

HIDDEN AND SURREPTITIOUS ADOPTION OF
ORGANIZATIONAL INFORMATION TECHNOLOGY SOLUTIONS

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ABSTRACT

Despite a broad literature on organizational adoption of technological innovations, the extant research has paid very little attention to a particular adoption scenario corresponding to user-initiated, surreptitious acceptance of information technology (IT) solutions that have been rejected at the organizational level. This lack of attention is surprising considering the strong anecdotal evidence pointing to various examples of user initiated organizational adoption of IT solutions. For example, in spite of formal organizational policies, procedures and guidelines sanctioning only a small subset of “pre-approved” and mostly vendor-bound organizational IT solutions, illegitimate, surreptitious, or hidden adoption of free and open source systems and applications by technical users has become increasingly prevalent in today’s organizations. While we have learned a great deal about the legitimate adoption of systems by people and organizations, we know very little about this growing category of organizational systems. Indeed, the antecedents and consequences of these forms of hidden and surreptitious adoption are likely to be multifaceted and complex. The concept of hidden and surreptitious adoption marks an important organizational occurrence where organizational hierarchy fails. The departure from “the routine, established and sanctioned” approaches provide an opportunity to drill down into the organizational logic behind this unexplored occurrence.

Drawing on concepts from institutional theory as well as on technology adoption literature this dissertation creates a careful synthesis of two previously separate streams of research and brings together two distinct sets of factors under the umbrella concept of social influence. In an empirical study the concept of hidden and surreptitious adoption was then analyzed and a causal network was proposed to help create a better understanding of hidden and surreptitious adoption of IT systems in organizations today.

The findings confirmed wide-spread organizational occurrence of hidden adoption. Four complementary causal streams were found to contribute towards the materialization and magnitude of hidden and surreptitious adoption of IT solutions. Three of these streams; normative pressures, identification pressures, and performance induced awareness were confirmed to contribute positively towards hidden adoption whereas the remaining stream, compliance pressures were found to have an inverse relationship. In turn, each stream was further evaluated in detail to uncover various factors that positively or negatively contributed to that particular stream. The empirical findings were then discussed in light of theory to identify their theoretical as well as practical implications.

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Scientia potentia est.

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CHAPTER ONE: INTRODUCTION

1.1 An Organizational Problem

Large, hierarchical organizations have a variety of rules and processes that govern their day-to-day operations. When such rules have been set in place from the top, do organizational actors in the bowels of the organization always obey them? If not, what factors may cause, contribute or otherwise lead to “non-compliant” or “deviant” behaviour? This dissertation is an attempt to investigate this grand question within the context of organizational adoption of information technology (IT) solutions by technical actors.

In spite of formal organizational policies, procedures, directives and guidelines which sanction use of certain pre-approved IT solutions, anecdotal evidence shows that technical users commonly disregard these formal rules and adopt unapproved and non-sanctioned alternatives illegitimately and in a surreptitious manner. Regardless of its cause, this kind of behaviour represents a real threat to organizational efficiencies. For example, if technical users disregard sanctioned solutions out of an operational necessity (e.g. the sanctioned solution fails to meet their performance related needs), the hidden nature of this selection would prevent the whole organization from benefiting from potential efficiency gains. If on the other hand, technical user preferences favour sub-optimal solutions (e.g. a sanctioned yet unfamiliar solution is rejected for a more familiar but less suitable non-sanctioned alternative), when aggregated across the whole organization, such practices would also likely result in organizational-level efficiency losses. In either case, an unproductive and efficiency reducing tension

exists between formally sanctioned, top-down mandated solutions and informally selected and surreptitiously adopted non-sanctioned alternatives. Despite the prevalence of such adoption scenarios, due to their hidden and surreptitious nature, adoptions falling into this category have traditionally been overlooked by the extant technology adoption research. This dissertation aims to address that gap and in an exploratory study create a preliminary investigation of the internal and external antecedents that may lead to hidden and surreptitious adoption of IT solutions by technical actors in organizational settings.

1.2 Two-Step Organizational Adoption Scenarios

Individual technology adoption is a well-established research stream in the information systems discipline and makes use of such theoretical lenses as the theory of reasoned action (Ajzen and Fishbein 1973, Fishbein and Ajzen 1975), the theory of planned behaviour (Ajzen 1985, 1991), the technology adoption model (Davis 1989), diffusion of innovations (Rogers 1995) and social cognitive theory (Bandura 1977, 1986).

While less mature than individual adoption, research into the topic of organizational technology adoption has been growing steadily (Fichman 1992, Fichman and Kemerer 1997, Gallivan 2001, Wynekoop 1992). This research stream has traditionally conceptualized a two-step adoption process; first, involving a organizational-level decision to initiate the adoption process (usually taken at senior-management levels); and second, a user-level, individual implementation process that puts innovation into actual use (Frambach and Schillewaert 2002, Gallivan 2001, Rogers 1995, Zaltman et al. 1973). Considering that there can only be two possible outcomes at each step (i.e. Adoption / No Adoption), this two-step conceptualization results in four potential organizational adoption scenarios, as shown in

Figure 1 below.

		Users	
		Accept	Reject
Organization / Management	Accept	Scenario 1	Scenario 2
	Reject	Scenario 3	Scenario 4

1.3 Research Gap - Under-explored and Unusual Organizational Adoption Scenarios

Even though the existing literature acknowledges that organizational adoption can be initiated top-down (i.e. by organizational / managerial decision) as well as bottom-up (i.e. by users themselves), not all potential scenarios subsequent to initiation under the two-step process have been thoroughly investigated. Indeed, the extant literature has placed emphasis on the more plausible scenarios at the expense of some others that are perceived as less probable or less interesting. For example, factors affecting Scenario 1, that corresponds to a common, formal two-step adoption process whereby a particular organizational technological innovation is accepted by organizational decision makers as well as by the users themselves have been looked at in Gallivan (2001), Leonard-Barton and Deschamps (1988), Sorebo and Eikebrokk (2008) and Zaltman et al. (1973) among others. Similarly, user rejection of organizationally mandated technologies (Scenario 2) has been explored in several studies including Brown et al. (2002), Gruenfeld and Foltman (1967), Hartwick and Barki (1994), Ram

and Jung (1991), and Rogers (1995). However, neither one of the remaining two scenarios (Scenarios 3&4) have been investigated at the same level by the research community. To be fair, Scenario 4 may not pose an interesting research avenue as both the organizational decision makers and users appear to be in agreement on non-adoption. Scenario 3, on the other hand, presents an interesting and presently under-explored research avenue corresponding to user-initiated adoption of non-sanctioned technological innovations that have already been rejected at the organizational level in favour of alternative solutions (i.e. sanctioned solutions) and it is the focus of this dissertation.

Several stakeholders take part in and contribute towards the occurrence of hidden and surreptitious adoption and are worth being described here to set the context in Scenario 3. For simplicity, these actors were grouped under two categories corresponding to their perceived level of involvement in the adoption process in a large, hierarchical organization.

1.3.1 Primary Actors

1.3.1.1 Organizational Decision-Makers

These actors are senior, executive-level managers who have the authority to make organizational technology adoption decisions vis-a-vis various IT solutions required by technical users in their day-to-day duties. These are the step 1 decision-makers in the two-step adoption process and decide which solutions will be sanctioned and which will be rejected at the organizational level. Despite maintaining full control over the first step of the two-step adoption model, the senior executives are generally removed from the second step of the process and have little or no knowledge of technical user-level preferences in the final step of the two-step adoption.

1.3.1.2 Immediate Managers

These are the organizational-unit level managers with operational responsibilities who usually operate under the delegated authority of senior-management. Normally, these managers do not possess sufficient authority to make independent technology adoption decisions but may indirectly affect the step 1 organizational adoption decisions as technical advisers to senior management. Unlike senior executives however, due to their proximity to technical users, immediate managers carry a much greater chance of being aware of user preferences of technical users.

1.3.1.3 Technical Users

Of prime interest to this study, these are organizational actors who, as part of their daily responsibilities, assume technical duties and carry out various functions in the IT organization. Technical users are both consumers and producers of IT solutions. These actors may carry such titles as (application/web/software) developer, (web/user interface) designer, database administrator, network administrator, systems integrator, software tester, and (application/data/security/network/enterprise) architect among many others. Due to the nature of their job functions, technical users are privileged users and possess various administrative rights that allow them to maintain control over a variety of IT solutions they use on a day-to-day basis. For example, they can install, configure or modify IT applications on their local systems or on servers on local or wide-area networks that run company applications. Technical users are the prime actors in step 2 of the two-step organizational technology adoption model and have sufficient power (i.e. rights) not only to either accept (i.e. Scenario 1) or reject (i.e. Scenario 2) organizationally sanctioned IT solutions but more importantly, possess the necessary power to even adopt solutions that had been previously rejected by senior management (i.e. Scenario 3). For example, whereas an average end-user (see the appropriate category below) can only accept (i.e. adopt) or reject (i.e. do not use or minimally use) a corporately mandated/sanctioned IT

solution, only a technical user would have the necessary administrative rights to replace that solution with a non-sanctioned alternative.

1.3.2 Secondary Actors

1.3.2.1 Corporate Actors

These are the various kinds of IT analysts who work in the corporate centre(s). Corporate actors assume such titles as IT planning analyst, IT policy analyst, business/IT analyst/planner, IT policy/standards coordinator, and IT policy adviser and may contribute to the forming of opinions of organizational decision makers with respect to first-stage selection of IT solutions. These actors may also be involved in the formalization/sanctioning process of the selected IT solutions by holding the pen on a range of formal documents that may include organizational policies, procedures, standards, guidelines, plans and best practices.

1.3.2.2 End-users

Constituting the largest group in numbers in a large hierarchical organization, end users are consumers of a variety of organizational IT solutions (though, their input at the requirements gathering stage may shape some of these IT solutions). Even though end-users themselves may involve in the second stage selection (i.e. acceptance or rejection during implementation) of IT solutions, due to their limited knowledge or insufficient administrative rights in an enterprise setting they often are unable to implement alternative non-sanctioned IT solutions by themselves.

1.3.2.3 Technology Vendors

Producers and marketers of IT solutions, these actors are a source of outside influence on all primary and secondary actors. Via carefully planned and executed marketing efforts that may include product

trial offers, information sessions, conferences, training offers, and trade shows these vendors contribute to the forming of opinions during both first and second stage selection with respect to IT Solutions. Technology vendors may include vendors of sanctioned as well as non-sanctioned solutions.

1.3.2.4 Techno-communities

Either vendor-driven or independent, these communities form around certain technologies and can even be specific to certain IT solutions. They indirectly contribute to the forming of opinions at both steps of the organizational technology adoption model as a source of information.

A commonly occurring example of Scenario 3 can be found within the realm of organizational software development. Due to well-researched link between technology standardization and software project performance many firms believe that technology standardization would lead to increased market growth and better customer value and thus perceive it as a beneficial effort (Hurd and Isaak, 2005; Na et al., 2004; Nidumolu, 1996). As a result, and in an effort to reduce risk, increase development performance and provide better customer value, many firms adopt standardized tools and techniques for their software development practices. However, when standardization efforts are not done right, instead of being a key to growth, such standards may be turned into manipulative market dominance tools by few vendors resulting in what is commonly known as “vendor lock-in”. One way such manipulation occurs in today's organizations involves product-based IT standardization restricting the use of certain products at the expense of others. When those standardized products do not align well with common development practices, this creates potential for user level rejection of mandated products (Scenario 2) and a corresponding potential for adoption or continued use of unofficial and unapproved development tools and techniques (Scenario 3). For example, the use of unofficial and unapproved open source software development tools and applications for software development in

place of officially mandated and sanctioned proprietary alternatives represents a common case under Scenario 3.

To clarify, non-sanctioned IT solutions that become subjects of hidden and surreptitious adoption may involve both proprietary and open source alternatives. Nevertheless, (and for reasons that will be discussed later in text) open source software tools and techniques appear to be more frequently represented as hidden adoption candidates than their proprietary equivalents. It is widely known that software practitioners today are increasingly facing the possibility of using or basing their work on open source software (Spinellis and Szyperski, 2004). According to recent developer surveys, more than one million software developers reported working on open source software projects in North America alone (Wheeler, 2007). Hence, when faced with the choice of either using officially sanctioned and mostly vendor-bound software development tools and applications or adopting (or continuing to use) common but unofficial and unapproved open source tools and techniques, the developers would likely surreptitiously adopt those common tools instead of officially mandated ones. Examples of commonly used but organizationally unsanctioned open source tools include scripting languages (Python, Perl, Ruby...), integrated development environments (Eclipse, Netbeans, Emacs...), version control systems (CVS, SVN, Git, Mercurial...), unit testing tools (JUnit, NUnit, CUnit...), functional testing tools (Selenium, Watij, Watin...), performance testing tools (Funkload, webLOAD...), bug tracking tools (Bugzilla, Mantis, Trac...), and most importantly, compilers (GCC, CINT, Javac, MonoDevelop...).

1.4 Re-conceptualization - Emergence of the Concept of Hidden and Surreptitious Adoption

While **Figure 1** is logically similar to Gallivan's (2001) taxonomy of two stage innovation adoption types in that it also relies on the earlier works of Zaltman et al. (1973), Leonard-Barton and Deschamps (1988) and Lucas et al. (1990), **Figure 1** differs from Gallivan's (2001) taxonomy in one important respect related to the treatment of the circumstances leading to Scenario 3 (Organizational Rejection – User Acceptance). Gallivan's (2001) treatment of organizational non-adoption does not necessarily mean rejection. Instead, as his selected term (i.e. “bottom-up adoption”) clarified, Gallivan used organizational non-adoption to mean more “lack of knowledge of” or “lack of decision on” an innovation rather than conscious or planned rejection of it.

Hence, Scenario 3 in **Figure 1** corresponds to a new category that cannot easily be captured by the term “bottom-up adoption”. While bottom-up adoption is a generic term used to mark occasions of user-initiated adoption in general, it does not imply any rejection of hierarchical authority. In addition, whereas bottom-up (or grassroots) in the adoption context generally assumes broad-based and coordinated support for an innovation (Carter et al. 2001), Scenario 3 may be limited to isolated pockets of users.

In addition to being a new category that is not fully captured by previous categorizations, another reason why Scenario 3 has not been investigated in the existing literature may be related to the dominant treatment of the two-stage organizational adoption model as one involving a contingent (and usually authority-based) adoption decision where managerial / organizational adoption (also known as primary adoption) must temporally precede user (or secondary) adoption (Zaltman et al. 1973). Naturally, this contingent treatment would logically preclude the possibility of any formal, second-

stage user adoption subsequent to first-stage managerial rejection.

Thus, I have termed the category represented by scenario 3 to be “hidden and surreptitious adoption” to emphasize particular measurement difficulties to which it may be prone. Hidden and surreptitious adoption will be very hard to identify through common self-report measures used in the adoption literature. For example, if questioned about the organizational adoption of a non-sanctioned IT solution, senior managers would most likely assume employee compliance with the formal organizational choice (i.e. rejection) and report non-adoption. Even on occasions when management is aware that their decisions have been ignored by users, they would still not be very likely to admit non-compliance for accountability reasons, and thus still report non-adoption. Similarly, even with promises of confidentiality, employees would also not be very likely to admit their disregard of organizational policies or procedures through self-reported instruments out of fear of reprisal for their disobedience. As a result, it is likely that the occurrence of hidden adoption will consistently be underestimated and stay “hidden and surreptitious”.

The topics of explicit and implicit management influence have previously been investigated (Leonard-Barton 1987, Leonard-Barton and Deschamps 1988, Moore and Benbasat 1991). However, to the best of my knowledge, the concept of hidden and surreptitious adoption has yet to be explored in the technology adoption literature.

The notable exception is the sporadic and isolated pieces of literature that can be found around the terms “Shadow IT” (Raden 2005) or “Shadow Systems” (Behrens and Sedera 2004, Oliver and Romm, 2002, Scott and Wagner 2003). An in-depth look at these samples clarifies that the term shadow IT appears to have been used in the context of informal provision of IT support services and is not directly

related to the concept of IT adoption. Moreover, even though the term shadow systems appear to be conceptually closer to the concept of hidden and surreptitious adoption, scholars appear to have treated shadow systems as ones that replicate functionality of various components in an Enterprise Resource Planning (ERP) system implementation and thus represent a specific kind of hidden adoption whereby one managerially sanctioned system (ERP) replaces functionality that would otherwise be found in a range of independent systems. In other words, the emergence of shadow systems in this specific case is an effort to make the ERP system deliver on its promises, does not involve rejection of ERP in its totality and still contributes towards the use of the whole system (albeit with modified components).

In light of the conceptual differences discussed earlier, a revised and renamed view of organizational adoption categories is reflected in **Figure 2** below.

Figure 2: Two-step organizational adoption with category names

		Users	
		Accept	Reject
Organization / Management	Accept	Formal Adoption	User-Induced Non-Adoption
	Reject	Hidden and Surreptitious Adoption	Formal Non-Adoption

1.5 Research Question

The purpose of this dissertation is to explore the concept of hidden adoption of organizational IT solutions by technical actors. Hidden adoption of organizational IT solutions concerns the second-stage, technical user-initiated surreptitious adoption of IT tools, applications, processes, methodologies or best practices following prior and genuine (i.e. not symbolic) organizational rejection of such IT solutions in question during first-stage selection by organizational decision makers. In particular, the internal and external antecedents of hidden adoption of organizational IT solutions will be investigated at an organizational unit level and focusing on second-stage technical user decisions in an effort to address the primary research question:

RQ: “What are the internal and external antecedents of hidden and surreptitious adoption of organizational IT solutions by technical actors?”

It is important to note that while the level of analysis is set at the organizational unit, the above definition of hidden and surreptitious adoption further concentrates the focus of the study to second-stage selection by individual technical users and exploration of various internal and external factors contributing to the forming of opinions at the technical actor level. In other words, while the formation of attitudes of organizational decision makers is important, hidden adoption by definition is about user-level acceptance of an IT solution that has already been rejected at the organizational level by senior/executive management. The first-stage managerial rejection (i.e. the process leading up to forming of senior management opinions) is taken as a given and the focus of this study is on the factors affecting user-level decision to adopt a non-sanctioned alternative in a hidden and surreptitious manner.

There are several reasons why answering this research question provides an important contribution to the research literature. First, the research fills a significant gap in the information systems literature by addressing a previously ignored yet practically common technology adoption scenario. The paper takes a more in-depth look at several areas that have been highlighted as deserving further research attention (Frambach and Schillewaert 2002). Among other topics, the paper looks at the organizational dynamics with respect to innovation acceptance and investigates the role of external constituents in the organizational adoption decision.

Second, the research offers an opportunity to further explore the role of institutional theory in IS adoption and usage, an area that has been highlighted as having considerable potential (Srivastava et al. 2009). Traditionally, the use of institutional theory has been rare in information systems diffusion research (for exceptions, see King et al. 1994, Teng et al. 2002 and Teo et al. 2003). Furthermore, on those rare occasions when it has been used as a guiding theoretical lens, the conceptualization of institutional theory has been largely limited to its cultural-cognitive elements. By looking at all three pillars of institutional theory (Scott 1995), this dissertation aims to realize a broader application of institutional theory to an understanding of organizational technology adoption.

Third, this topic provides an opportunity for the discovery of new theoretical insights in organization theory by exploring the competing internal and external pressures of social influence and the role of decoupling. In particular, the dissertation develops an original conceptualization that is based on the simultaneous use of the three processes of social influence and the three pillars of institutional theory to define internal and external factors. It also expands the concept of decoupling and introduces the notion of multi-layer decoupling.

Fourth, the research helps the practitioner community by exploring potential factors and organizational circumstances that influence employee disregard of managerial fiat. When exposed, such factors and circumstances may potentially lead to increased organizational efficiencies by way of reducing the unproductive tension between formal policies, procedures, standards and informal, hidden and surreptitious practices.

Finally, by using free and open-source software as an instance of hidden and surreptitious adoption of organizational IT solutions, this research indirectly contributes towards the literature on open source adoption and implementation research. The fast growing body of research on free and open source software has traditionally focused more on the production side than on its consumption or diffusion, an area that has been identified as under-researched following a comprehensive literature review in Aksulu and Wade (2010).

The dissertation continues with a thorough yet concise review of the literature on technology adoption. Significant conceptual work takes place in Chapter 2. In an effort to develop a sound theory base for this exploratory study, this chapter selectively borrows appropriate concepts from the relevant literature on technology adoption as well as on institutional theory.

Various selections concerning research design and methodology were clarified and justified in great detail in Chapter 3. Among others, selections regarding coding, interviewee selection, context bounding and process were explained and a methodological framework was described in this chapter.

Focusing on the analysis of collected data, Chapter 4 describes a multi-stage analysis process to guide the implementation.

Following the same procedural order described in Chapter 4 the actual results of the analysis are reported and illustrated through examples in Chapter 5. This chapter is supported by numerous matrix displays and network diagrams that are provided in associated tables and figures.

Finally, Chapter 6 provides an opportunity to discuss findings uncovered in Chapter 5, describes conclusions in light of theory and attempts to interpret theoretical as well as practical implications of the findings.

CHAPTER TWO: THEORIZING

2.1 Establishing the Theoretical Framework

Hidden adoption of organizational IT solutions concerns the second-stage, technical user-initiated surreptitious adoption of IT tools, applications, processes, methodologies or best practices following prior first-stage organizational rejection of such IT solutions by organizational decision makers.

In an effort to establish a theoretical framework, this chapter will refer to the relevant literature where appropriate and initiate a preliminary discussion of various kinds of influences expected on the occurrence of hidden and surreptitious adoption in light of existing theory. This early theorizing effort serves the purpose of establishing analytic categories to inform interview questionnaire design as suggested by McCracken (1988) and Miles and Huberman (1994). To set the stage, I will start with a brief review of the literature on adoption of technological innovations before zooming in on hidden and surreptitious adoption as an organizational phenomenon.

In order to do so, I will first introduce the concept of decoupling from the institutional theory literature. After explaining the conventional use of decoupling I will then advance a multi-layer decoupling argument for organizational technology adoption and provide several examples to clarify the specific circumstances surrounding hidden and surreptitious adoption. Next, I will introduce the concept of social influence, examine the deficiencies surrounding the past and present use of this concept in the organizational technology adoption literature and propose a broader conceptualization through the use

of internal and external categorizations simultaneously. Relying on this broad conceptualization I will then put forward a model for hidden and surreptitious adoption in organizational settings. Borrowing from the social influence literature and providing relevant examples subsequent to each topic area, I then advance several arguments in support of the proposed model for hidden and surreptitious adoption of organizational IT solutions.

2.2 Extant Literature on Adoption of Technological Innovations

In comparison with the more established and mature research stream at the individual level, the literature on organizational adoption of technological innovations represents a healthy and active area of research with further theoretical growth potential.

Despite availability of a variety of mature theoretical lenses that explain adoption of technological innovations by individuals such as the theory of reasoned action (Ajzen and Fishbein 1973, Fishbein and Ajzen 1975), the theory of planned behaviour (Ajzen 1985, 1991), the technology acceptance model (Davis 1989), diffusion of innovations (Rogers 1995), and social cognitive theory (Bandura 1977, 1986), it has been argued that individual adoption models are not sufficient to explain the adoption of technological innovations at the organizational level (Fichman 1992, Fichman and Kemerer 1997, Gallivan 2001, Wynekoop 1992). Even when a particular model is proposed to work at both individual and organizational levels (e.g. Rogers 1995), it is common to remap variables of an individual model to the organizational context, to account for the non-binary nature of organizational adoption decisions and to accommodate the complex interactions between various stakeholders (Fichman 1992).

As introduced previously, organizational technology adoption is generally conceptualized as a two-step process involving a high-level organizational decision that initiates the adoption process (commonly referred to as “initiation”) and a user-level, individual implementation process (commonly referred to as “implementation”) that puts the technology into actual use (Frambach and Schillewaert 2002, Gallivan 2001, Rogers 1995, Zaltman et al. 1973). Previous studies have investigated a variety of factors that affect organizational adoption at each of these two stages (see Frambach and Schillewaert 2002 for a review). For example, concerning initiation, factors ranging from characteristics of the adopting organization such as size (Moch and Morse 1977, Zaltman et al. 1973), structure (Damanpour 1991, Rogers 1995), perceived characteristics of the innovation itself (Rogers 1995, Tornatzky and Klein 1982), the effect and influence of technology suppliers (Frambach 1993, Robertson and Gatignon 1986), and various environmental factors (Gatignon and Robertson 1989, Robertson and Gatignon 1986) have been explored. Similarly, concerning implementation, factors that may affect individual, user-level adoption have been explored, such as perceived performance effects (Davis 1989, Rogers 1995, Thompson et al. 1991), perceived effort requirements (Igarria et al. 1996, Rogers 1995, Thompson et al. 1991), social influence (Fishbein and Ajzen 1975, Mathieson 1991, Venkatesh and Davis 2000) as well as a range of organizational facilitators such as perceived behavioural control (Ajzen 1991), technical support (Thompson et al. 1991), compatibility (Moore and Benbasat 1991, Rogers 1995), and management / organizational support (Igarria et al. 1996, Leonard-Barton and Deschamps 1988). Nevertheless, while useful in general, none of these studies have been specifically designed for nor addressed directly or indirectly the occurrence of second-stage, technical user-initiated, hidden and surreptitious adoption of technology solutions subsequent to prior and genuine organizational rejection. This dissertation aims to address this knowledge gap.

2.3 Decoupling - An Institutional Framework for Hidden and Surreptitious Adoption

While the definition of hidden and surreptitious adoption identifies the high level context for this kind of adoption to take place, that is, direct or indirect rejection of an IT solution at the organizational decision-maker level and a subsequent acceptance of that particular solution at the technical user level, it does not specify the particular circumstances that may lead to this organizational occurrence. In an effort to decipher the particular conditions surrounding hidden and surreptitious adoption of organizational IT solutions, I turned to institutional theory (DiMaggio and Powell 1983, Meyer and Rowan 1977, Scott 1995) and in particular to the concept of decoupling. As detailed in the following paragraphs, I found the concept of decoupling to be particularly suitable to explain the adoption process in institutionalized environments where multiple layers of stakeholders and their competing interests affect the adoption outcome. The additional insight provided by the decoupling concept served to position hidden and surreptitious adoption among many other types of adoption / non adoption possibilities, as indicated in the following pages.

