-Cawiezell JR (2007) Technology implementation and workarounds in the nursing home. *Journal of the American Medical Informatics Association* **15(1)**, 114–119, doi: 10.1197/jamia.M2378.

Volkoff O, Strong DM and Elmes MB (2007) Technological embeddedness and organizational change. *Organization Science* **18(5)**, 832–848, doi: 10.1287/orsc.1070.0288.

Vom Brocke J, Simons A, Herbst A, Derungs R and Novotny S (2011) The business drivers behind ECM initiatives: a process perspective. *Business Process Management Journal* **17(6)**, 965–985, doi: 10.1108/14637151111182710.

Vom Brocke J, Sonnenberg C and Buddendick C (2014) Justifying ECM investments with the return on process transformation: the case of an ECM-driven transformation of sales processes at Hilti Corporation. In Enterprise Content Management in Information Systems Research (Vom Brocke J and Simons A, Eds), pp. 255–277, Springer, Berlin.

Williams LJ, Edwards JR and Vandenberg RJ (2003) Recent advances in causal modeling methods for organizational and management research. *Journal of Management* **29(6)**, 903–936, doi: 10.1016/S0149-2063_03_00084-9.

Williams MD, Dwivedi YK, Lal B and Schwarz A (2009) Contemporary trends and issues in IT adoption and diffusion research. *Journal of Information Technology* **24(1)**, 1–10, doi: 10.1057/jit.2008.30.

Wixom BH and Todd PA (2005) A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research* **16(1)**, 85–102, doi: 10.1287/isre.1050.0042.

Wright RT, Campbell DE, Thatcher JB and Roberts N (2012) Operationalizing multidimensional constructs in structural equation modeling: recommendations for IS Research. *Communications of the Association for Information Systems* **30(1)**, 23.

Zeelenberg M and Pieters R (2004) Beyond valence in customer dissatisfaction: a review and new findings on behavioral responses to regret and disappointment in failed services. *Journal of Business Research* **57(4)**, 445–455.

Appendix A: Item development for workarounds

We develop and validate measurement items for workarounds in four steps in line with methods used in prior research developing new scales and developing new items systematically and rigorously (e.g., Chin *et al*, 1997; Maier *et al*, 2015a; Ragu-Nathan *et al*, 2008; Salisbury *et al*, 2002).

Step 1: Item development

In a first step, we scanned the recent literature discussing user resistance behavior (see Table A9 for an overview). In this step, we identified some user resistance behaviors related to IS implementations and developed an initial set of items for the proposed variable. We focused especially on those papers taking qualitative approaches to identify workarounds and used the example

Table A1 Items of workarounds and q-sorting results (items below 0.61 are removed, here: WA-5)

ID	*Item*	*q-sorting (correct assignment)*
WA-1	I always look for ways to avoid using the system.	0.89
WA-2	Instead of using the system, I often use alternatives.	0.92
WA-3	I use alternatives instead of the intended system I should use.	0.92
WA-4	I avoid using the system whenever I can.	0.87
WA-5	Using alternatives instead of the system is an obvious choice for me.	0.60

WA: Workaround.

statements provided to define a first set of items for a variable that can capture the manifestation of workarounds in an empirical study.

In parallel, we also interviewed 20 employees in the target organization (see methodology section) to (a) identify examples of users' workarounds in the organization and (b) identify the drivers and consequences of workaround behavior. Based on our analysis of the literature and the interviews, we developed a pool of items as illustrated in Table A1.

Step 2: Assessing reliability and construct validity of the new items

Using q-sorting, we tested the reliability and validity of the new proposed items (Landis and Koch, 1977; Nahm *et al*, 2002) inviting 39 students from our university to participate in a q-sorting test. We developed a list of items including the newly developed ones for workarounds, items proposed by Kim & Kankanhalli (2009) and by Laumer *et al* (2014) for different user resistance behaviors. We included the existing ones as it is recommended by q-sorting to include items of similar constructs. Hence, items of two established user resistance constructs were included alongside the newly developed ones for workarounds. Moreover, we created an introductory statement defining each variable and instructions how to proceed. In the test, each individual read the introductory statement and assigned each item to one of the three constructs. Based on the assignment, we calculated ratios to evaluate the number of individuals matching the items to the correct variable. Using these results, we removed each item (WA-5) which was assigned by less than 61%, as suggested by prior research (Landis and Koch, 1977).

