A SITUATIONAL PERSPECTIVE ON WORKAROUNDS IN IT-ENABLED BUSINESS PROCESSES: A MULTIPLE CASE STUDY

Nina Röder
Technische Universität München, München, Germany, nina.roeder@in.tum.de

Manuel Wiesche
Technische Universität München, München, Germany, manuel.wiesche@tu-dortmund.de

Michael Schermann
Santa Clara University, michael.schermann@in.tum.de

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Complete Research

Röder, Nina, Technische Universität München, Boltzmannstrasse 3, 85748 Garching, Germany, nina.roeder@in.tum.de

Wiesche, Manuel, Technische Universität München, Boltzmannstrasse 3, 85748 Garching, Germany, wiesche@in.tum.de

Schermann, Michael, Technische Universität München, Boltzmannstrasse 3, 85748 Garching, Germany, michael.schermann@in.tum.de

Abstract

Workarounds are still one of the most puzzling phenomena in business process management research and practice. From a compliance perspective, workarounds are studied as control failure and the cause for inferior process quality. From a process reengineering perspective, however, workarounds are studied as an important source of process improvement. In this paper, we advance recent theory on the emergence of workarounds to resolve this puzzle by analyzing empirical evidence from a multiple case study. Our analysis reveals that employees utilize workarounds based on a risk-benefit analysis of the situational context. If the realized benefits (efficiency gains) outweigh the situational risks (exposure of process violations), workarounds will be perceived as process improvement. Erroneous risk-benefit analysis, however, leads to exposure of the same workaround as control failure. Quite unexpectedly, we found that information systems serve as critical cues for the situational balance of benefits and risks. Our result suggests that process-instance-level workarounds are treated as options that are engaged if the situation permits, in contrast to process-level workarounds that manifest as unofficial routines. We also contribute the notion of situational risk-benefits analysis to the theory on workarounds.

Keywords: workaround, situational context, multiple case study

1 Introduction

Workarounds as deviations from defined routines in business processes are still one of the most puzzling phenomena in business process management research and practice (Afflerbach et al. 2013, El Kharbili et al. 2008, Sadiq et al. 2007). On a daily basis, managers have to decide whether to tolerate or to contest workarounds. However, research and practice show that workarounds may have vastly different outcomes. They may range from internal shortcomings, e.g., loss of control, facades of compliance, or inferior process quality (Bagayogo et al. 2013, Boudreau & Robey 2005, da Cunha & Carugati 2009) to severe external consequences, e.g., loss of revenue, fraud, or penalties (Hunt & Jackson 2010).

Alter (2014) suggests a theory of workarounds consisting of five ‘voices’ that reflect the dimensions and integrate extant research on the consequences of workarounds (Ansari et al. 2010, Augsdorfer 2005, Azad & King 2008, Boudreau & Robey 2005, Campbell 2011, Ferneley & Sobreperez 2006,

Martin et al. 2013). While this theory provides a structure for analyzing workarounds, we still lack a deep understanding of how and why workarounds occur in organizations (Augsdorfer 2005, Campbell 2011, da Cunha & Carugati 2009, Sobreperez et al. 2005, Tucker & Edmondson 2003). We further lack an understanding of the role of information systems (IS) in the emergence of workarounds.

We focus our investigation on the outcomes of workarounds in formalized business processes. Formalization is intended to increase control and reduce outcome variation, which makes workarounds in formalized business processes particularly interesting to study. Usually, IS play an important role in establishing formalized processes (e.g., through workflow management systems). Workarounds in less formalized business processes such as ad-hoc or creative processes are usually associated with positive outcomes (Kirsch 1996, Miller & Wedell-Wedellsborg 2013). In contrast, workarounds in formalized processes are usually associated with negative outcomes (Wiesche et al. 2013). Still, managers chose to tolerate this type of workarounds. Following a replication logic, we use Alter (2014) as a framework to empirically investigate a diverse selection of formalized business processes (Eisenhardt 1989, Yin 2009).

We ask the research question: *How does Alter (2014) help in understanding how and why employees enact workarounds in formalized IT-enabled business processes?* We conduct a multiple case study in three organizations to answer our research question. We follow the guidelines by Eisenhardt (1989) for study design, case selection, as well as data access, gathering, and analysis. We found the work of Alter (2014) useful in enhancing our understanding of workarounds. However, our analysis revealed that employees utilize workarounds based on a risk-benefit analysis of the situational context. Quite surprisingly, we found that features of IS play an important role in this risk-benefit analysis.

We structure the remainder of this paper as follows. First, we describe the theoretical foundation for studying our research question. We then explain our multiple case study strategy, describe our sample, and outline our core analytic tenets. In the results section, we present our empirical results on workarounds in our case organizations and the cross-case analysis. In the discussion, we reflect on our findings and offer theoretical explanations for our observations, discuss implications for theory and practice, and outline limitations. We conclude the paper by highlighting the key results of this paper and present worthwhile avenues for future research.