Like Liang et al. (2007) this study adopts a human agency perspective concerning the use of institutional theory, that is, it is perceived that the external forces that are subjects of institutional theory (to be further explained below) will only affect organizational behaviour through the behaviour of individual human agents (i.e. actors) within the organization. Unlike Liang et al. (2007) however, this study does not focus on the mediating effects of top management on external forces. Instead, this exploratory study focuses on the second step of the two-step organizational technology adoption and investigates the effect of both internal and external forces on occurrence of hidden and surreptitious adoption of IT solutions through the agency of technical actors within the organization.

Meyer and Rowan (1977) argued that organizations reflecting institutionalized environments maintain gaps between their formal structures and ongoing, actual work activities and practices. This distancing or decoupling of structures from activities happens primarily as a self preservation mechanism in order to prevent conflicts and loss of legitimacy with external constituents. In other words, decoupling allows organizations to gain legitimacy with their powerful external constituents while helping them maintain sufficient internal flexibility to address day-to-day practical considerations. Nevertheless, this kind of behaviour is known to result in managerial-level hypocrisies whereby upper management's official position and subtle, informal actions and encouragements may be opposite to one another (Westphal and Zajac 1994; 2001). The extant literature provides examples of the contradictory behaviour of upper management that exemplify the concept of decoupling. For example, examining long-term incentive plans, Westphal and Zajac (1994) looked at how CEOs officially encouraged adoption of these plans while subtly discouraging their actual use. Other research showed how CEOs personally associated themselves with practices that display concern for shareholders' interests in an effort to enhance their legitimacy with stockholders and other stakeholders (DiMaggio and Powell 1983, Schlenker 1980, Tedeschi and Reiss 1981). The extant literature also suggests that when institutional pressures lead to protection of technical activities through decoupling, this may result in organizational inefficiencies (Meyer and Rowan 1977, Selznick 1949, Zucker 1987). At the organizational level, this behaviour points to a stark contrast between different modes of operation for firms operating in the technical sector -where efficiency and success covary fully in line with the predictions of economic theory- and firms operating under this efficiency-reducing protectionism (Zucker 1987). The concept of decoupling has been researched in both profit (Westphal and Zajac 2001) and governmental (Tilcsik 2010) settings. **Table 1** below illustrates the concept of decoupling in an organizational setting.

Table 1: Decoupling in Organizational Settings

EXTERNAL ENVIRONMENT	INTERNAL ENVIRONMENT	
	FORMAL	INFORMAL
Powerful External Constituents' View	Structures Reflecting Formal Managerial Stance (Symbolic)	Actual Practices Reflecting Informal Managerial Stance (Substantive)

Despite the extra insight it provides into the external-internal distancing in organizational settings, a careful look at **Table 1** with the two-step organizational adoption model (**Figure 2**) in mind exposes one major shortcoming of the conventional decoupling view. It simply does not have any provisions for a similar distancing possibility between management and user levels (which, is the basis of the two-step organizational adoption model in the first place). In other words, in a multi-layer organizational setting consisting of external constituents, internal management and internal users, the conventional decoupling view only exposes the distancing in the first layer and assumes that informal managerial stance would be reflected in the actual user activities and practices (i.e. user adoption behaviour). As the two-step adoption model shows however (and as exemplified by the concept of hidden and surreptitious adoption), the actual user behaviour can also differ from the formal or informal managerial stance (a "formal stance" in this context refers to the official party line towards a particular technological innovation in an organizational setting either at management or user levels while an "informal stance" is the actual attitude towards that technological innovation at the same organizational level).

Hence, the full insight into the hidden and surreptitious adoption process will only be possible by juxtaposing the conventional decoupling concept with the two-step organizational adoption model.

Table 2 below reflects this view and exposes potential for multi-layer distancing that may occur in organizational settings during technology adoption.

Table 2: Multi-Layer Decoupling for Organizational Technology Adoption				
EXTERNAL ENVIRONMENT	INTERNAL ENVIRONMENT			
CONSTITUENTS	MANAGEMENT		USERS	
	FORMAL	INFORMAL	FORMAL	INFORMAL
Powerful External Constituents' View	Structures Reflecting Formal Managerial Stance (Symbolic)	Actual Practices Reflecting Informal Managerial Stance (Substantive)	Structures Reflecting Formal User Stance (Symbolic)	Actual Practices Reflecting Informal User Stance (Substantive)

The multi-layer decoupling view shown in **Table 2** above would allow better conceptualization of the particular conditions surrounding the occurrence of hidden and surreptitious adoption of IT solutions in organizational settings. Let me explain through two examples, one leading to hidden and surreptitious adoption potential and the other not.

The first example involves situations in which management would formally reject a particular IT solution at initiation. In this example, the formal nature of the rejection may be due to powerful external constituents' hostile views towards that particular technology solution. In an effort to maintain legitimacy with those powerful external constituents, the upper management would appear to be supporting formal structures with unfavourable stance towards the solution but would likely decouple actual practices from these symbolic structures via their influence on implementation resulting in favourable formal attitude towards the solution at user levels. For example, an organization whose sponsors or business partners include a well-established and powerful vendor may have policies in place that mandate use of certain products of the sponsoring vendor / business partner. Despite officially approving those organizational policies restricting use of any other competing product, the

organizational decision makers (i.e. senior executives) may -for efficiency related operational reasons- encourage use of those competing solutions. By doing so, the senior executives maintain legitimacy in the eyes of the powerful vendor and address the operational and practical needs of the organization simultaneously. Nevertheless, even though the act of any user level adoption would be “hidden” from the external constituents, it would not have any hidden or surreptitious character in the eyes of the management. After all, in this example the actual user-level adoption would be influenced and informally encouraged by the management themselves. In other words, while the adoption will be hidden from the external constituents, the management would be aware and -informally- supportive of the adoption at the user level.

The second example involves situations whereby upper management would informally reject a particular IT solution at initiation. In this example, the informal nature of the rejection may be due to powerful external constituents' favourable views towards that technology solution. In an effort to maintain legitimacy with those powerful external constituents, the management would appear to be supporting formal structures with neutral or positive stance towards the solution but at the same time would likely decouple actual practices from these symbolic structures via their influence on implementation resulting in hostile official attitude towards the particular solution at user levels. For example, a public sector organization may have policies and directives in place to allow fair and equal treatment of all vendors and to prevent unfair gains by a small number of “favoured” vendors. In order not to disturb its impartial and fiscally-responsible image in the eyes of its powerful constituents (such as various advocacy groups, professional unions and the public in general) the organizational decision makers may appear supportive of those policies. At the same time and for reasons ranging from previous working relationships to receipt of special perks and gifts, these senior executives may favour certain vendor offerings over competing ones and informally push for their adoption at the expense of

other more economically feasible or technically superior alternatives. This second example carries some potential to manifest the real meaning of hidden and surreptitious technology adoption as any user-level adoption of these upper management rejected solutions would have to be carried out in a hidden and surreptitious manner as it would -at least in the eyes of the upper management- be seen as a direct challenge to managerial authority. Ironically, by rejecting managerial authority, those users will in fact be in compliance with the formal policies of the organization and in line with what the powerful external constituents would have liked to see originally. This interesting situation can possibly be named as “reverse-decoupling” (or simply “re-coupling”) and possibly mark a deinstitutionalization instance where the rational logic prevails over the institutional one. The two multi-layer decoupling examples are summarized in **Table 3** below.

Table 3: Multi-layer Decoupling Examples in the Context of Technology Adoption					
EXTERNAL ENVIRONMENT		INTERNAL ENVIRONMENT			
CONSTITUENTS		MANAGEMENT		USERS	
		FORMAL	INFORMAL	FORMAL	INFORMAL
Powerful External Constituents' View		Structures Reflecting Formal Managerial Stance (Symbolic)	Actual Practices Reflecting Informal Managerial Stance (Substantive)	Structures Reflecting Formal User Stance (Symbolic)	Actual Practices Reflecting Informal User Stance (Substantive)
Example 1	Against a particular technology solution	Hostile towards a particular technology solution	Neutral or Positive towards that particular technology solution	Neutral or Positive towards that particular technology solution	No possibility for hidden and surreptitious adoption
Example 2	In favor of a particular technology solution	Neutral or Positive towards that particular technology solution	Hostile towards that particular technology solution	Hostile towards that particular technology solution	Potential for hidden and Surreptitious adoption

To clarify further, Example 2 above is not the only occasion where hidden and surreptitious adoption potential may be realized. On occasions when there are no discrepancies between the view of important

external constituents and organizational decision makers (i.e. no decoupling), hidden and surreptitious adoption can still occur if there is dissonance between the views of senior executives and users. **Table 4** below summarizes possible combinations of adoption attitudes of external constituents, organizational decision makers and users. This table provides further clarity to **Figure 2** by explaining the specific circumstances surrounding each adoption or non-adoption scenario. Particularly, the legend below the table links each adoption possibility to the two-step organizational adoption scenarios established in **Figure 2**. In a way, **Table 4** adds the missing external dimension to the internally focused **Figure 2**. Most importantly though, it clarifies those occasions when hidden and surreptitious adoption potential can be realized.

Table 4: Organizational Technology Adoption Possibilities							
EXTERNAL ENVIRONMENT	INTERNAL ENVIRONMENT						
CONSTITUENTS	MANAGEMENT			USERS			
	FORMAL	INFORMAL	FORMAL	FORMAL	INFORMAL	INFORMAL	
Powerful External Constituents' View	Structures Reflecting Formal Managerial Stance (Symbolic)	Actual Practices Reflecting Informal Managerial Stance (Substantive)	Structures Reflecting Formal User Stance (Symbolic)	Structures Reflecting Formal User Stance (Symbolic)	Actual Practices Reflecting Informal User Stance (Substantive)	Actual Practices Reflecting Informal User Stance (Substantive)	
PRO	PRO	AGAINST	AGAINST	1111 PRO 11111 21111 11111	444 AGAINST 444 444 444	22222 PRO 22222 22222 22222	33333 AGAINST 33333 33333 33333
		PRO	PRO	11111 PRO 11111 21111 11111	444 AGAINST 444 444 444	22222 PRO 22222 22222 22222	33333 AGAINST 33333 33333 33333
AGAINST	AGAINST	AGAINST	AGAINST	11111 PRO 11111 21111 11111	444 AGAINST 444 444 444	22222 PRO 22222 22222 22222	33333 AGAINST 33333 33333 33333
		PRO	PRO	11111 PRO 11111 21111 11111	444 AGAINST 444 444 444	22222 PRO 22222 22222 22222	33333 AGAINST 33333 33333 33333
11 21 31 41	Hidden and Surreptitious Adoption	222 222 222 222	Formal Adoption	333 333 333 333	User-Induced Non-Adoption	444 444 444 444	Formal Non-Adoption

Several points are worth re-iterating here to prevent possible confusions about **Table 4**. First, the intended context for the subject organization depicted in this table involves a large, hierarchical setting with multiple layers of management and users. Second, in this setting the first-stage organizational technology adoption decisions are taken by the senior executives and that none of the multiple levels of immediate managers will have direct control over the selection process (though, and as acknowledged earlier, these middle managers may indirectly influence forming of senior executive opinions). Finally, and very importantly, senior decision makers' actual behaviour (i.e. the formed opinions leading up to rejection of an IT solution) is taken as a given and treated as out of scope for this study. This exploratory dissertation focuses on the second-stage process and aims to investigate factors that may influence forming of technical user opinions subsequent to first-stage rejection by organizational decision makers (i.e. why technical users adopt an IT solution that has already been rejected by their senior executives at the organizational level).

While **Table 4** clarifies the specific circumstances surrounding each adoption or non-adoption scenario, it only represents an inventory of end state combinations showing formed attitudes in different layers of the organization leading up to various organizational technology adoption possibilities. In other words, **Table 4** does not explain how those attitudes are formed in the first place. In order for antecedents of the hidden and surreptitious adoption to be identified, further conceptual work is required around the mechanism governing the formation of specific attitude combinations required for hidden and surreptitious adoption to occur. In particular, this study focuses on the formation of second-stage attitudes of the two step technology adoption, that is, the attitudes at the technical user level. In order to do so, I turn now to the concept of social influence as the theoretical basis for explaining the antecedents of hidden and surreptitious adoption.

2.4 Social Influence - The basis for a Conceptual Model for Hidden and Surreptitious Adoption

Social influence (Kelman 1958, 1961) refers to individual or group level influences that would result in changes in existing attitudes and actions and it has a long history in technology adoption research as a guiding theoretical lens which I will further discuss momentarily. According to Kelman, three different processes of social influence (compliance, identification, internalization) may result in changes in behaviour even when the resulting overt behaviour may appear identical. **Table 5** below provides further details on the three social influence processes.

Table 5: Three Processes of Social Influence (Kelman, 1958)			
Process	Influence accepted because...	Induced behavior accepted because of...	Satisfaction due to...
Compliance	A favorable reaction is expected from another person or group	Expectations of rewards / approval or to avoid punishment / disapproval	Social effect of accepting influence
Identification	A desire to establish or maintain a satisfying and self-defining relationship to another person or group	Its association with the desired relationship	Act of conforming (content is irrelevant but the actual response is)
Internalization	The intrinsic rewards of the content of the induced behavior	Its congruency with the existing value system	Content of the new behavior

The concept of social influence appears to be particularly suitable for the exploration of hidden and surreptitious adoption as it provides an established and relevant theoretical base with which the factors affecting adoption in multi-layer, complex institutionalized environments can be investigated. It is important to note that the use of social influence as a concept in technology adoption research is not

new and represents a conservative approach as the following historical summary would clarify.

The concept of social influence first made its way into technology adoption models through Fishbein and Ajzen's (1975) "subjective norm" construct which took into consideration people's perceptions of whether other people who are important to them think they should perform the specific behaviour in question (e.g. adoption of a particular technology). While the subjective norm construct provided a generic definition, it did not break down social influence into its contributing elements.

Later on, social influence was operationalized through Thompson et al.'s (1991) "social factors" construct which was based on Triandis' (1971, 1977; 1980) theory of human behaviour, an important alternative attitudinal model to Fishbein and Ajzen's Theory of Reasoned Action. In Triandis' words, the social factors construct embodied "the individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Triandis 1980, p.210). In other words, Thompson's (1991) social factors construct chose to focus on the element related to individual value systems, which corresponds to Kelman's (1958, 1961) internalization process.

Despite its frequent use, the use of social influence concept in technology adoption research over the years has mostly been limited to the use of individual social influence processes or to generic and bundled definitions. This deficiency in the existing conceptualizations of the concept of social influence has also been voiced by Tingling and Parent (2002) who argued that the social influence concept in technology adoption models have mostly been narrowly confined to internal characterizations and that the predictive or explanatory power of adoption models could be increased with broader and external definitions. While Tingling and Parent (2002) appropriately proposed

institutional theory (DiMaggio and Powell 1983, Meyer and Rowan 1977, Scott 1995) for the task, they decided to focus their attention solely on the cultural-cognitive elements and mimetic isomorphism. It is important to note that this view is also in line with Triandis (1980) and Thompson et al. (1991) and continues the disproportionate representation in the literature of mimetic isomorphism among the three types of institutional isomorphism in North American journals, as argued in Mizruchi and Fein (1999). Only very recently and answering calls for the broader use of institutional theory in technology adoption research, a few studies have relied on one or more of the pillars of institutional theory to explore technology adoption in organizational settings and recommended further use in information systems research (for recent conceptualizations, see Chen et al. 2010, Lai et al. 2006, and Liang et al. 2007; for a recent critique of the narrow and less-informed use of institutional theory in information systems research see Currie 2009).

In support of Tingling and Parent's (2002) proposal to use institutional theory, this dissertation suggests that the broadest conceptualization for social influence will depend on appropriate characterizations of both internal and external factors in combination. For internal factors I suggest relying not on isolated processes or bundled definitions but full characterizations through all three processes of compliance, identification, and internalization (Kelman 1958, 1961). Relatedly, for external factors, the appropriate characterizations should expand beyond the cultural cognitive elements and mimetic isomorphism to include regulatory as well as normative elements and the related concepts of coercive as well as normative isomorphism. As indicated in the subsequent section, the complementarity and integrative potential between the three internal processes (identified in **Table 5**) and the three external institutional mechanisms (see **Table 6** below) would likely provide a comprehensive theoretical basis for identifying the antecedents of hidden and surreptitious adoption.

Table 6: Three Pillars of Institutions (Scott, 1995)

Pillars	Regulative	Normative	Cultural-cognitive
Basis of compliance	Expedience	Social obligation	Taken for grantedness, Shared understanding
Basis of order	Regulative rules	Binding expectations	Constitutive schema
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules, Laws, Sanctions	Certification, Accreditation	Common beliefs, Shared logics of action
Basis of legitimacy	Legally sanctioned	Morally governed	Comprehensible, Recognizable, Culturally supported

Thus far, this dissertation, building upon the two-step organizational adoption model has exposed “hidden and surreptitious adoption,” a practically common yet historically ignored technology adoption scenario corresponding to user-level acceptance and implementation of technology solutions by technical users after such solutions have been rejected at the organizational level by senior executives.

In an effort to explain the organizational dynamics surrounding this phenomenon, the dissertation then borrowed the concept of decoupling from the institutional theory, juxtaposed it with the two-step adoption model to accommodate the multi-layer distancing that characterizes hidden and surreptitious adoption, and proposed an expansion in the form of multiple decoupling.

In the absence of prior attention to both internal and external factors in combination to investigate technology adoption and in order to further explore possible antecedents leading to hidden and surreptitious adoption of organizational IT solutions, the dissertation now brings together two separate sets of factors corresponding to internal and external influences under the umbrella concept of social

influence. The next section extends a general discussion of the kinds of influences expected and serves the purpose of establishing the appropriate analytic categories that would inform the questionnaire design for the empirical research to follow.

2.5 Exploration of Internal and External Antecedents of Hidden and Surreptitious Adoption

A broader conceptualization for the social influence concept would be essential in explaining the hidden and surreptitious adoption of organizational IT solutions. In particular, the complementary nature of Kelman's (1958,1961) three processes of social influence (compliance, identification and internalization) and DiMaggio and Powell's (1983) three mechanisms of institutional isomorphic change (coercive, normative and mimetic) must be emphasized in this new, broader conceptualization. Even though Kelman (1958, 1961) did not restrict any one of the three individual level processes of social influence to internal characterizations, his definitions favoured internal influences. In comparison, Dimaggio and Powell's (1983) three mechanisms of institutional isomorphic change which are linked to the three elements of institutionalized organizations (regulatory, normative and cultural-cognitive) were specifically characterized to accommodate external influences. In this dissertation a much broader definition of social influence is proposed to combine both internal and external characterizations simultaneously.

Fortunately, various elements of this broad definition have already been addressed in the literature. As early as the 1960s, researchers distinguished formal (position based) authority from functional (technical competence and human skills) and acknowledged the potential for conflicts (Peabody, 1962). Research has also shown that employees' self-perception of superior competence (in comparison with their managers) could decrease the perceived legitimacy of authority messages (Milgram, 1965). As a

result we know that it is possible for skilled individuals to doubt the adequacy of their management's expertise to judge a technical innovation (Daft, 1978) and that highly skilled employees may formulate their own opinion about adopting an innovation based on personal knowledge and experience prior to any authority request (Leonard-Barton and Deschamps, 1988). I believe the proposed broad conceptualization of social influence may help further explain the nature of conflicting forces in the case of hidden adoption of organizational information systems.

Hence, in the following subsections covering the remainder of this chapter, I argue that internally, social influence may occur due to anticipated future favourable reactions from individuals or groups (compliance), existing self-defining relationships to other individuals or groups (identification) or congruency with individuals' value systems (internalization) all within the boundaries of the same organization. I would also put arguments forward to support the view that externally, social influence may occur due to formal or informal pressures exerted by other organizations under dependency conditions (coercive isomorphism), stem from professional association (normative isomorphism) or emerge in the form of imitation in situations where organizational goals are ambiguous and environmental circumstances are uncertain (mimetic isomorphism). Moreover, I would also highlight that there may even be causal relationships between these internal and external factors and emphasize that within the context of hidden and surreptitious adoption of organizational information systems, the cumulative effects of these internal and external influences as well as the possibility for the existence of other antecedents as well as several moderators or mediators must be considered.

2.5.1 Internal Pressures for Compliance

The forces against the organizational adoption of non-sanctioned IT solutions (i.e. solutions that have been rejected by organizational decision makers) may originate from explicit or implicit internal

pressures for compliance (Malhotra and Galletta 1999). Explicit internal pressures may manifest themselves in the form of formal organizational policies, procedures, standards and best practices restricting use of certain organizational IT solutions (Kerr and Newell 2003, Mark and Poltrock 2003). For example, many organizations today maintain an officially sanctioned and pre-approved list of IT applications or even create product-based and vendor-bound organization level IT platform standards.

On the other hand, implicit internal pressures may appear as various incentives / disincentives put in place by the upper management to encourage / discourage use (Astebro 1995, Chatterjee et al. 2002, Russell and Hoag 2004). For example, those “unwanted” IT applications and solutions may be subjected to unusually lengthy approval processes or unnecessarily high levels of approval to deter potential adoption.

It would therefore be logical to suspect that hidden and surreptitious adoption of IT solutions might be adversely affected by implicit and/or explicit internal pressures for compliance to the use of officially sanctioned solutions.

2.5.2 External Pressures of Normative Isomorphism

The forces for or against the organizational adoption of IT solutions may also originate from external pressures of normative isomorphism (Gosain 2004, Lai et al. 2006, Liang et al. 2007). These external normative pressures would likely involve professional association with vendors of existing (and sanctioned) IT applications in the form of formal education / training or membership in professional networks and such pressures would negatively affect hidden adoption of alternative, competing organizational IT solutions. In other words, by establishing technical professional designations (e.g. ORACLE DBA, Sun/ORACLE Certified JAVA Developer, Microsoft Certified Professional) or

creating industry associations and user groups (e.g. IBM Rational User Groups, MSDN - Microsoft Developer Network) the vendors may exert external normative pressures that would discourage hidden and surreptitious adoption of non-conforming organizational IT solutions. For example, an ORACLE certified database developer would be more likely to choose ORACLE DBMS over its non-sanctioned competitors even on occasions when such use would be considered sub-optimal (e.g. a technological overkill or financial waste). Adoption effects of vendors and professional networks have already been explored in the literature (Dos Santos and Peffers 1998, Swan and Newell 1995). The effect of training is a valid argument based on well-researched links between training and perceived ease-of-use (Venkatesh 1999, 2000).

Conversely, external normative pressures may also involve professional associations with the emerging IT solutions in the form of formal education / training or membership in professional networks (Ciesielska 2007, Xiao 2006). Despite recent increases in popularity of organizations that provide formal training on such innovative IT tools, applications or processes (e.g. PostgreSQL DBMS, Eclipse IDE, Scrum Agile software development methodology) and the potential for inclusion of those emerging software tools and applications in university course curriculum (e.g. via programs on open technology development), comparison of the magnitude of such external normative pressures with those exerted by established and sanctioned vendors and / or vendor-friendly industry associations would be difficult and context dependent. Nevertheless, and thanks to the distributed collaboration possibilities provided by the Internet, emerging technology professional networks in the form of inter-organizational, application-focused technology user groups have already become commonplace (Bagozzi and Dholakia 2006, von Hippel 2001). It is likely that these distributed networks will play an ever increasing role in setting the industry standards alongside the traditional big vendors. Regardless of their comparative strength, these external normative pressures would increase the likelihood of

hidden and surreptitious adoption of emerging organizational IT Solutions.

Hence, depending on whether professional norms are in favour of existing sanctioned solutions or alternatively, in favour of emerging non-sanctioned ones, it is possible that the external pressures of normative isomorphism might have positive as well as negative effects on hidden and surreptitious adoption of organizational IT solutions.

2.5.3 External Pressures for Coercive Isomorphism

The internal compliance forces elaborated above may themselves originate from coercive external pressures. In this context a very good example of a coercive pressure would involve occasions where powerful business partners (including technology vendors) or parent organizations mandate or strongly encourage use of certain proprietary technologies (Chwelos et al. 2001, Curtis and Payne 2008, Dos Santos and Peffers 1998, Lefebvre and Lefebvre 1993). This form of mandatory (or near-mandatory) use is usually justified on the basis of enterprise level technology standardization and appears very commonly in the industry.

For example, the giant retailer Wal-Mart is notorious for mandating use of certain technologies (e.g. Previously EDI or presently RFID) of its own selections by all its suppliers and is known to expel those that fail to comply. While such technology selections would largely be dependent on the particulars of the mandating organization (e.g. risk tolerance) and be driven by profit maximization considerations, it would not be too speculative to argue that emerging technologies would be underrepresented especially on occasions when they are not backed by established vendors. These coercive external pressures in turn would likely have a direct effect on internal compliance pressures.

2.5.4 External Pressures for Mimetic Isomorphism

Internal compliance forces may also originate from mimetic external pressures. These mimetic pressures would likely involve uncertainty induced imitation of organizations that are perceived as successful (Sharma et al. 2007, Sharma et al. 2008, Tingling and Parent 2002).

For example, in an effort to avoid technological risk especially in times of technological uncertainty (e.g. rapid technological change) organizations may choose the seemingly less risky route and become followers of other “successful” organizations. Under these circumstances it is only logical that the upper management would guard and sanction their chosen technological selections and discourage any deviations via implicit and explicit pressures as indicated in the section on internal pressures for compliance above. In theory, it can be argued that these benchmark organizations may themselves be early adopters of those innovative IT solutions that are the objects of hidden and surreptitious adoption. Nonetheless, since the use of such solutions would involve significantly more (perceived) uncertainties in comparison with more established and management sanctioned alternatives, it can be argued that such imitation efforts would most likely target organizations that use mainstream as opposed to innovative IT solutions. Indeed, organizational reluctance in introducing innovative and insufficiently tested technologies into major projects is well documented in the literature (Willcocks and Griffiths 1994). Therefore, it is possible that mimetic isomorphism might have a possible affect on internal pressures for compliance. In turn, and as argued above, these internal compliance pressures would likely have an adverse effect on hidden and surreptitious adoption.

2.5.5 Internal Identification Pressures

Previous research has shown that organizational user groups or communities of interests as well as technology gurus or champions within an organization may all contribute to identification processes

(Chakrabarti 1974, Lind et al. 1989, Rogers 1995, Zaltman and Duncan 1977). While such user groups have always been very common in the diffusion process (Fichman 2000) and have assumed many roles that range from initial familiarization of users to the new technology to provision of user-level support, for existing, formal software such roles are generally provided by commercial software vendors and / or consultants externally and would not create similar internal identification pressures.

