



RESEARCH ARTICLE

Institutionalized computer workaround practices in a Mediterranean country: an examination of two organizations

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Abstract

Information systems research often treats *computer workarounds* tangentially and as temporary phenomena. This exploratory research embraces anomalous system use in general and computer workarounds in particular by suggesting why the latter can be institutionalized and how they may be manifested in practice. Anomalous use is defined as sociomaterial actions around an IT artifact not consistent with its design or related official rules that nevertheless constitute system enactment in practice. The persistence of computer workarounds might be explained by the tension between top-down pressures from the external environment and bottom-up constraints from day-to-day operational work. These insights are drawn from an up-close study of workarounds in two cases from the Mediterranean region. The workaround practices involve decoupling and loose coupling, effectively creating 'equilibrium' between the aforementioned top-down and bottom-up influences. This may be attributed to parity between the influence exercised by external regulatory/accrediting bodies and the constraints of day-to-day work within the focal organization (i.e., work ethos, material constraints, and discretion to decouple). Our results show why some computer workarounds exhibit institutionalized behavior and their antecedent conditions. We also suggest that constituent workaround *practices* may exist as twin but distinctive behavioral patterns – non-compliance (or partial compliance) with an official rule and partially (or fully) working around designed systems.

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Introduction

The recent emergence of *computer workarounds* (e.g., Ferneley & Sobreperez, 2006) as a non-trivial information systems (IS) research topic reflects the growing theoretical interest in anomalous technology use to account for 'specific social and historical contexts' as well as 'focal practices' when IT artifacts are enacted in the real world. We propose that computer workarounds are a form of anomalous system use which refers to a variety of sociomaterial actions around IT artifacts. These actions may not be consistent with the designed uses and official rules but nevertheless constitute a form of IT enactment in practice. Computer workarounds defined in this manner build upon prior conceptions that focus solely on non-compliant user behaviors with respect to the intended system design (e.g., Koopman & Hoffman, 2003). The IS research that touches

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upon computer workarounds has often been concerned with them only tangentially (e.g., Boudreau & Robey, 2005). Still others explicitly conceive of them as locally constituted transient phenomena (Kobayashi *et al*, 2005) implying a readiness to give up the workaround and revert to use of the systems as designed. In addition, the research that focuses on an in-depth exploration of computer workarounds *per se* (e.g., Azad & King, 2008) does not explore their longevity – whether they are institutionalized or not (Selznick, 1996). Despite their prevalence in the workplace, the larger questions of whether computer workarounds may actually be *institutionalized* (persistent) and why they persist have not been sufficiently explored.

Given that an original IS design configuration embeds the official rules of an organization into a system, our particular interest is in analyzing the continuing co-existence of both the computer workaround and the ‘worked around’ system. Since the existing literature rarely deals with this co-existence, either theoretically or empirically, our research is by design exploratory in nature. With an eye towards exploring the contextual influences and their manifestations around workaround practices, our research questions are: *What is the context in which institutionalized computer workarounds co-exist with existing systems? What behaviors are evident in these institutionalized computer workaround practices?* To reduce repetition, workarounds and workaround practices are used interchangeably in this paper.

This paper builds on our earlier research that focused on the inner working of computer workaround micro-practices that enveloped the use of a medication dispensing system in a teaching hospital (Azad & King, 2008). That earlier paper was confined to an analysis of the social interaction of health professionals as they enacted these micro-practices (habitual emergency, verbal signature and fail-safe switch) to work around the medication dispensing system. In this paper, we expand our focus to two other aspects of workarounds. First, we look at the interaction between the extra-organizational environment and day-to-day work and how these interactions influence the institutionalization of workarounds. Second, we dig deeper into what is being worked around and how it is done, whether bypassing organizational rules and/or bypassing the systems that embed these rules. Using a case replication logic (Leonard-Barton, 1990), the current paper looks at computer workarounds in a tax agency and then a teaching hospital (both of which are in the same Mediterranean country). Owing to our ongoing work at the hospital, a new round of data collection was carried out which goes well beyond the scope of the earlier paper to explore the broader question pursued in the tax case. The current paper’s focus on outward-inward linkages and bypassing rules or systems is distinct from the earlier one. Nevertheless it clearly complements that research by working towards developing a well-rounded and theoretically rigorous treatment of workarounds.

The contributions of this paper are threefold. First, we uncover computer workarounds that are manifested as a socially stable pattern of action which is a property of institutionalization. Second, our proposed framework casts the institutionalized behavior of computer workarounds as a means of establishing ‘equilibrium’ between the pressures from outside the organization and the bottom-up pressure of work practices from within. We suggest this balancing stems from decoupled or loosely coupled practices of some workarounds. Third, these two cases show that workarounds could simultaneously bypass both designed systems and official rules as distinctive but coincident action patterns.

Treatment of traditional and essential workarounds

The existence of computer workarounds has been known to IS researchers for some time (Gasser, 1986; Gerson & Star, 1986). However, most IS researchers only tangentially address computer workarounds in their work (LaPointe & Rivard, 2005; Wagner & Newell, 2006). For example, Boudreau & Robey (2005) highlight the computer workarounds that are absorbed into a stable system design after initial implementation. More importantly, these authors focus on users’ exercise of agency during implementation. Thus, computer workarounds serve as evidence of user agency – workarounds are not the object of analysis *per se*.

In addition, there is a general propensity in the literature to focus on faithful-use (e.g., DeSanctis & Poole, 1994). This faithful-use bias dominates IS research to such an extent that computer workarounds, if addressed at all, are done so incidentally. These biases are manifested in at least two ways. First, computer workarounds are treated with less theoretical emphasis and perhaps less rigor. Second, computer workarounds are generally, at least tacitly, considered to be temporary phenomena. The net result of this faithful-use bias and indirect treatment of workarounds is a limited theoretical understanding of anomalous system use and its potential persistence, with some exceptions in more recent research as described below.

IS researchers have begun to move away from a faithful-use bias offering some valuable insights with regard to their technical and social-organizational underpinnings. For example, Kobayashi *et al* (2005) cataloged the social conditions surrounding the use of workarounds. However, they view workarounds as temporary, individual responses by users to systems that function irregularly. Azad & King (2008) went further by dissecting the inner workings of computer workarounds as situated practices through the interpretive flexibility exercised by empowered actors. They also developed a typology of micro-practices that shows the highly situated and emergent nature of workarounds. While these insights expand our knowledge, still lacking is a theoretical basis that could help us understand why some workarounds exhibit persistence and resilience.

Moving beyond the notion of intended use, Ferneley & Sobrepey (2006) suggest there can be 'positive' divergences between the designed and actual use of systems. They posit that users facing situational constraints 'may compensate by creating idiosyncratic methods of data collection, data management or working practice, in effect ... ensuring *essential* task completion' (p. 347, emphasis added). They label such cases where the system is being worked around to accomplish the task at hand as 'essential workarounds'. At the same time, they assert that this behavior is motivated by positive resistance – which is certainly the case sometimes, but may not always be so. More importantly, they do not explore whether workarounds that are essential in getting work done can be persistent. Such a theoretically informed view of workarounds without a faithful-use bias is new to the literature.