2 Theoretical Foundation

Early definitions coined workarounds in formalized business processes as “misfits with the idealized representations of work” (Gerson & Star 1986, 266) or as “nonstandard procedures operators devise to compensate for system deficiencies” (Courtright et al. 1988, 1150). Thus, workarounds have been studied mostly from an ex-post perspective as process violations (Cooper & Zmud 1990), technological change processes (Pfaffenberger 1992), resistance to process design (Bagayogo et al. 2013, Sobreperez et al. 2005), the emergence of shadow systems (Boudreau & Robey 2005), and improvisations in processes (da Cunha & Carugati 2009). Other researchers report on different consequences of the same workaround within the same business processes and how organization treat the workaround based on the consequences (Ferneley & Sobreperez 2006, Györy et al. 2012). More recent approaches define workarounds as goal-driven changes to defined routines in business processes (Alter 2014). The basic assumption in literature is that employees generally tend to resist control based on different goals (Davenport 1993, Ignatiadis & Nandhakumar 2009). Researchers suggest primarily organizational factors that contribute to this resistance such as lack of accountability, drift, and loss of control (Azad & King 2012, Boudreau & Robey 2005, Jenkins & Durcikova 2013).

Additionally, the increasing ubiquity of information systems in business processes aggravates the opportunities for workarounds. Employees engage in workarounds to cope with a perceived poor fit of technology and process (Safadi & Faraj 2010, Vogelsmeier et al. 2008). Information systems also increase the risk of illusion of control, which means that information systems present information that

do not reflect the actual process instances (Sobreperez et al. 2005). Similarly, employees exploit information systems to build 'facades of compliance', which means that employees use information systems in order to feign compliance (da Cunha & Carugati 2009).

Few studies approach workarounds from a holistic perspective. Martin et al. (2013) provide a synthetic typology of rule-breaking and enforcement that focuses on organizational deviance but lacks a management perspective. Ferneley and Sobreperez (2006) distinguish harmless, hindrance, and essential workarounds from a user perspective. Alter (2014) is one of the first to suggest a comprehensive theory of workarounds that structures the state of knowledge on workarounds. Alter (2014) develops five 'voices' of workarounds to structure phenomena associated with workarounds, types of workarounds, direct effects of workarounds, different perspectives on workarounds, and subsequent organizational challenges and dilemmas related to workarounds (see Figure 1).

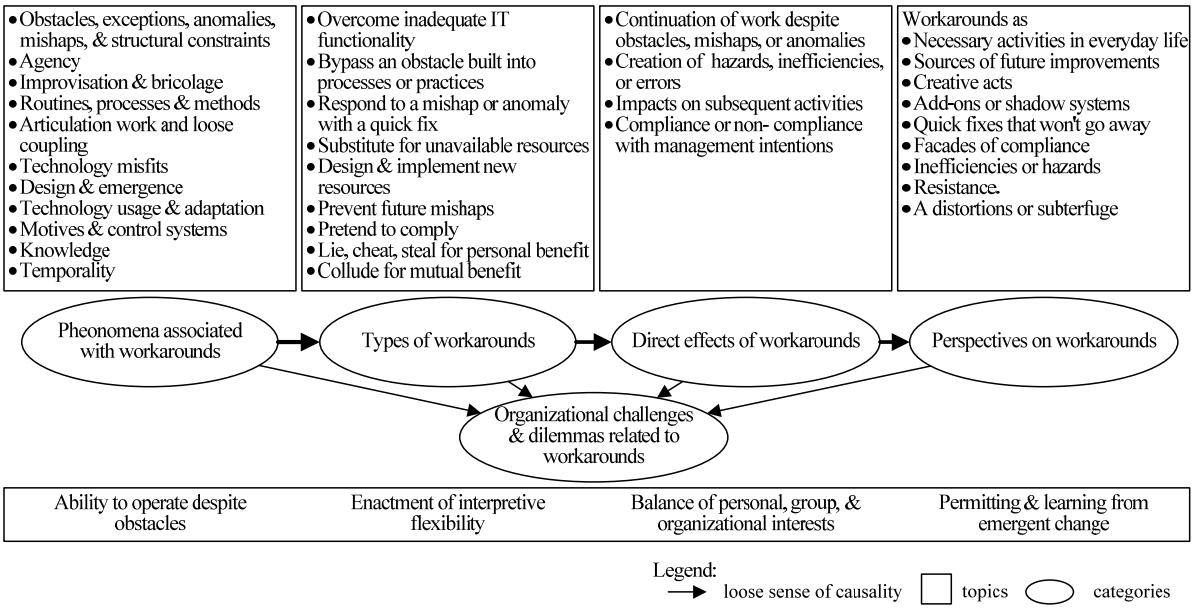

Figure 1. Five voices of workarounds (Alter 2014).

The 'phenomena' voice covers the range of antecedents of workarounds, e. g., routines that are perceived as inefficient by employees (Azad & King 2008). The 'types' voice provides a classification scheme for workarounds based on the operational objective affected by the workaround, e.g., employees bypass perceived obstacles to safeguard their own efficiency (Saleem et al. 2011). The 'direct effect' voice structures consequences and implications of workarounds, e. g., employees do not follow guidelines in order to get their work done (Sobreperez et al. 2005). The 'perspectives' voice structures the management perspective on workarounds, e. g., workarounds could be seen as sources of future improvements (Safadi & Faraj 2010). Finally, the 'organizational challenge and dilemmas' voice structures organizational challenges that arise from workarounds, e. g., employees seeking a maximum of flexibility in interpreting routines potentially induce loss of control (Campbell 2012).