For example, most innovative open source software projects solely operate on this community-based free user-to-user assistance model (Lakhani and von Hippel 2003) which is easy to replicate internally, thus creating identification pressures for all those involved. In comparison, while they can help end-users or technical users through provision of support or solution tips, it is doubtful that any vendor-sponsored or vendor-bound user group would be able to create similar identification pressures among potential adopters due to a real or perceived profit motive behind the establishment of such communities. It can thus be presumed that identification pressures fuelled by existence of internal user groups and/or technology champions might positively contribute towards occurrence of hidden and surreptitious adoption of organizational IT solutions.

2.5.6 Internal Internalization Pressures

The same mechanism that contributes towards creation of internal identification pressures may, at a deeper level, create internalization pressures for certain emerging technologies. As discussed previously, the main difference between identification and internalization pressures involve the content (Kelman 1958). While identification is mostly about the actual response and a desired relationship with the target group, internalization operates more deeply at the value system level making the content extremely relevant.

For example, while individual support for open source idealism is very common among open source software users (Dedrick and West 2008, Jaffe and Careaga 2007), similar support on idealistic grounds is virtually unheard of for any proprietary alternatives. Therefore, it is possible that technical users who perceive fit and consistency between their own value systems and value systems represented by alternative, non-sanctioned IT solutions might feel internalization pressures and be inclined to be subjects of hidden and surreptitious adoption of organizational IT solutions.

Naturally, the occurrence and magnitude of hidden and surreptitious adoption will depend on the relative cumulative strength of these pro and non-adoption forces. Based on the internal and external pressures discussed above, there is reason to suspect that the hidden and surreptitious adoption of organizational IT solutions would be most likely to occur where cumulative strength of internal pressures of identification and internalization as well as normative external pressures in support of these emerging information systems is greater than the aggregate internal compliance pressures and normative external pressures against them.

The concise but thorough literature review that was completed in this chapter solidified the suspicion previously based only on anecdotal evidence that the exploration of hidden and surreptitious adoption of IT solutions might provide a promising and research worthy topic of enquiry. This literature review and theorizing process has also provided further theory direction that helped establish a number of analytic categories. As will be discussed further in the methodology chapter that follows, these analytic categories provide major input into the questionnaire design for the empirical portion of research. In this theorizing effort, appropriate concepts were selectively borrowed from relevant literature on technology adoption and institutional theory. This involved extension of the conventional decoupling concept in the form of a multi-layer decoupling argument, a broader conceptualization proposal for the

concept of social influence and a discussion of various influences expected for possible internal and external antecedents of hidden and surreptitious adoption. In the following chapter the attention will shift from theory to the development of a sound methodological framework for the empirical portion of research.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

This chapter attempts to clarify and describe the thought process that govern the variety of selections made concerning design and methodology.

It has to be acknowledged at this point that in addition to the methodological choices discussed in this chapter, a succession of other selections have been made and have to be disclosed as “filters” shaping the research outcome. For example, this study assumes that social phenomena is dependent on and is continuously constructed by social actors. In other words, it's ontological preference is conceptually closer to the constructivist view. Further, epistemologically, the study holds an interpretivist stance and assumes that social actors hold the central role in the creation of social phenomena and that social and natural phenomena should not be treated similarly.

In terms of its research strategy preference, using the classic research strategies typology by Runkel and McGrath (1972), the empirical portion of this exploratory study could be classified in the general realm of a field study as it involves systematic investigation of phenomena within real-world behaviour systems. Nevertheless, and according to the same research strategies typology, it could also be classified as a sample survey as it specifically goes after a certain type of actor (i.e. technical users who adopt non-sanctioned IT solutions in a hidden and surreptitious manner) without designing a special setting to collect the data of interest. However, there are problems with each classification as field studies are assumed to involve observation predominantly as opposed to administration of standardized instruments and sample surveys are assumed to render judgements that are context-independent.

Similar issues exist with other research strategy classifications as well. For example, according to Judd et al. (1991) classification, this exploratory study may be bracketed as a form of qualitative research in general. Nonetheless, it would not fit properly with either the big Q (i.e. fieldwork, participant observation and ethnography) or the small q (structural interview or questionnaire) as it demonstrates specific elements from each. For instance, during data collection, this study takes a similar approach to structural interviews and approaches each interview with the same initial list of questions, but unlike structural interviews (and similar to fieldwork) it, at the same time, allows conversations to move in unplanned directions to become more engaged with the study participants. A similar categorization difficulty has also been highlighted in Singleton and Straits (2005) which emphasizes the misleading nature of bundling field research under the generic umbrella of qualitative research and admits the overlapping nature of qualitative interviews with survey research before establishing it as an adjunct to field observation as opposed to a separate approach.

Methodologically, this exploratory study can generically be branded as a case study. However, proper methodological classification was also complicated by lack of consistency around common terminologies and research classifications. For example, while Orlikowski and Baroudi (1991) refer to both case studies and surveys as “research designs” both Choudrie and Dwivedi (2005) and Mingers (2003) refer to case studies and surveys as “research methods”. Other studies may treat case studies as a research strategy.

To clarify upfront, the research approach followed in this exploratory study fits with a multiple-case study design that uses the sequential replication approach advocated in Yin (1984). For data collection, the study relies on semi-structured, in-depth long interviews.

The following discussion summarizes the thought process concerning various factors that influenced methodological selections and leads up to the selection of a comprehensive methodological framework for the research process.

3.1 Methodological Selection

The research methodology literature has found that many factors can affect what methodology or methodologies would ultimately be applied in the course of research, such as fit with the research questions (Trow, 1957), research aim (Laudan, 1984), availability of data, researcher's prior intellectual commitment to a philosophical position (Bryman, 1984) or to a theoretical base (Kling, 1980 and Laudan, 1984), familiarity with particular methodologies, strength of subjective disciplinary norms, and historical precedents.

In terms of disciplinary norms, commitments and precedents, a quick look at the technology adoption literature shows that two research methods dominated this realm of research: Surveys and Case Studies. Furthermore, between the two, surveys have been used extensively and in the broadest range of contexts, making them the most commonly used method for technology adoption research. For example, filtering more than 600 articles published in 4 prominent IS journals over a decade, Choudrie and Dwivedi (2005) reported that surveys and case studies accounted for 74 and 26 percent respectively in technology adoption research. The dominant use of surveys in technology adoption research is in line with several previous findings on method preferences in IS research in general from early 1990s (e.g. Orlikowski and Baroudi, 1991) to mid-2000s (e.g. Mingers, 2003). For example, while Orlikowski and Baroudi (1991) reported 49 percent survey use, Mingers (2003) announced that surveys were the preferred method in such prominent IS journals as MIS Quarterly and European

Journal of Information Systems, and surpassed by only case studies in such others as Information Systems Journal and the Journal of Information Technology.

Another factor that may have an effect on methodological selection concerns the fit with the research question. In a famous objection to Becker and Geer's (1957) argument for the methodological advantages of participant observation over unstructured interviews, Trow (1957) argued that the problem under scrutiny would indicate the most appropriate methodological approach. Exploration of hidden and surreptitious adoption of non-sanctioned IT solutions by technical users in large, hierarchical organizational settings presents unique challenges. For once, the occurrence of hidden and surreptitious adoption will likely be very hard to identify through mail surveys. For example, if senior executives are questioned about the possibility of second-stage adoption of non-sanctioned IT solutions, they would most likely assume technical user compliance to their first-stage selection (of sanctioned solutions) and report no occurrences of hidden and surreptitious adoption. Even on occasions when senior executives are aware that their first-stage decisions have been ignored by technical users, they would not be very likely to admit this authority-defiant, non-compliant behaviour and still report no instances of hidden and surreptitious adoption. Equally, even with promises of confidentiality and anonymity, technical users would also not be very likely to admit their disregard for organizational policies or procedures or ignorance of senior executive decisions out of fear of reprisal for their disobedience. As a result, it is very likely that the occurrence of hidden and surreptitious adoption will consistently be underestimated and stay "hidden" when queried through mail surveys making these kind of surveys a less than ideal method for data collection within the context of hidden and surreptitious adoption research. In order for a selected data collection method to be fruitful, it has to overcome the fear and establish sufficient levels of trust between the researcher and research participants. Naturally, such levels of trust would be extremely difficult to build (and maintain) through

mail surveys that are inherently impersonal in nature even with personalization efforts and repeated promises of confidentiality. This view has also been confirmed by previous research on surveys. For example, previous research has shown that concern about confidentiality and privacy reduces the likelihood of response in surveys (Singer et al., 1993). Furthermore, even though assurances of confidentiality might reduce this concern, previous research has also shown that such assurances in surveys risk being misinterpreted by respondents and reduce participants' willingness to respond (Singer et al., 1992).

Consequently, the most suitable methodological selections to explore hidden and surreptitious adoption should be ones that allow the researcher to get closer to the subjects and ensure trust at a personal level. One way to get closer to the subject and build rapport and trust is to use qualitative personal interviews. Of the three commonly referenced interview varieties (i.e. unstructured, semi-structured and structured - Fontana and Frey, 2005), semi-structured interviews in general and individual in-depth long interviews in particular appear to be suitable for a variety of reasons. For example, these individual, in-depth long interviews would provide a relaxed atmosphere where the required "person-to-person" trust can be built. This trust can help expose much more detailed information than what would be possible with most other data collection techniques. Semi-structured interviews would also allow both predetermined open-ended questions as well as unstructured and emergent questions to be entertained. In the case of hidden and surreptitious adoption research, predetermined questions can be used to drill down into analytic categories established during earlier theorizing, whereas the dialogue between the researcher and the interviewee would also make it possible to take productive digressions and drill down into potential emergent areas that may help expand or challenge these theory-backed categories. Unlike one-shot large-scale mail surveys, the iterative nature of the semi-structured, in-depth long interviews would allow modifications to eliminate unproductive questions or to add new

ones based on newly gathered knowledge.

As hinted above, certain methodologies would be better suited for closer involvement with the subjects than others. In identifying the characteristics of qualitative research, Bryman (1984) argued that the *sine qua non* of qualitative methodologies is a commitment to seeing the social world from the point of view of the actor, and that because of this commitment, close involvement is advocated. It is through this close involvement that better contextual understanding is developed. According to Bryman, the fluidity and flexibility of qualitative research allows better discovery of novel and unanticipated findings and serendipitous occurrences, a point that has also been voiced elsewhere (e.g. Glaser and Strauss, 1967; Rock, 1979; Shaffir et al., 1981). Indeed, the initial “serendipitous” discovery of the concept of hidden and surreptitious adoption links to a qualitative study I conducted a few years ago on the adoption of open source software in governmental organizations. Hence, qualitative methodologies that help build better contextual understanding and allow close involvement of the researcher would likely be better suited to exploration of hidden and surreptitious adoption of IT solutions in organizational settings.

Finally, research enquiry concerning the antecedents of hidden and surreptitious adoption of IT solutions requires unfettered and unrestricted access to an organization where the occurrence of hidden and surreptitious adoption is suspected. The issue of access, due to its direct linkages to security, privacy and confidentiality is known to have become a major stumbling block, especially in earlier stages of research where trust levels between the researcher and the source organization is low. While some data collection methods/techniques (e.g. large scale mail surveys, experiments) may potentially exacerbate this problem, some others (e.g. use of available / archival data or personal interviews) may not present similar levels of reaction during earlier stages of research.

3.2 Overall Research Design

According to Marshall and Rossman (2011) the research design discussions must address and clarify several topics including -among others- research strategy, genre and rationale; site selection and sampling; data collection methods; data management; data analysis strategy and a management time line. A couple of these topics have already been addressed in the above discussion. Others, will be addressed in the remainder of this chapter.

Even though it was not specifically called for, the idea of an overall framework that would guide the qualitative research process is tempting. While it is possible to find a number of alternative frameworks for qualitative data analysis, finding such frameworks that would encompass the whole qualitative research cycle proves to be challenging to say the least. Fortunately, one such methodological framework was proposed in McCracken (1988). Originally proposed as a model of inquiry for the long interview, this model appears to offer a balanced compromise between the methodological rigour required for scholarly work while offering much sought after practical relevance. In the next section, I will have a more detailed look at the specific steps involved in this model and clarify how this model will guide this exploratory study.

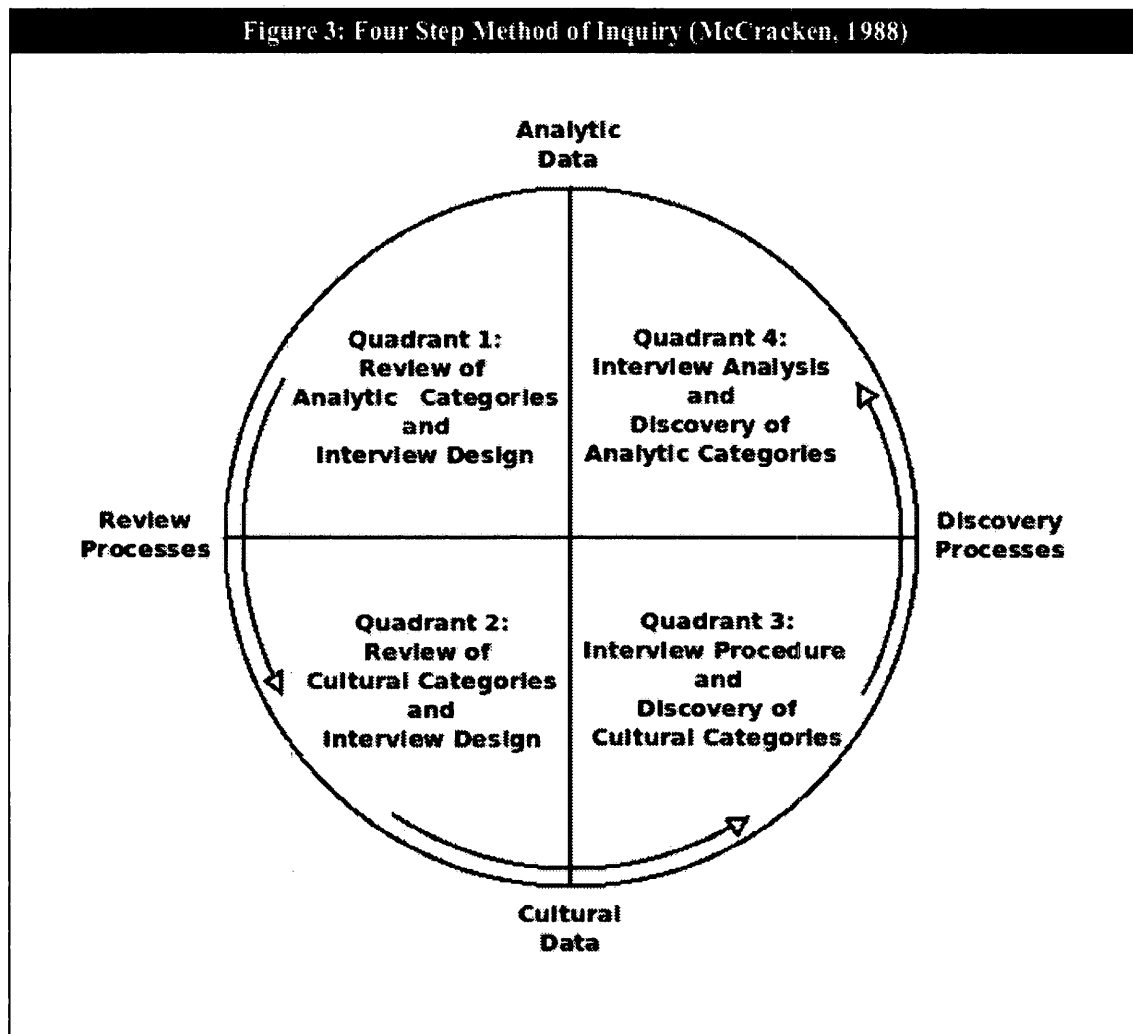
3.2.1 The Four-Step Method of Inquiry (McCracken, 1988)

The four-step method of inquiry involves four consecutively applied steps which, when combined, make up the four quadrants of a qualitative evaluation cycle.

To arrive at the four quadrant model McCracken (1988) divided the “circle of qualitative methods” in

two directions concerning domains of data (analytic vs. cultural) and processes (review vs. discovery).

This view is summarized in **Figure 3** below.



Each of the four quadrants represent a separate and successive step in the research process and is explained in detail below.

3.2.1.1 Quadrant 1: Review of Analytic Categories and Interview Design

This quadrant corresponds to a thorough literature review and is aimed at taking advantage of the

existing theoretical insights into consideration and help deconstruct this literature to arrive at an inventory of analytic categories for the domain under research. This approach is very much in line with the “tight design” argument put forward by Miles and Huberman (1994) where the authors revealed their stance as being “...off center, toward the structured end.” (p.17) and went on to argue that ignorance of such conceptual strength “can simply be self-defeating.” (p.17). Referencing Lazarsfeld (1972), McCracken (1988) also points to the special importance literature reviews carry in qualitative research as building “expectations the data can defy” and leading to “conspicuous, readable and highly provocative data” (p.31).

In addition to a range of other benefits, literature reviews also serve a very important practical purpose: they help with the creation of the interview questionnaire. The literature review completed in Chapter 2 corresponds to this first step of the four-step model and resulted in not only review and establishment of analytic categories for the possible antecedents of hidden and surreptitious adoption of IT solutions but also it led to the creation of the first draft of the interview questionnaire for the data collection effort.

These analytic categories are all listed in the preceding chapters and they originate from the theory review. For example, the conceptual work that was proposed to achieve a broad conceptualization around the concept of social influence through the use of internal and external factors in combination resulted in the establishment of three internal (Compliance, Identification, Internalization) and three external (Coercive Isomorphism, Normative Isomorphism, Mimetic Isomorphism) categories for adoption antecedents. Similarly, the two-step organizational technology adoption model depicted in **Figure 1** and **2** led to the creation of three different analytic categories to capture various adoption categories (Formal Adoption, User Rejection, Hidden and Surreptitious Adoption). These analytic

categories are reflected in the Sample Interview Questionnaire (see the grouped question headings in **Appendix A**) as well as in the Provisional Start-List of Codes (see the list of codes and their definitions in **Appendices B and C**).

3.2.1.2 Quadrant 2: Review of Cultural Categories and Interview Design

The second quadrant takes it further beyond the analytic categories established through the literature review by allowing the researcher to rely on his / her familiarity with the culture being studied and turn himself / herself into “an instrument of inquiry” (McCracken, 1988, p.32). Thus, the researcher re-considers the analytic categories established in the previous step in light of his / her experience with the topic of interest.

At this step, my previous research concerning the (lack of) adoption of free and open source solutions in the same institutionalized setting has proven to be invaluable in surfacing various associations, incidents and assumptions surrounding the topic of hidden and surreptitious adoption of IT solutions by technical users. Hence, I was able to come up with various anecdotal evidence related to the theory-driven analytic categories and visualize actors, events, schedules, purposes and consequences surrounding these instances. As argued in McCracken (1988), this exercise also serves the purpose of separating the structural incidents from the episodic ones, and the truly cultural instances from the idiosyncratic ones.

For example, it was only in this stage that I was able to recognize and isolate a couple of what I thought to be vivid examples of hidden and surreptitious adoption as episodic instances and was able to avoid serious miscategorizations, a risk that has also been highlighted in Miles and Huberman (1994). By allowing consideration of those categories and relationships not captured in the literature (but

exemplified through anecdotal evidence) this step has contributed tremendously to the theory-development effort in Chapter 2 and helped revise and better formulate the interview questionnaire resulting in a much more refined second draft. For instance, my previous research concerning adoption of free and open source software solutions in similar hierarchical settings alerted me to the importance of technical factors as possible antecedents to adoption. Previously, on numerous occasions technical personnel had justified their preference of free and open source solutions on the basis of those solutions' "technical superiority", a term that was not fully explored at the time. Nevertheless, since neither the internal nor the external analytic categories developed as adoption antecedents properly captured this category, technical factors was therefore added as a possible adoption antecedent representing a cultural category. Of course the distinction between analytic and cultural categories can sometimes be rather blurry as exemplified by this particular category. Had the initial theorizing effort considered technical factors as a possible adoption antecedent and reviewed and synthesized the relevant literature earlier, this particular category might have also been captured as an analytic category.

Similarly, recurring anecdotal evidence encountered through previous research projects as well as consulting assignments highlighted a range of other possible factors that could be possible antecedents to hidden and surreptitious adoption of non-sanctioned IT solutions by technical users. These factors ranged from lack of proper organizational enforcement capabilities (that would allow tracking of sanctioned vs non-sanctioned solution use) and possible complementarity between different solutions (e.g. solutions that rely on similar infrastructure) to monetary reasons (e.g. no sufficient budget for sanctioned solutions). Even though each of these factors could have become a cultural category on its own, the systematic nature of these instances was relatively hard to piece together at that early stage and a decision was made to create a generic and bundled cultural category titled "Other" to capture these instances (so that the later analysis and discovery process would either confirm or defy the

structural vs. episodic nature of these possible antecedents without risking premature analytic closure at an early stage). The cultural categories were also reflected in the Sample Interview Questionnaire as well as in the Provisional Start-List of Codes (though, they are not specifically differentiated from the analytic categories developed previously).

As an equally important benefit, by allowing conscious realization of cultural categories, this step also helped “manufacture the researcher distance”, which is only possible when one has a conscious understanding of his/her standing, assumptions, expectations and so on...

3.2.1.3 Quadrant 3: Interview Procedure and Discovery of Cultural Categories

This quadrant involves the formalization of the interview questionnaire first and continues with the administration of the formalized questionnaires as part of a standard interview procedure.

At this point, the draft interview questionnaire already had a number of category-specific questions that came from the analytic and cultural categories developed in the previous two steps. These categories served as the starting point for a formalized questionnaire. A number of biographical questions were added to the beginning of the questionnaire with the purpose of easing the interviewees into the interview. These biographical questions included such details as the educational and professional background of interviewees as well as the high-level details related to the positional and organizational tenure of the participants. In addition to serving as ice-breakers, the biographical questions helped form a bunch of quantitative descriptors that allowed numerical categorization of interviewees (e.g. Male vs. Female, Technical vs. Non-Technical, Young vs. Seasoned and so on...). The remainder of the questions were organized into a series of question areas that are related to specific analytic / cultural category they belong. For example, questions related to adoption categories (an analytic category) was listed

under the adoption categories and process heading. Other analytic categories related to specific internal (i.e. compliance/identification/internalization) and external (i.e. coercive/normative/mimetic isomorphism) adoption antecedents were listed under separate headings corresponding to that particular antecedent category. Similarly, questions investigating the adoption process (a cultural category) were bundled under the adoption categories and process heading. Questions related to other cultural categories (e.g. technical factors or other factors) were delivered through a range of planned prompts or structured as a separate question (e.g. adoption consequences). Questions in each of these areas were organized into a set of opening, non-directive “grand tour” questions and supplemented by floating as well as planned prompts to drill-down into areas of interest that came about during the conversation and to initiate discussion in areas of interest that didn't. A sample formal interview questionnaire is provided in **Appendix A**. It is important to note however, that this sample interview questionnaire was not cast in stone and throughout the consecutive interview sessions several questions have been added, removed or simply modified and then re-modified again to accommodate case-specific details. For example, after a few interviews it has become apparent that the specific IT designations and certifications along with professional association memberships held by the interviewees could have an effect on their tool preferences. This detail was originally implicit in the normative isomorphism category but had not been explicitly explored. Once this effect has become apparent, in subsequent interviews, immediately following the biographical questions a specific question was added to capture this detail. These changes have been recorded in each separate interview questionnaire which were saved as separate documents.

In light of the analytic and cultural categories exposed in previous quadrants, it is in this step that I finalized a provisional “start list” of codes in preparation for the upcoming data analysis. Known as the a priori approach, the list of codes that were created clearly tied to the conceptual framework and the

research question in Chapter 2 as well as to the key areas and concerns from my own experience. The original start list had 14 codes and is shown in **Appendix B**. An associated list of code definitions were also created and provided in **Appendix C**. It is important to note that both the initial set of codes and their definitions have gone through an iterative refinement process throughout the analysis where codes were changed, developed, expanded (or removed) and definitions were clarified further and further in each iteration. For comparison, a more recent list of 34 codes and their associated definitions used at a much later stage in analysis were provided for reference in **Appendices D** and **E** respectively.

3.2.1.3.1 Selection of Interviewees

McCracken (1988) specifically emphasizes that the the interviewees are not a “sample” per se and that their selection should not be governed by conventional sampling rules. He instead proceeds to provide a few rules of thumb for the selection of interviewees. Furthermore, within the domain of qualitative research, the quantitative concept of generalizability gets replaced by such evaluation criteria as transferability (Lincoln and Guba, 1985) and fittingness (Sandelowski, 1986). It is therefore tempting for the qualitative researcher to proceed with a sampling frame that would not be justifiable according to any dominant quantitative sampling standard. Under these circumstances, the ultimate sampling choice of the researcher would likely depend on the discipline-specific evaluative criteria that the research project will be held against, or more so, on the researcher perceptions with regards to reviewer or reader familiarity and appreciation of qualitative research norms. On my part, I opted to err on the side of caution. Hence, in order to be able to stand rigorous academic scrutiny, I decided to employ a methodologically justifiable sampling frame. Consequently, I focused my efforts on finding an appropriate sampling strategy, one that would minimize the risk of the selected set of interviewees being seen as a biased convenience sample.

My initial efforts in finding a methodological benchmark from either one of the information systems or operations management disciplines turned out to be unfruitful. As I tried in vain to find comparable disciplinary studies, the conceptual novelty of the idea of hidden and surreptitious adoption of IT solutions turned out to be a methodological disadvantage. In the absence of methodological benchmarks concerning the use of qualitative interviews for the hidden and surreptitious adoption of IT solutions, I turned my attention to other disciplinary areas and scanned the literature for examples of research conducted under similar contextual circumstances (i.e. where hidden occurrences of phenomena are investigated). While I was not able to find any comparable research within any of the professional and applied sciences disciplines, two disciplinary areas under the sociology discipline (gender and sexuality studies) appeared to have comparable research streams concerning “hidden populations”. To be clear, these research streams used the term hidden populations to refer to such groups as drug users, homosexuals, people with HIV / AIDS, criminal offenders, prostitutes, gang members, participants in certain social movements, runaways and the homeless (Heckathorn, 1997, 2002; Salganik and Heckathorn, 2004; Watters and Biernacki, 1989; Wiebel, 1990). Nonetheless, I thought that the same logic that keeps these populations hidden, that is, fear of reprisal and punishment for practising the non-sanctioned, would likely apply to the concept of hidden and surreptitious adoption and make these research streams methodologically relevant enough to be treated as benchmarks.