Step 3: Exploratory and confirmatory factor analysis

Using the remaining items of step 2, we conducted an additional survey in an organization focusing on another ECM system, as described above. The purpose of this survey was to collect data for an exploratory and confirmatory factor analysis to further evaluate the validity and reliability of the items for the new constructs. Therefore, a questionnaire was developed focusing on ECM usage, workarounds, user resistance, and several perceptions of the ECM in the organization. The data collected were used to conduct an exploratory factor analysis using SPSS 22. For this test, we used the newly developed items and the ones proposed for user resistance (Kim & Kankanhalli, 2009) and employee grumbling (Laumer *et al*, 2014). Our results reveal a three-factor structure. In a second step, the dataset was used to perform a confirmatory factor analysis using SPSS 23. Both steps revealed the same factor structured as illustrated in Table A2.

Table A2 Factor analysis

	Component		
	Intention to resist (ITR)	*Employee grumbling (EG)*	*Workarounds (WA)*
ITR-1	0.704		
ITR-2	0.803		
ITR-3	0.835		
ITR-4	0.745		
EG-1		0.765	
EG-2		0.708	
EG-3		0.802	
WA-1			0.834
WA-2			0.734
WA-3			0.765
WA-4			0.821

Factor loadings below 0.4 are not displayed in the table. We used Varimax method for rotation and Eigenwert 1 for the explorative factor analysis.

ITR: Intention to resist (4 items based on Kim & Kankanhalli, 2009).

EG: Employee grumbling (3 items based on Laumer *et al*, 2014).

WA: Workarounds (4 items based on steps 1 and 2).

Step 4: Construct reliability and discriminant validity

In a next step, we focused on the reliability and discriminant validity of the newly proposed measurement model of workarounds, calculating Cronbach's alpha for the remaining variables of step 3. The resulting value of 0.82 indicates a good construct reliability of the newly developed measurement model for workarounds (Hair, 2010; Nunnally, 1967). Furthermore, we performed again an explorative factor analysis to ensure convergent and discriminant validity. In this step, each item was assigned to the intended construct, confirming convergent and discriminant validity.

In summary, the measurement development process resulted in four items, which were used for the newly proposed variable of workarounds in validating the proposed research model.

Table A3 q-sorting results

	Representational information quality (%)	*Contextual information quality (%)*	*No assignment (%)*
Consistency	16.7	77.8	5.5
Format	0.0	100.0	0.0
Understandability	5.6	88.8	5.6
Completeness	83.3	16.7	0.0
Relevance	88.8	5.6	5.6
Timeliness	77.8	16.7	5.5
Usefulness	94.4	0.0	5.6

Appendix B: Discriminant validity of contextual and representational information quality

To further test the discriminant validity of contextual and representational information quality, additional studies were conducted. The purpose of these studies was to collect data for both a q-sorting study and an exploratory and confirmatory factor analysis to further evaluate the validity and reliability of the two information quality dimensions.

Using q-sorting, we tested the reliability and validity of the proposed information quality dimensions (Landis & Koch, 1977; Nahm *et al*, 2002) inviting 28 students from our university to participate in a q-sorting test. We included the characteristics identified in our qualitative study. We created an introductory statement defining the two dimensions and instructions how to proceed. In the test, each individual read the introductory statement and assigned each characteristic to one of the two dimensions. Based on the assignment, we calculated ratios to evaluate the number of individuals matching the items to the correct dimensions. As no characteristic was assigned by less than 61%, we conclude that the assignment of the characteristics to the two information quality dimensions is reliable and valid as suggested by prior research (Landis & Koch, 1977).

Furthermore, we also ran a factor analysis with the data collected in the main study of this paper. Also these tests reveal a two-factor structure using the characteristics identified in our qualitative study. Consequently, we include this structure in the main study to analyze the effect of representational and contextual information quality on the manifestation of workarounds.

Appendix C: Measurement items

Table A4 summarizes the definition for each quality characteristic used in our survey instrument.