While Alter's (2014) theory provides a useful skeleton for investigating workarounds, there are several puzzling issues with workarounds that remain unresolved and provide the research objectives for this research:

First, we lack an understanding of how workarounds emerge. Leonardi (2011) argues that employees engage in workarounds when they perceive a low helpfulness of the routines and policies in an organization. Ansari et al. (2010) differentiate between workarounds in personal-level routines and organizational-level routines. Orlikowski (2000) argues that the recurrent engagement with these routines affect the willingness to engage in workarounds. This is an important issue because Martin et

al. (2013) show that workarounds, which remain uncontested by management, will manifest as unofficial routines.

Second, we lack an understanding of how employees enact workarounds in formalized business processes. While the majority of studies examine workarounds as negative phenomena that threaten organizational objectives, Alter (2014) also include positive aspects of workarounds such as process improvements and process innovation (Augsdorfer 2005, Campbell 2011). However, most of these studies take an ex-post perspective. We still know very little about the emergence of workarounds. This is an important issue because such an understanding will help to establish more effective organizational routines (Tucker & Edmondson 2003).

Third, we lack a deep understanding of the role of information systems in the emergence of workarounds. Literature primarily studies the negative effects of information systems in workarounds (Baker & Nelson 2005, Koopman & Hoffman 2003, Petrides et al. 2004). Little is known about the role of information systems in facilitating positive effects of workarounds in formalized business processes (Ferneley & Sobreperez 2006). This is an important issue because such an understanding will help to establish design principles that help to develop more effective information systems.

Thus, in this paper we use Alter (2014) as a theoretical lens to study workarounds in a diverse selection of cases. In doing so, we also contribute to the incremental theoretical development of Alter's theory.

3 Research Methodology

This study used a multiple case design to follow a replication logic, where a series of cases is treated as experiments. Each case serves to substantiate or question the conclusions drawn from the other cases (Eisenhardt 1989, Yin 2009). We considered a multiple case study to be more likely to yield a generalizable, robust, and parsimonious understanding of workarounds. We operationalized the current body of knowledge to structure our analysis and additionally explored workarounds using grounded theory techniques (Strauss & Corbin 1997). We see this hermeneutic approach as particularly useful to substantiate and extend the existing body of knowledge on workarounds.

3.1 Study Design

We selected diverse cases of formalized business processes that differ in terms of domain, regulatory density, routinization, process maturity, and rule breaking culture (Alter 2014, Martin et al. 2013). When crafting our instruments and protocols, we triangulated perspectives on workarounds, including management, employee and IT, and compared multiple sources of data. The most important data sources however were semi-structured interviews since we found workarounds a highly sensitive topic and elaborating on this topic involved a high degree of trust (da Cunha & Carugati 2009). We crafted specific interview questions depending on the context and perspective of the interviewee using both questions that operationalize existing theory and open questions to explore situational conditions in workarounds. We entered the field using flexible and opportunistic data collection methods. In each case, we approached key stakeholders for the workaround topic and followed a snowballing logic to identify further interview partners. In the analysis phase, Alter's theory (2014) guides our within-case analysis. We particularly examined the five voices developed in the framework and identified specific instances of each voice for each workaround in the case (table 5). We identified similarities and differences in the cross-case analysis. We sharpened the quality of the predefined constructs by following a replication logic. We identified rationales and explanations for each workaround and particularly focused on the situational context. We further reflected similar and conflicting literature. We reached closure by identifying similar workarounds across cases.

We selected three cases for our sample (see table 1). As one of the most studied examples for a domain with flourishing workarounds, we found health care (case 1) to be particularly suitable to start our analysis as physicians talk rather frankly about how they interfere with organizational processes and work around information systems (Safadi & Faraj 2010, Vogelsmeier et al. 2008). In the second case, we focused on accounting processes where workarounds often come with serious consequences for the organization. Finally in case 3, we examined the innovation management process in the automotive domain. We found this process particularly suitable for our research endeavor as innovations often do not fit the intended process but organizations often approach management of innovations in a formalized manner.

	Case 1	**Case 2**	**Case 3**
Description	Common security issues in the health care sector are privacy breaches, especially within information systems.	Fraud causes significant harm to organizations. Organizations implement control mechanisms to prevent incidents and their recurrences.	The innovation management process within the automotive domain is supported by multiple IS, tools, and methods.
Domain	Health Care Industry	Accounting Industry	Automotive Industry
Core Process	Patient Record Process	Accounting Process	Innovation Management Process
Information System	Patient Care Information System, Electronic Health Record, Computerized Clinical Decision Support System	Travel Expense Report System Resource Planning System	Communication System, Ticketing System, Suggestion System, Innovation Platform
Sample	Junior (5) and senior (3) physicians, security officer (1), IT director (1)	Auditor (4), process owner (3), IT architect (1)	Innovation management (5), process owner (8), Sales and Marketing (4), IT architect (1)
Challenge	Physicians balance the potential consequences resulting from a privacy breach and the improvements in effective lifesaving.	Auditors are challenged with an extensive number of false positive fraud incidents and spend high efforts on examining these.	Management enforces formal process to gain oversight of innovation, certain radical inno-vations may not fit these formal process.
Wicked problem	Fear that compliance may hinder lifesaving.	Judgment in testing false positives.	Formalization of innovation management process.
Result	Physicians often ignore privacy guidelines.	Fraud remains undetected.	Most innovations are revealed only in the final stage of the innovation management process.

Table 1. Overview of included cases for this study.