Further research has shown that two particular methods appear to have dominated recent research on hidden populations (Heckathorn, 2002).

The first, chain-referral sampling, relies on an initial set of subjects (the seed group) to recruit future subjects in an expanding manner using referrals. The most commonly used chain referral method is

known as snowball sampling due to its resemblance to a rolling and growing snowball as each wave of referrals results in an ever growing subject pool. With this method, the seed group should ideally be drawn randomly from the population. Since random sampling would mostly be unfeasible within hidden populations, I quickly decided that application of this method would introduce bias into all subsequent waves of data collection (i.e. by each referral). In addition, by reference to Erickson (1979), Heckathorn (1997, 2002) identified many other shortcomings of snowball and other forms of chain referral methods ranging from bias towards more co-operative subjects (that may represent outliers) to potential masking and filtering by referring members for privacy concerns and over-representation of networks of better connected subjects. Interestingly, despite these biases, Heckathorn (2002) went on to justify the chain-referral method as a "basis for valid statistical inference" in his quantitative study.

Nevertheless, for the purposes of hidden and surreptitious adoption of IT solutions in large and hierarchical organizational settings, the chain referral method may not be appropriate as this method is known to work best when members of the target population know one another as part of an interconnected network. This assumption will clearly be violated in a large hierarchical organization as one that is proposed here (please see appropriate section on the host organization below). In particular, and due to size of the overall operations, the host IT organization has structurally been divided into nine IT clusters based on sectoral needs, that further limit cross-cluster networks.

The second method involves a form of location sampling. Borrowing aspects of street ethnography, theoretical sampling, stratified survey sampling, quota sampling and chain referral sampling, Watters and Biernacki (1989) developed a sampling procedure named "targeted sampling" that is specifically designed to reach hidden populations. While they are still not true random samples, targeted samples are not convenience samples and on occasions when random sampling is not feasible (as in the case of

studying hidden populations) targeted samples can offer a rigorous alternative to convenience sampling. Targeted sampling method is especially suitable when the target population is geographically concentrated (Heckathorn, 2002). I believe the targeted sampling method would offer a better methodological fit in the exploration of hidden and surreptitious adoption of IT solutions within large and hierarchical organizational settings.

Targeted sampling method involves two steps that are applied and re-applied in an iterative fashion. During this iterative process, data are constantly analyzed and used via feedback loops to adjust the recruitment and sampling techniques (Watters and Biernacki, 1989).

During the initial step, controlled lists of specified populations within geographical districts are developed (ethnographic mapping) and in the latter step, detailed plans are designed to recruit adequate number of subjects at the sites identified by the ethnographic mapping to conduct interviews.

In an enterprise setting, I would propose that the geographical districts be replaced by organizational districts (e.g. each of the IT Clusters in the proposed organization). Since these organizational districts, where the population of interest can be found, are well defined and most of the time include lists of employees along with their titles and contact information, targeted sampling would likely be very appropriate.

The detailed steps making up the targeted sampling is summarized in Watters and Biernacki (1989) and a customized version for this dissertation is provided in **Table 7**.

Table 7 - Targeted Sampling Method (based on Watters and Biernacki, 1989)

Step	Detailed Instructions
Initial Mapping	<ul style="list-style-type: none">-Relying on content analysis and direct observations define organizational districts in which to conduct research.-Through direct observation and internal social media (e.g. organizational communities of interest) determine which organizational communities (neighbourhoods) contain the highest concentration of hidden adoption.-Construct an organizational map of hidden adoption communities and rank them in terms of density of hidden adopters.-Include hidden adopters that are active in the community
Ethnographic Mapping	<ul style="list-style-type: none">-Create a typology of social contexts of hidden and surreptitious adoption.-Create a typology of social networks of hidden adopters (e.g. adoption profiles, preferences and habits).-Identify pool of potential respondents by identifying opinion leaders within social groups.-Build trust and use opinion leaders in each social group in a manner similar to snowball sampling to facilitate introduction to others.
Target Plan Development	<ul style="list-style-type: none">-Use the sub-grouping information developed during ethnographic mapping.-Identify targets (organizational unit-based, hidden adoption communities) in each district (e.g. IT Cluster)-Develop appropriate plans for recruiting group members.
Target Plan Revision	<ul style="list-style-type: none">-Revise target plan as necessary to accommodate changing social contexts, networks and member enrolment rates.
Interview Protocol and Instrument Revision	<ul style="list-style-type: none">-Based on the interim findings revise the sampling frame/tactics, interview protocol or instrument as necessary.

In practice, I ended up following a relatively more streamlined version of this plan.

The initial mapping of organizational districts proved to be a straightforward exercise. I started with a high level organization chart and was able to use this organization chart in combination with a publicly accessible company directory listing to drill down to the level of individual organizational units (including individual members) with ease. In identifying areas with potential for hidden and

surreptitious adoption of IT solutions I relied on two separate sources.

First of these, involved an on going policy refresh effort around open source solutions. The host organization had an ageing policy on the use of open source solutions and recently created a number of focus groups to gather feedback from across all nine IT Clusters (interestingly, this consultation effort turned out to be a rarity as my research has later shown). Since a significant number of anecdotal evidence concerning hidden and surreptitious adoption of IT solutions involved free and open source solutions it was only logical to assume that a high concentration of hidden and surreptitious adoption actors would likely overlap with users of free and open source solutions. So, I mapped those organizational districts housing the focus group participants as potentially dense areas for hidden and surreptitious adoption.

The other source involved a cross-cluster IT solution development committee which involved members at the senior management level from across all IT Clusters. The purpose of the group was to increase cross-cluster collaboration around common and replicable solutions which, among other types of solutions, included nurturing and sharing of various types of IT solutions and innovations. When I approached this group and presented my research idea, a few members of the group have shown interest and gave their blessing to the idea. These members have later directed me to various organizational units under their control which they thought were the most innovative and bleeding edge and thus potentially harboured candidates for hidden and surreptitious adoption of IT solutions. Subsequently, I added those organizational districts as potentially dense areas for hidden and surreptitious adoption and created an unordered list of potential organizational units.

Using this pool as the starting point and relying on the source as well as the position related

information gathered from the corporate directory listing (job title, organizational unit related information and so on) I completed a basic ethnographic mapping covering the members of these organizational units. While it was (at least initially) not possible to gather information related to opinion leadership among these members, based on their job function I was still able to conceptualize a range of typologies concerning social contexts and networks of hidden and surreptitious adoption of IT solutions. For example, adoption profiles, preferences and habits of web front-end developers differ from enterprise JAVA developers which in turn differ from ORACLE DBAs and so on. This ethnographic map was then used as a pool to identify and select targets in each IT cluster. The process of recruiting candidate organizational units got initiated with a contact to the senior manager (usually a director) responsible for the target organizational unit. On a few occasions meetings were arranged with senior managers as feeder interviews to further refine and revise the target plan. On others, the senior manager was only contacted as a gatekeeper and to obtain permission to contact members of his / her organization (target member names were not shared with senior managers). The secondary purpose of this higher-level initiation contacts was to protect the individual (and anonymous) interviewees in case their participation was questioned on the basis of the required time commitment, a valid concern which did not materialize. Despite this multi-stage filtering effort and the existence of previous contacts (e.g. via focus group participation or committee presentation) the response rate at the senior management level was still less than 50 percent. Over 6 months, a total of 31 interviews were conducted with 29 interviewees covering 4 IT Clusters (4 cases) out of 9 available IT Clusters until theoretical saturation was deemed sufficient. Descriptive interview information is provided in **Appendix F**. Further information on theoretical saturation can be found under the appropriate heading in **Chapter 4**.

3.2.1.3.2 Host Organization

The host organization is a large public sector entity with around 70,000 employees including a large

technology group with approximately \$2.5 billion IT capital assets on the balance sheet and more than \$600 million in annual external IT expenditures (not including IT salaries and wages) as of 2010. Previously ran in a decentralized manner, the IT portion of the organization has gone through a series of centralization efforts in the last decade. As part of this centralization effort, previously independent IT groups serving similar sectoral needs were structurally and brought together in nine “IT Clusters” (originally 7 then 8 and finally, as of 2012, 9). These IT Clusters share technical resources within their respective sectors and represent distinct IT selections to an extent that they could even be treated as semi-independent organizations. Each IT Cluster has its own CIO and organizational structure. More recently, the centralization effort has been continuing beyond the IT Clusters to include consolidation of infrastructure (e.g. e-mail, server and data centre consolidation) as well as consolidation of services (e.g. help desk, internal consulting and enterprise architecture consolidation). Despite this centralization effort at a high level, the existing IT Clusters still maintain autonomy around the technological choices within the boundaries of corporate IT standards with certain flexibility.

For several reasons, I believe this particular organization (or bundle of sub-organizations) provides a very suitable setting for a dissertation fieldwork concerning the exploration of the concept of hidden and surreptitious adoption.

First, the organization has a variety of existing IT investments and associated IT people, process, technology bundles built over the years where the existence of internal and external compliance pressures could be examined. Similarly, and due to its existing and ongoing relationships with external technology partners (e.g. hardware, software and service vendors) this highly institutionalized environment would provide an appropriate testbed where the existence and magnitude of potential external normative as well as coercive pressures could be investigated.

Second, this public sector organization maintains a network of other public sector organizations and routinely exchanges information with these broader public sector partners through such engagements as technology based working groups and cross-jurisdictional committees. These exercises inadvertently result in benchmarking of other public sector organizations within the same network whereby certain “successful” practices get copied among network members. This kind of networked environment provides an excellent setting where external mimetic pressures can be explored.

Third, due to its size and previously decentralized structure, the IT organization as a whole still maintains a variety of alternative technology selections where several formal and informal communities of practice exist within the organization. While these formal / informal user communities and their associated community leaders would provide an opportunity to look at the existence of internal identification pressures, certain informal communities (such as ones clustered around the use of open source solutions) would also provide a rare opportunity in an institutionalized setting where internalization pressures could be investigated.

Finally, and in relation to access to information, the site offers several advantages. For example, due to its obligations as a public sector entity, this organization holds a wealth of archival information regarding the selection, use and disposal of its information technology assets. In addition to publicly accessible archival documents, and due to availability of multiple contacts in the subject IT organization, this site also proved to be a valuable source of internal and non-public information via access to Intranet pages behind the corporate firewalls and to internal corporate communication.

3.2.1.3.3 Defining Sample Cases and Bounding the Context for Data Collection

Miles and Huberman (1994) defines a case as “a phenomenon of some sort occurring in a bounded context” (p.25) and goes on to argue that the case is in effect the unit of analysis of the study. Considering the cluster structure of the host organization, the sample case in this study can be defined as an “Organizational unit made up of technical users engaged in (or have potential to engage in) hidden and surreptitious adoption of IT solutions in the context of the semi-autonomous information technology clusters of a large public sector organization.” It is important to emphasize once more that these organizational units are technical by definition and as such at the individual level (i.e. members of the organizational unit) they contain highly technical users with technical roles and titles (e.g. developers, database designers, software testers, IT project managers, IT business analysts and so on) as opposed to end users. This distinction has also been clarified in **Appendix F**.

At this stage, and as described in the section on interviewee selection in detail, I already had a list of organizational units laid out in a target plan. These organizational-unit based, hidden and surreptitious adoption target communities were organized in each organizational district (i.e. IT Clusters). Nevertheless, I felt the need to further revise and clarify the target plan by providing clear and unambiguous definitions of settings, actors, events and processes (i.e. sampling parameters) of interest to explain how the context for data collection was bounded. The following description serves that purpose.

“The target setting involves semi-autonomous IT clusters of a large public sector organization . The actors of interest are IT knowledge workers who perform technical duties (i.e. technical users). I will be looking at a specific event (software development and maintenance) and focus on its associated processes. These processes will involve, among others, business modelling, requirements gathering,

systems modelling / architecture, software coding, software testing, bug fixing, systems integration, deployment, maintenance, and performance tuning. ”

I also decided to treat each IT Cluster as a separate case and use a multiple-case sampling approach to allow cross-case comparisons in order to add confidence to findings. This approach made much sense as each IT cluster operated as a semi-independent entry with its own organizational structure, technology platforms, IT leadership and so on. The tight description above served the purpose of maintaining consistency around settings and actors, and of keeping the focus on same events and processes, in other words to impose a coherent sampling frame that would allow cross-case comparisons that would otherwise be impossible.

Even though the cases are sampled from the same organization, each case belongs to a separate IT Cluster with its own Chief Information Officer and organizational structure. Historically, and for the duration of this study, each IT Cluster has maintained great autonomy in picking its technology footprint and acted as loosely coupled and largely independent arms of the same large organization. The IT inventory in these clusters today represent the result of a decentralized era where clusters maintained a lot more autonomy over IT adoption than they have now. Only recently these organizations have started to operate under more central control, a distinction made in **Table 9** (time ordered matrix). Consequently, the cases appear much like different organizations and thus are still interesting to compare along the analytic and cultural categories established earlier. Further, no confounding effects are suspected as these clusters still carry the technology adoption selections made in a previous (decentralized) era. It has to be acknowledged however that such confounding effects will present bigger issues in the future than they are today.

3.2.1.3.4 Interview Process

The interviews had to be booked weeks in advance. Before technical users at non-management ranks were approached, prior permission was obtained from the manager of the organizational unit while protecting the identities of individual interviewees (i.e. a blanket permission was requested to conduct interviews with technical staff members). Potential interviewees were first contacted via e-mail. This e-mail correspondence provided very high-level details about the research study, mentioned the prior management approval and requested further permission to continue with a face-to-face interview. Due to the personalized nature of e-mail messages and the legitimizing effect of the higher level approvals, the response rate was close to 70 percent. A day prior to the scheduled face-to-face interviews, interviewees were again sent personalized e-mail notifications to remind them of the approaching interview. Nonetheless, despite the advanced notice, occasionally interviews had to be rescheduled to accommodate day-to-day operational pressures felt by the interviewees.

The interview protocol was followed to the best extent possible while not disrupting the interview flow. The interviews started with a brief introduction that talked about the purpose and background of the study at a high-level. The introduction served the important purpose of reiterating the confidentiality of the discussion and helped gain trust of the interviewees. No questions were asked of the interviewees before the written informed consent was obtained. A few biographical questions were used to get the interviewee into talking mood and ensure an environment of mutual respect and understanding. Prior to asking any area specific questions the interviewees were asked to freely describe their day-to-their work practices and were encouraged to talk about various IT tools and methodologies they relied on to complete their technical work. Interviewer familiarity with IT tools, methodologies and practices was key in obtaining these otherwise lower-level technical details. Detailed notes were taken to capture any instances of non-standard technology use or to note any occasions that would be considered violation

of organizational policies, procedures, standards, directives or guidelines.

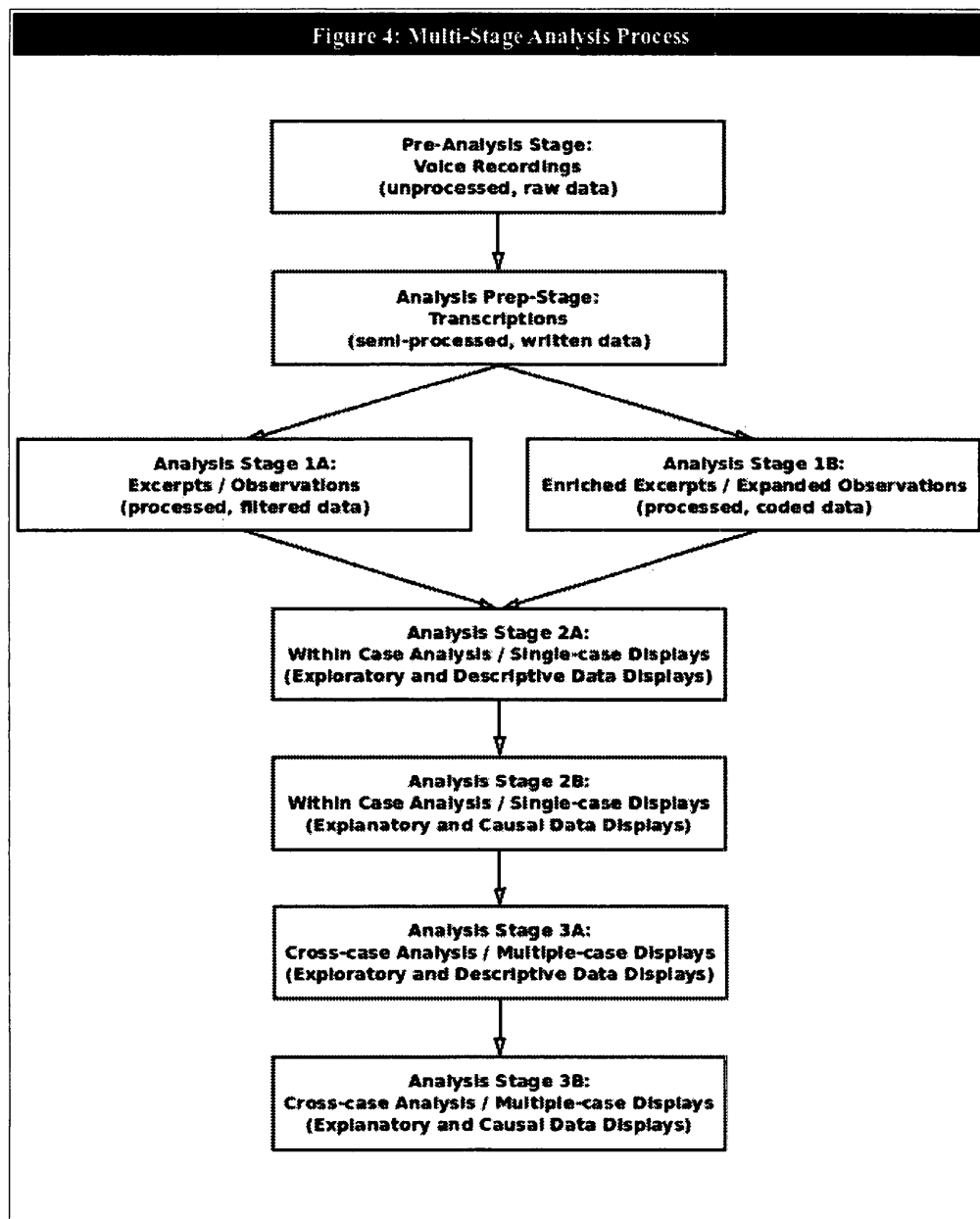
A series of grand-tour questions were then asked in each of the pre-defined question areas (provided in the sample interview questionnaire – please see **Appendix A**). Each of these areas had a number of floating and planned prompts. Questions were phrased in easy-to-understand terms and delivered in a non-directive manner. As answers were captured, special emphasis was placed on identification of interviewee assumptions and implications. Drill down questions were used to confirm suspicions. In addition to listening for mere utterances, interviewees were also watched for visual cues that ranged from explicit facial expressions and hand gestures to more subconscious indicators such as eye-movements or inadvertent emotional gestures or body movements. Within the time limitations interviewees were given sufficient time to tell their own stories using their own terms in an uninterrupted manner. When the prepared questions were all consumed, interviewees were given another chance at the end of the interview to add any points that they believed should have been covered in more depth during the interview.

Following each interview participants were sent personalized and customized e-mail messages that thanked them for their participation and requested permission to recontact them should it become necessary in the research process. These messages were highly customized where selected elements from the interview were embedded in the body of the sent messages.

3.2.1.4 Quadrant 4: Interview Analysis and Discovery of Analytic Categories

The last quadrant of the qualitative research framework involves a multi-stage process for the analysis of collected data. The high-level stages of this eight-step process were modelled on McCracken (1988), though it is more of a synthesis and an expansion than a mere reproduction of the five-stage analysis

model McCracken proposed. Indeed, the detailed analysis made use of the variety of methods described in Miles and Huberman (1994) and followed a sequential and case-oriented replication strategy similar to the one described in Yin (1984). This multi-stage process is summarized in **Figure 4** below. The analysis process shown in this figure is described in more detail in the following chapter. After each stage has been described in Chapter 4, the actual implementation results along with references to supplementary data displays were revealed in Chapter 5.

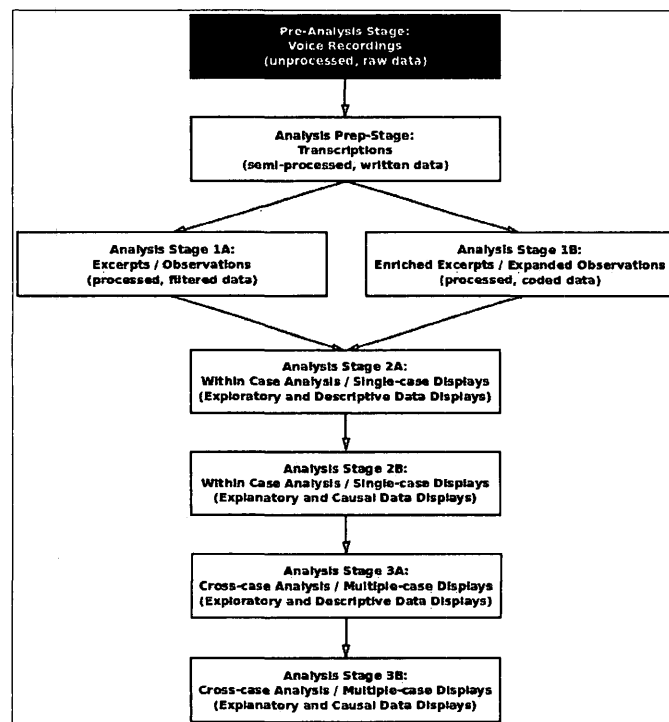


In this chapter a methodological framework was described and its particular implementation details were revealed. The four-step method of inquiry consists of four consecutively applied steps which, when combined, make up the four quadrants of a qualitative evaluation cycle. Each of the four quadrants represent a separate and successive step in the research process. For this study the process started with a literature review and development of analytic categories (quadrant 1), took advantage of researcher as an instrument of inquiry to refine these categories (quadrant 2) and continued with the collection of data through standardized instruments in semi-structured interview routines (quadrant 3). The final step of the framework (quadrant 4) involves a detailed method for the analysis of collected data and this meticulous analysis process is explained in Chapter 4 and the implementation results are reported in Chapter 5.

CHAPTER FOUR: ANALYSIS

In the previous chapter a methodological framework was described. This framework consists of four quadrants that guide the qualitative research cycle and the last quadrant (quadrant 4) corresponds to the analysis of qualitative data and the write-up of research results. The multi-stage analysis process summarized in **Figure 4** is further described this chapter. The chapter has been structured to follow the same sequence described in **Figure 4** and each of the boxes shown in this figure has been described under a corresponding heading. In order to provide a roadmap, the particular stage under focus has been highlighted and shown in relation to other stages of analysis after each heading.

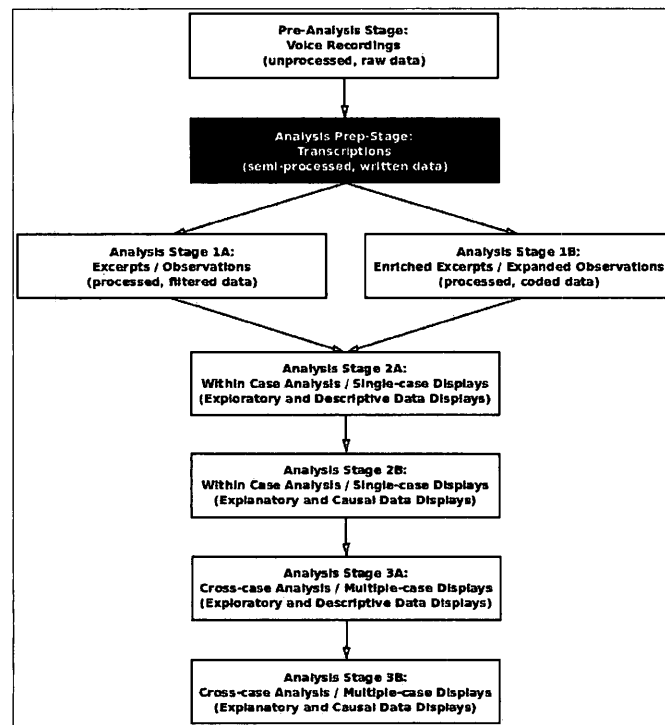
4.1 Pre-Analysis Stage: Voice recordings (unprocessed raw data)



Each interview was digitally recorded using two separate digital recording devices (a digital recorder and a digital recording pen). The recordings usually started while I explained the informed consent form (sample provided in **Appendix G**). This was deliberate. By recording the verbal exchange during this stage I was able to go beyond a mere signature proof and captured the verbal cues, concerns, questions and, on many occasions, the verbal authorization and consent of the interviewee. Various notes were taken during the interviews. Some sources would suggest coding and analyzing these notes but due to richness of interviews themselves I never felt the need to go back to hand-written field notes during later stages of analysis. Instead, I used these field notes to highlight various pointers and to create reminders during the interviews which then became the basis of further questioning. The field notes were also proven to be very useful when content summary forms were prepared. During interviews, interviewees were watched for various visual cues (raised eyebrows, rolling eyes, positive or negative nodding, blushing, looking away, looking up, looking down...). These cues were noted in the field notes as appropriate.

The voice recordings were immediately transferred to a secure laptop computer with either .mp3 or .m4a compression and a cloud-based backup was taken shortly thereafter. Interviews were named sequentially indicating interview date and sequence (e.g. DDMMYY_XXX.mp3) and personally identifiable descriptive information (e.g. interviewee names) were avoided in file names and in file properties. The naming and data management conventions developed for raw data (e.g. interview transcripts) were also applied in later stages to partially processed (e.g. interview transcripts) and processed (e.g. coded transcripts and displays) data.

