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EXPERIENCES OF MISFIT AS CUES FOR SENSEMAKING OF ERPs

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ABSTRACT
The adoption of computer-based enterprise resource planning systems (ERPs) has become an important feature of large organisations in both the public and private sectors. Successfully embedding ERP systems in organisational structures does, however, pose a significant array of technical and social (human) challenges. Chief among these is ensuring that ERP users successfully adapt to new/changed work processes and tasks post-adoption. In this study Karl Weick's theory of Sensemaking is adopted to investigate the process by which users develop the meaningful understandings of ERPs. It is proposed that experiences of misfit, that result from user ignorance or organisation-artefact misalignment, act as triggers for sensemaking. Based on an integrated interpretive framework a case study of a South African Metropolitan Municipality is used to analyse 34 experiences of misfit and their consequences. Findings suggest that experiences of misfit trigger various types of response strategies during which users' understanding of and beliefs about ERP technology are updated.

KEYWORDS
enterprise resource planning systems, ERPs, metropolitan municipality, local government, technology adaptation, information systems adoption, sensemaking, misfit

INTRODUCTION: COGNITION AND TECHNOLOGY ADAPTATION

An important area of concern in the field of IS (information systems) has been the adoption of IT (information technology) artefacts by individuals and user communities (Benbasat & Barki, 2007; Mathieson, 1991; Parasuraman, 2000; Saeed & Abdinnour, 2013; Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh, Thong, & Xu, 2012). Research in this domain includes efforts to identify the factors that determine adoption behaviour, but also the process, often referred to as adaptation, by which adoption occurs among members of a user community. The importance of this area of research is rooted in the broadly accepted premise that the potential benefits of IT investments, while influenced by system quality, depend directly upon the nature, level and appropriateness (DeLone & McLean, 1992, 2003; Petter, DeLone, & McLean, 2013) of system usage. It follows that, while an IT artefact may be a technical success, its value for an adopting organisation can only be realised when it is successfully embedded in and integrated with organisational work systems (Alter, 2008).

Whereas behaviourist approaches have been utilised in the bulk of studies on adoption, there is a small but significant collection of scholars who have investigated the cognitive dimensions of adoption/adaptation (Askenäs & Westelius, 2003; Bansler & Havn, 2006; Beaudry & Pinsonneault, 2005; Berente, Hansen, Pike, & Bateman, 2011; Griffith, 1999; Henfridsson, 2000; Jackson, Poole, & Kuhn, 2002; Mishra & Agarwal, 2010; Orlikowski & Gash, 1993; Saeed & Abdinnour, 2013). Studies of this nature present a number of challenges. These include the collection of rich data through time-consuming techniques such as interviews or observation; as well as qualitative analysis informed by theories, models and methodologies generally imported from one or more reference disciplines (e.g., sociology or cognitive psychology). From these studies have emerged a body of knowledge, that addresses both the process by which IT artefacts become individually and socially constructed and the content or substance of these constructions. This study aims to extend this line of research by applying Karl Weick's theory of sensemaking to investigate the role of experiences of misfit as cues for sensemaking of a computer-based ERP (enterprise resource planning) information system by a South African metropolitan municipality. Experiences of misfit are broadly defined as incidents of individuals feeling that the software is "impeding the proper execution of organisational operations" (Strong & Volkoff, 2010, p. 733). While IS research generally frames experiences of misfit negatively (e.g., as evidence of failure to achieve organisation-artefact alignment) (Goodhue & Thompson, 1995; Kanellis, Lycett, & Paul, 1999; Kanellis & Paul, 2005; Soh & Sia, 2004; Strong & Volkoff, 2010), this study proposes that they act as triggers for users to make sense of the nature and role of a new technology in an organisation.

To investigate this proposition data collected during a case study of an ERP adoption project at a South African metropolitan municipality are analysed. Government and research reports provide strong evidence that South African municipalities face an array of managerial challenges with financial and supply chain management highlighted as areas of particular concern (Department of Cooperative Governance and Traditional Affairs Republic of South Africa, 2009; Department of Government Communications and Information System, 2012; Memela, Mautjane, & Nzo, 2008). In a 2009 report, COGTA (Department of Cooperative Governance and Traditional Affairs, Republic of South Africa) acknowledged that "a culture of patronage and nepotism is now so widespread in many municipalities that the formal municipal accountability system is ineffective and inaccessible" (Department of Cooperative Governance and Traditional Affairs Republic of South Africa, 2009). These findings are corroborated by a 2008 study which found that municipalities generally have very limited or no audit reporting capabilities, poor managerial leadership, a lack of performance reporting systems and a lack of acceptable organisational structures (Memela et al., 2008). Computer-based ERP systems have the potential to address these challenges by imposing legislation, regulatory frameworks and best practices upon organisational work systems (Askenäs & Westelius, 2003; Jacobs & Weston, 2007; Strong & Volkoff, 2010). While most small/rural municipalities lack the resources required to undertake extensive ERP adoption projects, metropolitan municipalities governing ever-growing urban areas are better positioned to harness the potential of ERP software packages.