Table A4 Definition of quality characteristics

Variable	*Characteristics*	*Definition*
System quality	Complexity	The perception that IS complexity causes inconsistent outcomes and the need for expert support.
	Flexibility	Perception of the ease of changing the IS to meet changing business needs.
	Navigation	Perception of the ease of navigating through IS and of searching for information.
	Usability	Perception of the extent to which the IS is visually appealing, consistent, fun and easy to use.
Service quality	Service reliability	Perception of the degree of the accuracy, dependability and consistency of the services provided to use an IS.
	Service responsiveness	Perception of the degree that prompt service is provided to IS users.
Representational information quality	Consistency	Perception that the information is always presented in the same format and is compatible with previous information.
	Format	Perception that the format of the information provided by an IS is simple, sufficient and adequate.
	Understandability	Perception that the information provided by an IS has clear meaning and is easy to comprehend.
Contextual information quality	Completeness	The perception that the information provided by an IS is complete, sufficient and adequate.
	Relevance	Perception of relevancy, clarity, applicability and strength of the information of an IS.
	Timeliness	Perception that the information is provided in a timely, adequate and reasonable manner by the IS.
	Usefulness	Perception that the information of an IS is informative, valuable and useful for the user.

Table A5 illustrates the measurement items used and the respecting loadings of each item for the respective construct.

Appendix D: Measurement model validation

Table A6 illustrates the reliability of the first-order constructs and the correlations between them.

Table A5 Measurement items and loadings

Construct	*Item*	*Loading*	*Reference*
Net benefits	The ECM system helps me to improve my job performance.	0.898	Iivari (2005)
	Using the ECM system improves my content-related work.	0.945	
	Using the ECM system increases my productivity.	0.931	
	Overall, using the ECM system enhances my content-related work.	0.955	
	The ECM system helps me to improve my work efficiency.	0.912	
Workarounds	I always look for ways to avoid using the system.	0.831	Self-developed (see Appendix A)
	Instead of using the system, I often use alternatives.	0.749	
	I use alternatives instead of the intended system I should use.	0.658	
	I avoid using the system whenever I can.	0.655	
Satisfaction	Overall, I am very satisfied with the ECM system.	0.928	Bhattacherjee (2001)
	Working with the ECM system is satisfactory.	0.947	
	Overall, I am satisfied with the ECM system.	0.900	
Contextual information quality			
Completeness	The ECM system provides me with complete information.	0.911	Wixom & Todd (2005)
	The ECM system produces comprehensive information.	0.924	
Relevance	Information within the ECM system is applicable.	0.887	McKinney *et al* (2002)
	Information with the ECM system is relevant for my job.	0.740	
	In general, information within the ECM system is relevant.	0.867	
Timeliness	The information provided within the ECM system is up-to-date.	0.896	Chang & King (2005)
	The information provided within the ECM system is received in a timely manner.	0.896	
Usefulness	Information within the ECM system is informative.	0.885	McKinney *et al* (2002)
	Information within the ECM system is valuable.	0.903	
Representational information quality			
Format	The information provided within the ECM system is well laid out.	0.926	Wixom & Todd (2005)
	The information provided within the ECM system clearly presented on the screen.	0.821	
Consistency	Information within the ECM system is accurate.	0.882	McKinney *et al* (2002)
	In general, information within the ECM system is reliable.	0.894	
Understandability	Within the ECM system, information is easy to comprehend.	0.944	Chang & King (2005)
	Within the ECM system, information that is clear in its meaning.	0.943	
System quality			
Complexity	The ECM system is too complex to handle appropriately.	0.630	Ragu-Nathan *et al* (2008)
	It is too complex to use the ECM system to search information.	0.915	
	I find it too complex to understand and use the ECM system.	0.905	
Flexibility	The ECM system can be adapted to meet a variety of needs.	0.911	Wixom & Todd (2005)
	The ECM system can flexibly adjust to new demands or conditions.	0.925	
Navigation	Within the ECM system it is easy to go back and forth between pages.	0.830	McKinney *et al* (2002)
	With a few clicks it is possible to locate the information in the ECM system.	0.925	
	In general, the ECM system is easy to navigate.	0.916	
Usability	The ECM system is easy to use.	0.944	McKinney *et al* (2002)
	In general, the ECM system is user-friendly.	0.939	