4.2 Analysis Prep-Stage: Transcriptions (semi-processed, written data)



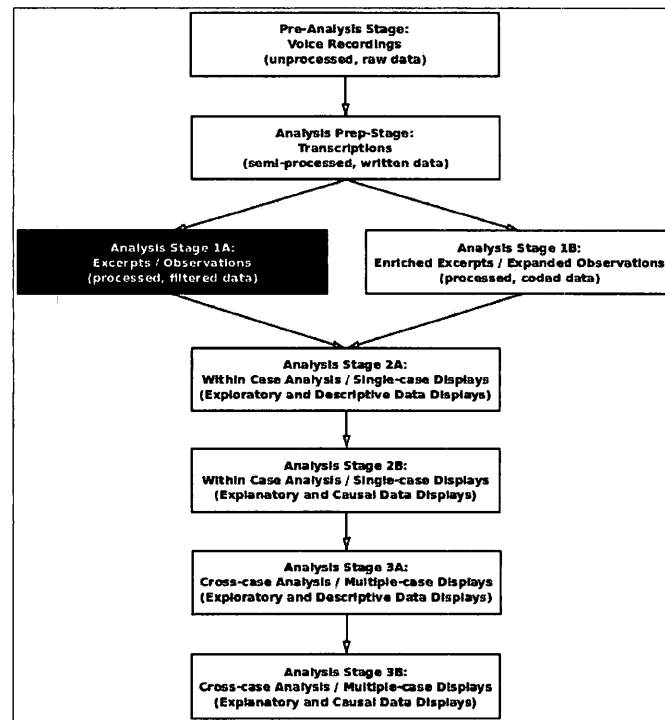
Shortly after each interview, a contact summary form was created (see **Appendix H** for a sample). This form summarized various descriptive details about the interview (type of contact, cluster name, site, blocked and recorded interview time...) and had three sections. The first section was reserved for the main issues that struck me as very important in this contact and this was where I talked about surprises, important linkages and relationships that came to light during that particular interview. Section 2 was for lesser issues that were salient, interesting, or illuminating but not as groundbreaking or surprising as ones captured in the previous section. Section 3 was all about questionnaire improvement and had space to talk about existing questions that need to be deleted or modified or else, missing questions that would be beneficial to cover in subsequent interviews. I usually ended up completing the contact summary forms as I went through the transcription process. While it is possible to code and subsequently analyze contact summary forms, because the same issues and points were usually

captured in much finer granularity in coded excerpts I did not separately code the contact summary forms. Consequently, these forms served the main purpose of questionnaire improvement and for creation / revision of coding scheme.

I created a verbatim transcript of the interviews myself. This was against the advice of McCracken (1988) who recommends that the transcription process should be completed by a professional typist using a transcribing tape recorder. According to McCracken, self-transcription has two major disadvantages: it creates premature familiarity with the data before the coding and it is also a monotonous experience that is likely to cause researcher frustration. These points are noted and constitutes good advice. Nonetheless, due to several other -more pressing- issues I opted to do my own transcripts instead of outsourcing it to a professional transcriber: First, the interviews were highly technical and full of technical jargon that would be very difficult to comprehend to a non-technical transcriber. Secondly, the technical actor roles were mostly held by non-native speakers of English who, on occasions, had medium-to-heavy accents which made the transcription effort fairly challenging. As the sole interviewer I was able to recall visual cues and had a natural advantage against a third party lacking such contextual visual details. This visualization exercise involved recollection of actual scenes from interviews and also allowed me to remember visual details and include such non-verbal cues as textual explanations in transcripts providing a much richer description ("...so that's where we are actually linked in Kanban (shows an application on a computer screen)..."). Transcriptions were done using a specialized computer application named Transcriber, a free software package (distributed under GNU Public License) specifically designed to help manual annotation of voice recordings. Through a nicely designed and easy-to- use graphical user interface, this application supports many common audio formats has features to segment speech, create labels for speakers, capture attributes related to them, and even offers keyboard shortcuts for more experienced users. Once complete, the

individual transcripts were exported to text file format for ease of importing into the specialized qualitative data analysis application (described later in text). The resulting text transcripts were in excess of 400 pages in single-line spacing format.

4.3 Analysis Stage 1A: Excerpts / Observations (processed, filtered data)

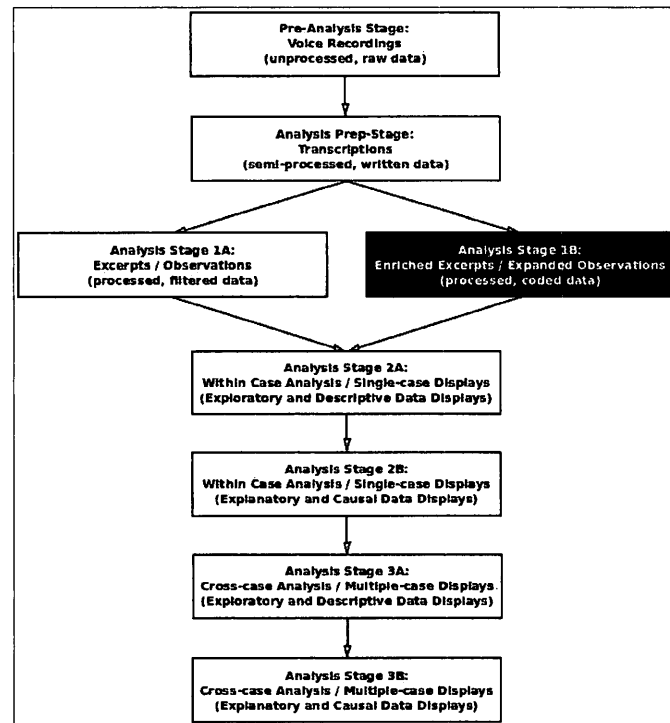


In this early stage of analysis each useful and seemingly relevant chunk or segment of transcribed text (an excerpt or observation) was marked and treated in its own right with the objective of developing much more extensive (but still isolated) understanding around the occurrence. The “isolation” comes from the internal as opposed to external emphasis, that is, each excerpt was looked at without consideration to how or why that particular excerpt might be linked to other excerpts. Consequently, each chunk or segment of transcribed text that was seen as an opportunity to uncover the underlying assumptions, associations and beliefs feeding its existence was excerpted.

It is important to note that the stages shown as distinct and separated in a sequential diagram like **Figure 4** are never too clearly or distinctly demarcated in real life. As a result, times and again I realized that while I created the Contact Summary Forms described in the prep-Stage above I also was involved in excerpting (but not coding) of transcribed text. Thus, when transcripts were created, the transcription process allowed contact summary forms to be supplemented with additional excerpts making these contact summary forms the container of excerpts. The excerpts themselves have been identified using a selection process that can only be called informed-intuition. The informed nature of selection comes from the knowledge of analytic and cultural categories that have been identified previously while intuition can be described as what McCracken (1988) refers to as “a little voice within the investigator”. Quoting Berreman (1966), McCracken goes even further to argue that such intuition is “the most powerful (if most obscure) of analytic devices at our disposal”.

The non-linear and organic nature of the analysis process mentioned above was also apparent between the two parallel steps of stage 1 analysis where, on many occasions, the excerpting in Stage 1A and the coding described in Stage 1B (see below) happened almost simultaneously where excerpts were coded and memos created immediately following the excerpting.

4.4 Analysis Stage 1B: Enriched Excerpts / Expanded Observations (processed, coded data)



Throughout Stage 1B, the marked excerpts were further enriched by way of coding and memoing. The tight isolation of excerpts in the previous stage (where they were not even linked to other excerpts) was somewhat relaxed and the excerpts were treated within the boundaries of each transcript. This allowed excerpt-to-excerpt linkages to be considered and similarity or contradiction-based relations to be noted. That being said, each transcript was still treated at its own right and without consideration of other transcripts either within or beyond the specific case that transcript belonged to.

The coding exercise started with the assignment of codes (labels) to excerpts. Initially, this labelling exercise involved little or no interpretation where appropriate codes from the provisional list of codes were applied to excerpts purely based on apparent phenomena or meaning of that chunk of text. This stage is also known as descriptive coding (Stage 1B1). Following Miles and Huberman's (1994) advice

in the beginning I aimed at using single code for each excerpt. However, this was only possible in the earlier instances of descriptive coding and as time went by, with each subsequent transcript, multiple-coding became the norm rather than an exception. Use of a well-designed qualitative data analysis software was of tremendous help at the coding stages (see the computer based data analysis section below).

The actual coding was a highly iterative process. In later iterations, as my contextual understanding evolved and my sensitivity to underlying interviewee assumptions and beliefs heightened, I was able to move beyond a somewhat mechanistic activity of merely affixing labels to excerpts to a much more complex form where I started looking for behind-the-scenes meanings and unspoken but implied utterances. Unlike the descriptive coding stage that preceded it, this was a highly interpretive exercise. This stage is usually named as interpretive coding (Stage 1B2). It is important to put a word of caution here for researchers who are more at home operating with an objectivist ontology and a positivist epistemology. The move from descriptive to interpretive coding can be a discomfiting exercise at first. After all, descriptive coding can easily be tied to an objectively reproducible logic. I am almost certain that it could even be done in an automated way (one day if not today). However, the same argument will not hold for interpretive coding and thus it will be much harder to justify in a quantitatively oriented mind. The trick here involves -at least temporarily- letting go of generalizability concerns. I always kept reminding myself that I was more interested in uncovering the conditions under which the model for hidden and surreptitious adoption of IT solutions would operate within the already bounded context (i.e. certain actors operating in specified settings performing a limited number of processes part of a clearly defined event), and not with the generalization of the findings to other settings. At times, I felt more like a detective than a researcher in social sciences.

An example here would help differentiate between descriptive and interpretive coding undertaken in Stage 1B within the confines of a single transcript and also show the iterative nature of the coding stage. The following excerpt had multiple descriptive and interpretive codes associated with it. For the time being let's focus on the underlined portions:

“OK, so, if the <hidden for anonymity> Cluster is using it and I have a very, I'd have to have a very good reason for this, so, let's say for example, there was a piece of technology that my client wanted, my client is footing the bill and someone else was using it already, and implemented it successfully then I would leverage whatever mechanism they used to bring that in.” (Interview 16)

During descriptive coding this portion was coded with a AA-INT-IDENT code indicating that this hidden and surreptitious adoption antecedent was an example of an internal identification pressure. At the time, the interviewee appeared to treat that other cluster as a successful benchmark and a yardstick. In other words, it was treated as evidence showing the possible effect of a desired association with an organizational user community (they are successful and we would like to be successful (like them) so we will use what they use).

Now take a look at the following excerpt which is from the same transcript but talking about a different occurrence.

“I think someone else in the Cluster was already using SVN anyways so, we said we'll just use that.” (Interview 16)

Here the technical user was talking about his selection of a particular source code repository (SVN) on the basis that it had already been used elsewhere in the same organizational unit. This excerpt has less to do with desired association and more to do with one incident being used as precedent to another, hence a sub-level code under internal identification pressures was assigned to this excerpt (AA-INT-

IDENT-PRECEDENT). Having read this excerpt, it became a possibility that the previous excerpt might also have had this backstage meaning. In other words, the previous excerpt could also have been interpreted as a hidden and surreptitious adoption incident helped by a precedent being set in the same organizational unit. On this occasion, during interpretive coding the same excerpt was assigned this additional new code related to precedence.

It is even possible to take it further. The following excerpt is also from the same transcript.

“I think that made it a bit easier too because someone else was already using it. So we already knew OK, it's supported so we can just...” (Interview 16)

Now, naturally this third excerpt was coded with the same precedence code assigned to the second excerpt. However, there was more to it as the underlined portion brought a whole new issue to light. Perhaps the precedence was not an end in itself but just means to imply and indicate that on those occasions (when there is adoption precedent) finding support (on a non-sanctioned solution) would not be as challenging as it would have been otherwise. Consequently, another sub-code under internal identification pressures was created to capture this (AA-INT-IDENT-SUPPORT). Finally, going back to the very first excerpt, when it was read again with this new code in mind, it became perfectly possible to interpret this as a similar occurrence where the user proceeds with adoption of a non-sanctioned tool because he was certain that support would be available due to its earlier use in another cluster. Thus, during interpretive coding, this third code was assigned to the same excerpt.

Another method that helped with the enrichment of excerpts involved creation of memos. I relied on extensive memoing throughout all analysis phases involving individual transcript, within case and cross-case analyses. In almost all cases, being the sole investigator, these memos were written for

myself. On rare occasions I also used them to illustrate points during case analysis meetings with dissertation steering committee members. Even though most of the 80 plus memos written during analysis were related to excerpts and coding in that they were assigned to specific chunks or segments of codes, there were also a number more generic memos with structural or contextual content. The qualitative data analysis software made it extremely easy to create memos on the fly, automatically assigned dates and times, showed where exactly in text this memo originated, allowed assignment of titles and had grouping capabilities. As was the case with case summary forms, while memos themselves can also be coded and analyzed, I never felt the need for this and predominantly used memos as sense-making and patterning tools and to link and group separate pieces of related data elements in clusters.

4.4.1 Computer Assisted Qualitative Data Analysis Software (CAQDAS)

At this point, I believe a few sentences should be spared on the selection process of a computer assisted qualitative data analysis software. Several qualitative data analysis tools were evaluated before a selection was made. These involved industry standard proprietary options (Atlas.ti, Nvivo, MaxQDA) as well as other comprehensive proprietary options (Qualrus, HyperRESEARCH, Provalis QDA Miner) and several good open source alternatives (GTAMS, CLAN, CAT). Perhaps somewhat uniquely, native availability of the tools on Linux / UNIX was a key factor (and a limitation) in the evaluation. In the end Dedoose, a cloud-based qualitative and mixed methods research application was selected as it worked well in all major browsers (e.g. no client installation was needed), required little or no administration (e.g. no backups or product upgrades were required), had good security features and offered import/export capabilities to/from several other major CAQDAS alternatives.

4.5 Analysis Stage 2: Within Case Analysis (single-case data displays)

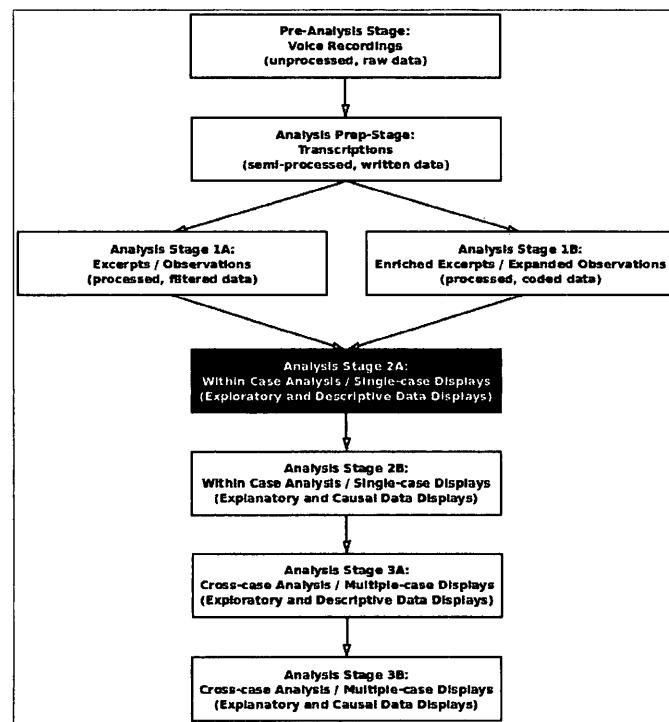
In the previous stage I treated enriched excerpts within the boundaries of each transcript that particular excerpt belonged to. This allowed me to build excerpt-to-excerpt relationships but still enforced a transcript-based isolation. With within case analysis, I further relaxed this isolation and started treating those enriched excerpts as part of a case, that is, a specific, hidden and surreptitious adoption candidate organizational unit representing an IT cluster. This allowed further development of excerpts in relation to other excerpts from the same case. Nonetheless, despite being part of a multiple-case design, each case was still treated in isolation from other cases (i.e. other IT Clusters) at this stage. This approach fit well with the particular case oriented strategy I was following. As mentioned earlier in text, I decided to follow a replication-based strategy based on Yin (1984) where I studied each case in depth in light of the theoretical framework I developed and updated the coding scheme before moving on to a successive case in a sequential manner. The findings were then used as part of an inductive exercise to confirm or refute the theoretical propositions made.

Various matrix type and network type data displays were utilized to draw and verify tentative conclusions about each particular case. The data displays themselves were aimed at summarizing large chunks of information in easily digestible visual form and are accompanied by analytic text to build a story around those occurrences. Examples of both matrix and network family of displays are used as appropriate to the context and data at hand. The particular matrix and network displays that were utilized as part of analysis will be explained under the within-case and cross-case analysis sections below, though, the interested reader should refer to Miles and Huberman (1994) to learn more about various other sub-types of these two display format families. Many tactics ranging from noting patterns and themes to clustering and counting were employed to draw conclusions from data displays. Several

tactics were also employed to avoid premature closure on early conclusions. These included drilling down on surprises and questioning alternative explanations as well as seeking confirmation from participants in subsequent interviews.

Following Miles and Huberman (1994) the data displays are organized under two separate sub-sections corresponding to exploratory and descriptive displays (Stage 2A) and explanatory displays (Stage 2B). While the exploratory and descriptive analysis focused on the question of what (instances of hidden and surreptitious adoption) and how (specific circumstances surrounding those instances), the explanatory analysis moved deeper to the question of why (why does hidden and surreptitious adoption happen?)

4.5.1 Stage 2A: Exploratory and Descriptive Displays



Within the bounded context of individual cases, a number of displays were used to draw and verify

descriptive conclusions concerning hidden and surreptitious adoption of IT solutions by technical users. As hinted above, the purpose at this stage of analysis was focused on developing a better understanding around the occurrence of hidden and surreptitious adoption as well as on uncovering the specific circumstances surrounding its realization within the context of individual cases.

Data displays themselves are means to go beyond ordinary and unreduced narrative text and present case related information in a visually appealing format that would ease drawing conclusions. The following four types of matrix displays were used as part of exploratory and descriptive within-case analysis. Each will be explained briefly below.

4.5.1.1 Context Charts

Context charts map the interviewees, list a number of descriptive details about each interviewee along with the organizational structure of the particular organizational unit. They also show each interviewee's overall personal attitude towards the use of non-sanctioned solutions.

4.5.1.2 Checklist Matrices

Checklist matrices are used to analyze field data on the major variable of interest (i.e. the dependent variable) in the study, that is, the second-stage hidden and surreptitious adoption of non-sanctioned IT solutions by technical users. The components that are included in the matrix all come from the conceptual framework. The rows show each of these components which represent various internal and external influences that are thought to affect the occurrence of hidden and surreptitious adoption of IT solutions. The internal influences include compliance, identification and internalization pressures. The external influences are directly tied to the institutional theory and structured around the three pillars: coercive, normative and mimetic pressures. The columns show various actor types (organizational

roles) who were interviewed.

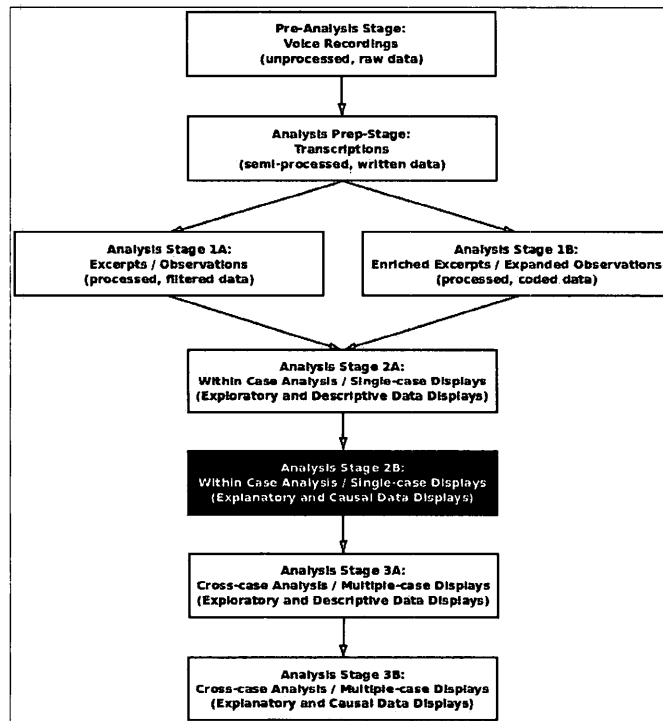
4.5.1.3 Time-ordered Matrix

The time ordered matrix takes advantage of the nature of qualitative data that allow tracking of event sequences and processes and provides a comprehensive chronological perspective in a descriptive manner with regards to IT governance, organizational structure and accountability shifts over time. This matrix is an extended and generic event listing in that it lists a series of events and puts those occurrences into a number of categories chronologically. In particular, by breaking the whole IT organization into its component parts, namely, business area specific IT Groups, IT Clusters and the Central or Corporate Group, the display allows comparisons to be made over time. It also lists key events that are thought to have played seminal roles in shaping the transformation.

4.5.1.4 Conceptually-Clustered Matrices

These comprehensive displays bring together a number of related concepts around hidden and surreptitious adoption of IT solutions while focusing on specific clusters. The three major columns correspond to adoption categories&process, adoption antecedents and possible moderators&mediators of hidden and surreptitious adoption respectively. The rows themselves are organized according to categories of organizational users (e.g. immediate managers, technical users, etc.) and are further broken down by individual interviewees. Responses in each column are presented in conceptual clusters (shown as Headings) and where appropriate, excerpts in each conceptually clustered area is further sub-clustered and tagged (shown in parentheses after the associated excerpts). This fine granularity was made possible by the iterative coding exercise that allowed increasing levels of depth to be uncovered and categorizations made in successive rounds of coding leading up to the following analysis. For simplicity the analysis is organized around the same column headings and sub-clusters.

4.5.2 Stage 2B: Explanatory and Causal Displays



In stage 2A my focus was more on finding examples of hidden and surreptitious adoption (the “what?” question) and looking at the circumstances surrounding these instances (the “how” question). Consequently, I predominantly relied on descriptive and exploratory type displays detailed above. The underlying coding exercise had descriptive as well as interpretive elements.

In Stage 2B my focus has shifted away from the somewhat simpler what and how type questions towards the more illusive and complex why type questions. This effort focused on finding plausible explanations to why technical users chose to adopt non-sanctioned and non-approved IT solutions in a hidden and surreptitious manner and was supported by a more inferential form of interpretive and pattern coding exercise.

As emergent themes and patterns were investigated, this stage represented a major effort where within case recurrences were investigated and analyzed. Since each iteration of coding led to re-coding of previous observations, analysis of each additional case involved verification of patterns and themes from the previous case and resulted in a more and more refined set of patterns or meta-codes (which were extremely useful during the cross case analysis stage that followed). As various factors and their interrelationships got discovered, case-specific preliminary causal network diagrams were gradually created throughout this stage to explain causal relationships among variables.

These diagrams are further described below.

4.5.2.1 Causal Network Diagrams

During within case analysis, interim and preliminary causal network diagrams were created to display a number of variables of interest and show how these variables are related amongst themselves at each cluster. Both the variables themselves and the relationships amongst them followed the result of the inductive and iterative coding exercise and tied directly to the descriptive displays in Section 2A.

These interim causal networks represented an attempt to understand case-specific causal influences and ultimately helped construct the cross-case causal network explained in Stage 3B below. To avoid confusion, these individual, preliminary causal networks were not included in the reporting of results in Chapter 5.

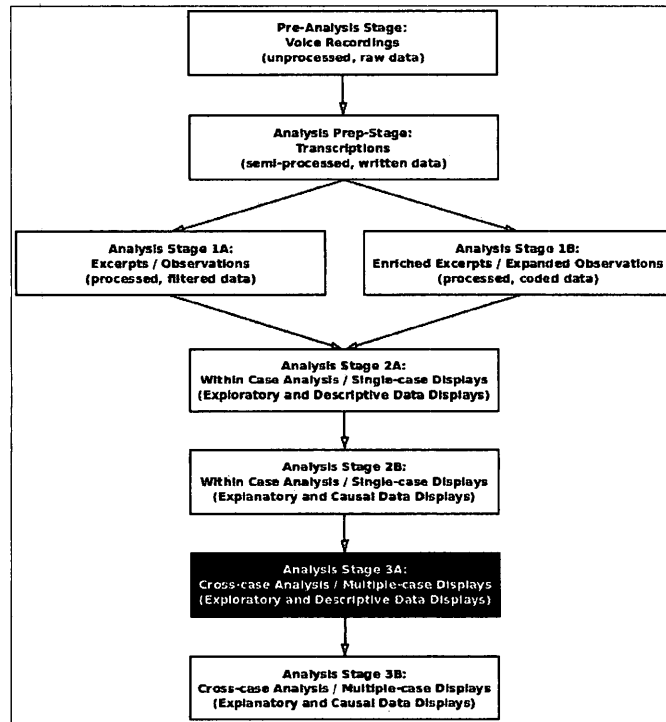
4.6 Analysis Stage 3: Cross Case Analysis (multiple-case data displays)

The analysis and its associated displays produced in Stage 2A/B were all produced within the bounded context of a single case. Even though the individual cases were assessed within the context of a single cluster, they all involved actors with similar roles who were engaged in similar events and performed comparable processes to ease cross-case analysis involving multiple clusters. As noted earlier, throughout the iterative coding exercise evolving codes were applied and re-applied to all cases. This was also in line with the replication strategy (Yin, 1984) selected for the analysis. Initially one case was studied in depth and then additional cases were examined in a sequential manner to confirm or negate patterns found during earlier analysis.

At Stage 3 the focus of analysis moved away from single cases and aimed at developing a synthesis involving all observations. This stage also served the purpose of increasing generalizability of findings (though, as mentioned earlier, the primary concern was with the verification and fine tuning of previously discovered conditions and factors which affected the occurrence of hidden and surreptitious adoption as opposed to generalization of these findings to significantly different settings than what is studied here).

Similar to Stage 2, the cross-case analysis stage (and its associated displays) is grouped under two conceptually different sub-stages involving exploratory/descriptive and explanatory analysis addressing what/how and why questions respectively.

4.6.1 Stage 3A: Exploratory and Descriptive Displays



For the exploratory/descriptive analysis stage (Stage 3A), a number of matrix type case-ordered displays were used. These displays list case-by-case data in aggregate form according to a number of variables of interest and serve the purpose of confirming/disconfirming existence and relative strength of those variables. For brevity, actual direct quotes from individual interviews were not included in these displays (those quotes can still be seen as part of the within case analysis in Section 2A).