Institutional theory (especially its organizational variants) (e.g., Scott, 2008) appears to be a natural source of inspiration for a further exploration of the institutionalized status of essential workarounds. It was institutional theorists who originally pointed out how certain collective actors become captives of their external or extra-organizational institutionalized environment (e.g., Selznick, 1949). These top-down pressures often appear as 'legitimacy obligations' that 'organizations-in-sectors' consider as 'social facts' received via the extra-organizational institutionalized environment (Greenwood & Hinings, 1996, p. 1032). Organizations tend to enact these focal influences as a part of their formal procedures and rules. However, organizations also exercise a certain level of discretion, despite being subject to influences from the extra-organizational environment in which they operate. The separation of influence emanating via the extra-organizational institutionalized environment from that which is due to the collective entity's core activities is termed 'decoupling' (Meyer & Rowan, 1977). These twin concepts of extra-organizational institutionalized environment and decoupling are attractive lenses with which to theoretically analyze the potential existence of essential workarounds. Sometimes these workarounds may be institutionalized in the context of day-to-day practices of anomalous system use *vis-à-vis* the intended system design and the embedded rules.

Research methodology

Given our interest in computer workarounds as institutionalized phenomena in these two organizations, the logical choice was a comparative case study method (Lee, 1989; Yin, 2003). A comparative approach is especially important when focusing on something as elusive as essential workarounds. The case studies were conducted by the two authors, who formed an insider-outsider research team, as recommended by Evered & Louis (1981). In the tax agency case, one of the authors was deeply immersed in the organizational processes and practices, while the other author served as a devil's advocate, requesting theoretical justification of

the practices under examination (Eisenhardt, 1989). The authors reversed roles for the hospital case. Switching between empirical depth and theoretical depth in the two cases created a balanced dialogue between phenomena and theory throughout our research.

Case studies are often criticized on the grounds that the authors get too close to the phenomena and fail to maintain a reasonable academic distance. We took a series of safeguards to minimize the potential for bias. First, we studied the two cases sequentially, so that we could use the first case as a generative source to elaborate on decoupling constructs to shed light on essential workaround practices. We then used the other case to refine our theoretical and empirical insights (Leonard-Barton, 1990). Second, the role reversals of our insider-outsider team allowed us to lower the risk of familiarity bias. A single researcher examining a single case might be more susceptible to force fitting the data to the theory or vice versa (Evered & Louis, 1981). Third, feedback from key actors inside each organization served as an additional control. We asked two managers in the tax arrears case to comment on our framework (i.e., workarounds as decoupling practices) during the coding and conceptual development phase and on an early draft of the paper. In the follow-on hospital medication case, we asked nurses, nurse managers and two physicians for feedback on the framework. In both cases, they were supportive of the decoupling framework as a fairly accurate characterization of the 'situation on the ground'. Their ideas and comments were incorporated into the final version of the paper.

The remainder of this section provides an introduction to our two cases, data collection approach and timeline, choice of respondents, and translating the research question into a more detailed protocol for data collection. Finally we report on the details of our data analysis – both protocol and process.

Case backgrounds

Tax arrears collection case The organization in this case study is a unit within a national internal revenue agency in a Levantine country in the eastern Mediterranean. It is charged with the collection of taxes, particularly tax arrears. One of the authors gained access to the agency with the approval of upper management and the focal organizational unit to study their work practices based on a prior consulting assignment. The magnitude of accumulated tax arrears (approximately \$500 million) was known to be a problem by several successive governments. In late 2000, the government designed and implemented the Integrated Tax Administration Computer System (hereinafter referred to as the Tax System) to support taxation and more strict procedures to crack down on ballooning arrears as well as delinquent taxpayers. A major impetus for this effort was an agreement between the government and the International Monetary Fund (IMF, 2005) to ratchet up the

treasury's fiscal capacity to get a more favorable assessment of national finances and thus potentially reduce interest payments on the national debt. Against this backdrop, the research team looked at the process of collecting arrears and the associated policies and procedures, especially the use of the computer systems. At the time of the research (i.e., 5 years after the Tax System was installed), collection appeared to have become more efficient. However, the collection department practices were still perceived to be not fully compliant with the designed procedures. The workarounds that bypassed the Tax System reduced the audit capability needed for IMF reports. This in turn led to the perception that the workarounds were at least partially responsible for lack of major progress in lowering the national arrears based on insufficient collections from delinquent taxpayers.

Hospital medication dispensing case As part of an effort to obtain accreditation, administrators in a Levantine hospital were interested in improving the process of ordering, dispensing and administering medications. Permission was obtained from both the institutional review board and the hospital director. Our initial focus was on problems in delivering a class of anti-microbial medications that are restricted because misuse can lead to the development of antibiotic-resistant bacteria. Restricted medications require the approval of an infectious disease specialist who must 'sign' a 'Request for a "Restricted" Anti-microbial Agent.' The need for this special approval (referred to as 'fill form') seemed to be a frequent source of delay. Subsequently, the focus of the study became the information system, that is, the Medication Dispensing System ('Dispensing System'), which processes orders for all medications, including restricted ones. We were particularly interested in the workarounds associated with this system.

Mediterranean context These cases were chosen because they involved persistent computer workarounds whose parent organizations are both in the same country in the Levant area of the Mediterranean. Traditionally, the governance systems of organizations and their institutionalized environments in the Mediterranean region appear to be characterized by distinctive features. For example, Greece and Cyprus are thought to be less formal in their market institutions as compared with the northern and western countries of the European Union (e.g., Constantinides & Barrett, 2006). Nevertheless, there appears to be a duality in which rigid organizational authority co-exists with informality in some Mediterranean region countries (Navarra, 2010). The governance structures in the Levant region of the Mediterranean show a tendency for their formal organizational structures to be ceremonially rigid while in practice there appears to be a culture open to a flexible interpretation of the rules (International Finance Corporation, 2009). This duality has two advantages for our case study approach, all other factors being equal. First, it may increase the

chances that the organizational actors will resort to essential workarounds in order to resolve situational factors and get on with their work. Second, such workarounds may be more visible to research examination than they would in a different setting. In addition, the governance structures characteristic of the Mediterranean also tend to mediate the ability of leaders to engage in transformational change. That is, the standard tools of coercive managerial control often look less viable (Navarra, 2010). We will highlight these contextual factors and the ways in which they potentially figure in our research enterprise in the discussion.

Data collection

Tax arrears collection case The collection of data proceeded along two tracks. One track included interviews with key informants. The second track entailed shadowing of key collection personnel for 4 h a day, 2 days a week. The interviews and shadow work were carried out from January to May 2006. Twenty-nine interviews were conducted with the 21 interviewees; the average session lasted 90 min. Interviewees included members of the collection department management and staff, key members of the IT department, and the general director of the internal revenue agency. The interviewees were chosen to provide an even-handed account of workarounds – pro and con. In addition, we wanted to ensure representation of frontline and supervisory positions. Others who might provide useful information were also included (e.g., the IMF economist). The interviews were conducted by the two authors and a research assistant. The shadow work was led for two weeks by the insider author and then was turned over to the research assistant. The insider author examined copious note taking on a frequent basis calling contacts within the tax agency to verify any unexpected observations.