Members of the research group conducted interviews with relevant stakeholders, including physicians and IT employees in the first case, auditors, process owners, and IT architects in the second case, and innovation managers, process owner, sales and marketing, as well as IT architects in the third case. Overall, we conducted 12 interviews in case 1, 6 interviews in case 2, and 20 interviews in case 3. We tape-recorded, anonymized, and transcribed all 38 interviews in 352 pages of text. The average interview time was 54.64 minutes (case 1), 42.76 minutes (case 2), and 83.71 minutes (case 3). The average job experience in their role was 12.82 years in case 1, 5.25 years in case 2, and 6.67 years in case 3. Table 1 provides a short description of the case, states domain and sample, outlines the workaround context by illustrating the challenge within the organizational process, synthesizes the wicked problem that the involved parties face, and the consequence from this situation.

Following recommendations for multiple case studies (Eisenhardt 1989, Yin 2009), we used the theory of workarounds (Alter 2014) for the confirmatory analysis and focused on the situational aspect of workarounds in the exploratory analysis. We wrote individual case write-ups that triangulated all data and used Alter's five voices (2014) as coding scheme for the interviews. In each case, we identified workarounds and coded each characteristic with the corresponding voice. Our analysis involved 238 codes in total, on average 7.5 per workaround in case 1, 13.25 codes per workaround in case 2, and 6.8 codes per workaround in case 3. We applied the guidelines of open coding and identified categories

related to dynamics of workarounds without forcing existing concepts from the literature onto the data (Strauss & Corbin 1997). In our cross-case analysis, we identified similarities in workarounds in different cases and identified the situational aspects of workarounds across all three cases.

4 Results

4.1 Workarounds in Health Care

In the context of health care, we examined how physicians in hospitals use information systems. We examined several workarounds in case 1. The first workaround - *download data* - we observed in the health care case involved physicians who copy patient records from the secure information system onto private storage systems. The hospital implemented an information system in order to store and process all patient records. Physicians do not need to download any confidential information from the system. However, physicians copy patient records onto USB sticks or send it via e-mail. They send records to colleagues to ask for their opinion or take the patient record home for further investigation. We found that this workaround changed depending on the physical infrastructure (whether the USB port was activated or not) and system functionality (whether the physician was able to copy data from system). The second workaround – *data access reason* - occurs when physicians access patient records: When opening a patient record in the system, physicians are asked to provide a reason for accessing this particular file. Thereby, management was able to trace access to patients' records. We observed that physicians leave this field blank or fill in replacement characters. Other physicians copy and paste reasons form other records or include abstract descriptions such as 'important'. This occurs particularly often in routine cases, e. g., during ward rounds or when admitting new patients. We found that in situations that are considered normal and routine such as ward rounds, physicians do not provide real arguments. When a physician works on a different ward or accesses records from patients who are not in his regular set of patients, an explicit reason is included in the field. The third workaround – *password security* – refers to situations when physicians do not ensure the confidentiality of their passwords. Passwords are stuck to the screen, hidden beneath the keyboard or openly shared with other team members. We observed cases in which the initial password set by the administrator was not changed at all. The IT experts even estimated, that most of the physicians do not change their initial password. We observed, what we referred to as 'VIP flag' indicator as driver of this workaround. The hospital information system comprised a field that marked certain patients as important. As long as this field was not marked, passwords security was not considered important among physicians. The fourth workaround – *standard password* – refers to a standard password that allows users access to all functions and data. The standard password was intended for emergency situations, but is often also used when physicians do not have access to certain functions, when employees work on different wards or when interns are trained in a ward.

Workaround	**Illustrative quote**	***Code (italic)* and corresponding voices (underlined)**
Download data	"If someone has a PC and wants their USB port to be unlocked then they has to sign with me that they is also responsible for the consequential costs, e.g. if they introduce a virus or the like. However, this PC can also be used by someone else who brings his USB as well […] And then we've had the case that a student introduced something contaminated for him. And I tell him, this is your PC, I have your signature. And he tells me, but I wasn't here at that time, I have proof that I was in the OR."	*create awareness among physicians /* enactment of interpretive flexibility *process hinders daily work /* inefficiencies or hazards
	"And it has happened before that our company was mentioned in the paper or that we attracted negative attention from the state data protection commissioner. Because data from this institute suddenly appeared on the Internet. That's the worst case, of course."	*patient sensitive data distributable /* non-compliance with management attentions

Table 2. Illustrative workaround in health care.

For each workaround, we identified the five voices to fully understand how the workaround occurred. Table 2 provides an example of how we mapped the concepts to the interview data in the case of our hospital case. Regarding the phenomenon associated with the workaround, we found different occurrences. We coded the fact that sensitive patient data is distributed with the 'technology usage and adoption' characteristic, because we found differences between the intended and actual use of technology. Similarly, we identified the temporary use of the standard password as 'temporality'. We identified the voice type of workaround as 'bypassing an obstacle' when physicians download information from the system and thereby bypass organizational guidelines and when using the standard password in regular day-to-day situations. We identified 'pretend to comply' when physicians enter irrelevant information in the data access reason field and when physicians share their passwords. The voice effect of the workaround was 'non-compliance with management intentions' in all four cases, for example when ambiguous data access reasons prohibit traceability of patient record access reasons. The perspective voice was considered as 'inefficiencies or hazards' for the download data workaround as the defined process within the system hinders physicians in their day-to-day work. Finally, the organizational challenge voice is different across all cases. In the download data case, the challenge 'enactment of interpretative flexibility' lies in creating awareness among physicians. The challenge of 'balance of interests' occurs in the standard password workaround, where the differentiation between emergency and standard process is highly influenced by stakeholders' interests. Table 5 provides an overview of characteristics of all workarounds. In the first three columns, we introduce the case domain (health, accounting and automotive), the name of the workaround and a short description. The next five columns, combined as 'Five Voices', represent our coding based on Alter (2014). We introduce the workaround in general (*italic text in cell*) and the classification according to Alter's (2014) five voices (underlined text in cell). In the last column, we highlight the 'Enactment Criteria' which refers to IS that serve as critical cues for the situational balance of benefits and risks.