WEICKEAN SENSEMAKING THEORY AND ITS APPLICABILITY TO INFORMATION SYSTEMS ADOPTION

The sensemaking concept has been used in a variety of ways. Snowden (2005), in the context of knowledge management (KM), defines it as "the way that humans choose between multiple possible explanations of sensory and other input as they seek to conform the phenomenological with the real in order to act in such a way as to determine or respond to the world around them" (Snowden, 2005, p. 46). Also notable is the work of Dervin (Dervin, Foreman-Wernet, & Lauterbach, 2003; Dervin, 2003) who developed the sense-making methodology – a widely applied communication-based research methodology which has been used in IS contexts (Foreman-Wernet, 2003; Naumer, Fisher, & Dervin, 2008). Further applications of sensemaking theory have been done in the field of human-computer interaction as a means to investigate the role of machines, and mental models of machines, in the processes by which humans become informed (Klein, Moon, & Hoffman, 2006a, 2006b). The most extensive and complete account of sensemaking as an organisational activity, however, is contained in the writings of Karl Weick (Daft & Weick, 1984; Weick, 1991, 1993, 1995, 1998, 2005; Weick & Quinn, 1999; Weick & Roberts, 1993; Weick, Sutcliffe, & Obstfeld, 2005).

Weick states that human actors perceive reality as a constant stream of experiences through ongoing processes of "automatic information processing" (Weick, 1995, p. 14). During these processes "present moments of experience" (referred to as cues) are extracted from the environment through the senses and placed in "perceptual frameworks" (or frames) to form a plausible understanding of reality. Meaning, accordingly, is created when a person can construct a relation between a cue and a frame. Over time and through exposure to a greater variety of experiences humans develop a repertoire of frames that enables them to create meaning out of a greater variety of cues.

His theory dictates that when actors are confronted with novel events these processes of automatic information processing are interrupted. Such interruptions may be insignificant and bridged with little cognitive effort, but when the disparity between an actor's expectations and perceived reality reaches a "threshold of dissatisfaction" – experienced as a "shock" – the actor is prompted to "pay attention and initiate novel action" to form a plausible understanding of events. Stated differently, shocks denote situations where an actor's inability to relate cues to frames leads to confusion and agitation which, Weick argues, form the wellspring of occasions for sensemaking.

Occasions for sensemaking may trigger a variety of responses aimed at re-establishing the sensemaker's plausible understanding of reality. Weick describes two drivers (or starting points) of these responses. When sensemaking is driven by beliefs it takes the form of arguing or expecting. Arguing occurs when sensemakers test the validity of their frames through engagement with peers or colleagues in an attempt to justify subjectively held beliefs. Expecting, on the other hand, denotes sensemakers' continuous efforts to relate their expectations of reality with experiences. In both cases beliefs form the basis or anchor for the sensemaking process. Importantly, the outcome of these processes often involves the updating of frames to maintain the plausibility of that which is experienced. In this way the sensemaker dynamically establishes a cue-frame relation or, stated differently, a justifiable understanding of what is occurring.

When sensemaking is driven by action, Weick argues, it generally takes one of two forms. Committing, refers to instances where the sensemaker takes irrevocable action and retrospectively constructs a meaningful understanding of that action. This form of sensemaking is particularly apparent when the action committed to is public and/or voluntary and the sensemaker has to construct a plausible justification retrospectively. Manipulation denotes sensemakers' active creation of the environment of which sense must be made. Weick emphasises this circularity by arguing that actions manipulate the environment and, in doing so, partly determine the reactions which follow. These reactions, in turn, form new cues for sensemaking. These continuous cycles of actor-environment engagement highlight the self-fulfilling nature of sensemaking processes, as actions are often taken to justify beliefs and beliefs are retrospectively updated to justify actions.

The sensemaking perspective offers "a powerful means of articulating and tracing the influence of information systems" by enabling the researcher to "explain and anticipate outcomes around technology" (Orlikowski & Gash, 1994, p. 201). In accordance with this view, this study frames the adoption of a computer-based ERP system as an occasion for sensemaking based on three key motivations: firstly, the adoption of an ERP system involves the redesign of existing organisational work systems. Users, as a consequence, are confronted with new or different task portfolios often imposed upon them by the artefact (Strong & Volkoff, 2010). This process not only triggers a steep organisational learning curve, but also influences the roles (and identities) of organisational actors (Ignatiadis & Nandhakumar, 2009). Secondly, ERP systems are technically complex phenomena likely to trigger various degrees of ambiguity and uncertainty about their nature and role in the organisation (Askenäs & Westelius, 2003; Jacobs & Weston, 2007; Soh & Sia, 2004). Finally, sensemaking is particularly well suited to the analysis of adoption as a social process during which user communities continuously and collaboratively construct shared frames of reference about artefacts (Orlikowski & Gash, 1994).

EXPERIENCES OF MISFIT AS CUES FOR SENSEMAKING

An important property of sensemaking, Weick argues, is that it is focused on and by extracted cues. The study of sensemaking, consequently, concerns itself with "ways people notice, extract cues, and embellish that which they extract" (Weick, 1995, p. 49). These cues form the focal points around which people "develop a larger sense of what may be occurring" (Weick, 1995, p. 50). Weick uses the metaphor of a seed to describe how cues play a "form-producing" role in the sensemaking process, guiding actors to link the concrete to the abstract within a specific context.

Previous research in IS has considered features of technological artefacts as cues for sensemaking. Griffith (1999), for example, argues that because proprietary ERP packages are technically complex phenomena it is idealistic to expect that users will form accurate understandings of entire artefacts. Rather, initial conceptualisations of a technology are formed by extracting and enlarging specific features of the technology as cues that trigger processes of subjective and intersubjective sensemaking. "Any technology is actually a combination (constellation) of features: distinct parts, aspects, and qualities. Features that are noticed by users then can be socially constructed into an organisational system" (Griffith, 1999, p. 473).