Hospital medication dispensing case Based on our earlier work (Azad & King, 2008) we were quickly granted access to the site which facilitated the new round of data collection. The current study's interviews took place in late 2007 and early 2008. The scope expanded to cover additional units within the same hospital that met two criteria: (a) the units had high usage of restricted medications (e.g., infectious, oncology, and pediatrics); (b) the units were thought to be employing 'fill form' workarounds *vis-à-vis* the prior-approval rule and the associated information system. A broad mix of personnel were interviewed including 25 nurses, 12 members of the medical team (interns/residents, fellows), eight pharmacists, and three infectious diseases attending physicians. Each interview lasted 30–60 min. Some of these interviews were done in a shadow style (e.g., with the interviewer walking alongside the interviewee). We sought to elicit if and how the respondents were working around the 'fill

form' and why the workarounds had co-existed for so long.

Data analysis protocol and process

The replication logic strategy recommended by Leonard-Barton (1990) suggests that authors use the knowledge gained in an earlier case to leapfrog the coding process. We followed this strategy and attempted to see if the codes from the 'anchor' case (tax arrears) were proximate to the information in the second case (medication dispensing). Then, based on 'closeness of fit' among these categories we did a few more iterations. There is a risk of force fitting the data in such situations. However, it is also important to note that we carefully selected the two cases based on our prior experience within these organizations. We coded and analyzed our data using the process recommended by Strauss & Corbin (1998) as summarized below.

Our initial focus was two dozen useful codes with roughly one-half on antecedent conditions (workaround rationales) and the other half on workaround practices. The elements of the extra-organizational context and internal work environment appeared to show up in almost all the rationale (antecedents) codes. The remaining codes appeared to be equivalent for the persistence of workarounds and their 'disconnections' from systems or rules. Subsequently, we looked at potential theoretical frameworks as 'sensitizing devices' (Klein & Myers, 1999) to refine and reduce these codes as well as potentially elaborate the underlying concepts. We were attracted to the notions of extra-organizational institutionalized environment and decoupling. First, Selznick's (1949) theory of *institutionalization* as 'infusion with value beyond the technical requirements of the task at hand' speaks to organizations being held captive by their

environment. Second, despite being captive to their institutionalized environments, focal organizations appear to exercise discretion in their day-to-day work – *decoupling* of extra-organizational environment pressure from work practices (Meyer & Rowan, 1977; Orton & Weick, 1990).

The two cases turned out to have very similar day-to-day work practice challenges (bottom-up) and extra-organizational pressures (top-down) allowing us to narrow in on five final codes referenced (a) through (e) *vis-à-vis* notions of extra-organizational institutionalized environment vs internal work. First, we converged on the following labels (codes) which appeared to capture the spirit of the underlying bottom-up challenges of *day-to-day work* that embody (a) *material constraints* (e.g., 'something you have no control over'), (b) *discretion to decouple* (e.g., 'the collection manager has more discretion to stray from the rules than the IT manager') and (c) *work ethos* (e.g., 'we don't want to go after innocent taxpayers mistakenly'). Second, the presence of influence from the *extra-organizational environment* often in the form of standards (e.g., the top-down influence of international accreditation bodies such as IMF) was also quite similar in both cases. It contributed to (d) adoption of organizational *policy-directives* (e.g., 'strengthening tax arrears collection'), and (e) *policy-based systems* (e.g., 'the new tax collection computer system'). These antecedent conditions are summarized later in Table 1 and Figure 3 in our cross-case findings section.

The focal theories of decoupling (Meyer & Rowan, 1977; Orton & Weick, 1990) provided powerful metaphors to describe the tug-of-war between top-down and bottom-up pressures but were less useful for coding the detailed level of observed practices. This necessitated elaborating the decoupling notions based on our data

Table 1 Antecedent conditions of institutionalized computer workarounds

Source of pressure				
Top-down (Extra-organizational)		Bottom-up (Day-to-day work)		
Policy directive (Rules)	Policy-based system	Work ethos	Discretion to decouple	Material constraints
<i>Tax case</i>				
IMF standards on tax collection efficiency; Reporting & negotiations	Embedding of stringent arrears collection business rules in computer system in the form of delinquency status and collection periods	'No false positives'; 'Do not wrongly declare a taxpayer delinquent'	Collection department has greater informal discretion to stray from the rules than the agency management	Low trust in data quality of tax amounts, dates, addresses; lack of functional ability by clerks to update data
<i>Hospital case</i>				
JCAHO standards for medication administration	Embedding control of anti-microbial medications as prior approval recorded in computer system	'Patient safety above all else'; 'Dispense first – get approval later'	Attending physician's professional clout equal to infectious specialists' ability to interpret and bend rules; both groups have more discretion than pharmacists and nurses	Limited availability of infectious specialists; lab results not available when the patient needs drug

analysis where we narrowed down the dozen initial codes to four. These potential patterns of decoupling and loose coupling included four distinctive practices that go beyond their mere metaphorical existence: (i) decoupling of practice from the official rules; (ii) loose coupling of practice with the official rules; (iii) decoupling of practice from the designed computer system; and (iv) loose coupling of practice with the designed computer system. These decoupling/loose coupling practices are further described and analyzed in the cross-case findings section.

The findings are presented in the following three sections: an analysis of the tax case, an analysis of the medication case, and a cross-case analysis. The two within-case presentations provide evidence of top-down and bottom-up pressures as antecedent conditions to the enactment of workaround practices. The cross-case analysis integrates these results and proposes potential patterns among the two cases *vis-à-vis* antecedent conditions and workaround practices.

Tax arrears collection system

The law states that the taxpayer is considered delinquent after two attempts to get him to pay. According to published administrative procedures, the Tax System is presumed to be the formal basis for classifying a taxpayer as delinquent based on lack of settlement of taxes owed. The formal procedure to trigger legal action is based on the following sequence of activities, as shown on the left of Figure 1.

A collection order is issued by an auditor in the income tax department, who passes a slip copy of the order to the

IT department. Often a temporary (hourly) IT department data entry worker enters the information on the collection order into the Tax System. The collection department initiates the collection process by mailing the collection order to the taxpayer and obtaining a return receipt slip, which provides legal evidence that the taxpayer has been served with the collection order. This slip is also passed on to the IT department for data entry. If the taxes have not been settled within 60 days of the initial collection order being served, a duplicate warning is sent to the taxpayer; another return receipt is obtained and is passed on to data entry for recording in the Tax System. If within 15 days of the second notice the taxes owed still have not been settled, the taxpayer is presumed delinquent. A legal action ‘flag’ is supposed to be set to ‘DELINQUENT’ in the system by a tax collection clerk.