For Stage 3A, a total of four case-ordered displays were created to look at 27 factors that are grouped under about 10 higher-level categories. These displays are briefly explained below.

4.6.1.1 Case-Ordered Display for Internal and External Influences

This case-ordered display was created to look at evidence confirming or rejecting the existence of various internal and external pressures across the four Clusters. The rows show each of the four clusters while the columns list individual pressures under two generic categories (internal and external). In line with the theoretical framework, three internal (compliance, identification and internalization) and three external (coercive, normative and mimetic) pressures were considered.

4.6.1.2 Case-Ordered Display for Adoption Categories and Process

The case-ordered display on adoption categories and process was designed for two purposes in mind; primarily, to investigate cross-cluster evidence confirming or rejecting the occurrence of hidden and surreptitious adoption of IT solutions, and secondarily, to look at evidence across clusters related to the processes and categories of hidden and surreptitious adoption. Showing a structurally similar design to the previous case-ordered display, a matrix type display was created where rows show each of the four clusters while the columns list types of adoption processes and categories. Two adoption processes (top-down vs. user-driven) as well as three hidden adoption categories (silent, shared and dual) were shown. A fourth column corresponding to a pre-hidden adoption category (user rejection) was also added under the hidden adoption categories heading.

4.6.1.3 Case-Ordered Display for Antecedents of Hidden and Surreptitious Adoption

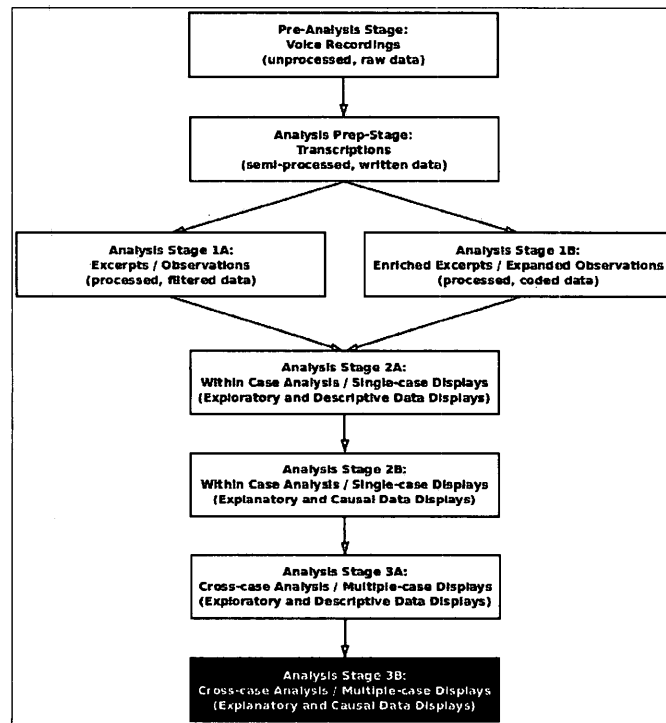
The case-ordered display on hidden and surreptitious adoption antecedents provides an aggregated view of positive and negative evidence collected across four clusters with the objective of confirming existence as well as relative magnitude of various antecedents of hidden and surreptitious adoption of IT solutions. The rows of the matrix display show each of the four clusters while the columns present a

number of factors that are believed to affect the occurrence of hidden and surreptitious adoption. These factors were grouped under four higher-level headings: technical factors, past experience/previous use, coolness and popularity, and other factors. Since each of these factors have already been explored and described in detail at the individual interview level as part of the earlier within case analysis section (Stage 2A), the focus here was to prove/disprove their existence and strength of these factors across all cases.

4.6.1.4 Case-Ordered Display for Possible Moderators and Mediators

Last of the exploratory/descriptive cross-case display series, this case-ordered display presents aggregated, cross-cluster evidence on potential moderators and/or mediators which are believed to affect the occurrence of hidden and surreptitious adoption of non-sanctioned IT solutions via their effect on adoption antecedents and on internal/external pressures. Just like the preceding case-ordered displays, the rows are organized to show various clusters and columns list a number of factors. These factors were grouped under four higher-level headings: technical knowledge and skill; project size, visibility and criticality; awareness; and availability of help and support. This cross-case level analysis complements the more in-depth analysis of the same factors that was carried out as part of the within case analysis effort in Stage 2. Nonetheless, the amount of detail provided in the aggregated matrix display here does not go down to the individual interview level (i.e. no interview level quotes were provided). Instead, taking up on those factors that were uncovered in Stage 2, the case ordered display looks at the repeat occurrence and relative magnitude of each factor in different clusters.

4.6.2 Stage 3B: Explanatory and Causal Displays



For the explanatory analysis stage (Stage 3B), the predominantly descriptive approach that governed the previous stage assumed a more inquisitive and inferential tone. In this final stage of analysis the attention has shifted from finding and verifying factors that affected the occurrence of hidden and surreptitious adoption of IT solutions to the backstage meanings and questions of why. The ultimate purpose of this stage was to establish a causal model for the hidden and surreptitious adoption of IT solutions in organizational settings. Three matrix type predictor outcome displays were created to investigate the major contributors to internal/external influences, antecedents and moderators/mediators of hidden and surreptitious adoption. These contributors were then used to build a cross-cluster causal network display. These displays are briefly explained below.

4.6.2.1 Case-Ordered Predictor-Outcome Matrix for Internal and External Influences

The case-ordered display on internal and external influences that was created in Stage 3A confirmed

existence of various types of internal and external pressures that impacted the occurrence of hidden and surreptitious adoption. This first predictor-outcome matrix, takes it one step further and focuses on the more implicit question of why these influences positively or negatively affect hidden and surreptitious adoption of IT solutions. It is at this stage that the power of qualitative enquiry really manifests itself. By allowing to zoom in on those instances where each type of internal and external pressure occurred, by providing a rich contextual view into each occurrence and by permitting validation across multiple clusters, the explanatory qualitative analysis helped uncover the most likely antecedents of and contributors to the occurrence of hidden and surreptitious adoption for each type of influence. A matrix type display was prepared to accommodate the cross-cluster findings and to ease observation of similarities and differences across different clusters.

4.6.2.2 Case-Ordered Predictor-Outcome Matrix for Adoption Antecedents

The case-ordered predictor-outcome matrix on antecedents of hidden and surreptitious adoption was created to shed more light onto the antecedent variables that were confirmed to affect the occurrence of hidden and surreptitious adoption in Stage 3A. By focusing in detail on each kind of antecedent in context, the circumstances and factors surrounding each occurrence was uncovered. Cross-cluster findings were examined in a matrix type display.

4.6.2.3 Case-Ordered Predictor-Outcome Matrix for Possible Moderators and Mediators

In Stage 3A, the existence and magnitude of a number of moderators and mediators were confirmed. The predictor-outcome matrix developed here is an attempt to take a more in-depth look at the factors that might be influencing the individual or collaborative effects of these moderators and mediators on hidden and surreptitious adoption. Similar to the previous two predictor-outcome matrices, a matrix type display was created to accommodate cross cluster findings.

4.6.2.4 Causal Network Diagram

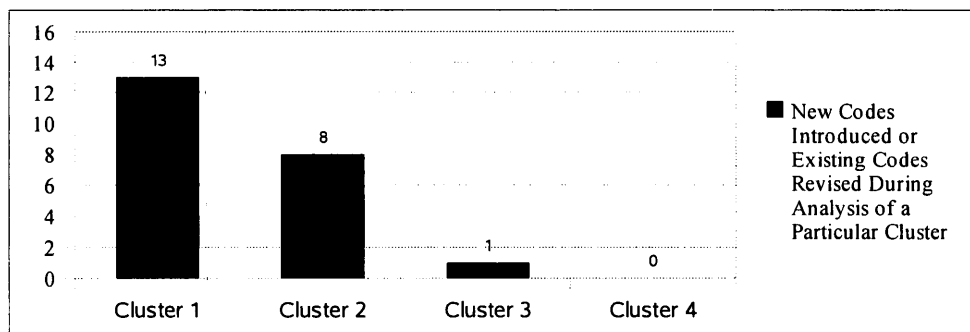
The cross-cluster causal network represents the final step of the explanatory analysis and builds up on the four case-ordered displays prepared in Stage 3A and the three predictor-outcome matrices completed in Stage 3B. The network display shows all variables that are estimated to be the strongest predictors of the occurrence of hidden and surreptitious adoption of IT solutions in large organizational settings as well as the observed or inferred causal relationships among those variables.

4.7 Theoretical Saturation

A question of great magnitude in qualitative research concerns the finalization of the iterative data gathering and analysis cycle, that is, deciding on when to stop covering more cases and conducting additional interviews. This has traditionally been referred to as “achieving theoretical saturation”. Simply put, theoretical saturation is deemed sufficient when further data collection produces increasingly lower returns and results in informational redundancy by providing little or no further insights than what has already been achieved (Saumure and Given, 2008; Strauss and Corbin 1990). More recently, some researchers started referring to achievement of “theoretical sufficiency”, that is, having well-described categories that also fit well with the data at hand which would allow drawing meaningful conclusions (Charmaz, 2006; Dey, 1999). Sticking with the conventional description, in this study theoretical saturation was sought by way of checking three different indicators at the case level: number of new codes introduced, number of questionnaire revisions, and number of new memos generated per coded interview.

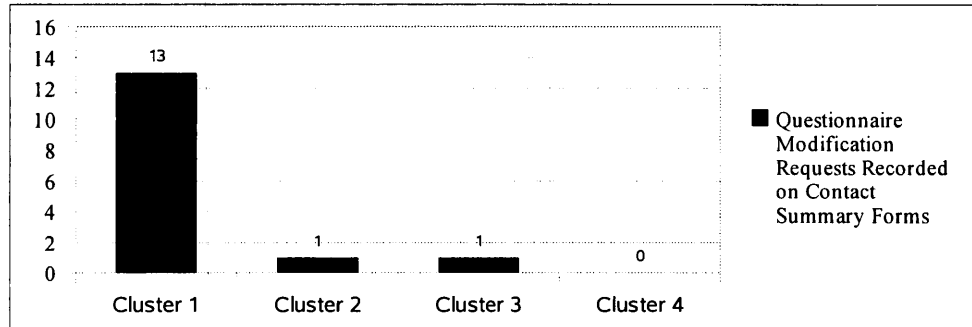
One of the most commonly used indicators of theoretical saturation involves examination of new codes

that emerge in successive interviews or cases. As theoretical saturation is approached, the number of new codes that emerge will first reach a plateau and then start declining. When new code generation reaches a level that would not justify the additional effort required to conduct more interviews, theoretical saturation is said to be accomplished. Since this study started with an a-priori start list of codes that included 14 codes, generation of new or modified existing codes through the analysis of successive “replicated” cases was tracked. Analysis of data related to the first cluster resulted 13 in new or modified codes that were added to (or revised in) the list of codes. The data analysis involving the second cluster resulted in an additional 8 new or modified codes while examination of the third cluster data generated only one additional code bringing in the total number of codes to 34. During the analysis of the last case no new codes were needed indicating that theoretical saturation may have been reached. The evolving list of actual codes is provided in **Appendix I** and summarized in the following chart.



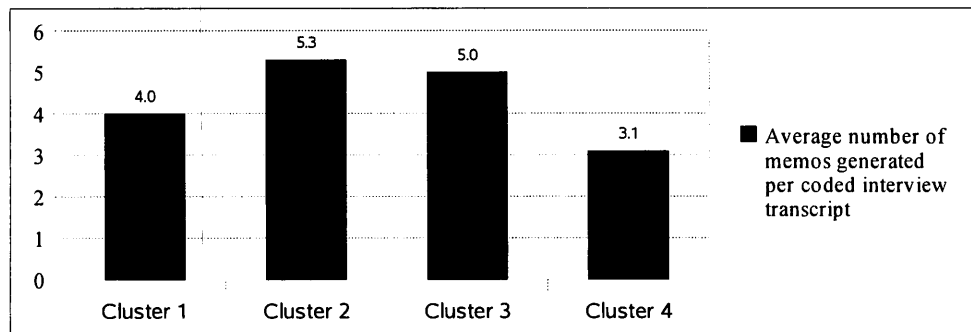
For research that makes use of semi-structured interviews with a flexible questionnaire, another indicator of saturation may involve looking at revisions of the questionnaire itself. Since questionnaires of this nature permit addition, revision or removal of individual questions, the number of such revisions may be used as a proxy with the logic that such changes would have been necessitated by need to uncover new variables, expose new patterns or test new typologies (indicating that new data collection would be of value – hence no saturation). Such changes to questionnaires can be tracked separately or

through an existing mechanism in place like Contact Summary Forms (CSFs). As mentioned during the discussion on CSFs, one field in this form was specifically earmarked to keep track of questions that need to be deleted, modified or added in subsequent interviews. During interviews in Cluster 1, 13 such changes have been noted. In Clusters 2 and 3 there was only 1 change each and in the last cluster no such change requests have been noted. As shown in the following chart, the speedy decline in the number of questionnaire modifications from 13 in Cluster 1 to 1 in Cluster 2 & 3 and no modification requests in none of the interviews in Cluster 4 may be used to support that theoretical saturation may have been reached.



Memoing is an essential method that is commonly used throughout analysis to help organize data in the form of ideas that are expressed with conceptual elaboration. Since memos are generally written when an “idea strikes” during coding, it can be argued that the rate with which they are generated may also be used as a proxy for theoretical saturation. As theoretical saturation is approached, the number of memos generated per coded interview may likely decline indicating that the researcher is less likely to encounter those moments. In this research, throughout the analysis, a large number of memos were created and assigned to specific chunks or segments of codes along with a few more generic memos that have structural or contextual content. In Cluster 1, on average 4 memos were created per coded interview. In Cluster 2 this rate reached its highest at 5.3 memos. As shown in the chart below the rate

then consistently declined to 5 in Cluster 3 and to its lowest, 3.1 memos per coded transcript in Cluster 4 hinting that theoretical saturation may have been reached.



Following the same structural sequence summarized in **Figure 4** this chapter described the multi-stage analysis process that was adopted for the qualitative data analysis. Each step was defined in detail and -where applicable- the use of data displays were explained. The following chapter talks about the actual implementation results and includes references to relevant data displays which are provided in appendices.

CHAPTER FIVE: RESULTS

This chapter reports the results of the multi-stage analysis process described and explained in Chapter 4. For simplicity, the reporting of results are carried out in the same order as the stages of the analysis process detailed in the previous chapter. Where appropriate, this chapter makes use of illustrative excerpts taken from actual data displays. For reference, all data displays have been provided in relevant appendices.

5.1 Within Case Analysis

5.1.1 Exploratory and Descriptive Displays

5.1.1.1 Context Charts

For each Cluster a separate context chart was created to map the interrelationships between interviewees which define the context of individual behaviour. These charts are provided as **Figure 5** in **Appendix J**. Each chart shows a list of interviewees and their placement in the organizational structure along with a number of descriptive details about each interviewee. Among others, such details as interviewee's organizational role, actual position title, self-ranked technical skill level, organizational and positional tenure, gender and apparent age are listed. The charts also show each interviewee's overall personal attitude towards the use of non-sanctioned solutions as judged by the interviewer after each interview.

31 percent of interviews were conducted in Cluster 1, 24 percent in Cluster 2, 14 percent in Cluster 3 and 31 percent in Cluster 4. 38 percent of interviewees were classified as technical users, 31 percent as

immediate managers, 14 percent as senior managers and the remaining 14 percent as corporate staff. The interviewees were predominantly male (about 70%) which was not surprising considering the well-researched and ongoing gender imbalance in IT related positions. Most interviewees (about 67 percent) were middle-aged while remaining ones were classified as young (note: apparent age reported, the actual age was not asked). The interviewees were highly educated. Only 4 percent had not completed any university level education. 39 percent reported having completed an undergraduate degree whereas 50 percent had masters and 7 percent had doctoral degrees. 62 percent of interviewees completed an IT related education. Most of the interviewees (69 percent) had cross-cluster exposure defined as either having previously worked in another cluster or being exposed to work in other clusters through committee work or short-term secondments. The interviewees felt they were relatively technical. When asked how they would rank their own technical skills on a scale of 1 to 10 (10 being an expert), of the ones who reported a numerical ranking, 13 percent ranked themselves as 6, 17 percent as 7, 44 percent as 8, 13 percent as 9 and the remaining 13 percent as 10.

Somewhat surprisingly, none of the interviewees showed outright negative attitude towards adoption of non-sanctioned solutions. In Cluster 1, four of the interviewees had positive, two very positive and the remaining two had neutral attitudes. In Cluster 2, out of the seven interviews completed, four had positive and three had neutral views. In Cluster 3, one interviewee maintained very positive attitude while two interviewees had positive views. Only one interviewee had a neutral view towards adoption of non-sanctioned solutions. In Cluster 4, out of nine interviewees, one had very positive and three had positive attitudes while four interviewees maintained neutral views. Only one interviewee had a neutral stance that bordered on the negative. In all four clusters it was noticeable that the higher ranking officials maintained a considerably higher percentage of neutral views in comparison with technical users who predominantly held either positive or very positive attitudes towards adoption of non-

sanctioned solutions. Technical users who had positive or very positive attitudes had examples to support their claims of non-sanctioned tool use despite organizational standards and policies. Technical users who had extremely positive attitudes towards adoption of non-sanctioned IT solutions also were the ones who appeared to have considerably higher technical skills (as demonstrated by their answers to interview questions that are technical in nature). Interestingly, these users also either had relatively short organizational tenure or did not have much mobility in the organization (i.e. stayed within the same organizational unit for the duration of their tenure). The attitude of the immediate manager appeared to have an effect on how relaxed technical users felt about talking their personal experiences in using non-sanctioned solutions. The users who reported to a manager who had positive attitude adoption of non-sanctioned solutions had openly talked about various instances of non-sanctioned solution use in a relaxed manner. Others who reported to a manager with neutral attitude towards hidden and surreptitious adoption were a lot more cautious initially. Once the personal level trust has been built they were generally forthcoming.

5.1.1.2 Checklist Matrices

Focusing on the dependent variable of the study, that is, the second-stage hidden and surreptitious adoption of IT solutions by technical users, a checklist matrix was developed for each of the four clusters/cases and include components corresponding to internal and external influences theorized during conceptual development. These matrices are provided as **Table 8** in **Appendix K**. The rows in each matrix show internal and external influences that are thought to affect the occurrence of hidden and surreptitious adoption of IT solutions. The internal influences include compliance, identification and internalization pressures. The external influences are directly tied to the institutional theory and structured around the three pillars: coercive, normative and mimetic pressures. The columns show various actor types (organizational roles) interviewed in each cluster and are summarized in the chart

below.

Actor Type	Technical User	Immediate Manager	Senior Manager	Corporate	Total
Cluster 1	6	2	-	-	8
Cluster 2 ¹	-	1	1	5	7
Cluster 3	1	2	1	-	4
Cluster 4	4	3	2	-	9
Total	11	8	4	5	28²

¹ Unlike the other 3 Clusters included in this study, Cluster 2 has a central role in addition to its other responsibilities (i.e. provides a number of central services to other Clusters) and includes actors in associated enterprise-wide strategy, policy and planning related corporate roles.

² A total of 32 interviews with 30 participants were conducted. However, interviews with 2 participants were not included in the analysis. One interview in Cluster 1 (Interview No:11) was excluded as this particular interviewee only had a couple of months experience in the organization and another interview conducted with an external vendor representative (Interview No: 23) was also excluded as the sole interview representing external view of the clusters.

5.1.1.2.1 Compliance Pressures

Explicit as well as implicit compliance pressures were apparent at both the immediate management and the technical user levels in Cluster 1.

At the manager level, explicit pressures manifested themselves in the form of various types of approvals that are required at the project level. For example, interviewee 01, talked at length about the numerous architectural approvals and assessments that he has to go through and complained about ever tightening approval requirements even “for any small changes or any small projects”.

“I guess in the architecture review. Any small changes should go to the ARB (Architecture Review Board) and ACT (Architecture Core Team) checkpoints. Even in existing applications you make a change and you are subject to review and apply, you know, TRAs (Threat Risk Assessments) and PIAs (Privacy Impact Assessments) and that type of tools. And I sensed that in the last year or two there has been a big push to do that for any small changes or any small projects even.” (Interview 01)

The explicit compliance pressures were also apparent for interviewee 10, who openly admitted that her

applications were “corporate managed” and that she had to make sure that “everything is done exactly to corporate requirements.”.

“My sort of shop is a little more unique than the rest of our shop right now because we are on a mainframe application still. So, it's much more, sort of, corporate managed. We have to make sure that we are...everything is done exactly to corporate requirements.” (Interview 10)

At this level, implicit pressures appeared to come in the form of encouragements or discouragements from above where immediate managers “sense” these various cues from the upper management. This however, does not seem to be sitting well with the immediate management as they feel decisions are made for them and that the upper management “offer no choice”, a situation interviewee 01 described as “pathetic”.

“Well, they'll make the decision for us. Make the decision for us on which route to go. I mean, it's pathetic. They may even procure the product (laughs). Not just leave it to the team to do it. They offer no choice.” (Interview 01)

Technical users operate under various compliance pressures. Existence of corporate standards is one such explicit pressure. On occasions when they feel like deviating from standards, technical users still feel “intimidated” and they feel the need to “protect themselves” as voiced by interviewee 02.

“No, of course, you see, I will follow corporate standards, because I can, in the back of my mind, I will be thinking, that if I follow this procedure or this technology, if anything happens down the road, after two years, people is going to go for my throat. They say, hey, why did you do that? So, in order to protect myself, the order should come higher than my level. Like people who would be involved, like the project manager, manager, director or the CEO.” (Interview 02)

As a result, technical users usually “test the waters” with their management as mentioned by interviewee 04 and “would be more relaxed” using non-sanctioned solutions if they “have approvals” as added by interviewee 05.

“For small things...Aaaaahhh...I guess I will have to test the waters. If my senior manager says yes, sure put the request in, I would like to try that.” (Interview 04)

“I would be much more...I would be much more, I would be more relaxed using them. Given that I have approvals and, they are, you know, certified or, you know they are the OK tools to use. Now, I do use them kind of secretly.” (Interview 05)

Despite compliance pressures and after openly admitting they would “be more comfortable if the standards did not exist at all” (interviewee 06), it is interesting to see that some would still use non-sanctioned solutions “kind of secretly” as voiced above (interviewee 05).

In Cluster 2, explicit compliance pressures were also mentioned by corporate users. According to Interviewee 18, these pressures manifested themselves through the existence of strict standards and procurement rules and were exacerbated further because of the ongoing structural changes (i.e. centralization of IT resources), an issue that was further analyzed using the time-ordered matrix later in text.

“Uhm, a lot of that is also...uh...a lot of that has also been uhm...determined by what is standard, what is available in the <Organization Name> to for acquisition, purchase of what not...” (Interview 18)

“But in terms of, in relative terms some clusters have access to more, uhm, tools, uhm, more development tools, more access to more innovation, uhm, options. Uhm, they have, they put it to...well, before all of the server consolidation, some clusters and areas had, uhm, their own data centres and their own areas where they could, uhm, try things out before actually, uhm, investing and creating, uhm, projects around them. And that ability is significantly diminished since.” (Interview 18)

For implicit compliance pressures Interviewee 18 argued that such implicit pressures usually emanated from higher-levels in the organization and imposed by people who could be considered as champions of certain technology solutions.

“On, in terms of higher level direction, it usually comes from the top, so executive sponsors, I wouldn't even say...like director level perhaps, it usually comes from like the CIO or director that provides that high level champion of the new technology. Without that nothing usually moves.” (Interview 18)

The existence of explicit as well as implicit compliance pressures in Cluster 2 were further confirmed by immediate managers. For example, referring to directives mandating the use of certain IT solutions Interviewee 15 first points to the explicit nature of the compliance pressure and then emphasizes the extremely high-level approval requirements for any non-sanctioned solutions, an implicit compliance pressure in itself.

“I can't go and police everybody. It should say mandated. Actually, now the directive does say, uhm, any tool must be approved by the Corporate CIO. So <person name>, if someone wants to come in with a tool that's different from whatever we bring in, they need to get that approval from the Corporate CIO.” (Interview 15)

Further, Interviewee 15 also points at compliance pressures through such secondary mechanisms as procurement and legal approval requirements for non-sanctioned solutions.

“Supply chain (department) is another issue because we can't, we can't release an RFP, we can't release an RFQ, and do any of that procurement without going through them or without using their standards and templates and what not.” (Interview 15)

“Legal (department) has been somewhat of a kind of think in the box type of problem for us. Uh, so, they have a lot of comments and concerns but they don't have a lot of suggestions.” (Interview 15)

Existence of similar occurrences have also been acknowledged at the senior management level in Cluster 2. For example, Interviewee 19, pins the core of the problem squarely down on the uninformed standard making process itself.

“Part of it is...the centre, uhm, establishing the standards without knowing what's happening at the coalface so to speak.” (Interview 19)

The technical users in Cluster 3 echo the explicit compliance pressures due to mandated standards applicable to IT solutions. For example, Interviewee 17 recalled occasions where sub-optimal solutions was enforced by his manager in order not to go against a mandated standard. Nevertheless, Interviewee 17 quickly clarifies that he would be willing to “ignore the standard” on those instances. Through other examples, Interviewee 17 made an argument for the systemic and limiting nature of existing policies and standards applicable to IT solutions which necessitate use of non-sanctioned alternatives.

“I’ve had managers who got the (unclear) convictions and who have actually like postpone stuff for a long time because they didn’t want to go against standards. Personally my view is if the standard is obviously not designed for my scenario and adhering to the standard would either cost my clients far too much or it just outright kill the project if the clients couldn’t afford it then ignore the standard.” (Interview 17)

“(Referring to technical users) They are actively prevented by the way our policies are, all our policies are towards creating these unmodifiable, monolithic mega systems. And everyone has to use the same thing nobody can actually customize for the work that they are actually doing. And you are not allowed to automate anything of your daily tasks. Unless you go around and outside the system.” (Interview 17)

As for the implicit compliance pressures, unnecessarily lengthy approval processes as an example of such compliance pressures were also cited in Cluster 3. Recalling an instance involving his proposal to use open source libraries, Interviewee 17 reported the “horrible” approval process that was the main deterrent against the use of these non-sanctioned solution.