Table A5 ***(Continued)***

Construct	*Item*	*Loading*	*Reference*
Service quality			
Service reliability	When I have a problem with the ECM system, the IT department shows a sincere interest in solving it.	0.911	Pitt *et al* (1995)
	When I have a problem with the ECM system, the service provided by the IT department is dependable.	0.943	
	When I have a problem with the ECM system, the service provided is effective.	0.927	
Service responsiveness	When I have a problem with the ECM system, the service employees respond in a timely manner.	0.895	Chang & King (2005); Pitt *et al* (1995)
	When I have a problem with the ECM system, the service is completed in a timely manner.	0.956	
	When I have a problem with the ECM system, the services is provided in the time promised.	0.965	
Controls (single item)			
Age	How old are you?	i	
Gender	Are you male or female?	i	
Usage	How often do you use the ECM system?	i	

Table A6 First-order reliability, AVEs, and correlation of constructs

	AVE	Composite reliability	Cronbach's alpha	1	2	3	4.1	4.2	4.3	4.4	5.1
1 Net benefits	0.862	0.969	0.960	0.929							
2 Workaround	0.528	0.816	0.720	−0.431	0.727						
3 Satisfaction	0.856	0.947	0.915	0.650	−0.459	0.925					
4 Contextual information quality (2nd order construct)											
4.1 Completeness	0.842	0.914	0.809	0.491	−0.357	0.639	0.917				
4.2 Relevance	0.695	0.872	0.781	0.561	−0.368	0.672	0.596	0.834			
4.3 Timeliness	0.803	0.891	0.754	0.383	−0.337	0.454	0.622	0.595	0.896		
4.4 Usefulness	0.799	0.889	0.746	0.551	−0.391	0.701	0.702	0.773	0.620	0.894	
5 Representational information quality (2nd order construct)											
5.1 Format	0.767	0.867	0.707	0.429	−0.251	0.641	0.513	0.662	0.529	0.586	0.876
5.2 Consistency	0.788	0.882	0.726	0.385	−0.172	0.432	0.470	0.588	0.607	0.601	0.520
5.3 Understandability	0.890	0.942	0.876	0.512	−0.388	0.635	0.573	0.737	0.559	0.740	0.640
6 System quality (2nd order construct)											
6.1 Complexity	0.684	0.864	0.756	−0.422	0.431	−0.668	−0.395	−0.456	−0.327	−0.476	−0.525
6.2 Flexibility	0.842	0.914	0.812	0.592	−0.236	0.541	0.414	0.608	0.414	0.464	0.386
6.3 Navigation	0.795	0.921	0.868	0.348	−0.220	0.459	0.342	0.427	0.315	0.416	0.395
6.4 Usability	0.887	0.940	0.869	0.497	−0.471	0.749	0.428	0.556	0.387	0.509	0.556
7 Service quality (2nd order construct)											
7.1 Service reliability	0.859	0.948	0.916	0.394	−0.280	0.439	0.378	0.418	0.336	0.438	0.367
7.2 Service responsiveness	0.882	0.957	0.928	0.407	−0.304	0.515	0.396	0.415	0.302	0.428	0.364
8 Age		Single-item constructs		−0.071	0.038	−0.034	0.008	0.025	0.006	−0.046	−0.127
9 Gender				−0.009	−0.003	0.150	0.082	0.092	0.049	0.054	0.112
10 Usage				−0.270	0.184	−0.219	−0.078	−0.264	−0.147	−0.187	−0.177

	5.2	5.3	6.1	6.2	6.3	6.4	7.1	7.2	8	9	10
1 Net benefits											
2 Workaround											
3 Satisfaction											
4 Contextual information quality (2nd order construct)											
4.1 Completeness											
4.2 Relevance											
4.3 Timeliness											
4.4 Usefulness											
5 Representational information quality (2nd order construct)											
5.1 Format											
5.2 Consistency	0.888										
5.3 Understandability	0.552	0.943									
6 System quality (2nd order construct)											
6.1 Complexity	−0.215	−0.485	0.827								
6.2 Flexibility	0.294	0.460	−0.374	0.918							
6.3 Navigation	0.238	0.400	−0.513	0.371	0.892						

Table A6 *(Continued)*

	5.2	*5.3*	*6.1*	*6.2*	*6.3*	*6.4*	*7.1*	*7.2*	*8*	*9*	*10*
6.4 Usability	0.319	0.543	−0.600	0.536	0.492	0.942					
7 Service quality (2nd order construct)											
7.1 Service reliability	0.380	0.430	−0.324	0.331	0.303	0.341	0.927				
7.2 Service responsiveness	0.321	0.428	−0.380	0.337	0.399	0.403	0.849	0.939			
8 Age	−0.076	−0.040	0.044	−0.002	−0.062	−0.043	−0.051	−0.010	n.a.		
9 Gender	0.069	0.061	−0.115	0.151	0.021	0.126	0.092	0.062	0.091	n.a.	
10 Usage	−0.165	−0.192	0.091	−0.185	−0.159	−0.211	−0.130	−0.118	0.135	0.016	n.a.