In actuality, the practices of the collection department loosely follow the official policy with respect to declaring a taxpayer delinquent (right of Figure 1). After serving the taxpayer with the first collection order and obtaining the return receipt slip, the collection department clerks add the ‘serve date’ to a spreadsheet file, which mimics the data entry action of the IT department. The spreadsheet includes the taxpayer’s details and the amount owed. Most of this information comes from the collection order. Once a duplicate collection notice is served, collection clerks attempt to obtain additional information for their spreadsheet to ascertain the status of the amount in arrears and whether the taxpayer has made ‘good faith’ efforts to settle his taxes. The clerks consult their spreadsheet files, their personal contacts within the

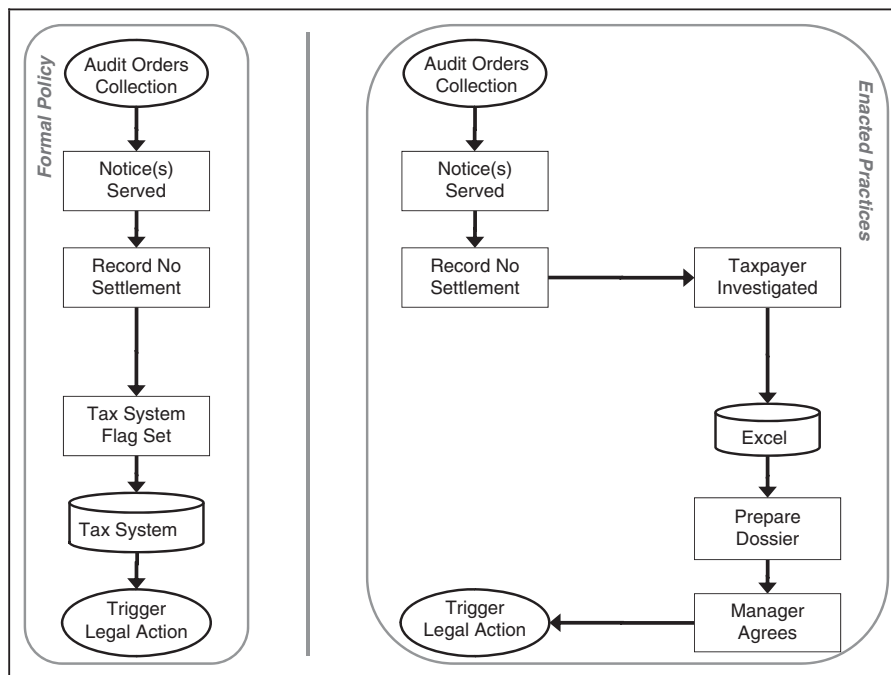


Figure 1 Working around the tax arrears collection procedure.

postal service, and their informal knowledge about the taxpayer's prior record, including whether he has been 'honest' in his dealings with the Treasury.

If these efforts result in an opinion that the taxpayer is not really 'interested in paying', a dossier is prepared and referred to the assistant manager of the collection department to approve a declaration that the taxpayer is delinquent, thereby triggering legal action against him. Upon approval, a legal proceeding is authorized, which includes notifying the Ministry of Justice and placing liens against the taxpayer's real estate holdings. This decision is recorded in the spreadsheet file by the 'delinquency follow-up clerk' (but almost never in the Tax System). The extra verification efforts delay the delinquency action by about 90 to 180 days from the serve date of the initial collection order.

Loose coupling with policies/procedures

The recollections of a veteran tax collection clerk show evidence of the historical institutionalization driving the workaround practices:

I have always asked my supervisor before I refer the cases to the Ministry of Justice. The information in that [Excel] file is very important for her to be sure.

Another member of the collection department concurs that the spirit of the official policy is being followed:

We take the law seriously and want to make sure that taxpayers pay what they owe. For us it takes time to make sure you have the right person with the right income tax, with the right address...

We classify the collection department's approach to implementing the collection of tax arrears as a loose coupling. The staff flexibly interprets certain rules about the collection process (e.g., 90 to 180 rather than 75 days), which fits their perception of the contingencies they face. In other words, enacting this workaround satisfies the intent if not the letter of the law.

Decoupling from computer systems

The design of the Tax System intends to integrate the issuance of collection orders and the process of collection into a tightly coupled activity. The IT department staff, and especially the manager, are not happy with the enacted practices of the collections department:

We have had difficulty getting the tax clerks to enter the delinquency status of taxpayer. They don't enter the delinquency so we do not know who is delinquent, then afterwards we hear complaints that the system is not up-to-date because it does not have delinquency dates. They insist that using a spreadsheet is better.

The IT department blames the tax collection clerks and their supervisors for the existence of the workarounds. The developer of the Tax System points to the disconnect

caused by the spreadsheet:

We designed a fully integrated system Tax System. If administrative action is taken without entering it into the system, then we no longer have an integrated workflow.

The perspective of the tax collection clerks is different, one of whom offers this view:

I use the system to see who owes and how much. But it has problems. Some of the amounts are inaccurate. How can a small company that I know make 100 times its real income! These problems reduce our trust in the System. Without trust how can you send the law after a taxpayer? It is not just one 'flag' that IT people say. I refer everything to Joseph to enter into the spreadsheet. Then, I am 100% sure the right action is being taken against the taxpayer and it is not a machine making decisions.

The Tax System no longer mirrors the actions of the collection department employees and the related follow-up procedures, which was a key reason for computerization. That is, in practice they are decoupled through the workarounds, since the system is totally bypassed.

Two coincident (i.e., in simultaneous existence) patterns can be deduced via these observations from the tax arrears case: practices were simultaneously decoupled from the designed tax collection system and loosely coupled with the official tax collection rules. We observed the designed computer system being continuously worked around (e.g., bypassed) while the official collection rules were being partially worked around.

Day-to-day work

Three bottom-up constraints that influence work practices are offered as reasons for the spreadsheet work-around.

Material constraints The collection clerks pointed to data problems, that is, incorrect amounts and inaccurate dates. Others highlighted wrong addresses of the collection orders that should have been recorded as 'undelivered', were instead recorded as 'delivered'. A veteran clerk at pursuing delinquent taxpayers opined that:

Some companies are ghost companies. I do not waste my time on these. Only 10% of the taxpayers that are potentially delinquent according to the Tax System data are in fact inputted in the Excel sheet, after checking, double checking and triple checking. Then we can go after delinquents without fear.

Most collection clerks shared these sentiments. They regard the data in the Tax System as just 'bare bones'. They defend a more holistic approach to determining delinquency status of taxpayers before taking any legal action.

Based on these comments a spreadsheet has emerged to accommodate the situational contingencies that are encountered in the staff's daily work. This mismatch between perceptions of operational needs and perceived

shortcomings in the infrastructure represents *material constraints* of work.

Work ethos Some collection clerks were adamant that 'you cannot just leave a "flag" in the system to serve as a judgment call for so and so's property to be seized by the government... that decision should be made by somebody and with his signature'. The assistant manager of the collection department recounted an anecdote. An overzealous clerk had set the flag on the new system for a certain taxpayer, which triggered legal action including barring him from traveling abroad. The person was stopped at the airport:

The person was a former Minister and the delinquency was not personal but through a company he owned. But the really embarrassing thing was that he had made an installment plan and was paying all the installments on time. You do not go after a Minister without an airtight case.