“I wanted to use open source libraries which is some of which we had already used but it was just after the current open source policy they had been...the manager said no, no you can’t. This is typically the approval process is to (unclear) go find something commercial and couldn’t find anything for some very small project and I ended up wasting probably my salary would have dwarfed by far the amount that would have cost to actually pay for a half-decent commercial library for what I was trying to do. Because there was nothing good, it just, still management thing no, no, you can’t just use the open source because it’s too, the approval process is too horrible.” (Interview 17)

At the immediate manager level, Cluster 3 managers pointed to strict enforcement of rules by the centre

as examples of explicit compliance pressures. For example, the corporate intolerance to non-sanctioned solutions has been voiced by Interviewee 14 and exemplified with an example involving project methodologies while Interviewee 16 emphasized the indirect explicit pressures through such secondary groups as architectural approval bodies.

“They say, hey remove it or else we are not signing it off, right. Do it or it doesn't go live.” (Interview 14)

“In terms of, if you look at different methodologies, in terms of project management you have the PMBOK, so that's applied without any, what you call exceptions, in terms of project management methodology.” (Interview 14)

“And then there will be some reviews with our enterprise architects to make sure that we are sort of, uhm, everything is being, uhm, followed there.” (Interview 16)

Similar to technical users, immediate managers in Cluster 3 also agreed to the existence of implicit compliance pressures that are exerted through unnecessarily lengthy and vaguely explained approval processes for non-sanctioned solutions. For example, recalling an incident involving the use of an already tested non-sanctioned solution in production environments Interviewee 14 talked about delayed approvals whereas recalling similar occurrences Interviewee 16 voiced his reluctance to go through similar approvals in the future.

“Here again, I don't know, whether it's a vendor or whatever right, I've seen that we are very very close in terms of adopting or opening up to new technologies, uhm, sometimes back they tried saying that OK you can use it in dev and test environment but before you go to production you need to have your CIO's approval and what not.” (Interview 14)

“...it took time to for it to go to the Corporate CIO because it had to go to the CIO, I did a CIO briefing so that my CIO could go and inform the Corporate CIO. So got that exemption but, I would say there are roadblocks in terms of the process not being clear in the first place itself.” (Interview 14)

“Interviewer: (referring to the approval process for non-sanctioned tools) Did you, uhm, know what that process would have included?”

Interviewee: At that point in time no.

Interviewer: No. OK.

Interviewee: Now I do. At that point in time, no I didn't.

Interviewer: OK. Knowing what you know now, would you have gone ahead?

Interviewee: No (laughs).” (Interview 16)

At the Senior Management levels, Cluster 3 respondents' views of explicit compliance pressures involving formal policies and procedures were confirmed further. To illustrate the power of such formal pressures Interviewee 20 gave an example involving a corporate vendor of record arrangement,

“But basically, you, if a corporate VOR (vendor of record agreement) exists, you must use it period. All it has to do is exist.” (Interview 20)

Technical users in Cluster 4 had similar stories involving explicit and implicit compliance pressures. Concerning explicit pressures Interviewee 25 gave an example of an incident where a non-fitting sanctioned solution was enforced and points to the “gap between the real architects and the people who were on the floor”. Referring to similar repeated occurrences, Interviewee 28 emphasized the top-down enforcement of sub-optimal upper-management decisions via mandated and organizationally sanctioned solutions.

“And regardless of what's underneath uhm, and I think they, another cluster's already produced something and they had it tightly coupled with the infrastructure itself, and we were forced to use that and I am like...you can't use this because they have portal and we don't have portal and I'm like how am I going to put this in my physical diagram now right, so that's where like you kind of think that the architects are there and they have some thing that...it's like...when somebody is like...so hands on and so working...like at the code level and...it just doesn't like...you just don't see eye-to-eye right. So...and it's not just me like a lot of the folks over here that's the...there was somewhere there was like a gap between the real architects and the people who were on the floor...” (Interview 25)

“I mean, for instance, if...you know you have the suite of, you know, half a dozen products and one manager really likes the one product in that suite and makes a, you know, strong case for that, then, you know, the other products, even though they may not fulfil what, you know, the other groups want then they have to come fall in line...” (Interview 28)

The limiting nature of top-down compliance pressures have also been echoed by immediate managers

in Cluster 4. For example, Interviewee 22 emphasized the negative performance effects that originate from the sanctioned solutions which he refers to as “constraints”. Interviewee 30 clarifies that such compliance pressures may be exerted through various formal mechanisms involving required project and architectural approvals that are aimed at forcing certain standards.

“(Referring to immediate managers) Uhm, depending upon the constraints imposed on them, they might say, it's not fair on you folks to impose to push ten different constraints on me and still expect me to finish on this date. No, if I follow, if I adhere to these constraints manager, you change my date...Oh then maybe, we will kind of change...” (Interview 22)

“In terms of making sure there is architectural compliance and there is project compliance with my group, uhm, I would expect that as part of a solution delivery even for smallest projects there would have been some, uhm, linkage into that. So, in terms of, uhm...you know the gate keepers kind of going through I would expect, I would hope that is going to keep us work, I certainly challenge all of my staff to, if not be aware of the penalties, be aware of what uhm, toolsets are, uhm...are standard.” (Interview 30)

Cluster 4 senior managers added further proof to the existence of top-down compliance pressures. Interviewee 24 pointed to the formalization of sanctioned tools through enforced processes that require such IT solutions be present at hand-off points whereby project approval processes are inherently tied to verification of the use of sanctioned solutions.

“So, if you've got well-established processes that expects certain tools to be used because the tools are often hand-off points right, between parties, then they will be forced into using the tools that are predominantly prescribed by the Cluster right, or the organization.” (Interview 24)

5.1.1.2.2 Identification Pressures

The identification pressures in Cluster 1 appear to originate from two sources: knowledgeable individuals and user communities. Both immediate managers and technical users were able to provide numerous examples showing the existence of such pressures in Cluster 1. Two practical occasions seem to be fuelling the desire to establish and maintain relationship with these individuals or groups. The

first involves the obtainment of help and support (e.g. these individuals and/or groups/communities may actually involve in the provision of support on a non-sanctioned solution) and the second uses instances of non-sanctioned solution use as precedent (e.g. technical users may cite individual or community use of a certain non-sanction solution to justify their own intended adoption of the same non-sanctioned solution).

Immediate managers in Cluster 1 talked about how having a knowledgeable person at hand or even knowing his or her existence would "go a long way to adopt the solution" and how precedence of a non-sanctioned solution adoption elsewhere by individuals or groups would help them support their own adoption decision (interviewee 01). They also mentioned that those knowledgeable persons could even be consultants on contract and having access to such people would have a "positive effect" towards adoption of non-sanctioned solutions (interviewee 10).

"Well, oh, definitely, having a knowledgeable person would go a long way to adopt the solution." (Interview 01)

"But in any case it would be helpful to know that somebody is using what I would like to use." (Interview 01)

"Well, if I find out that some other cluster is using what I am trying to use I will certainly try to use that as an argument. Yes, it will help my argument, that is true." (Interview 01)

"Well, I think if...having access to a knowledgeable individual will have positive effect because it would give them more information about the product that they would like to use. The people will know if there is a higher risk or lower risk they may not have considered. So, for me it's much more positive situation." (Interview 10)

As far as the effect of communities go, the immediate managers in Cluster 1 appear to trust self-formed and bottom-up user communities more than top-down enforced "centres of excellence" type structures and they also see such communities as platforms for two-way influence and as means for legitimization of non-sanctioned solutions (interviewee 01).

“Because we can really, in a community, we can influence what type of tools, products or processes are of interest and make sure that everything is considered. Again, I am not sure whether the same is true for the centre of excellence.” (Interview 01)

Technical users' view of top-down communities mimic the view of managers where such structures "don't give them any confidence" (interviewee 02). In comparison, they see user-driven communities of interests as positive influences to their adoption decisions (interview 04).

“But these corporate...they don't give us any confidence. We feel much more confidence by the information provided by them in the community.” (Interview 02)

“You know if it's something new which has not been formally approved and implemented, I guess the..., if the COI (Community of Interest) exists, that would be a positive aspect in making my decision.” (Interview 04)

As argued earlier, one aspect of this decision appears to be related to provision of support (interviewee 05).

“Interviewer: (Referring to adoption of a non-sanctioned tool) Would you be more willing to use it if there was a COI (community of interest)?

Interviewee: Yeah, definitely, yeah. I would be more, knowing, you know, there is support, there is people you can...they can help you, you know. I believe everything has been done before. So, you can always ask someone else's or, you know, for getting...how did you do it? what happened? what were the...what's to avoid? what were the harder parts, you know...So, I do. So, it would be a support and more comfortable and confident, uhm, layer or, you know, a group to rely on.” (Interview 05)

The boundaries between internal and external communities seem to be blurry where technical users are as comfortable interfacing with external communities (or knowledgeable individuals) as they are with internal ones (interviewee 04).

“I think you keep your eyes and ears open and if you follow, you know, articles in the web and you talk to people or, even if you walk into a university talk to students, they would tell

you, you know, what teachers have been talking about, what have they been taught at school.” (Interview 04)

The positive influence of having a knowledgeable individual at hand surfaces as a common theme (interviewees 04, 05, 06, 07, 08).

“If I have somebody who is already exceptionally expert in that thing I would definitely get his input. I would try to work, convince him to use this tool or his expertise in developing this prototype.” (Interview 04)

“Interviewer: I was going to ask you whether the existence of a person who is knowledgeable nearby would have an effect? So, access to an expert... Interviewee: Yeah, yeah, definitely. Uh, because it makes my job as a developer...At the end of the day tools should help me as a developer, help me and make it faster and easier.” (Interview 05)

“Yeah, because the deadline is so close. Like just the end of month they need to do it fast. That's why they...But if there are some people who really knows how to do it who can help them out when they have the problems I think we can we can still keep that so I am saying basic training is very important to keep those new software.” (Interview 06)

“I would try to experiment it myself. I would try to do a POC (proof of concept) and see if it's good enough and then probably I would engage an expert.” (Interview 07)

“I think if there is someone who has already known it, it's better to talk to him and learn it right? It's better yeah.” (Interview 08)

The immediate managers in Cluster 2 acknowledge the effect of knowledgeable individuals. For example, when asked about the possible effect of such individuals Interviewee 15 replies without hesitation and in another part of the interview gave a real-life example of such an effect.

“Interviewer: Do you think having a knowledgeable individual has an effect that you can tap into as a resource?

Interviewee: Definitely. I mean, yeah, if you have the right skill set, you are going to get the right things done.” (Interview 15)

“But what happened was, you had one person in <Cluster Name> saying, oh no no, let's implement Microsoft Project, it's great. And they were selling it to the other Clusters. And then the other Clusters jumped on board and said, well, this guy is saying it's great and there is a loophole around to get this, we are going to go on that path and do that.”

(Interview 15)

Immediate managers in Cluster 2 also voiced their concerns and mistrust regarding the top-down established communities of interest. Interviewee 15 provided a couple of examples where such top-down communities failed to meet their Cluster-wide expectations.

“OK, uhm, I don't know. It depends on how good that centre of excellence is at doing agile or .NET or, because the .NET centre of excellence to me is a joke right now. Uh, because of their track record, even <Branch Name> tried to use them to create our solution for our integrated business tool and they failed miserably.” (Interview 15)

“You have Sharepoint service out of <Cluster Name> and we brought them into trying to do some stuff with Sharepoint, they even brought in Microsoft experts and they couldn't do it.” (Interview 15)

Similar to their superiors, technical users in Cluster 2 also acknowledged identification effects but focused more on group level effects as opposed to effects exerted by knowledgeable individuals. For example, Interviewee 18 has referred to the possible effects of peer groups as well as online groups, forums and communities.

“...the communities of interest do expose the users to other options, what other people are doing. In that way it does influence them.” (Interview 18)

“So, uhm, when you asked the question who else would they tell or who else they inform, they would probably tell their peer group if they think that it is useful tool that their peer group would uhm find helpful.” (Interview 18)

“So, again searching the Internet, the biggest source of information is usually forums. Uhm, and it's usually starts with a questions and then following with a bunch of answers that may or may be not conflict with each other. And you try to sort of figure out what the best solution is or the trend is. Uh, similarly with who else is doing it, at the time I had a very large circle of friends and colleagues not all working in the <Organization Name>. But, who I knew were in technical areas. And I would ask them what they would be doing or how they would do it.” (Interview 18)

The immediate managers in Cluster 3 emphasized the importance of both individual-level as well as

community-based influences as a factor in forming identification pressures. When Interviewee 14 was asked how his decision to use a non-sanctioned solution would be affected if he knew about similar occurrences in other clusters, he admitted that he would be feeling more comfortable knowing the same non-sanctioned solution had already been used in another cluster. Similarly, talking about his team's decision to use SVN, a non-sanctioned and unapproved software code repository and a version control tool, Interviewee 16 recalled that his team decision was affected by the knowledge that this non-sanctioned tool was already being used by other(s) in the same cluster (i.e. there was precedence). That being said, Interviewee 16 also clarified that such a scenario where a non-sanctioned tool is being used in place of a sanctioned alternative would be most likely when the sanctioned tool did not meet the requirements of the task at hand.

“Interviewer: If you know that some other clusters are also playing with it, how would that affect your decision? Would you feel more comfortable? Less comfortable?”

Interviewee: Definitely, I would feel more comfortable.” (Interview 14)

“I think someone else in the Cluster was already using SVN anyways so, we said we'll just use that.” (Interview 16)

“OK, so, if the <Cluster Name> Cluster is using it and I have a very, I'd have to have a very good reason for this, so, let's say for example, there was a piece of technology that my client wanted, my client is footing the bill and someone else was using it already and implemented it successfully then I would leverage whatever mechanism they used to bring that in. But only if it met the criteria that the client is paying for it, and the standard technology didn't meet the requirements.” (Interview 16)

Immediate managers also confirmed the role of knowledgeable individuals and user communities as sources of help and support in forming identification pressures. For example, Interview 14 talked about how -in the absence of commercial support- the availability of community based support could have a balancing effect. Speaking about the role of experts Interviewee 16 emphasized the importance of such people in times of problems with certain solutions.

“So, you know, I have my own reason saying that, you know, hey you know what, I've looked at it, I understand you have issues with support but there is a huge community out there who are supporting this.” (Interview 14)

“Interviewee: So, when they run into a problem we do have, for example in here we do have different, within our cluster they have people they go to. So we do have different working groups they are across the Cluster and across different branches.

Interviewer: OK, do they go to people they know, who are experts?

Interviewee: Yes, I would say so.” (Interview 16)

Technical users in Cluster 3 spoke about the role of knowledgeable individuals and user communities in shaping technical user opinions. For example, Interviewee 17 talked about the role of blogs and social media as conduits to knowledgeable individuals and confirmed importance of having access to such individuals. Having admitted to belonging to various user groups, Interviewee 17 differentiated between vendor sponsored and independent communities and emphasized importance the latter communities played in shaping his opinions.

“Investigating technologies in general there are a lot of stuff happening in blogs and social media where you see prominent developers investigating stuff right. I might give that a try, see the types of projects that are being developed. Uhm...you know actually, actually do some toy project and see what it's like to deploy, see what it's like to developing.” (Interview 17)

“Interviewer: Yeah, so, on those occasions when things change too quickly again when you are evaluating those innovative solutions, would having access to a knowledgeable individual help?

Interviewee: Sure.

interviewer: Do you have, uhm, friends across <Organization Name> you consult with, or outside <Organization Name>?

AM: Yeah.” (Interview 17)

“I belonged to various user groups over time when my schedule allows. And the...the longest and the most consistent one being probably the Linux user group just because they have an active mailing list.” (Interview 17)

“What I've noticed is the user groups surrounding sort of the commercial platforms, they tend to be sort of vendor sponsored whether it's say we know that Microsoft or ORACLE or they are, you know, companies that make money of off consulting or training or whatever right. Those ones doesn't seem to have as active as sort of a user community. There is a community of people in those companies, but then there is sort of the attendees

who tend to be sort of you know corporate developer types. There is generally not much interaction in the community at large. Unlike the open source groups, uhm, because there is no vendor there, people are a lot more connected with each other and treated a lot more like they should be treated.” (Interview 17)

Both knowledgeable individuals and user communities appear to exert identification pressures in Cluster 4, though, the specific examples provided focused on occasions when the desire to establish and/or maintain relationships with these individuals or communities are primarily fed by the need to obtain support on particular IT solutions. This effect was observable in interviews involving technical users, immediate managers as well as senior managers. For example, Interviewee 25, a technical user, explained how she would tap into knowledgeable individuals as means to learn a new technology solution, a view that was repeated and confirmed by Interviewee 26. Interviewee 26 also talked about the role of user forums as sources of support.

“When it comes to that I may look at somebody already using it like if another developer using it, oh it's easy for me to learn because I can just sit with him for a day and then he is going to tell me how to use this or if it's something I have used in previous projects...” (Interview 25)

“Interviewer: (Referring to technical users) Do they look at other, knowledgeable individuals or groups within their surrounding areas?”

Interviewee: Yeah, yes, yes.

Interviewer: They do?

Interviewee: Yes, they do. So (unclear) developer, most of the time the new developer will not come to us at least but he will go to other developer.” (Interview 26)

“Interviewer: How would you get your questions answered? Where do you go?”

Interviewee: Yeah, so, uh...forums, user forums, right.

Interviewer: User forums?

Interviewee: Yeah, yeah, user forums are, if you (unclear) and then if they don't find answer and if you are really stuck then they just throw away then just move onto another tool, (laughs) you know.” (Interview 26)

In addition to the effect of larger “trusted” communities which was voiced by Interviewee 22, peer-to-peer influences as means to learn a new technology as well as to obtain help and support were also

acknowledged by immediate managers.

“Interviewee: And given that the maturity of Apache that our gang and the folks who are actually...uhm...

Interviewer: The Apache Foundation?

Interviewee: Foundation. So, they...because of the trust they have we are allowing them to use the Apache products.” (Interview 22)

“Interviewer: Do they get affected by their peers? What they are doing, what they are using...

Interviewee: Uhm...if I am doing my job right yes. If I am encouraging innovation, if I am encouraging people to talk, if I am encouraging people to communicate across the group, uhm...yes” (Interview 30)

“Interviewer: So, whenever they need, let's say, support, do they go and talk to each other?

Interviewee: Oh, yeah. If a particular...in the morning, 9 o'clock (unclear) happens, if if a particular thing is holding an individual they will raise it, I am stuck at this point because of I don't know, I haven't used this particular uh PDF generator, this particular function I am stuck, that's why I got, I am getting delayed I spent (unclear) times today. OK, who else? You...spend an hour with <Developer Name>(?)” (Interview 22)

In comparison, Senior Managers in Cluster 4 primarily emphasized the role of broader user communities as the most likely source of support particularly around the adoption of free and open source solutions.

“(referring to open source non-sanctioned solutions) They are very easy to use it because they are very, they are very popular within developer community. And there is generally a lot of support for them...Ok, so, if you are having problems you know integrating your IDE (Integrated development Environment) into you know, into one of these open source repositories, you can get help online right. I mean there's millions of users out there that you know, through some kind of chat forums, wikis, whatever right, I mean there is definitely a lot of support.” (Interview 24)

“That's probably why they use a lot of the...popular open source tools, because they can get the support from their peers and their colleagues in the broader community of practice.” (Interview 24)

“And what better way to do it than with open source where you have a very large community base that can help you out if you are in a pinch.” (Interview 24)

In addition, a strong influence that emerged through findings involves a particular individual that can be bracketed as an "executive champion". Throughout a number of examples, technical users (e.g. Interviewee 29) as well as immediate managers (e.g. Interviewee 27) in Cluster 4 referred to identification pressures one such individual created within their branch.

“Interviewer: (referring to adoption of quoted non-sanctioned solutions) So, how do you think this, or do you know how this got started, who initiated it?”

Interviewee: Uhm.....my understanding was it was our head, <Name of Director> at the time was our head and he came in from the outside...and decided a lot of the processes needed to change and started the transformation. And uh...with that came agile and Kanban and RTC, a lot of the IBM tools that...uh, RTC is really the only one I've had exposure to...” (Interview 29)

“Interviewer: (Referring to adoption of quoted non-sanctioned solutions) But, who initiated it, originally?”

Interviewee: Uh, that came, here is an interesting point, uhm.....that, in the Cluster we hired a new head...and that new head came in and brought with him...this...new approach. That's what he had done in his previous job. He came in and changed our organization tremendously...Uhm...we are still paying the price for it and he has left. He has moved on...and doing the same thing somewhere else now...” (Interview 27)

5.1.1.2.3 Internalization Pressures

The possible theorized effect of internalization pressures (e.g. support of non-sanctioned solutions purely based on ideological grounds) failed to find support at both immediate management and technical user levels in Cluster 1.

Technical users In Cluster 1 were unanimous in emphasizing that they would not make such decisions on ideological grounds. Even ones that have shown proclivity for free and open source solutions felt the need to come clean by explicitly stating they did not consider themselves as rebels and arguing that bad products would disappear in the open source community (interviewee 05).

“It does have an influence but sooner or later bad products disappear even in the open source community. Uhm, even initially if people and groups, you know, say because it's

ideology I am going to use it but then they realize it's making their life hell and it drops it goes it disappears. Or it transforms into uhm, you know, a different product or a different project you know.” (Interview 05)

“I don't consider myself a rebel. I'd like to confirm you know.” (Interview 05)

Other technical users reiterated this view by saying that they would "choose something because it is good" (interviewee 06), because it "solved the problem effectively and easily" (interviewee 07) or because "it helped them do more faster" as developers (interviewee 08), and not because it was something that fit their value systems or ideology.

“Interviewer: Do you think technical users may select a particular IT solution despite potential reaction from really upper management on pure ideological grounds? For example, would somebody pick Git just because it's open source? Even if it was a bad technical solution?”

Interviewee: No, I don't think so. I wouldn't do that. Nothing, you choose something because it is good. (unclear) not just open source.” (Interview 06)

“Interviewer: Do you think technical users would select a particular solution, innovative solution, purely based on ideological grounds? For example, would somebody select Git or Subversion just because it's open source?”

Interviewee: Probably not. Like I mentioned, so the idea is to solve the problem, you know, like how effectively and how easily you can solve the problem.” (Interview 07)

“Interviewer: Do you think technical users might adopt certain technologies or solutions purely based on ideological grounds meaning, for example, would somebody go ahead and use Subversion just because it's open source?”

Interviewee: Uhm, not really. I think it should depend not just on open source, sometimes having an inexpensive, I mean, license but have more feature the tool it's very, I mean, helping the developer doing more faster. It's not just open source. Depend on tools.” (Interview 08)

When asked about their view, immediate managers in Cluster 1 also rejected the possible role internalization effects might play in forming favourable opinions towards second stage adoption of non-sanctioned solutions.

Even though corporate staff in Cluster 2 thought internalization pressures might play a role in shaping

technical user opinions, they were not able to cite a specific example within an organizational context adding to suspicions that they may not have differentiated between contexts involving personal vs. organizational use.

"I can't think of an example within the <Organization Name> but I do have some friends who tend to do one thing or another because either it's open source or because they believe in...I would characterize them as, uhm, anti-establishment, so they don't, they choose not to do the Microsoft solution because it's Microsoft. So, they would opt for the other thing without even looking at how good Microsoft is for example, because they just don't like Microsoft philosophically." (Interview 18)

"Interviewer: And does that affect their selection of the technical solutions?"

Interviewee: I would say so. Uhm...I think it influences them. I don't think it would be an overwhelming decision factor for them.

Interviewer: Can you think of a specific example that you've come across?"

Interviewee: No." (Interview 18)

The sole technical user interviewed in Cluster 3 (Interviewee 17) openly admitted his proclivity to make selections under internalization pressures (i.e. ideological selection) for personal/home use but clarified that such pressures would not be applicable in work related decisions where he tends to be "more pragmatic".

"Interviewee: I personally, I, I...I do gravitate towards that ideologically yes, uhm, I do prefer open systems that respect my privacy, so, and at home I use Linux partly for ideological reasons, partly because I can configure it just to have it my way.

Interviewer: At home?"

Interviewee: Yeah.

Interviewer: How about at work?"

Interviewee: At work, uhm...probably, well Firefox as opposed to Chrome for that reason. In terms of, in terms of systems I build they tend to be more pragmatic." (Interview 17)

The opinions of immediate managers in Cluster 3 was divided. While Interviewee 14 rejected the possible pressures due to internalization, Interviewee 16 thought it would be possible to see such effects. However, when asked to cite a specific example, Interviewee 16 was not able to recall any occurrences such effects.

“Interviewer: For example, do you think a technical user would pick a solution just because it's open source...regardless of its qualities?”

Interviewee: Uhm, not really. Because if you look at the open source community or open source solutions there are huge number of solutions where people have started some work, left it in between and never really worked on it.” (Interview 14)

“Interviewer: OK. Uhm, do you think users, technical users would select a particular IT solution purely based on ideological grounds?”

Interviewee: What do you mean?

Interviewer: For example, would somebody select, uhm, Git just because it's open source? Regardless of the technical functionality.

Interviewee: You mean a technical user?

Interviewer: Yeah.

Interviewee: Yes, I think that I have seen that happen.

Interviewer: So they would pick solutions because it's open source regardless of the technical aspects?

Interviewee: I've seen recommendations like that happen. (Unclear) people have said OK, I like this project because, and their reasoning, you could tell the reasoning is more geared towards what that product was meant to be instead of the real, instead of meeting the actual requirements.

Interviewer: Do you recall like an example?

Interviewee: (Sighs)...Not specifically.” (Interview 16)

Most of the technical users in Cluster 4 did not believe ideology would play a role in organizational adoption decisions. On one occasion a technical user thought ideology might play a role for some people though he was not sure whether such decisions would be more affected by cost considerations as opposed to ideology. No specific examples were provided to support this view.

“Interviewer: Do you think technical users would select a particular technology solution purely based on ideological grounds? For example, would somebody use an open source product because it's open source?”

Interviewee: ...No, I don't think so. Somebody sees values in it, somebody sees some value in it.” (Interview 26)

“Interviewer: Do you think technical users would pick an open source solution purely based on ideological grounds, just because it's open source?”

Interviewee: Uh.....uh, I don't think so. Just because it's open source, no. If there is a product out there which is licensed, I think they do prefer because you have like you can go with maintenance and support and everything else.” (Interview 25)

“Interviewer: Do you think technical users pick a particular solution purely based on

ideological grounds? For example, would somebody pick a solution just because it's open source?