4.2 Workarounds in Accounting

The second case deals with observations of employees obtaining fraud in the enterprise software sector. The first workaround – *supplier effort* – represents the case in which the supplier side uses split payment accounts as a way to avoid additional effort when charging the organization with bills. Suppliers with an invoice extending the amount of $12,000 need to fill out an additional form so that the organization can create a data log and tag the supplier as registered for further payments. In this concrete case, the supplier already knew about the threshold and provided two separated invoices each amounting to $6,000 to avoid filling out the form. By doing so, the quantity of split payment accounts is boosted, which leads to greater efforts from an organizational perspective as the challenge lies

within identifying concrete invoices afterwards. This workaround is only possible due to the information on which threshold the organization uses as trigger for saving the supplier information being available to the supplier. The second workaround – *shell account* – is used to obtain money from the organization surreptitiously. Employees store incorrect account numbers in the system to initiate transfers to shell accounts and organizations. Outliers or irregularities are the only way for the organization to identify potential fraud cases. To be able to exclude false positives, e.g., suppliers who have changed their account number and therefore appear in irregularities, auditors have to recheck the data manually. The third workaround – *facilitate invoice* – deals with issues in which employees use split payment accounts instead of stock accounts. This is the case when stock accounts are not traceable on the first attempt in the system. Employees are frustrated and see the detection of the right account as hindrance of their work. Therefore they use the option to book the invoice as split payment entry as facilitator. Knowing the threshold is located at $12,000 they are able to split the invoice into several withdrawals. From an organizational perspective, the number of executed workarounds rises when the threshold is increased. Keeping the amount to a minimum and checking for reoccurring withdrawals is an attempt to prohibit this workaround. Within the fourth workaround – *trickster* - fraud occurs when managers embezzle money for their own benefit. In the concrete case, the manager found an accomplice in a supplier and was able to defalcate funds using unnoticed repayments. The organization lost a large amount of money. After some years, the incident was detected when paper-based documents were found, containing all the information.

Workaround	**Illustrative quote**	***Code (italic)* and corresponding voices (underlined)**
Facilitate invoice	"Of course that's a kind of routine as well. If I get handed a bill that's lower than $12,000 that I'm supposed to enter and I look for the core dataset and can't find it, then I'll use the one-time supplier. That's a kind of routine that, like I said, is only based on the value limit."	*use split payment account optionality /* obstacles, exceptions, anomalies, mishaps, and structural constraints *unsuccessful attempts to find stock account /* bypass an obstacle
	"Yes, because simply put, I think by now we're talking about 24,000 core datasets that are being maintained in our system. Many of those are virtually unused by now. For many of those it was realized that they were used for one year and then no one needed them anymore […] if the goal is now supposed to be the reduction of the core datasets, the logical conclusion is: more entries using the one-time supplier […] However, you always have either too many entries using the one-time supplier or too many core datasets."	*optionality leads to overrun /* facades of compliance

Table 3. Illustrative workaround in accounting.

Each workaround identified in this case was mapped to the five voices (see table 3). To provide insights on how we preceded, the classification will be explained. In the case of the enterprise software workarounds, we found fraud to be the predominant factor. Having a closer look at the phenomena associated with the four workarounds, we coded two characteristics, namely 'obstacles, exceptions, anomalies, mishaps, and structural constraints' and 'technology misfit'. Obstacles are represented on the one hand by a high effort to save supplier information and on the other hand by difficulties when tracing stored information. As technology misfit we used the fact that it is possible to enter incorrect or different account numbers and the possibility to execute repayment. In investigating the type of workaround we coded the detail that employees initiate bank transfer to shell accounts or organizations as 'lie, cheat, steal for personal benefit'. We did so because the characteristic of this code represents the underlying concept of fraud. The same type was applied when employees use the support of suppliers to perform private repayment, resulting in illegal transactions. Both workarounds with obstacles as phenomena have been coded with the type 'bypass an obstacle'. They try to

overcome the hindrance by using split payment accounts when the attempt to find stock account fails or they break down the amount to enter the bill. Focusing on the effect, again we found two characteristics. 'Continuation of work despite obstacles, mishaps, or anomalies' applies when suppliers and employees use split payment accounts instead of stock accounts. 'Non-compliance with management intentions' can be attributed to the workarounds in which employees do not conform to regulations. The perspective in which both fraud workaround cases were classified is identical as well. We used the characteristic 'inefficiencies or hazards' as perspective to explain illegal transaction. The aspect 'facades of compliance' is used when amounts are split to fit the threshold of split payment accounts. 'Balance of personal, group, and organizational interests' and 'enactment of interpretive flexibility' have been identified as organizational challenges. The dilemmas regarding the split payment accounts are facing the flexibility vs. control mismatch. Referring to balance, we find deviations in personal and organizational interests.