Askenäs and Westelius (2003), however, argue that the feature-based approach neglects the effect of the ERP's agency on the way it is constructed. To acknowledge this effect, they argue, users' constructions of the ERP should be considered in relation to their perceptions of "fit between the structure in the company and the IS functionality" on the one hand, and their perception of "how the system is trying to influence the user's work on the other hand" (Askenäs & Westelius, 2003, p. 210). Using these two dimensions they create four quadrants, each representing a metaphorical role (they add a fifth role for ERPs that have been rejected by the user community). The roles are described as:

- **Bureaucrat:** The ERP maintains the organisational structure and ensures that the enactment of structure conforms to rules. Users tend to accept this imposed structure if it fits their task portfolio.
- **Manipulator:** The ERP forces users to follow procedures that are experienced as unproductive or ineffective and align poorly with their requirements.
- **Consultant:** The ERP does not command work processes, but advises users when required. Users are able to manipulate the artefact to meet the requirements of non-standard use cases.
- **Administrative assistant:** The ERP is used for simple data-related tasks but does not control or enforce the organisation's processes or structure.
- **Dismissed:** A redundant ERP which has been dismissed by the user community.

Unlike the feature-based approach, the fit-based approach dictates that users' perceptions of a technology are dictated by their experiences of the application of the technology to achieve particular outcomes/goals. In doing so, it acknowledges that it is not the features themselves that users extract and enlarge, but the alignment between the features and users' requirements. In this study the fit-based approach is extended through the investigation of the role of particular experiences of misfit as cues for sensemaking of a technology.

Within IS the notion of fit has been addressed, both explicitly and implicitly, since the 1980s. Contributions to this body of literature have changed over time in response to the advancement of IT artefacts utilised in organisations. While early research of fit concerned correspondence between stand-alone, tool-like artefacts and single users, e.g., Goodhue and Thompson (1995), more recent research addresses organisation-artefact alignment as a separate level of concern (Sia & Soh, 2007; Soh & Sia, 2004; Strong & Volkoff, 2010).

Investigations of fit between individual users and particular IT artefacts typically focus on the premise that an individual's performance is influenced by "the correspondence between task requirements, individual abilities, and the functionality of the technology" (Goodhue & Thompson, 1995, p. 218). An experience of misfit, accordingly, may result from misalignment between any two of the three constructs. This dictates that misfit can exist even when the technological artefact offers all the required functionality – for example, when the user lacks the ability to utilise a particular function of the technology to complete a task.

Organisation-artefact alignment is not concerned with the individual user, but focuses on the degree of correspondence between the integrated work-flow framework of an integrated software system (like an ERP) and the organisational structures (which include policies, procedures and norms) of its adopter (Sia & Soh, 2007). The investigation of fit at this level of analysis is particularly important in the context of IS projects that involve the implementation of a commercial ERP package. Since such packages are developed for the broader market, they cover a generic requirement set which may differ substantially from that of adopters. Soh and Sia (2004) find that the requirements which commercial ERPs fail to address can be attributed to two sources. The first is voluntarily acquired organisational structures that include policies, procedures and norms which the organisation adopts on a voluntary basis. These structures typically result from strategies organisations employ to differentiate themselves from the competition. The second source of misalignment is industry-specific structures imposed upon the organisation by authorities (e.g., lawmakers or industry regulators).

Strong and Volkoff (2010) argue that, while organisation-artefact misalignment can be defined in terms of objective structures, instances thereof are subjectively experienced by users when ERP systems obstruct or complicate their work. They use grounded theory techniques in a qualitative case study to identify two primary categories of experience (deficiencies and impositions), which can be triggered by six categories of generative mechanisms. This enables the definition of twelve types of misfit experiences presented in Table 1.

While Strong and Volkoff (2010) investigate the antecedents of misfit, this study takes interest in its consequences. It is proposed, in particular, that experiences of misfit prompt users of ERP systems to engage in sensemaking. Three primary motivations support this proposition. Firstly, because experiences of misfit obstruct work processes, users are prompted to cope with or overcome them through some form of cognitive or behavioural adaptation (Beaudry & Pinsonneault, 2005). Secondly, the integrated nature of ERP systems implies that experiences of misfit are

often shared by users working within the same or similar business processes. It is expected, accordingly, that these experiences will spawn conversation (argumentation) about the nature, role and functions of the technology (Bansler & Havn, 2006). Finally, experiences of misfit may illustrate to users the shortcomings or limitations of the ERP artefact. Users, consequently, are expected to update their frames of the technology when they gain awareness of its deficiencies.