The rationale which appears to underlie the collection department's actions is that any collection order should be double and triple checked. It is better to err on the side of too much information in order to eliminate any chance of going after a taxpayer wrongly, even if legal action is delayed in justified cases. We label this logic, which dominates the internal revenue service, a *work ethos*. This work ethos appears to be contributing to both the loose coupling of practice with the procedures and the decoupling of practices from system use.

Discretion to decouple/loosely couple The fact that the Tax System is only sporadically used by the collection clerks is attributable to their view of the IT Department's approach to data administration. The assistant collections manager gave this opinion:

We are not given a chance to interact with the system. This makes the system chauffeur-driven and we are not in charge of the data. But we are data owners in the agency and we should administer data entry, and queries. The IT department perceives us as computer-untrustworthy. So we 'augmented' the system with our own spreadsheet.

The IT department could not compel the clerks to use the system. The IT department manager explicitly addressed this issue: '...we do not have discretion over these employees and cannot force them to use the system'. We were also informed that firing and hiring decisions did not depend on the clerks' tax collection efforts. As a result, the collection department appeared to be in a relatively privileged position *vis-à-vis* the IT department, giving it latitude in straying from the official rules. Thus, we surmise that the collection department has the *discretion* to be able to engage in both *loose coupling* of practices with policies and *decoupling* of practices from systems.

Extra-organizational environment

The continued presence of formal administrative procedure side-by-side with workarounds points to the fact

that the higher organizational levels are under pressure from the extra-organizational institutionalized environment to keep the rule on the books. That is, the need for legitimacy in the eyes of international financial markets compels the management to hold onto the formal policy despite deviations from it in practice.

Policy directives Negotiations with international donors (e.g., the IMF and the World Bank) resulted in the government pledging to crack down on delinquent taxpayers, who collectively owed approximately \$500 million according to the IMF (The World Bank, 1994). The resultant reform program adopted with direct input from the IMF included references to the tightening up and standardization of procedures and the computerization of the collection processes in the ministry. These pledges no doubt played a part in putting pressure on the government to design and implement the associated policies.

Policy-based systems More specifically, the government agreed to modernize the tax administration apparatus in the country through the adoption of an integrated tax system. The director of internal revenue rationalized the systems as follows:

Along with a lot of other countries, we need the IMF to be satisfied with our tax collection efforts. If not, the interest rates we are charged skyrocket and borrowing costs become unaffordable... I am aware that we have had problems increasing tax collection!

Although a stringent process for collecting arrears is embedded in the system design, the top management of the agency is aware that it is not necessarily being followed. Indeed, the director appears satisfied with this state of affairs as common to most countries. A similar opinion is echoed by an IMF economist:

We know full well that tax administration practices vary in different countries, and we do not have the manpower to actually audit their every tax collection effort, so we aim for long-term improvements, which we hope will become 'owned' by the country's leadership, and that they in turn will put pressure for implementation.

Medication dispensing system

The dispensing of restricted anti-microbial drugs is governed by rules printed on the back of the anti-microbial approval form with the sequence of events shown at the left of Figure 2. The rules dictate the formal prior-approval procedure to be followed by attending physicians, infectious medicine specialists, pharmacists, and the nurses who administer the medications. The first rule says, 'A physician ... will contact the infectious medicine specialist and obtain approval ... prior [to] the writing of the order'. The second rule says, 'The form will be sent to the pharmacy together with the prescription'. These rules are embodied in one flag of the Medication System. Unless this form flag is set to 'received', the

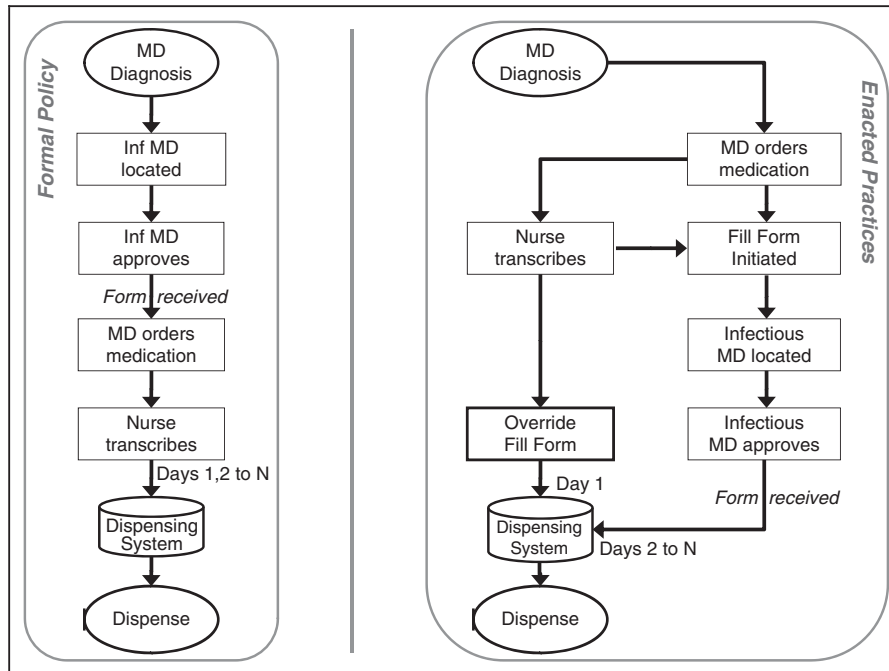


Figure 2 Working around prior approval for medications.

Medication System cannot print the medication slip needed to dispense the ordered drug. Cooperation and tight coordination is required for the actors in the hospital to implement the formal (as-stated) prior approval policy for dispensing anti-microbial drugs. A handful of infectious medicine specialists must be in proximity to dozens of attending physicians in dozens of units in order to approve the restricted medication before it is ordered.

Such coordination is impractical if not physically impossible. Therefore, all the actors (i.e., the attending physicians, infectious specialists, nurses and pharmacists) have enacted a *de facto* 'concurrent approval' policy (right of Figure 2). The attending physicians write a prescription for a restricted medication on the order sheet. The nurse transcribes the order and sends the prescription to the pharmacy, which proceeds to dispense sufficient doses for the first 24 h. During that time the nurses are expected to get the attending physician to gain approval from an infectious medicine specialist for the order and sign the form. Once a signed form is received by the pharmacy, additional doses will be dispensed.

Decoupling with policies/procedures

Practice is disconnected from policy in several ways. First, a prescription for a restricted medication is placed on the order sheet, just like a prescription for a non-restricted medication. The portion of the rule requiring prior approval is overlooked. Second, consultation comes after the fact, even though the infectious medicine

department authored the rules requiring prior approval. An infectious medicine specialist said:

We are consulted on the patient and we recommend the use of a restricted antibiotic, so the pharmacy will provide the desired antibiotic only for the first 24 hours. After that, our signature is needed.

Third, the pharmacy dispenses the doses for the first 24 h (day 1 on Figure 2) despite the absence of a signed form. The rule requiring a signed form is enforced only when the doses for the second 24 h (days 2 to *N* on Figure 2) are prepared.