Table A7 illustrates the cross-loadings of the items of the first-order constructs. The items are shown in Table A5 and are used in Table A7 in the same order as illustrated in Table A5.

Appendix E: ECM system vendors

Table A8 provides an overview of ECM software vendors.

Table A7 Cross-loadings (first-order constructs)

Item	*1*	*2*	*3*	*4.1*	*4.2*	*4.3*	*4.4*	*5.1*	*5.2*	*5.3*
1 Net benefits	*0.898*	−0.414	0.689	0.463	0.562	0.352	0.543	0.464	0.391	0.490
	0.945	−0.352	0.553	0.404	0.481	0.340	0.466	0.369	0.319	0.452
	0.931	−0.355	0.532	0.440	0.463	0.346	0.470	0.369	0.320	0.436
	0.955	−0.371	0.542	0.472	0.503	0.380	0.492	0.362	0.353	0.447
	0.912	−0.484	0.667	0.485	0.573	0.354	0.565	0.409	0.387	0.531
2 Workaround	−0.430	*0.831*	−0.453	−0.348	−0.426	−0.318	−0.459	−0.262	−0.313	−0.414
	−0.332	*0.749*	−0.351	−0.322	−0.234	−0.278	−0.242	−0.158	−0.077	−0.232
	−0.112	*0.658*	−0.214	−0.168	−0.137	−0.183	−0.134	−0.136	0.009	−0.183
	−0.265	*0.655*	−0.229	−0.123	−0.162	−0.151	−0.178	−0.130	0.026	−0.224
3 Satisfaction	0.562	−0.393	*0.928*	0.584	0.624	0.417	0.632	0.623	0.411	0.583
	0.612	−0.426	*0.947*	0.588	0.638	0.406	0.659	0.606	0.432	0.609
	0.632	−0.455	*0.900*	0.603	0.603	0.439	0.655	0.549	0.355	0.569
4 Contextual information quality (2nd order construct)										
4.1 Completeness	0.432	−0.362	0.563	*0.911*	0.539	0.520	0.635	0.425	0.387	0.543
	0.467	−0.297	0.609	*0.924*	0.555	0.618	0.653	0.513	0.472	0.510
4.2 Relevance	0.500	−0.333	0.663	0.557	*0.887*	0.529	0.642	0.664	0.479	0.640
	0.411	−0.241	0.366	0.311	*0.740*	0.319	0.488	0.346	0.423	0.400
	0.485	−0.330	0.588	0.561	*0.867*	0.586	0.766	0.566	0.558	0.739
4.3 Timeliness	0.336	−0.267	0.407	0.545	0.567	*0.896*	0.540	0.480	0.606	0.468
	0.349	−0.337	0.406	0.569	0.498	*0.896*	0.572	0.468	0.481	0.534
4.4 Usefulness	0.531	−0.354	0.596	0.528	0.736	0.486	*0.885*	0.464	0.506	0.637
	0.459	−0.346	0.656	0.718	0.652	0.617	*0.903*	0.578	0.566	0.685