TABLE 1: STRONG AND VOLKOFF'S (2010) TYPOLOGY OF EXPERIENCES OF ORGANISATION-ARTEFACT MISALIGNMENT

Generative mechanism	Description	Experienced as deficiency	Experienced as imposition
Functionality misfit	The reduction of process efficiency due to artefact adoption.	When artefact functionalities require work-arounds to complete tasks.	When integration or standardisation embedded in the artefact is incongruent with that required by interdependent business processes.
Data misfit	Data or data characteristics stored in or needed by the ES lead to data quality issues such as inaccuracy, inconsistent representations, inaccessibility, lack of timeliness, or inappropriateness for users' contexts.	When there are too few attributes or levels of data associated with certain entities or the software fails to support relationships between entities.	When integration and standardisation between different business units requires the alignment of entity definitions, which leads to imposed generalisation of entities.
Usability misfit	Interactions with the artefact required for task execution are experienced as cumbersome or confusing.	When the artefact's user interfaces are poorly designed for data capture (e.g., forms and fields) or presentation (e.g., reports).	When integration of application areas in the artefact leads to large, complex data sets and more effort is required to locate relevant data.
Role misfit	Roles in the artefact are inconsistent with the skills available, creating imbalances in the workload, bottlenecks, idle time and mismatches between responsibility and authority.	When it is not possible to set up roles with the desired locus of accountability within the ES.	When integration or standardisation embedded in the artefact impacts the roles and responsibilities defined in organisational structure by changing skills required in roles, workloads, authority required in roles, etc.
Control misfit	The controls embedded in the artefact provide too much control, inhibiting productivity, or too little control, leading to the inability to assess or monitor performance appropriately.	When the artefact forces the application of standard rules to instances where a business process presents an exception to the rule.	When rules embedded in the artefact make diversions from typical business process flow impossible.
Organisational culture misfit	The artefact requires ways of operating that contravene organisational norms, such norms, in turn, may be embedded in a broader (e.g., national) culture type.	Due to its holistic nature, emerging from the totality of the technology and its context, misfits from this source are only experienced as impositions.	When actors are required to contravene organisational norms by acting in obedience to rules imposed by the artefact.

RESEARCH DESIGN

To investigate the proposition that experiences of misfit act as cues for sensemaking of ERP technology an empirical investigation was performed in March 2013. The empirical investigation took the form of a single, cross-sectional case study during which the researcher aimed to gain an in-depth understanding of the adoption/adaptation process through multiple data collection techniques. Case studies enable researchers to investigate not only the IT artefact itself, but the range of phenomena (culture, style of management, role hierarchies, etc.) that form the organisational context in which technological artefacts are embedded (Avison & Pries-Heje, 2005; Yin, 2009). The vast majority of investigations in this line of IS research, accordingly, utilise case study design (with qualitative methods) to collect "a full variety of evidence", which may include interviews, documentation and artefacts (Yin, 2009, p. 11).

The case organisation is one of South Africa's nine metropolitan municipalities, referred to using the pseudonym *Metro*. A variety of data collection techniques were utilised, including the analysis of public reports on local government; the analysis of *Metro's* internal documentation (policies, standard operating procedures, workflow diagrams, role hierarchies, forms etc.); interviews with directors; a survey completed by more than 800 ERP users; a group interview with members of the ERP project steering committee; and, finally, one-on-one interviews with 24 users in the supply chain management (SCM) department. These techniques were used in an iterative manner enabling the researcher to design data collection instruments based on the analysis of data previously collected. For the purpose of this article focus falls on the interviews conducted with users. However, data collected through other techniques is utilised here to enable description of the users' organisational context.

Interviews were conducted with 24 individuals from three branches in the SCM Department. The individuals were selected based on an analysis of their roles (task portfolio) with emphasis on the degree to which their tasks involved interaction with the ERP.

TABLE 2: THE BRANCHES (UNITS) AND ROLES OF INTERVIEWEES WITHIN THE SCM DEPARTMENT

Branch	Role	Number of interviewees
Procurement	Team Leader	3
	Buyer	5
	Assistant buyer	5
Tenders and contracts	Practitioner	1
	Professional officer	1
	Admin officer	2
	Clerk 3	1
	Clerk 2	2
	Support staff	1
Supplier management	Clerk 3	2
	Head	1
Total		**24**

During each interview questions were asked about the participant's role at *Metro,* how they used the ERP system, their general views on the system, and their experiences of and problems working with the system. For each problem identified, participants were asked to describe the problem, what they did when it happened, how they learned to handle the problem in that manner, and any problems that may have subsequently resulted from that way of doing things (refer Apppendix A). The interviewer, based on responses from the interviewee, asked more specific questions where required. To avoid confusion the interviewer did not use sensemaking terminology (e.g., frames or cues) during the interviews, more general terms like "view", "understanding" or "perception" were used. All the interviews were recorded using a digital dictaphone and the researcher made field notes after completing an interview to summarise the key aspects thereof.

Analysis of the interviews was informed by Weick's theory of sensemaking and earlier findings about experiences of misfit and sensemaking of technologies. The framework dictates, firstly, that an experience of misfit denotes one of two scenarios: The first scenario includes cases where, due to a lack of knowledge of the technology, the user is unable to achieve a task outcome (i.e., user-technology misfit due to individual abilities). The second scenario includes cases where the user's performance is obstructed or impeded due to an instance of artefact-organisation misalignment. The two forms of experience, the framework proposes, will impact user performance by either obstructing completion of a task or negatively impacting task efficiency. It is further proposed that this will trigger behavioural responses among users that can be analysed as forms of technology sensemaking. The framework does not propose predefined categories or types of behavioural responses.

Application of the framework followed five steps:

1. All the interviews were analysed by a single researcher (the author) to identify particular experiences of misfit as the primary units of analysis.
2. Each experience of misfit was then analysed further based on the following principles:
    a. The experience was categorised as an instance of user ignorance if it resulted from the user's self-reported inability (lack of knowledge) to utilise the artefact's features correctly to achieve task outcomes.
    b. The experience was marked as an instance of task-technology misfit and categorised according to Strong and Volkoff's (2010) typology (see Table 1), if it resulted from an instance of artefact-organisation misalignment.
    c. The user's response to the experience was analysed and framed as a form of sensemaking as described in section 2.