4.3 Workarounds in Automotive

We examined the innovation management process in one automotive organization for workarounds (case 3). The first workaround – *innovation camouflage* – refers to innovators who enter their innovative ideas in information systems to handle change requests. They do not use the defined formal process for collecting innovations within the organization. Innovators use this process because it is less complex and requires less information. From former innovations, they learned that new innovations require laborious top management approval and thus, disguise innovations as change requests increase the chances of getting the innovation implemented. We found that the decision to consider this workaround is influenced by the manner in which the innovative idea fits in with the innovation management process. The easier the idea can be entered into the innovation management process, the higher the chances are of actually using this process. The second workaround – *standard application* – occurs within the IT department when implementing innovative services. The department using the innovative service often requires certain functionalities that are unique to their setting. Consider for example a service that requires a specific certification for operation. The IT department is challenged with an individual certificate that requires individual support and does not meet the standard platform configurations. The IT department thus implements standard certificates, but pretends to implement individual certificates. We found that the IT department exercises this workaround when the service department is not able to determine whether a standard application is implemented or not. The third workaround – *reap resources* – occurs during the planning of new applications. When estimating calculation and storage capacity for new applications, employees often exaggerate numbers. In our example, exaggerations reached almost 400% of the actual capacity needed. When asked about their motives, interviewees answered that they do not trust other departments that use the same capacities. Since everybody exaggerates, the whole capacity will be reduced by a certain percentage. If they would not exaggerate, their actual capacity would be reduced. We found that the lack of trust between departments encourages this workaround. Finally the fourth workaround – *functionality integration* – occurs in the implementation of new applications. Organizational guidelines state that functions in new applications cannot use other new functions in order to reduce dependencies. Programmers implementing new functions A and B that are supposed to use one another are often implemented with a new function C that proxies the corresponding functionality. We found that programmers use this workaround when they feel confident that the functions are working properly.

Workaround	**Illustrative quote**	***Code (italic)* and corresponding voices (underlined)**
Reap resources	"The person responsible for hardware brought matter to a head. He had to develop the function host, on which all 20 functions would run in parallel, and he wanted to know in the first months how much computing time everyone needed […] and then everyone put a proper markup on their function and as a result we had 400% CPU load. Of course there was a huge uproar then […] therefore my opinion: it can only work if everyone trusts one another. That the system component developers don't have to be afraid that some kind of hardcore functions are created by the function late in the game, and at the same time the function developers mustn't be afraid of being pinned down to their promises."	*resource specification overestimated* / knowledge *trust in correct resource specification of all stakeholders* / balance of interests

Table 4. Illustrative workaround in automotive.

For each workaround, we identified the five voices (summarized in table 5) to fully understand how the workaround occurred. Table 4 provides an example of how we mapped the concepts to the interview data. Regarding the phenomenon associated with the workaround, we found different occurrences. We coded the act of disguising innovations in change requests as 'deviations of routines, processes, and methods', as innovators ignore organizational routines and processes when using different information systems. In this case, the type voice is categorized as 'bypass an obstacle' as the adopted process increases the chances of getting the innovation implemented. The effect voice differs across workarounds. We found impacts on subsequent activities in the innovation camouflage workaround when the innovative idea is considered as extension of an existing product and in the reaping resources case when the deadlock of too much occupied capacity occurs. In the functionality integration workaround, we coded the effect as 'continuation of work' as the missing integration of functionalities hinders programmers in doing their job. In case 3, the façade of compliance perspective dominated our sample workarounds. In the innovation camouflage case, employees are redesigning their innovative idea as an extension to an existing product, and the new function C in the functionality integration workaround formally fulfills the guidelines of not directly interacting with other new functions. The organizational challenge voice differs from 'interpretive flexibility' by defining the boundary between change request and innovation to 'balancing personal, group, and organizational interests' when establishing trust in the case of reaping resources.

4.4 Cross-case Analysis

We compared our cases to identify similarities and differences. We observed similar patterns of behavior in the password security workaround in health care and reaping resources on innovation. While the former occurred in the context of access provisioning, the latter occurred in computing capacity allocation. However, both were caused by different organizational conditions. In the hospital, the hindering factors of compliance motivated physicians to gain additional access rights. In the innovation case, the pro forma gathering was motivated by a lack of trust among organizational units. Similarly, the innovation camouflage workaround in the innovation case and the invoice facilitation workaround in the accounting case bypass obstacles by disguising innovations as change requests and by bypassing existing stock accounts. Both workarounds are conducted in order to reduce efforts, but have different effects (changes in final products vs. non-transparent vendor lists).

Across all cases, we found that specific instances of the workarounds were fundamentally different depending on the situation. In the workaround of physicians who downloaded patient records from the system, we found that physicians either followed the standard procedure and processed data only within the system or downloaded and shared records outside of the system. We found that the workaround was influenced by a technical barrier, which either hindered or allowed certain behavior.