5 Representational information quality (2nd order construct)										
5.1 Format	0.427	−0.300	0.656	0.516	0.614	0.482	0.563	*0.926*	0.434	0.585
	0.307	−0.103	0.433	0.360	0.542	0.446	0.450	*0.821*	0.498	0.537
5.2 Consistency	0.306	−0.111	0.372	0.364	0.452	0.451	0.469	0.428	*0.882*	0.464
	0.374	−0.192	0.394	0.467	0.588	0.621	0.595	0.493	*0.894*	0.515
5.3 Understandability	0.471	−0.380	0.602	0.508	0.687	0.484	0.684	0.595	0.503	*0.944*
	0.494	−0.352	0.595	0.574	0.704	0.572	0.713	0.613	0.538	*0.943*
6 System quality (2nd order construct)										
6.1 Complexity	−0.205	0.213	−0.355	−0.266	−0.316	−0.264	−0.256	−0.333	−0.116	−0.263
	−0.331	0.387	−0.592	−0.289	−0.324	−0.205	−0.370	−0.390	−0.108	−0.422
	−0.462	0.421	−0.650	−0.410	−0.479	−0.349	−0.509	−0.551	−0.283	−0.477
6.2 Flexibility	0.477	−0.211	0.478	0.352	0.575	0.358	0.443	0.361	0.264	0.408
	0.606	−0.222	0.515	0.407	0.543	0.402	0.411	0.348	0.275	0.436
6.3 Navigation	0.249	−0.123	0.350	0.265	0.319	0.236	0.331	0.309	0.161	0.309
	0.357	−0.227	0.440	0.343	0.398	0.330	0.414	0.359	0.255	0.373
	0.316	−0.224	0.428	0.301	0.416	0.270	0.362	0.385	0.212	0.383
6.4 Usability	0.474	−0.446	0.718	0.394	0.521	0.353	0.491	0.508	0.320	0.542
	0.461	−0.442	0.693	0.412	0.526	0.377	0.467	0.541	0.281	0.480
7 Service quality (2nd order construct)										
7.1 Service reliability	0.362	−0.241	0.383	0.313	0.374	0.276	0.374	0.305	0.380	0.392
	0.399	−0.221	0.429	0.375	0.394	0.343	0.423	0.370	0.370	0.431
	0.332	−0.320	0.406	0.361	0.395	0.313	0.420	0.340	0.306	0.371
7.2 Service responsiveness	0.337	−0.251	0.426	0.365	0.365	0.298	0.404	0.386	0.328	0.430
	0.370	−0.269	0.479	0.356	0.389	0.274	0.396	0.304	0.288	0.381
	0.430	−0.330	0.537	0.394	0.411	0.282	0.407	0.341	0.294	0.401
8 Age	−0.071	0.038	−0.034	0.008	0.025	0.006	−0.046	−0.127	−0.076	−0.040
9 Gender	−0.009	−0.003	0.150	0.082	0.092	0.049	0.054	0.112	0.069	0.061