CASE BACKGROUND

Metropolitan municipalities, much like large private sector organisations, have been under increasing pressure to leverage the capacity of IT artefacts to improve performance. Following general global trends South African metropolitan municipalities (metros) have expanded considerably over the last four decades due to urbanisation and in-migration. This process has placed extensive pressure on the resources available to metros as the demand for the expansion of service delivery steadily climbs. Particularly challenging in this regard has been the rapid growth of informal settlements around metropolitan areas, as homeless, and often jobless, citizens migrate closer to the urban centres in the hope of improving their standard of living (Department of Cooperative Governance and Traditional Affairs, Republic of South Africa [COGTA], 2009, p. 39). Unemployment levels in metros range between 26% and 50% (COGTA, p. 23). Apart from these challenges the size of metros also implies that they require "more sophisticated urban management capacity and skills to deal with spatial planning, land-use management and infrastructure life-cycle management" (COGTA, p. 22).

Metro was established as one of South Africa's metropolitan municipalities following municipal elections in 2000. The process involved the amalgamation of seven previously autonomous municipalities under a single local authority. It has a workforce of just over 30,000 people and is responsible for the delivery of municipal services to around 3,5 million citizens spread over an area of 2,500 km2. As a local government organisation *Metro* is governed by a legislative council elected through municipal elections. The council at the time of the investigation was elected in 2011 and consisted of 221 seats. The council elects, from its membership, a mayor who is appointed as the head of the municipality's executive structure. The mayor, in turn, appoints a 12-member council representing the organisation's 12 directorates. Each directorate is managed by an executive director and divided into various functional departments. *Metro's* largest directorate (Finance) has 10 departments while the smallest (Social Development and Early Childhood Development) has two.

As a major part of its establishment *Metro* faced the challenge of integrating more than 100 smaller, fragmented legacy systems used throughout the municipalities that were amalgamated. Based on a high-level requirements analysis process the organisation realised the need for a large, integrated solution and a decision was made to implement a proprietary package. Following this decision *Metro*, in consultation with Gartner Research, initiated a rigorous selection process to identify the most suitable supplier. The process involved over 250 members of staff (mainly senior and middle management) and culminated in the selection of an international supplier. The supplier had limited experience in the implementation of their product in local government contexts and the implementation within *Metro* posed a significant challenge - the project was labelled as the largest of its kind (i.e., local government implementation) ever undertaken.

The first phase of the project life-cycle involved a four-month analysis and design process with the aim of ensuring alignment of the ERP with *Metro*'s requirement set. The second phase involved the implementation of the accounting, procurement, materials management and human resources functionality and was completed in 10 months. The final phase of the project involved the release of more functionality and was completed by mid-2003.

While *Metro* initially faced quite a lot of criticism for the project, mainly due to the costs involved, it was widely hailed as a success after the organisation reported a 14% rise in income generated through billing from 2004 to 2005. This improvement contributed to the improvement and integration of *Metro*'s information management processes through the ERP implementation projects. The return on investment meant that the project effectively covered its own costs in the two years following implementation and future gains could be utilised to improve service delivery.

Because of its size (over 30,000 employees) the collection of qualitative data across all *Metro*'s functions was unfeasible. The researcher consequently decided to select a particular functional area for investigation. The decision was dictated, firstly, by the degree to which the ERP was integrated with organisational work systems in the functional area and, secondly, by the key challenges identified by the AGSA's (Auditor General of South Africa's) reports on local governance in South Africa (Auditor General of South Africa, 2011, 2012). Following an investigation of the AGSA's reports and meetings with the relevant directors at *Metro*, a decision was made to perform data collection within *Metro*'s SCM department.

Chapter 11 of the MFMA sets out the regulations for SCM in municipalities. These regulations aim to ensure that "procurement processes, contract management and the controls in place to ensure a fair, equitable, transparent, competitive and cost-effective SCM system that complies with legislation and that minimises the likelihood of fraud, corruption, favouritism as well as unfair and irregular practices" (Auditor General of South Africa, 2011, p. 70). Given the general poor state of financial management within South African municipalities, it is not surprising that the implementation of the SCM policy has been dismal. The AGSA reports that, for the 2009-10 financial year, irregular spending by municipalities was almost always a result of the contravention of the SCM policy and legislation, accounting for 94% (R3,9 billion) of all irregular municipal expenditure. This figure increased to 98% (R6 billion) in the 2010/11 financial year (Auditor General of South Africa, 2012).

On average *Metro* handles close to 30,000 supply-chain transactions every month. The bulk of these transactions involves the utilisation of contracts for the supply of products which *Metro* requires on a regular basis. Once such a contract has been awarded to a supplier, following the formal bidding process and the specification of an item's cost, the organisation can bypass the time-consuming processes of collecting and adjudicating quotations for a large part of these transactions. The routine nature of such transactions makes them well suited to computerisation, and *Metro* utilises its ERP extensively in this area of business. However, in accordance with MFMA regulations, a competitive bidding process must be followed when demands exceeding R200,000 are processed. The unique nature of each tender complicates the application of the ERP in this process, as *Metro*'s Director of IST (Information Systems and Technology) explained:

> It's technically one-offs so why configure this whole thing for a special road? So I think we have got to be very careful to think to what extent we want to automate this and always ask ourselves is this really going to be, in the long run, the right thing to do. To ask a system to automatically do the adjudication for you on the big-end tenders is probably asking too much and would actually create more problems than benefits.

To cater for such cases the SCM Department, while using the ERP system extensively, also developed various manual (paper-based) workflows to process high-value transactions and a collection of contingencies.