	Workaround	Description	Five Voices: Phenomena	Type	Effect	Perspective	Org. Challenge	Enactment criteria
Health	Download data	Physicians copy patient data from the secure information system	*Sensitive patient data gets distributed /* technology usage and adaptation	*Physicians download data form system /* bypass an obstacle	*Patient- sensitive data distributable /* non- compliance with management intentions	*Process hinders daily work /* inefficiencies or hazards	*Creating awareness among physicians /* enactment of interpretive flexibility	USB port partially activated
	Data access reason	Physicians do not provide reason for accessing patient data	*Request for data access does not check for content /* motives and control systems	*Physicians insert irrelevant information /* pretend to comply	*Overcome traceability /* non-compliance with management intentions	*Checking not enforced by system /* sources of future improvements	*Distributing correct interaction /* permitting and learning from emergent change	Anomal behavior/ access
	Password security	Physicians do not ensure confidentiality of password	*Log ins are shared /* improvisation and bricolage	*Physicians share passwords /* pretend to comply	*Prohibit data access documentation /* non-compliance with management intentions	*Too complex to keep password in mind; fear of forgetting password in important situations /* necessary activities in everyday life	*Emphasis on importance of password handling /* ability to operate despite obstacles	x
	Standard password	All employees in the ward use standard passwords	*Standard password for emergency situations /* temporality	*Possibility to use stationary password is used in general /* bypass an obstacle	*Prohibit data access documentation /* non-compliance with management intentions	*Option to ease daily tasks /* inefficiencies or hazards	*Definition of exceptional cases /* balance of personal, group, and organizational interests	VIP flag
Accounting	Supplier effort	Split payment accounts as facilitator – supplier perspective	*High effort to save supplier information /* obstacles, exceptions, anomalies, mishaps, and structural constraints	*Breakdown order to pass split payment analysis is (less than 12.000$) /* bypass an obstacle	*Registered suppliers pass split payment analysis /* continuation of work despite obstacles, mishaps, or anomalies	*Suppliers facilitate invoicing /* facades of compliance	*Dealing with problem specifications /* enactment of interpretive flexibility	Supplier information stored in system
	Shell account	Store deviating account number	*Enter deviating account number /* technology misfit	*Initiate bank transfer to unofficial account /* lie, cheat, steal for personal benefit	*Violated law/regulations /* non-compliance with management intentions	*Harm company by steeling /* inefficiencies or hazards	*Preventive system /* balance of interests	x
	Facilitate invoice	Split payment accounts as facilitator – employee perspective	*Use split payment account optionality /* obstacles, exceptions, anomalies, mishaps, and structural constraints	*in vain attempts to find stock account /* bypass an obstacle	*Stock account is not used but multiple split payment transactions /* continuation of work despite obstacles, mishaps, or anomalies	*Optionality leads to overrun /* facades of compliance	*Dealing with unambiguous assignment /* enactment of interpretive flexibility	Supplier in system traceable
	Trickster	Managers defalcate funds	*Illegal repayment /* technology misfit	*use supplier to perform private repayment /* lie, cheat, steal for personal benefit	*High expenses /* non-compliance with management intentions	*Harm company by stealing /* inefficiencies or hazards	*Preventive system /* balance of interests	x
Automotive	Innovation camouflage	Innovations are treated as change requests	*Desired innovation as change request /* routines, processes and methods	*process provides opportunity to extend product /* bypass an obstacle	*Modifies original service/product /* impacts on subsequent activities	*Possibility to integrate other innovations /* facades of compliance	*Boundary between change request and new innovation /* enactment of interpretive flexibility	Fit of innovation in process
	Standard application	IT department pretends to implement standard application	*Implementation requirement not realizable with standardization /* improvisation and bricolage	*standardization needed for future maintenance /* pretend to comply	*Implementation looks like conformity /* continuation of work despite obstacles, mishaps, or anomalies	*Pretend to include intend requirement /* facades of compliance	*Justification of implementation /* ability to operate despite obstacles	Transparency and detection probability
	Reap resources	Pro forma gathering of resources during planning phase	*Resource specification overestimated /* knowledge	*overestimation to defend own function /* prevent future mishaps	*Overestimation leads to "dead lock" /* impacts on subsequent activities	*Fear to lose rights for additional capacity /* resistance	*Trust in correct resource specification of all stakeholders /* balance of interests	Degree of ınovation and uncertainty
	Functionality integration	Bypassing requirements by additional component	*Functionality only possible within custom design /* routines, processes, and methods	*implementation of additional functionality to provide data /* pretend to comply	*Requirement not considered /* continuation of work despite obstacles, mishaps, or anomalies	*Easier to test/implement /* facades of compliance	*Deal with problem specifications /* balance of interests	Personal ıowledge

Table 5. Workarounds in the health, accounting and automotive industry.

We found that activating the USB port depended on the hierarchical role and network of the employee who uses this computer. The IT employee could not convince senior hospital management to not activate their USB port. Hence, the chance of downloading data workarounds on this particular computer rose. Similarly, in the invoice facilitation workaround, the traceability of the supplier within the information system influenced the decision of exercising the workaround. The innovation camouflage workaround was influenced by how the innovation fits in with the intended innovation management process. The easier the innovation could be integrated into the system, the more likely the intended innovation management process was used.

Upon further examination of these influences, we found that employees utilize workarounds based on a risk-benefit analysis of the situational context. Employees are fully aware of the consequences of their workaround behavior. Such consequences range from positive aspects such as efficiency gains to negative aspects such as exposure of process violations. Only if the realized benefits outweigh the situational risks, the workaround will be conducted.