These disconnections with the official procedure require interdependent action by various actor groups which renders them coordinated activities. Most of the actors we interviewed had not read the rules on the back of the form and were surprised when informed about them. These in-practice procedures have been ritualized. The intended tight coupling of the formal procedure has been decoupled from the actual practice that takes the form of a concurrent approval process during the first 24 h. This is shown on the right of Figure 2.

Loose coupling with computer systems

The intended system use of the Medication System is to prevent dispensing of restricted anti-microbial drugs without a signed approval form. The pharmacist takes on the role of policy enforcer of the users of the Medication System, even though there are points upstream at which non-computerized enforcement could take place (e.g., nurses could be barred from transcribing restricted medication orders). The tacit understanding

inherent in the concurrent approval practice allows the pharmacists to override the flag that blocks dispensing on the first day without a signed form.

The non-delivery of restricted medications due to the absence of a signed form for the second 24h is problematic. An intern said:

It's the duty of the nurses to remind us about filling the fill-form needed for the patient ... If this does not occur, the pharmacy will not provide the floor with the antibiotic, and the patient does not receive the antibiotic. This happens a lot.

The concurrent approval practice does not allow for a second override. Of course, there are exceptions. An infectious medicine specialist said:

If we're outside the hospital, we call the pharmacy and give oral approval so that the pharmacy will give the restricted antibiotic to the unit for the next 24 hours, but by the next 24 hours, we're supposed to come and sign the form.

These two exceptions or overrides illustrate the enactment of procedures that in practice loosely couple the intended system usage with the actual use in practice.

These observations point to two coincident patterns: the medication dispensing practices were simultaneously decoupled from the official prior-approval rule and loosely coupled with the designed medication dispensing system. We see the official rule being fully worked around while the designed system is being partially worked around.

Day-to-day work

Three bottom-up constraints that influence work practices offer reasons why hospital staff bypass the dispensing system and enact workarounds.

Material constraints A key issue brought up by the medical team (interns, residents, attending physicians) and nurses alike was the inconvenience and interruptions that would arise from getting a signature for the form. A nurse said: '[after the morning round] ... if another fill form must be signed during the day then we will have to wait to the next day in the morning to be signed'. The nurses estimated that eight out of 10 forms are incomplete by the time of the next day's dose. The interns/residents find that the most difficult part about the antimicrobial fill-form is filling it in at night. 'At times when we're sleeping at night, we are called by the nurses to fill in the form, which is really annoying...'

Work ethos The nurses who carry out the orders and administer the restricted medications are guided by the ethos that patients are put at risk if orders are not carried out. Nurses go to great lengths to coordinate the approval process, even though the formal procedures do not require their participation, because they are the patient's

advocates in a hospital. A nurse said:

This [follow-up by nurses for doctors] is causing lost time and effort for the nursing team and sometimes jeopardizing patient care by missing or delaying doses.

An intern verified the views of the nurses, saying:

At times, the nurses fill the form in order to save time and provide the antibiotic to the designated patient without delay ... fill the form and just call us to come and check on it and consult the infectious medicine team to approve it.

The same logic is seen in the use of oral approvals when the infectious medicine specialist is unavailable to sign and calls the pharmacy directly. Here the ethos of patient safety above all else appears to be a key influence in the enactment of workarounds.

Discretion to decouple/loosely couple The following examples illustrate the relevance of differentials and disparities in professional hospital ranks. This affords greater *discretion* to some professionals to engage in decoupling practices. For example, a nurse's comment is indicative of their limited ability to intervene:

I waste a lot of my time just calling the intern and making sure that he/she fills out the form and following up on the issue with the intern and the pharmacy.

Infectious medicine specialists exhibit a greater degree of relative discretion. Without their tacit or explicit acceptance of concurrent approval, the entire actual approval procedure would collapse. They possess the discretion to decouple practices from the formal procedure in day-to-day work. One infectious physician specialist said:

Sometimes to save time, once we're consulted, we sign blank forms where the name of the patient, patient number, name of antibiotic and dosage are already written, before waiting for the rest of the details to be filled in on the form.

The infectious specialists also have the discretion to allow oral approval on weekends. A pharmacist said:

On weekends, we send the restricted antibiotics to all pediatric floors even if we don't have a signed form. But we need the infectious disease attending physicians or fellows to call us and give us an oral approval for the desired antibiotic.

The above episodes appear to indicate that the discretionary influence of infectious specialists and attending physicians is greater than that of nurses and pharmacists.

Extra-organizational environment

Below we provide evidence of top-down pressures from the extra-organizational institutionalized environment, such as the international accrediting bodies, on hospital management and the rules they design. These pressures are part of the reason why the rules and the systems that embed them continue to co-exist with the workarounds.

Policy directives When the current policy was written in 1985, there was worldwide concern over the inappropriate use of antibiotics, especially in developing countries (Kunin, 1993). These concerns no doubt influenced the formulation of this policy, though the authors of the rule no longer work at the hospital. While we were conducting our interviews, the hospital was preparing to apply for accreditation by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). While no formal JCAHO policy exists with regard to anti-microbial usage (Patton, 2002), such concerns are reflected within the medication administration process, which is an element of accreditation. The chief pharmacist said, 'The restriction is to prevent abuse of drugs and the development of resistant bacteria'. He wanted to shorten the maximum length of a restricted medication order from the current seven days.

Policy-based systems The formal policy of prior approval is embodied in the Medication System. The rule that the form flag must be set to 'received' is based on the assumption that the approval form will arrive at the same time as the prescription. The flexibility to override the flag may reflect the 'in case of emergency' provision in the formal policy or adaptations in practice. However, the chief pharmacist said, 'Our policy is not to renew. There is concern over misuse or abuse of restricted medication'. While only a prototype exists, the chief pharmacist is pushing to computerize the approval forms themselves so that usage statistics can be gathered. But referring to the physicians' ethos, she lamented that, 'In the end, only if they [i.e., the physicians] were convinced that it is best for the patients will [they] do it'.

Workaround antecedents and patterns

The cross case analysis builds upon the tax arrears collection system and the hospital medication dispensing system both being worked around and their respective essential computer workarounds appear to be fairly stable and persistent. The conditions that appear to contribute to the existence of these essential workarounds involve both top-down and bottom-up pressures. These conditions are summarized in Table 1.

The top-down pressures emanate from the extra-organizational environment in the form of highly institutionalized directives and standards set by international bodies – specifically, the IMF directives to increase tax collection efficiency and the international accreditation standards for hospitals (i.e., JCAHO), which include active efforts to avoid the development of antibiotic-resistant bacteria. These maxims had found their way into the organizational procedures and computer systems of both organizations.

The bottom-up pressures are manifested in day-to-day work constraints in the form of work ethos, discretion to decouple and material constraints. These conditions may be classified as antecedents to the existence of persistent computer workarounds, especially when the top-down

and bottom-up pressures appear to be in equilibrium as seen in the two cases. The decoupling through enacted workarounds which lead to equilibrium between opposing pressures is shown schematically in Figure 3.