Table A7 ***(Continued)***

Item	*1*	*2*	*3*	*4.1*	*4.2*	*4.3*	*4.4*	*5.1*	*5.2*	*5.3*
10 Usage	−0.270	0.184	−0.219	−0.078	−0.264	−0.147	−0.187	−0.177	−0.165	−0.192
Item	*6.1*	*6.2*	*6.3*	*6.4*	*7.1*	*7.2*	*8*	*9*	*10*	
1 Net benefits	−0.477	0.535	0.362	0.539	0.365	0.391	−0.037	−0.009	−0.283	
	−0.369	0.535	0.297	0.413	0.332	0.313	−0.104	−0.004	−0.225	
	−0.306	0.542	0.281	0.415	0.341	0.360	−0.079	−0.040	−0.260	
	−0.324	0.549	0.300	0.395	0.357	0.371	−0.081	−0.034	−0.239	
	−0.454	0.577	0.358	0.515	0.418	0.433	−0.041	0.035	−0.239	
2 Workaround	0.383	−0.268	−0.212	−0.435	−0.278	−0.304	−0.060	−0.051	0.163	
	0.320	−0.270	−0.157	−0.355	−0.195	−0.247	−0.061	−0.049	0.138	
	0.272	0.002	−0.117	−0.283	−0.109	−0.109	0.149	0.060	0.022	
	0.252	−0.019	−0.122	−0.252	−0.175	−0.147	0.210	0.100	0.169	
3 Satisfaction	−0.646	0.500	0.439	0.722	0.433	0.526	0.001	0.135	−0.188	
	−0.611	0.516	0.441	0.734	0.394	0.456	−0.011	0.130	−0.238	
	−0.595	0.486	0.391	0.620	0.391	0.448	−0.087	0.150	−0.182	
4 Contextual information quality (2nd order construct)										
4.1 Completeness	−0.403	0.368	0.328	0.359	0.376	0.354	−0.026	0.048	−0.082	
	−0.326	0.392	0.301	0.423	0.320	0.372	0.038	0.100	−0.063	
4.2 Relevance	−0.474	0.563	0.402	0.591	0.333	0.373	0.001	0.073	−0.156	
	−0.197	0.476	0.243	0.287	0.237	0.219	0.040	0.083	−0.293	
	−0.404	0.483	0.384	0.446	0.449	0.407	0.033	0.081	−0.256	
4.3 Timeliness	−0.296	0.397	0.305	0.317	0.275	0.254	-0.004	0.102	−0.127	
	−0.290	0.345	0.259	0.377	0.328	0.287	0.015	−0.014	−0.137	
4.4 Usefulness	−0.435	0.417	0.374	0.427	0.381	0.346	−0.004	0.069	−0.180	
	−0.418	0.414	0.370	0.481	0.402	0.416	−0.075	0.030	−0.156	
5 Representational information quality (2nd order construct)										
5.1 Format	−0.534	0.380	0.372	0.567	0.346	0.358	−0.138	0.142	−0.245	
	−0.359	0.282	0.315	0.379	0.292	0.268	−0.075	0.034	−0.022	
5.2 Consistency	−0.184	0.228	0.177	0.267	0.361	0.294	−0.062	0.109	−0.121	
	−0.198	0.291	0.244	0.299	0.316	0.277	−0.073	0.017	−0.170	
5.3 Understandability	−0.453	0.423	0.390	0.532	0.386	0.396	0.009	0.050	−0.198	
	−0.463	0.444	0.365	0.492	0.426	0.411	-0.085	0.065	−0.163	
6 System quality (2nd order construct)										
6.1 Complexity	*0.630*	−0.189	−0.657	−0.356	−0.173	−0.226	0.016	−0.104	0.061	
	0.915	−0.282	−0.363	−0.540	−0.241	-0.293	0.030	−0.120	−0.002	
	0.905	−0.417	−0.373	−0.563	−0.357	−0.395	0.055	−0.073	0.158	
6.2 Flexibility	−0.357	*0.911*	0.394	0.507	0.277	0.309	0.013	0.108	−0.170	
	−0.330	*0.925*	0.291	0.478	0.329	0.310	−0.015	0.168	−0.169	
6.3 Navigation	−0.374	0.263	*0.830*	0.349	0.281	0.338	0.001	0.036	−0.089	
	−0.501	0.357	*0.925*	0.473	0.249	0.343	−0.119	0.035	−0.171	
	−0.485	0.360	*0.916*	0.477	0.285	0.387	−0.037	−0.013	−0.158	
6.4 Usability	−0.553	0.504	0.482	*0.944*	0.316	0.369	−0.079	0.085	−0.214	
	−0.578	0.505	0.444	*0.939*	0.327	0.390	0.000	0.152	−0.183	
7 Service quality (2nd order construct)										
7.1 Service reliability	−0.245	0.294	0.228	0.271	*0.911*	0.735	−0.063	0.114	−0.149	
	−0.315	0.337	0.286	0.318	*0.943*	0.798	−0.043	0.102	−0.095	
	−0.339	0.289	0.324	0.358	*0.927*	0.827	−0.036	0.041	−0.121	
7.2 Service responsiveness	−0.353	0.262	0.335	0.342	0.868	*0.895*	−0.029	0.033	−0.130	
	−0.346	0.327	0.367	0.384	0.779	*0.956*	−0.005	0.038	−0.073	
	−0.372	0.352	0.415	0.404	0.761	*0.965*	0.002	0.096	−0.131	
8 Age	0.044	−0.002	−0.062	−0.043	−0.051	−0.010	*1.000*	0.091	0.135	
9 Gender	−0.115	0.151	0.021	0.126	0.092	0.062	0.091	*1.000*	0.016	
10 Usage	0.091	−0.185	−0.159	−0.211	−0.130	−0.118	0.135	0.016	*1.000*	

Table A8 ECM software vendor's overview based on Gartner's magic ECM quadrant 2013 (Gilbert *et al*, 2013)