5 Discussion

In this research, we used Alter's theory of workarounds to study workarounds in health care management, accounting processes, and innovation management (Alter 2014). While the theory enhanced our understanding of the workarounds, our analysis revealed three advancements:

First, we contribute to a more nuanced understanding of how workaround emerge. In line with Ansari et al. (2010) we differentiate workarounds in process-level routines and process-instance-level routines. We show that workarounds in process-level routines (e. g., setting a standard password known to colleagues) will be enacted once while workarounds in process-instance-level routines will be enacted based on situational factors (e. g., the VIP flag). While Orlikowski (2000) argued that recurrent engagement with these routines affect the willingness to engage in workarounds, we show that the particular situational factors determine whether a workaround will be enacted. This contributes to our knowledge of how workarounds manifest as unofficial organizational routines (Martin et al. 2013). Workarounds on a process-level manifest quickly as unofficial routines. In contrast, workarounds on a process-instance level manifest as options that will be engaged if the situation permits. The distinction of process-level workarounds and process-instance-level workarounds may also serve as an explanation for the dynamics in organizational routines (Gasser 1986, Lenz & Reichert 2007).

Second, we contribute to a more nuanced understanding of how employees enact workarounds. We found that employees engage in situational risk-benefit analyses before enacting workarounds. Employees calculate the potential benefits, e. g., in terms of efficiency gains and the situational risks, e. g., the exposure of process violations. Depending on this calculation, employees will either conduct workarounds (when benefits outweigh risks) or follow the defined process (when risks outweigh benefits). However, when employees misjudge the situation in their risk-benefit analysis, the workaround is exposed as control failure and management has to step in and punish for not following the defined processes. Most interestingly, risk-benefit analyses are being done once for process-level routines and repeatedly in each situation for process-instance-level routines. This contributes to our knowledge about how different perspectives on workarounds may overlap and create organizational conflicts. Risk-benefit analyses may serve as an explanation of the so-called 'balancing loop' of the ongoing process of balancing organizational problem and employee reaction (Tucker & Edmondson 2003). Furthermore, the risk-benefit analysis may serve as an important feedback mechanism in organization improvement (Keating et al. 1999).

Third, we contribute to our understanding of the role of information systems in the emergence of workarounds. We understand IS as an enabler of business processes, which help organizations to support their key business activities. During the risk-benefit analysis, employees are looking for

indicators that help them to identify risks and benefits of enacting the workaround in a particular process instance. We refer to them as *cues*. Our prime example of such a cue is the VIP flag in the hospital. Cues have emerged to realize the efficiency gains from violating business process design and to mitigate risks from doing so. Quite unexpectedly, we found that information systems serve as catalysts for workarounds by providing effective cues for the situational risk-benefit analysis. In contrast to literature where information systems are used to forfeiting surveillance (da Cunha & Carugati 2009, Sobreperez et al. 2005), we find a more enabling role of information systems: Information systems provide information that help employees to make well-grounded decisions on the risks and benefits of enacting a workaround (Lenz & Reichert 2007).

This study advances our knowledge of workarounds in formalized business processes in several ways. First, we establish the usefulness of Alter's theory of workarounds (2014) by empirically substantiating the five voices. We found the theory particularly useful for identifying the relevant dimensions for analyzing workarounds. However, we suggest carefully defining the scope of the characteristics of each voice in order to avoid overlaps. We further found that with the notable exception of the perspective voice, the current voices largely neglect the positive role of workarounds (Augsdorfer 2005, Campbell 2011). Second, we introduce the concept of risk-based analysis in workaround behavior. We further extend knowledge on how and why workarounds occur. Third, we provide arguments for differentiating between process-level workarounds and process-instance-level workarounds. Fourth, we outline the importance of cues in workaround decision-making for process-instance-level workarounds and suggest that information systems play an important role in designing and implementing these cues. Fifth, we outline an enabling effect of information systems on workarounds by asserting and extending knowledge for workaround decision making.

This study has practical implications as well. Before applying the findings to practice, more research is needed to replicate and extend the current findings. Assuming that further research validates our findings, our analysis suggests that managers should differentiate between process-instance-level workarounds and process-level workarounds. While the former allow the implementation of certain cues to influence workaround behavior, the latter point to bad process design and often require redesigning the process. For process-instance-level workarounds, managers should tolerate employees' risk-benefit analyses and even provide additional information for decision-making.

We acknowledge that there are several limitations to our study. Our analysis was based on only 38 interviews in three organizations. Given the exploratory nature of the study and our broad interest in workarounds, this research presents only a first step toward understanding the emergence of workarounds in organizations. We further acknowledge that, while comprehensive and well-grounded in literature, the theory of workarounds may not be as useful as other theories. Further research might study workarounds from an bureaucratic perspective (Gouldner 1954, Martin et al. 2013).

6 Conclusion

We contribute to a more nuanced understanding of workarounds as one of the most puzzling phenomena in business process management research and practice. We advance Alter's theory on workarounds (2014) to resolve this puzzle by analyzing empirical evidence from a multiple case study. While we found Alter's theory useful in enhancing our understanding of the workarounds, the analysis revealed that employees enact workarounds based on a risk-benefit analysis of the situational context. We contribute to a more nuanced understanding of how workaround emerge by differentiating workarounds in process-level routines and process-instance-level routines. During the risk-benefit analysis, employees look for indicators that help them to identify risks and benefits of enacting the workaround in a particular process instance, which we refer to as cues. We found that information systems serve as important cues that guide this risk-benefit analysis. For future research, we suggest to further examine the distinction between process and instance workarounds, the role of cues in workaround enactment, and how IT can facilitate or inhibit this enactment.

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