A two-by-two matrix spotlights the distinctive patterns of workarounds as bypassing rules-*vs*-systems that have emerged (Figure 4). The vertical axis represents what is being worked around – either a rule or a system – the focal object. The horizontal axis represents the focal object's relative (increasing) degree of coupling with the official rule or designed system – decoupled or loosely coupled. Our cross-case analysis reveals four types of workaround practices. First, looking at the vertical axis points to either the official rule or designed system being bypassed (or used anomalously). Second, looking at the horizontal axis, the bypassing takes the form of decoupled or loosely coupled behavior. Furthermore, the twin practices in cells 1 and 4 as well as those in cells 2 and 3 are coincident (i.e., in simultaneous existence) – the identical shading in cells is meant to highlight these coincident twin patterns.

In cell 1 (*decoupled* actual rule compliance from official rule), the actor groups in the hospital enact a concurrent approval 'rule' for anti-microbial medications. There is an overarching ethos among medical professionals that puts patient safety above all else. Owing to the risk of microbial infection from waiting for prior approval, 'dispense first, get approval later' is the practiced ethos. Second, the discretion afforded to attending physicians as a professional group enables them to overlook the rules (e.g., decoupling) within parameters they consider acceptable. This is enacted with the tacit cooperation of the infectious specialists (guardians of the prior approval policy). The latter turn a blind eye towards this practice in the first 24 h allowing for symbolic compliance (e.g., Meyer and Rowan, 1977). Third, the material constraints on the work practices of the attending physicians, nurses, infectious physician specialists and pharmacists are important mediating factors. These include the delayed availability of lab culture results and the small number of infectious specialists, who are unable to make rounds to all patients who need to be attended to. These factors collectively contribute to a time-limited enactment of a workaround *decoupling* the prior approval rule from practice. Furthermore, this concurrent approval rule-breaking practice has persisted for more than 20 years, despite at least two computerization efforts to increase compliance practice *vis-à-vis* policy.

Cell 4 (*loosely coupled* actual system use with designed use) represents anomalous system use to bend the rules. The work ethos of 'patient safety comes first' conflicts with requiring the prior approval flag to be set as 'received'. It appears the 'in emergency' provision of the rule, which the system allows, is invoked to allow dispensing for only the first 24 h. Beyond the first day the salience of the work ethos has less sway as enough time has passed to resolve the material constraints that existed just after the order was written. The probability of

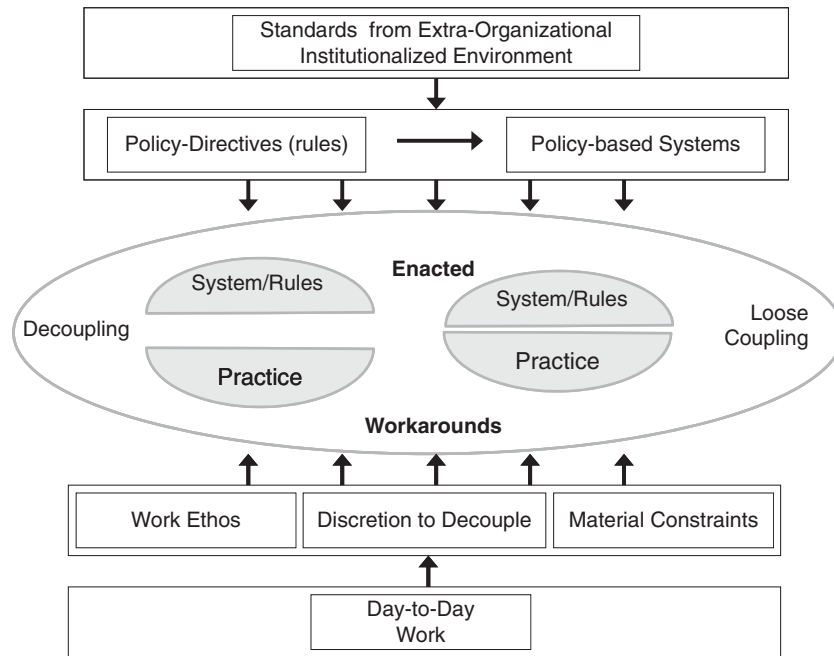


Figure 3 Institutionalized workarounds.

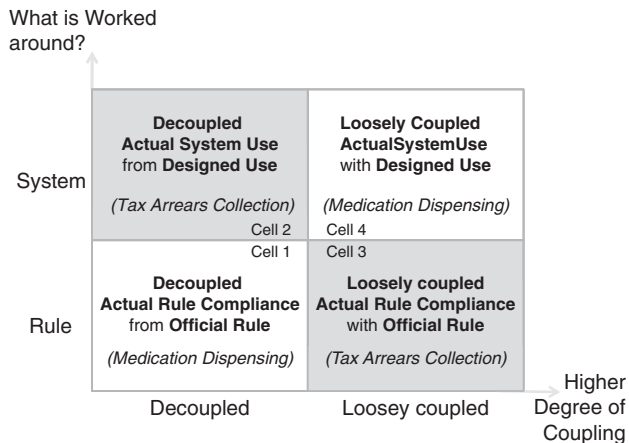


Figure 4 Patterns of institutionalized workarounds.

finding an infectious physician specialist has increased, and the lab results are more likely to be available. The situational discretionary latitude shifts in favor of the pharmacists who are the *de facto* enforcers of the policy through ensuring an approval form is received. The infectious physicians can also assert their professional clout now that the urgency has passed and an approval form must be received. These factors appear to collectively contribute to a loose coupling of system use with practice played out each and every time a restricted medication is ordered.

In cell 2 (*decoupled actual system use from designed use*), the same three antecedent conditions appear to account for the conflict with the rules embedded in the system used for tax arrears collection. The work ethos of ‘avoiding false positives’ at all costs is in full force. In addition, the collection department has more discretionary latitude than the IT department according to most informants. Furthermore, the material constraints on reliably declaring taxpayers delinquent are still binding. These factors collectively contribute to the decoupling of system use from practice, meaning that the delinquency flag is simply not set. Notably, little effort has been made to change the department’s modus operandi despite the spreadsheet existing side-by-side since the inception of the worked around system.

In cell 3 (*loosely coupled actual rule compliance with the official rule*), due to the operative work ethos in tax arrears collection, there appears to be a strong push to avoid false positives that would result in wrongly declaring a taxpayer delinquent. At the same time, the discretionary leeway that the collection department management and clerks enjoy is limited to merely bending the rules of procedure in declaring tax delinquencies rather than totally breaking them. The material constraints facing the clerks in making a delinquency determination appear to be significant – for example, unreliable data on taxes owed, or lack of current address. These factors, along with the institutionalized pressure to appear to honor IMF dictums, collectively influence the loose coupling of the tax arrears collection procedure

with practice. Again, it is important to note that there is little visible effort to eliminate this workaround, leading to its persistence as a highly institutionalized affair.

In summary, these findings go beyond merely showing the existence of an essential institutionalized workaround and its antecedents. Our interviews and shadow work help us to propose workarounds as a form of loose coupling or decoupling between practice on the one hand and either compliance with an official rule or the designed use of a computer system on the other. Furthermore, we elaborated the decoupling metaphor into a 2×2 classification matrix. This classification scheme helped us distinguish between non-compliance (or partial compliance) with an official rule or partially working around the designed system (or fully bypassing it).