Vendor	*Software*	*Gartner's magic quadrant*
IBM	IBM Connections, Web Content Manager, IBM Docs	Leader
Microsoft	SharePoint	Leader
Hyland Software	OnBase	Leader
OpenText	OpenText OpenText Cloud	Leader
EMC	Documentum Platform EMC OnDemand	Leader
Oracle	WebCenter Content	Challengers
Xerox	Xerox Transactional Content Manager (XTCM), Xerox mortgage services/BlitzDocs, Xerox litigation services (OmniX, CategoriX and Viewpoint) Xerox DocuShare	Visionaries
Alfresco	Alfresco (on-premises, cloud)	Visionaries

Appendix F: User resistance studies

Workaround is one example of user resistance behavior observed in relation to the usage of enterprise systems such as ECM. There are other forms of user resistance behaviors which have already been discussed by prior research (see Table A9), whereas only few articles have explicitly focused on workarounds. Studies focusing on workarounds as user resistance behavior have used interviews to identify and describe potential ways users can work around an IS. They have not provided and applied an instrument for further empirical analysis in this area.

Table A9 User resistance behavior

Category	*Dimension/example*	*References*
System usage	Intention to use	Bhattacherjee & Hikmet (2007), Polites *et al* (2012), Eckhardt *et al* (2009)
	Discontinuous usage intention	Maier *et al* (2015a), Maier *et al* (2015b), Turel (2014)
	Refusal to use system	Klaus *et al* (2010), Klaus & Blanton (2010), Martinko *et al* (1996)
	Avoid system use	Klaus *et al* (2010), Klaus & Blanton (2010), Martinko *et al* (1996)
	Not utilizing the new system when utilization is voluntary or mandatory/expected	Rivard & Lapointe (2012)
Complaining	Complaints	Klaus *et al* (2010), Klaus & Blanton (2010), Markus (1983), Rivard & Lapointe (2012)
	Impatient during training	Klaus *et al* (2010), Klaus & Blanton (2010)
	Voicing dissatisfaction	Lapointe & Rivard (2005)
	Humor	Klaus *et al* (2010), Rivard & Lapointe (2012), Selander & Henfridsson (2012)
	Voicing opposite views	Lapointe & Rivard (2005), Markus (1983), Rivard & Lapointe (2012), Selander & Henfridsson (2012)
	Gossiping about the implementers and the system	Rivard & Lapointe (2012), Selander & Henfridsson (2012)
	Voicing feelings of fear and concern toward the system/project	Rivard & Lapointe (2012)
	Telling negative stories about the system	Selander & Henfridsson (2012)
	Irony and satire	Selander & Henfridsson (2012)
Motivation and productivity	Decreasing motivation	Klaus *et al* (2010)
	Decreasing productivity	Klaus *et al* (2010)
	Procrastinating	Klaus *et al* (2010)

Table A9 ***(Continued)***

Category	*Dimension/example*	*References*
Cooperation	Intention to resist	Kim & Kankanhalli (2009), Laumer *et al* (2015a, 2016)
	Rebellion	Lapointe & Rivard (2005), Rivard & Lapointe (2012)
	Inaction/lack of interest	Lapointe & Rivard (2005), Rivard & Lapointe (2012)
	Avoiding involvement in the project	Joshi (1991), Rivard & Lapointe (2012), Selander & Henfridsson (2012)
	Pretending to comply	Kim & Kankanhalli (2009), Rivard & Lapointe (2012)
	Asking others to intervene on project-related issues	Rivard & Lapointe (2012)
	Forming coalitions	Lapointe & Rivard (2005), Rivard & Lapointe (2012)
	Boycotting project activities	Rivard & Lapointe (2012)
	Boycotting the system	Rivard & Lapointe (2012)
	Going on strike	Rivard & Lapointe (2012)
Turnover	Quit job/job change	Klaus *et al* (2010), Rivard & Lapointe (2012)
	Turnover intention	Lapointe & Rivard (2005), Maier *et al* (2013)
	Calling in sick	Selander & Henfridsson (2012)
Sabotage	Hacking the system	Klaus *et al* (2010)
	Entering information inappropriately	Klaus *et al* (2010), Marakas & Hornik (1996)
Workarounds	Using shadow system	Klaus *et al* (2010)
	Performing job differently than directed	Klaus *et al* (2010)
	Trying to use old system	Klaus *et al* (2010)
	Persisting in using a former system in parallel with the new system when usage is voluntary	Rivard & Lapointe (2012)
	Persisting in using the former system in parallel with the new system when usage is mandatory/expected	Rivard & Lapointe (2012)