DISCUSSION OF FINDINGS: FOUR BEHAVIOURAL STRATEGIES TO MAKE SENSE

From the interviews the researcher identified and analysed 34 experiences of misfit. The categorisation of these cases involved the analysis of the generative mechanisms of each in accordance with the principles applied by Strong and Volkoff (2010). While many of the cases clearly fell within one of the prescribed categories, some required careful, systematic analysis to justify categorisation and ensure consistency. An example is a case where a user could not complete a task because data were not captured completely at a previous point in the workflow. While it seems, prima facie, that the user experienced an instance of data deficiency, the data capture error (as opposed to a technological deficiency) is the generative mechanism of misfit. Furthermore, the data capture error may itself have resulted from an earlier experience of misfit (e.g., usability misfit). To ensure consistency across the analysis the researcher categorised each experience in accordance with the user's interpretation of the generative mechanism. This decision was motivated by the argument that the user's response to misfit should be considered in relation to his/her understanding thereof, as opposed to an objective analysis of the chain of events preceding it. While this approach enabled consistency in the analysis process, it should be noted that an objective analysis of multiple data sources afforded the researcher a more accurate view of the various misfit instances. For the purpose of this study, however, interest falls on the manner in which users developed plausible (as opposed to accurate) understandings of their experiences. Le Roux (2013) presents a detailed analysis of the full body of empirical evidence collected at *Metro*.

Of the 34 experiences, 17 experiences were attributed to instances of organisation-artefact misalignment, 15 experiences were attributed to user abilities and two experiences were attributed to technical (hardware) deficiencies. The 17 instances of organisation-artefact misalignment included

- seven cases of control misfit (three deficiencies and four impositions);
- three cases of role misfit (all impositions);
- three cases of usability misfit (all deficiencies);
- two cases of data misfit (both deficiencies); and
- two cases of functional misfit (both deficiencies).

In seven of the 15 cases attributed to user abilities, the user admitted that the experience resulted from his/her own lack of knowledge about the system features. In the other eight cases, however, users attributed their experience of misfit to the abilities (or lack thereof) of a user capturing or processing data at an earlier point in the workflow.

Experiences of misfit affected users' task performance in two primary ways. In 24 of the analysed experiences the user could not complete the task at hand until the problem was resolved. In these cases misfit obstructed the workflow and, in doing so, forced the user to take some form of action to overcome the problem. In the remaining 10 cases misfit impacted the user's performance, primarily by inhibiting his/her ability to achieve task outcomes efficiently. In such cases the user could achieve the task outcomes, but in a manner perceived as tedious and/or frustrating.

Initial analysis of the data revealed that users responded to misfit by employing a variety of strategies. After further analysis these strategies were reduced to four general types. In the sections which follow, each of these strategy types are discussed with reference to particular examples and analysed as a form of sensemaking.

STRATEGY 1: USER CONFRONTATION

The response strategy adopted in 12 of the 34 cases is referred to as "user confrontation" and involves the user confronting (mostly telephonically or via email) another user. This strategy was adopted in all cases where users attributed their own experience of misfit to the abilities of another user. It was also adopted in response to three experiences of control misfit and one of role misfit. While this form of confrontation may involve undesired conflict among users, it acts as a form of informal user training during which acceptable usage norms are made explicit and errors pointed out and resolved. The following interview excerpts provide examples of users describing confrontation.

> "So, I phoned the lady and said to her I'm sick and tired, can't you people think for yourselves, you can see there is an address field. And she said can't I be a bit nicer. So I say I've been saying this a hundred million times, I don't think being nice will work anymore."

> "I still have to explain things to my buyers, every day, because each has a different setup to work with, each tender is different. I get frustrated after a while, anyone would, but I've learnt to relax and handle each one on its own merits."

> "One day I saw a requisition come through for an item that is on tender and it was for R1! And I called them and said what the hell are you doing? If you work like that we can just get people off the streets to do your job. How can you release a requisition for R1? And these are senior people!"

Instances of confrontation are analysable as action-driven sensemaking processes. While they generally result in argumentation (belief-driven sensemaking), the action of confronting another user is not undertaken with the aim of establishing frame validity. It is, rather, an attempt to manipulate the environment through the establishment of usage norms with the aim of, in Weickian terms, consolidating that which is real. In this context the user's environment is inter-organisational and continuously shaped and reshaped by the actions of other users sharing the same integrated software artefact. By manipulating the usage behaviour of others through confrontation users

actively create the environment in which they work. The goal of confrontation, then, is to establish correspondence between the user's beliefs about desirable ERP operation and his/her reality.

STRATEGY 2: WORK AROUND

In 11 of the 34 cases users adopted a workaround in response to the experience of misfit. Despite various calls for research into workaround practices (Kellogg, Orlikowski, & Yates, 2006; Orlikowski & Gash, 2011), this area of IS remains notably under-researched (Azad & King, 2008; Ignatiadis & Nandhakumar, 2009; Pollock, 2005). "IS researchers have generally focused their theoretical energies on the intended use of information systems, devoting much less attention to computer workarounds" (Azad & King, 2008, p. 264).

In all the instances where workarounds were adopted at *Metro*, it was done in response to an instance of organisation-artefact misalignment. Three scenarios were evident. In the first, users required certain data to which they did not have access through the ERP (role/control misfit experienced as imposition). To obtain the data users contacted a colleague who did have access to the data and requested that it be exported and sent to them via email. In the second, users needed to compile reports for particular stakeholder groups. While they were able to utilise the ERP's built-in reporting functionality, the resulting reports either lacked certain data or contained too much data (data misfit experienced as deficiency). Users responded to such instances by extracting the data from the ERP to a spreadsheet and manipulating the output to develop the desired report. In the third scenario certain requirements of a business case were not catered for by the ERP functionality (functional misfit experienced as deficiency) and required users to follow a manual (paper-based) workflow.