Discussion

Analysis of the evidence from our two cases provides a richer understanding of IT workarounds and anomalous use phenomena in several ways. First, we unpacked the black box of 'essential' workarounds (Ferneley & Sobreperez, 2006) – focusing on what contributes to being 'essential' (e.g., antecedents). Our findings suggest that the interaction between two sets of antecedent conditions provide an impetus for essential workarounds: top-down extra-organizational institutionalized environments (policies and standards as well as computer systems which embed these as rules in the work environment) and the bottom-up day-to-day work conditions (material constraints, work ethos and discretion to decouple). Material constraints may be manifested as low data accuracy in taxpayer-related information or getting a physician's signature. Work ethos may show up as the dictum to avoid at all costs wrongly declaring a taxpayer delinquent or delaying treatment for a patient. Discretion to decouple may be seen in the latitude afforded to the collection department as opposed to the IT department in straying from the rules within certain bounds, or a physician overriding the prescribed rules but not a nurse.

Second, the existence of persistent workarounds provides evidence that some IT workarounds may be more than temporary and transient (Kobayashi *et al*, 2005). We look further into the black-box of persistent workarounds by showing that they can take on an equilibration role via patterns of decoupling and loose coupling. This equilibrium may reinforce the *status quo*, whereby the workaround may co-exist with the 'official system', at least for a few years. Our third insight on the types of workarounds addresses the tendency of prior literature to lump them into a single behavioral pattern (e.g., Boudreau & Robey, 2005). Despite bending (or breaking) the rules or using a parallel system, these workarounds were essential for making untenable systems workable. By theoretically distinguishing between two types of workarounds (rule-breaking and bypassing a system) that may also be coincident in practice, researchers are in a better

position to focus on untangling their underlying dynamics as distinct but related phenomena.

In addition, the insights from this study suggest that workarounds can be more than acts of resistance. The prior literature often links the presence of computer workarounds to resistance either implicitly (e.g., LaPointe & Rivard, 2005) or explicitly (e.g., Ferneley & Sobreperez, 2006). While not the focus of our research, our data suggest that characterizations of workarounds as resistance need to be viewed more holistically. In particular, rule-bending (rule-breaking) and partial-use (totally bypassing systems) can be behaviors that are primarily associated with two of our antecedents related to day-to-day work conditions: work ethos and material constraints of work. While some parties in both of our cases pointed out the aspects of non-compliance, those executing the workarounds felt their actions were essential to getting business done. Thus our work may be among the first to provide both a theoretical and empirical rationale to delink workarounds and resistance, especially where essential workarounds are concerned. In other words, the organizational actors working around the official rules/designed systems within their task environment may be enacting articulation work (making rules/systems workable) and not necessarily resisting rule compliance/system use.

There are two major practical implications from our research. First, our two cases with institutionalized computer workarounds show that the overall situation is in equilibrium and in support of getting essential organizational work done through decoupling and loose coupling. As a result, attempts that aim to rectify the situation by eliminating the workaround may bring about unintended results. That is, if the workaround is converted to more stringent rules embedded in the re-designed system, then an outcome may be the enactment of a new workaround. So a counter-intuitive practical implication of our study is that 'rationalizing' workarounds (or the so called 'rational' responses to workarounds) is likely not to produce the intended result.

Second, examples from the tax case show it is important to be aware that mere improvements in the IT infrastructure may not lead to a change in decoupling/loose coupling practices. Outcomes may differ depending on whether one targets work ethos ('no false positives'), discretion to decouple (the discretionary advantage the collection department enjoys over the IT department), or material constraints (the fact that collection clerks are not able to update the data in the Tax System and have 'no data warehousing capability'). For instance, giving the collection clerks the ability to update the data themselves may not result in any change in practices, given their aversion to the risk of wrongly declaring any taxpayer delinquent – a work ethos that is embedded in the tax agency's prior practices and history. As far as computer workaround solutions are concerned, material constraints may be rectified through better data and systems provisions, but work ethos and the discretion to

decouple might be more amenable to social/organizational remedies.

Our study has limitations that should be addressed in follow-up research. First, we have focused on two cases from the not-for-profit sector: a government agency and a private non-profit teaching hospital. Hence, the institutionalized status of the computer workarounds could be associated with the public sector characteristics of the tax agency as an organization lacking the budget or the managerial authority (i.e., it may be too bureaucratic) to address the workarounds. For-profit organizations may experience less of an extra-organizational institutionalized environment and the pressures that go along with it (i.e., markets may function differently from the environments we have examined). Thus, they may exhibit other decoupling practices, other workaround phenomena and patterns – or none at all. Therefore, one or more case studies of for-profit organizations may be useful to help rectify this shortcoming.

Second, our choice of two cases was meant to afford us the possibility of studying the richness of workaround patterns and their inner workings. Our entrée into the case studies was long after system design and implementation. Future work could look into the trajectory of systems from design to implementation, uncovering the link of past policy with system design. Additional research can be undertaken to confirm the existence of similar environmental pressures and core operational influences within a larger group of cases, or a survey of a large number of organizations could be conducted. Moreover, the general contextual situation existing in the Levant area of the Mediterranean brings with it a certain organizational culture of rigid rules (on the books) that co-exist with flexibility of rules (in practice) (International Finance Corporation, 2009). This culture can be very distinctive, a fact that may be related to the behaviors we observed. This contextual factor calls for further research to focus on different geographical areas within and outside the focal region, for example, northern/southern vs eastern Mediterranean, and Western Europe/USA vs Mediterranean, where the milieu may point to productive theoretical differences.

Conclusions

Our research used two in-depth case studies from the Levant area of the Mediterranean that found *computer workarounds* may be *institutionalized* and persistent. The

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antecedent conditions for these workarounds were work ethos, material constraints of work and discretion to decouple *vis-à-vis* day-to-day work (bottom-up) pressures. In addition, the pressures of the extra-organizational institutionalized environments in the form of standards and policy directives (top-down) were contributing factors to the existence of persistent computer workarounds. Furthermore, these institutionalized workarounds appeared to be manifested in practice as distinctive patterns of bypassing rules-*vs*-systems.

These findings generate several key but tentative insights. First, researchers can no longer assume that computer workarounds are temporary phenomena. Second, by focusing on workarounds that put into equilibrium the tension between the task environment and an IT artifact, attempts to reduce the incidence of future workarounds may prove difficult since through decoupling and loose coupling old or new workarounds can again equilibrate the situation. Third, we have taken the notion of institutionalized 'essential workarounds' (Ferneley & Sobreperez, 2006) out of the black box, highlighting their potential patterns in practice as well as their underlying antecedents – that is, an equilibrium due to conflict between the extra-organizational environment and the day-to-day work practices. Finally, we have provided an entrée for looking at workarounds through the lens of decoupling (loose coupling). In particular, we have taken steps to elaborate the decoupling framework to address the characteristics of workarounds, highlighting and opening up for further debate the twin coincident (i.e., simultaneous existence) practices of non-compliance (or partial compliance) with official rules *vs* partial use (or bypassing) of designed system – an important distinction that has been vague in prior research.

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