From a sensemaking perspective, these experiences of misfit play two important roles. In cases where the instance of misfit was experienced as an imposition the role of the ERP as imposer of data access control became illuminated. This is evident from the following explanation given by an interviewee:

> We e-mail [data to colleagues] a lot – especially to people without access. And I've asked [the developers] why it is like that? I think it has to do with combating corruption. They prefer that the project manager on site does not work on [the ERP] – so that he can't have access to give work to his friends.

While users understood the ERP as a tool to increase organisational efficiency, experiences of misfit such as this led them to make sense of the ERP as playing the role of an auditor enforcing adherence to internal policy and legislation. In instances where the business case required the adoption of a manual workflow, the bureaucratic nature of the artefact became illuminated. At *Metro* certain circumstance justified the placement of an emergency/urgent purchase order which allowed users to bypass the ERP and place the order telephonically to the buyer. One user explained:

> When there are urgent purchases that need to be made the relevant person will contact the buyers and inform him that it's an emergency or urgent matter. The buyer will allow the purchase order but first thing in the morning he will want all the relevant documentation from the department to process it in the [ERP].

In the example above, the experience of misfit serves as a cue which makes the role of the ERP as bureaucrat sensible. It also reveals, contradictorily, the inability of the ERP to, firstly, determine/judge whether a particular business case may be classified as urgent or an emergency and, secondly, to disregard its built-in rules if this is the case. Consequently, while users do construct the ERP as an active role-player as suggested by Askenäs and Westelius (2003), the experience of misfit serves as a cue which highlights its rigid, non-human nature.

Like user confrontation, the creation and adoption of work-arounds constitutes active manipulation of the environment. Such manipulation offers users a sense of control over the environment and, in particular, the artefact. The existence of these practices blurs the traditional user-system boundary and cultivates, rather, an image of the information system as continuously enacted through iterative cycles of environment perception and manipulation. This view embraces the notion of information systems as complex, adaptive, socio-technical systems.

STRATEGY 3: IMPROVISED LEARNING

In six of the 34 cases, the user experiencing misfit approached a colleague from his/her own unit/department for advice or support. Boudreau and Robey (2005, p. 9) refer to this practice as improvised learning and define it as "learning situated in practice, initiated by users, and implemented without any predetermined structure, schedule, or method". In all six cases users adopted this strategy when they attributed their experience of misfit to their own lack of knowledge of the ERP's structure and functions. One user explained:

> I had in-house training when I started at [*Metro*] for a week. But most of it, well, it's that you have to want to learn. So if you have an accounts payable query and you don't know how to handle it, you get up and you walk to someone and say 'Please help me, I don't know how to do this'. So that next time you can do it on your own. So, yes, most of it was self-taught.

As a form of sensemaking, improvised learning, in a similar way to user confrontation, involves engagement among users about the application of the ERP in a particular business scenario. Unlike user confrontation, however, improvised learning is initiated by the user acknowledging his own lack of knowledge/ability and generally occurs among users that share the same unit or department. This enables rich (face-to-face) interaction between users that,

based on the cases analysed, share a relationship of mutual trust. While interviewees were mostly positive about this practice, they were aware that overreliance on colleagues was undesirable. One user explained:

> You know when you just start in a new unit you get the feeling that you're not yet accepted there. Then it is difficult to ask 'Sorry, I'm stuck, can you please help me?' At some stage people will get bored with coming and helping you. Because she'll come and explain it to me but as I'm going along I get stuck because I can't remember everything she said. Now if I go and ask again, what is she going to think of me? It depends with people, some people will help, and others won't.

An important effect of improvised learning is that it facilitates frame alignment and shared usage norms among users. Through continuous engagement about the functions and role of the ERP, increasingly rich and meaningful shared frames of the technology can be expected to emerge (Bansler & Havn, 2006). Users, through this practice, make the technology sensible to each other in a manner that is relevant and applicable to their shared context.

It is important to acknowledge, once more, the active role of the user in improvised learning. By seeking guidance from co-workers (taking action) the user actively generates cues around which sense can be made. Weick emphasises this aspect of sensemaking by distinguishing it from interpretation, which, he argues, frames the sensemaker as a passive perceiver of external stimuli. The sensemaking process (improvised learning) commences with action which, in turn, generates sensible stimuli.

STRATEGY 4: FORMAL SUPPORT

In the remaining six cases of misfit users utilised a formal support channel (e.g., contact the help desk or attend a training session). In two of these cases the experiences were results of technical/hardware problems, in two more they resulted from the user's own lack of knowledge/ability and, in the remaining two cases, the experience could be attributed to instances of organisation-artefact misalignment (control misfit experienced as deficiencies).

While *Metro* did implement an extensive formal training programme for users, many of the interviewees felt that improvised learning was a more effective practice.

> The problem is there are a lot of new things coming out on [the ERP] all the time. There isn't enough time to train everyone. They might train us, but they can't train all the people that must use it out there. We usually learn things by ear – 'How do you use this, how do you use that?' But [at formal training] there is no time to do that.

The findings suggest that the advantage improvised learning has over formal training is that it occurs in relation to an experience of misfit. While formal training presents users with the acceptable usage norms in a simulated environment, improvised learning is triggered by a particular experience. When users opted to utilise formal support when they experienced misfit the support staff were often unable to resolve the problem immediately.

> For example, last year I had this problem where the system changed for all repairs and maintenance items. You had to do a works order but I think management were informed of the change but we, at lower levels, didn't know. We constantly experienced problems when we tried to put through a purchase requisition. I logged the call but they couldn't assist me in the beginning. Then, after about two months I had the same problem and I logged the call again. Eventually somebody came back to me to [explain the problem].

The data suggest that users mostly perceived instances of misfit to be context-specific, prompting them to seek advice from a person who was familiar with the acceptable usage norms of that context. There is little evidence, accordingly, to support the proposition that the use of formal support channels in response to experiences of misfit is conducive to making a technology sensible to users.

CONCLUSIONS

Based on a qualitative investigation of data gathered through semi-structured interviews it is argued that experiences of misfit trigger various forms of response strategies among users. Of the four strategy types identified three can be viewed as forms of action-driven sensemaking. These include the confrontation of users that do not follow acceptable usage norms; the adoption of workaround practices; and the adoption of improvised learning practices.

Three primary arguments emerging from the analysed data support the proposition that experiences of misfit trigger sensemaking. These four arguments establish linkages between the properties of sensemaking in organisations as described by Weick (1995) and the analysed data. Firstly, the findings show that experiences of misfit are disruptive of users' work. In 24 of the analysed cases the user experiencing misfit could not complete the task at hand. These disruptions force users to pay attention and construct plausible explanations of the experience upon which they can act. Importantly, the nature of ERP facilitated workflow implies that users cannot ignore these disruptions, since a transaction allocated, but ignored, will draw attention from a supervisor or line manager. Secondly, it is argued that users' extract and enlarge experiences of misfit retrospectively.

The data revealed that users' recollections of misfit experiences are rich in detail and typically involve reasoning about the underlying causalities. This suggests that these experiences have been bracketed out from ongoing streams of experience and reflected upon critically. Thirdly, the study provides strong evidence that responses to misfit are, in most cases, of a social nature. In 23 of the cases analysed users either confronted a co-worker (12 cases) or consulted a co-worker (11 cases). These behavioural patterns constitute action-driven sensemaking processes during which users either manipulate (enact) their environment or actively generate stimuli to reduce ambiguity/uncertainty.

While this study focussed on experiences of misfit, it may be proposed that experiences of fit can play a similar role, particularly when users successfully apply a technology in a new or unique scenario. These user success stories, it is argued, also have the potential to trigger sensemaking when they are extracted and discussed.

Finally, it is worth reflecting about the implications of these findings for practice. While this study is of a descriptive nature, practitioners may find value in these findings in three ways. Firstly, it is important to note that in only six of the 34 cases experiences of misfit triggered the use of a formal support channel. Hence, while IS/IT departments may use logs of support requests as indicators of fit achieved, they should be careful to rely too heavily on them. This study suggests that by far the most (28 of 34) cases of misfit experienced are handled informally among users. Secondly, the findings suggest that formal training programmes are limited in their ability to stimulate sensemaking. While an obvious necessity, it seems that users learn more effectively from improvised, informal engagement in response to misfit experienced than from formally designed training courses. Lastly, the value of an organisational culture that supports and cultivates informal learning should be highlighted. IS/IT departments should, in combination with formal support/training, encourage informal learning practices. This may involve interventions which, for example, recognise or reward individuals that frequently adopt the role of informal trainer in a particular department.

LIMITATIONS AND FUTURE RESEARCH

While ERP-based information systems satisfy a significant set of the characteristics of general business information systems, one should be mindful of their unique attributes when framed as targets of sensemaking. Three attributes, in particular, must be noted. Firstly, the integrated nature of ERPs implies that adoption by users is generally mandatory. Secondly, ERPs are designed to impose task/process structure and, thirdly, ERP usage emphasises task-interdependence. Combined, these attributes serve to drive the adaption process and, as part thereof, subjective and shared technological sensemaking. Weick's theory of sensemaking may indeed be relevant/applicable to a wider range of technology adoption projects, but the findings of this study relate strongly to the unique attributes of ERP artefacts. The adoption of IT artefacts for hedonic purposes, for example, is driven by different forces and may, in turn, lead to different sensemaking processes. A second notable limitation of this study is that it is concerned primarily with sensemaking by the user community. An investigation of the sensemaking processes that occur, for example, among members of IT/IS departments during adaptation is likely to uncover different findings. A final limitation worth noting is that the author performed the analysis without assistance, an arrangement that may have obstructed the objective interpretation of the data.

Despite these limitations, future research projects can build upon this study in various ways. It has been shown here that Weick's theory of sensemaking provides researchers with a useful analytic and conceptual framework to interpret action-driven technology sensemaking. This provides researchers with an alternative to traditional adoption models and illuminates the cognitive and social dimensions of (non-linear) adaptation processes. Importantly, it also provides a basis for the reconceptualisation of the user-system boundary by acknowledging the user's role in the manipulation of his/her environment.

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APPENDIX A

Outline of interview questions.

1. Please give us a brief overview of your role and its associated tasks at *Metro*.
2. How do you use the ERP system during these tasks?
3. What is your general view of the ERP system?
4. Do you experience any problems or issues when working with the ERP system?
   a. Could you describe one?
   b. What do you do when this happens?
   c. How did you learn to handle it this way?
   d. Are there any problems which result from this way of doing things?