Interviewee: Uhm...some people might, yeah...sure...uhm.....I don't know of any specific examples but, I know there is people that certainly favour that and uhm, I don't know necessarily if it's from an ideological perspective or more of a cost perspective.” (Interview 28)

Immediate managers in Cluster 4 supported the majority view, downplayed the possible internalization effects and suggested that such decisions would involve a more pragmatic view.

“Interviewer: OK. Uhm, do you think technical users would pick a particular solution purely based on ideological grounds? For example, would somebody pick a solution just because it is open source?

Interviewee: Uhm.....I don't know if they would do that uhm, you know, I don't, I mean, I would like to think that people are more pragmatic than that.” (Interview 30)

5.1.1.2.4 Coercive Pressures

The potential effect of coercive external pressures were pronounced widely throughout the interviews in Cluster 1.

The immediate managers were much more vocal about this pressure, producing more than twice as many excerpts per person where such pressures were mentioned. However, the nature of influence was not seen (or admitted to be) as sinister as it was implied in technical user interviews. While immediate managers may have been suspicious about political aspects of certain top-down decisions (e.g. disproportionate selection of big vendor offerings) and the effect of vendor lobbying and "presence at higher levels of government", they mostly explained this upper management behaviour as the "easier or safer" choice (interviewee 01). The other explanation tied preferential treatment of certain vendors to a (perceived) government policy and mandate to support Canadian businesses (interviewee 10).

“(referring to big vendors) So, therefore they (decision makers) tend to follow the products

that are derived from any of those companies. Because it is simply easier or safer.” (Interview 01)

“If you say it's IBM or it's Microsoft, I mean, they are...I guess, nobody can accuse you of saying who knows them or what have they done obviously. ” (Interview 01)

“Well, I guess they have a big presence at higher levels of the government. That is all something equivalent to the lobbyists in Washington, DC, something like that.” (Interview 01)

“Interviewer: What about the vendor community? Do you think they may have an influence?”

Interviewee: ... To some degree they would have influence. Again it depends on their background, if they are Canadian and if they are affiliated possibly to some...government that's in power. That might be of some influence.” (Interview 10)

“I think they have a requirement or the government wants to make sure that, uh, they support certain applications or certain businesses. They have a requirement to do so. Supporting Canadian manufacturers and things like that versus other manufacturers from abroad.” (Interview 10)

Technical users were a lot more suspicious about potential vendor involvement and influence at higher levels where policies were made and standards created. Some went so far as to suggesting that personal gains may have been involved (interviewee 02).

“Yes, yes, definitely it will have effect. Because these top guys are usually not very technical. So, when, suppose you are a friend of mine, right, and you come with some product. I would feel more comfortable buying from you rather than buying from someone which I don't know.” (Interview 02)

Similar to the argument put forward by their managers, others argued that big companies were favoured because they were tested and tried (interviewee 05, 06) or referred to perceived higher level government policies that aimed to redistribute wealth via these big corporations (interviewee 05).

“They were very comfortable with Microsoft. They were very comfortable with Solaris or AIX or people working there were all up for these two or three big giants. Everybody was happy and comfortable with that they wrote the policies saying OK this is the standard this is tested through them.” (Interview 05)

“Yeah...In our environment, being in the, you know, in the <organization name> and the public service I believe there is...there is politics involved. Uhm, there is financial politics. There is a pie, a budget, and I believe they wan't to give slices to the private sector, for example IBM, uhm, you know, and other slices. So, basically distributing the pie, the budget money to the private sector, which is, in a way, I do think and believe it's a a government mandate in a way, distributing the wealth and that's going back to economics classes. Government is supposed to distribute the wealth among...in the society, right?” (Interview 05)

Some made the connection between levels of external vendor influences and corporate marketing budgets (interviewee 07). In addition to potential vendor involvement at higher levels, the possibility of vendor influence at lower levels through consulting arrangements (e.g. where consultants on contract influence adoption decisions) were also suggested by technical users (interviewee 06).

“And if they hear only what these big corporates are telling them, right, like what Microsoft, because Microsoft and IBM and you know even now Google, they have lots of marketing dollars, right. So, they can really push their products, and as far as other industries are concerned, I mean, they really don't listen to all these, you know, big marketing talk. So, they go by what the product delivers. So, they go by that.” (Interview 07)

“For version control, uhm, we always use Git for our projects. And they also suggest to use SVN because of the vendors.” (interview 06)

Existence of possible external coercive pressures were acknowledged by corporate staff in Cluster 2. Due to the nature of their work, corporate staff were careful and reserved in their responses but still admitted that vendors heavily influenced senior executive decisions through extensive lobbying efforts as indicated by Interviewee 18.

“Interviewee: So, you are asking me what in my opinion influences CIOs decisions?”

Interviewer: Yes.

Interviewee: Uhm, so, part of my experience in <Cluster Name> was actually to work as the EA (Executive Assistant) to CIO. So, I think I have a bit of a insight into that perspective.

Interviewer: It's great (laughs).

Interviewee: (Laughs) Definitely their peer group. So, other CIOs, uhm, vendors, their

senior management team...uhm, and their own experiences.” (Interview 18)

“Interviewer: The other thing you mentioned was vendors. So, how do vendors influence this process?”

Interviewee: ..I am not sure how much I can say, uhm...it depends on the vendor I suppose, uhm, many vendors I've seen are very, they are very familiar with thow the government works, and they use that to their advantage. Uhm, they may book meetings directly with the CIOs. Uh, they may book meetings directly with the deputy <position name>, or the <position name> themselves and use that as a lobbying point to influence the decisions of the CIOs of the organization. It depends on the vendors. Sometimes their goal in getting a meeting with the <position name> will just be to get a meeting with the CIOs.” (Interview 18)

This view was also confirmed at both the immediate management and senior management levels in Cluster 2. For example, Interviewee 15, an immediate manager himself, talked about vendor pressures during selection process and recalled occasions of vendor cover-up when previous delivery promises fell apart.

“I think it just was the tool that was picked. Because of the requirements, because of the vendor coming in and saying they could do all these great things, uhm, you know, it just happened that they were the tool that was chosen.” (Interview 15)

“So after the fact when things weren't working out as well as they could have been, I think the vendor was trying to cover that up and do a lot of schmoozing rather than delivering.” (Interview 15)

Similarly, Interviewee 19, a senior manager in Cluster 2, had concerns about the corporate consultation efforts during the selection process (of sanctioned solutions) and suspected that vendor community heavily affected the information flow.

“Interviewer: Do you think the vendor community may have an influence on this or not?”

Interviewee: Uhm, possibly I'd even say probably. And I have, it seemed to be the kind of things that came out of consultations and information that was fed in through sources like the vendor community.” (Interview 19)

The existence of external coercive pressures were confirmed at both technical user and immediate

management levels in Cluster 3. In particular, the influence of vendors have been voiced with strong terms and suspicions at both levels. For example, Interviewee 17, a technical user, not only acknowledged the existence of such pressures but also talked about his suspicions of possible corruption involving such vendors.

“Interviewer: So do you think vendors may have an influence?”

Interviewee: There is definitely an influence there yes. And there is definitely representing outside interest rather than <Organization Name> interest and than there is the pathology of the way we structure the centre and the <Organizational Units>. The people in the centre are in the bubble.” (Interview 17)

“And then there is other things where in certain cases I am pretty sure there was some corruption involved. Because I can remember one standard where two joint standards for rather inappropriate software for whatever ended up getting picked and the guy who ran through one of those standards two months later he left and worked for one of the vendors. And then about a year later he flipped over to work for the other vendor uhm (laughs) and the CIO at the time was sacked sometime after that.” (Interview 17)

Immediate managers in Cluster 3 have been a lot more vocal yet less speculative about possible coercive pressures and provided vivid examples focusing on big vendors in particular. For example, Interviewee 14 talked about the influence of big vendors on technology adoption decisions at both the initial selection as well as during later stages of technology use through such mechanisms as prolonged outdated standards and offers involving complementary set of proprietary solutions.

“I see in <Organization Name>, you know, it's mostly the bigger vendors like ORACLEs and Microsoft who have major influence on the...on our technology decisions.” (Interview 14)

“ (explaining outdated standards) larger companies, like Microsoft or ORACLE it's difficult for them to adopt because it will break, it won't have compatibility with their applications, they can't make it compatible with their applications. They have invested millions and millions of dollars into their own you know, product or toolset for which they haven't reaped the benefit yet.” (Interview 14)

“The vendor community that's large vendors are not open to this kind of unique, uhm, you know, making sure that their tools or platforms are compatible with these components. Or giving people that freedom to go and hey you know what can you think of it or can you

come up with new ideas..” (Interview 14)

Similarly, Interviewee 16 talked about possible vendor influence on forming of corporate IT standards at executive levels as well as vendor interference and misrepresentation during the selection process involving various solutions following the establishment of standards.

“Interviewer: Do you think, uhm, vendors may have an influence on the forming of the policy?”

Interviewee: I think they do. I think vendors will have a huge influence on policies because they get to the <Senior Management Council> table whereas your software developers don't. So, I think that has a huge influence.” (Interview 16)

“I think vendors do play an influence on these, basically like I said before, I think they are getting themselves at the <Senior Management Council> table and I think they are talking up their solutions.” (Interview 16)

“Interviewer: OK. So, uhm, why do you think that they picked ClearCase (the sanctioned solution) in the first place?”

Interviewee: That I have, because, I'll be honest with you, I think I know the reason why is because it's IBM. And because it has a vendor (of record status) and because they can get probably a support agreement for that. Whereas SVN is open source they couldn't get support agreement for that. Here we use Visual Source Safe (another sanctioned solution) which is by Microsoft. We do have a support agreement in place for it.” (Interview 16)

Technical users in Cluster 4 were sure of the coercive pressures exerted by vendors and talked about such pressures with high-levels of suspicion. For example, having acknowledged such pressures Interviewee 26 went on to argue that one such avenue such pressures were exerted involved placement of external consultants in the organization on various term assignments by a number of external vendors.

“Interviewer: How about uhm, the vendor influence? Do you think the vendors influence...”

Interviewee: Of course, vendors always have a big influence right.

Interviewer: And how so?

Interviewee: Because I've seen in every, it's not in even, not so much in...I am not so much sure of this but I have seen in my previous one, vendor always have big influence on the toolsets and everything else that we use.” (Interview 26)

“(referring to the effect of outside consultants) So, they have like...so, and the reason being, because, there are so many consultants, the problem here, again, is I think, that the consultants we got that we get is from.....so many different organizations, right. So, and everybody comes from a different background.” (Interview 26)

Similarly, Interviewee 26 not only acknowledged existence of vendor influence but also relayed his suspicions involving potential upper management corroboration with certain preferred vendors.

“Interviewer: How about the effect of the vendor community out there?”

Interviewee: Yeah, well, maybe that's sort of one area where I would be a bit, you know, suspicious or uh...you know I would say maybe that's some...that would be where maybe some of the bias comes in.” (Interview 28)

“I mean, for instance, if...you know you have the suite of, you know, half a dozen products and one manager really likes the one product in that suite and makes a, you know, strong case for that, then, you know, the other products, even though they may not fulfil what, you know, the other groups want then they have to come fall in line...” (Interview 28)

Immediate managers in Cluster 4 were a lot more cautious but still acknowledged the existence of external coercive influences. Instead of focusing on and speculating about the potential influence of a few big vendors however, immediate managers in Cluster 4 talked about potential influences at the policy making stage through involvement of external consultants. For example, both interviewees 22 and 30 talked about the organization-wide tendency to bring in external consultant experts.

“Mostly I think those folks who are putting together standards definitely they go for sure with their experience. And also they I believe with some of these standards they called in, uhm...colleague folks from outside. Uh, one or two consultants, experienced consultants who have work experience in other industries, and several industries. So that, I think they used that help in following the standards to an extent.” (Interview 22)

“And there is a strong tendency to, uhm, bring in external IT consultants to develop and internal IT resources to function and do that kind of work.” (Interview 30)

Assuming a similar tone, Interviewee 27 talked about the close involvement of vendors in the policy making process as well as internal misinterpretations that magnify such coercive effects (e.g. across-

the-board application of specific vendor-driven recommendations).

"...well, the leadership stuff in the morning, down in <Location Name> Room and then, uhm.....you could get in through the, I haven't seen any of those for a while. Because they started becoming, in my opinion, more vendor-driven." (Interview 27)

"Like, it's interesting because few years ago there's multiple studies, and a lot of the enterprise architecture and all of the project management standards and so forth, you know, they are driven by these big corporate reports that are kind of odd(?), uhm, like project management in particular. If you go back to the original study that was released back (unclear) they dealt with projects that were 100 million dollar projects. And they had a number of recommendations for 100 million dollar projects. Somebody has come along and said, looked at those recommendations and said, let's apply it to everything. They haven't scaled it, right. And that scalability is often a challenge. So, maybe there is a corporate standard that...again.....needs to be...scaled to the situation." (Interview 27)

While the senior managers in Cluster 4 did not directly acknowledge external coercive pressures, they still indirectly verified such pressures via the defensive position they assumed on sanctioned solutions. For example, Interviewee 24 justified sanctioning and mandating of certain big vendor solutions on the basis of those solutions being selected as leaders in certain consultant reports.

"(referring to external influences on selection of sanctioned tools) The big players like your IBMs, your ORACLES, your Software AGs, they've all kept up in terms of their application servers kind of being the leaders of the pack, OK. And if you look at some of the, like the you know the Gartner Analysis, Forester Analysis they're always in the leader quadrant, OK. Their products are always there in the leader quadrant." (Interview 24)

5.1.1.2.5 Normative Pressures

The possible influence of normative pressures on adoption of IT solutions was clearly voiced throughout interviews with technical users in Cluster 1. Technical users clearly showed their tendency to search the market for popular, prevalent and "industry-proven" successful alternatives and to keep "up-to-date with the whole community" leading up to much closer ties with these professional networks and thus feeding normative pressures. For example, Interviewee 02 talked about his decision to adopt a non-sanctioned yet then industry standard technology solution (ORACLE Forms) despite a corporate

standard mandating the use of JAVA (presently also an ORACLE product). The interviewee gives a hint into the logic behind his decision by talking about his firm belief in the then more established and mature Oracle technology. This belief was fuelled by the strong professional network build around the Oracle Forms product line and was legitimized by such mechanisms as professional designations, training, various sponsored user groups and professional networks.

“Success is more important. And I told him, see, Oracle tool, which is form, is established tool and Oracle is still maintaining it. Because they know that this product works.” (Interview 02)

“Not the...I did not look at the Cluster or to corporate. I looked what's happening out there. And I says, do they have successful projects? Do they, Are they running it successfully for some period of time? If they can run there, we can run here too.” (Interview 02)

This view was also echoed by Interviewee 04 who re-iterated how industry-proven, market-prevalent alternatives with tight-knit communities around them contribute to forming of normative pressures.

“But, I guess when they are sure that no, this is a good, industry-proven alternative and they are confident, they would go for it.” (Interview 04)

“And those tools if I look in the market now, to the job requirements, let's say Python is pretty prevalent. Every resume, the new ones, I mean, this is the tool of choice nowadays, so organizations are looking for developers who know these advanced tools.” (Interview 04)

“I think you keep your eyes and ears open and if you follow, you know, articles in the web and you talk to people or, even if you walk into a university talk to students, they would tell you, you know, what teachers have been talking about, what have they been taught at school.” (Interview 04)

Other technical users appeared to be supportive of this view too.

“OK, this is a proven thing in the States and they have been using it for years, then it must be OK to adopt this.” (Interview 05)

“The important thing is there are a lot of solutions out there. Like if you have come up with

a problem, just Google on line, there's a lot of developers out there, they have similar issues with you, they are using Eclipse like free, they are not using RSA (IBM Rational Software Architect).” (Interview 06)

“Personally I want to keep my technology up-to-date with the whole community.” (Interview 06)

“Sometimes like, uh, the industry standards are not <organization name> standards.” (Interview 07)

*“Interviewer: What are some other considerations that you have when picking up a tool?
Interviewee: Uhm, depends on tools within the market. If it's very popular...” (Interview 08)*

The immediate managers also clarified the role normative pressures could play during the technology adoption process. For example, hinting the role of communities that form around industry standard alternatives interviewee 01 talked about the safe approach of “following certain leads in the industry” while interviewee 10, gave examples of occasions when external consultants on contracts became conduits of information and advocates of industry standard solutions leading to forming of normative pressures.

“Also the, I think, the perception that it is safer, from a political viewpoint to follow certain leads in the industry.” (Interview 01)

“...because again, it's not a, it's a process or a product that not only the folks that are very well versed in the products here but consultants are also advocating and the masses are actually advocating one product over another there's got to be some justification in it.” (Interview 10)

Corporate staff in Cluster 2 pointed to the process of legitimization of certain solutions through formal certifications which help build up normative pressures (which in turn, might contribute to favourable opinions about certain IT solutions over others). For example, Interviewee 18 not only acknowledged the obvious effect of normative pressures in scenarios involving such legitimization efforts but also raised an important follow-up question focusing on the outcome of selection between two solutions that

had been legitimized through similar certifications.

“So, when someone gets certified with something that's their knowledge, that's their experience, they are very much familiar with it. I think a better test of that would be if they were to be certified in two things, how they choose between them. Because now they would have knowledge of both things now how do they choose? They would not necessarily default to one. They would...choose between one of the other equally picking on what they think the best fit would be.” (Interview 18)

In comparison, the immediate managers in Cluster 2 pointed to the possible benchmark effects that might help contribute to normative pressures. For example, Interviewee 15 talked about the selection process involving large package programs for social service delivery and customer relationship management and how, as part of the selection process, the adoption of considered solution alternatives by benchmark industry organizations might have affected the outcome by helping build normative pressures (e.g. If known benchmark organizations in the industry all adopt one particular solution, that might contribute towards build up of normative pressures).

“So, I was involved a little bit with the Curam and Siebel, uhm, discussions, uhm, and we did look at other agencies and other, uhm, governments that have been either using or have gone through the implementation and how easy it was.” (Interview 15)

Immediate managers in Cluster 3 talked about their observations of technical user behaviour under normative pressures and criticized corporate staff for being disconnected from technical user needs. For example, referring to technical user preferences for non-sanctioned solutions Interviewee 14 gave an insight into the mind of a technical user and explained how technical users justify their use of such solutions on the basis of industry prevalence of such solutions. This view was also confirmed by Interviewee 16 who talked about how he was influenced by technical preferences of his colleagues in the industry.

“I think if you tell them that hey you should not be using, you know, open source IDE,

probably they understand but if it's a library, hey it's just a library right? It's ease of use, functionality is there right, I don't have to re-write, and it's a library, the whole world is using it, why not us? Right?" (Interview 14)

"I've reading that there has been some people in the industry who has been using it to automate tests. So, I am looking to see how we could best go about doing that." (Interview 16)

Switching to normative influences on corporate staff in the centre Interviewee 14 talked about the effect of professional designations which might influence corporate staff preferences in favour of sanctioned vendor offerings but contrasted these pressures with the presumably much higher normative pressures technical users felt due to industry prevalence of non-sanctioned alternatives. When asked about the possible effect of preferences made by other similar organizations, Interviewee 16 suggested that such external influences might also occur through industry experts brought in from outside.

"(Referring to corporate staff) Probably they would have people who have all these, you know, different certifications like CRISC, CISAs and you know what not, right. They are more of from a, they come from a theoretical perspective, right, so they are trying to look at things more from a process perspective, from what the PMBOK says or what COBIT says what Val IT says, they are looking at theoretical material to define those processes. They are not looking at any kind of practical what you call implementations, because they haven't come from those areas, right." (Interview 14)

"Uhm, well see, the problem with the corporate if you look at it they are more theoretical in their approach. Which is in terms of, uhm, what I should say, policies, processes, right, they are not looking at in terms of, like the world outside right, it's changing very rapidly, very agile." (Interview 14)

"Interviewer: What about what other organizations are doing?"

Interviewee: Uhm, yeah, I think that that also has an impact as well. So, if you do a scan, so for example, we are getting people out from outside, if they are coming in with a certain level of experience and expertise for a certain product or features." (Interview 16)

Technical users in Cluster 4 emphasized normative pressures that are due to industry prevalence of certain non-sanctioned IT solutions and pointed out that corporate staff should closely align internal standards to match the external industry standards. The following excerpts taken from Interview 26

illustrates this view.

“(Referring to continued use of non-sanctioned solutions) If you study the outside industry you find out of 10, 8 people are using, before they come to <Organization Name>, they were already using that tool, right, before they come to <Organization Name>. So, when they come to <Organization Name>, naturally they want to use that tool, because they have more comfort level, their use in past and if you have tight project deadlines, then you know, you want to go with the fastest way you can.” (Interview 26)

“Uh, same thing like past experience and the ease of development in their mind and I think primarily...if they think the standards are a little outdated then...then, uhm, I think the onus should be on the standard side also that you know they should keep it as current as possible with industry.” (Interview 26)

Immediate Managers in Cluster 4 talked about the influential role external industry experts played when they were brought in as consultants. While Interviewee 22 talked about materialization of such normative pressures that may be due to industry associations and networks, Interviewee 27 explained that technical user preference for external sources of information might be explained if one considers the larger pool of resources available externally.

“Mostly I think those folks who are putting together standards definitely they go for sure with their experience. And also they I believe with some of these standards they called in, uhm...colleague folks from outside. Uh, one or two consultants, experienced consultants who have work experience in other industries, and several industries. So that, I think they used that help in following the standards to an extent.” (Interview 22)

“Interviewer: (Referring to preference of industry standards over company standards by technical users) I am trying to figure out why they are preferring the outside as opposed to inside?”

Interviewee: ...Uhm.....I mean why I do it is, it's because there is a wealth of information out there that...uhm.....would you rather go to the corner store...a corner store, a mom-and-pop corner store for...uhm.....a plumbing fixture, or would you rather go to home depot? You get a lot more variety at home depot.” (Interview 27)

This last point about the wealth of information that is easily accessible externally through such resources as various communities of interest and professional networks (and the influence that is due to this association) was also emphasized by Cluster 4 Senior Managers. The following quote by

Interviewee 24 illustrates this view.

“I think the community of practice outside the <Organization Name> is much much bigger, it's much much more vast if you would, and the amount of expertise collectively is much much greater than what the <Organization Name> can ever provide. So, when you're talking about millions of users that are contributing right, to you know, improving the use of JAVA or you know, telling you know, how to do certain things it's techniques, tips, tricks, whatever it is...<Organization Name> cannot compete with that, OK. And these would be you know, kind of generic problems around you know, how do I code something, I am getting this type of error when I am trying to do this right, and those are very specific you know, to perhaps to JAVA language itself, and you know, how to do certain things you know, while you are coding.” (Interview 24)

5.1.1.2.6 Mimetic Pressures

The possible effect mimetic pressures may have on adoption created as much discussion among the immediate managers as it did among the technical users in Cluster 1. However, there was no agreement among Cluster 1 immediate managers about whether their organization would be susceptible to such pressures. While interviewee 01 claimed such pressures existed and argued that managers not only looked at “what other clusters are doing” but also followed what other external organizations were doing; interviewee 10 had her doubts about mimetic influences claiming that had such pressures existed her own organization would have been “up-to-date in their tools” and not “seem to be very far behind” of other similar organizations.

“It certainly would give ammunition to those that want to, you know, adopt a new standard from say the Federal if they say well if the Federal Government has done it then the <organization name> could follow it. So it is a good precedent.” (Interview 01)

“There is an effect particularly at the management level seems to be more keen on that type of things - on finding out what other clusters are doing. At the staff level, I don't think it is. Sometimes it may happen.” (Interview 01)

“I find that hard to believe because other organizations are very much up-to-date in their tools and their IT practices and we seem to be very far behind. So, I don't think they have that much of an influence in the sense that we are supposed to run with them but...no I don't. I don't think it does.” (Interview 10)

There was a lot more agreement on the potential effects of external mimetic pressures amongst the technical users. Cluster 1 technical users talked about taking cues from from benchmarks in the industry (interviewee 02), possibility of using such benchmarks in support of their decision to adopt certain non-sanctioned solutions (interviewee 04) as well as the tendency of higher level decision makers to copy examples that were perceived as successful without much thought (interviewees 05, 06, 07).

“Not the...I did not look at the Cluster or to corporate. I looked what's happening out there. And I says, do they have successful projects? Do they, Are they running it successfully for some period of time? If they can run there, we can run here too.” (Interview 02)

“I think this could be a big influence if, I mean, I'm sure if we see Federal Government using Linux and Python and all that that could be a good card to play.” (Interview 04)

“Yeah. That's one thing. Like in Canada. And another thing with <system name> happened that they started looking to the States. Ah, for, like California they have a <industry name> system, BC, they have a <industry name> system. So, they were looking...Oh what are they doing? And maybe we can copy it.” (Interview 05)

“But, uhm, if somebody or some peer company or peer government start using them and very successfully probably they will consider.” (Interview 06)

“Because if somebody else is doing so they would feel comfortable, you know, because if like one public sector is doing so it must be good enough because if they are doing it so, it's more likely that they would follow.” (Interview 07)

When asked about the possible influence other similar organizations may have on their own organization, corporate staff in Cluster 2 pointed to various issues that ranged from the perceived unique nature of their business lines to difficulties of getting access to information in other organizations. Interestingly, the former point about perceived uniqueness has also been cited by a senior manager in Cluster 2 as the reason why mimetic pressures may not have materialized in his Cluster, an issue he referred to as “not-invented here syndrome”. Nevertheless, existence of mimetic

pressures through peer groups have still been acknowledged by the same corporate staff member later on in the same interview (Interview 18).

“Interviewer: How about other similar organizations? Do they look at other similar organizations and see what they are doing?”

Interviewee: We would like to say that. Uhm, we do use other organizations more so than others. But in some ways, in some areas we lead, so there is no other organization out there that does the same thing. It is also harder to get information about what other organizations are doing. So, unless you know someone who knows someone who knows someone else, it's a little bit difficult to find out really what technologies are being used. There are some good relationships that are being build.” (Interview 18)

“Uhm, I'm sure they do environmental scans try to find out what other jurisdictions are doing but honestly uhm, often it seems to me that there is a not-invented-here syndrome going on uhm, so it tends to push the other way sometimes. You know, it almost like, we can't choose that one because we don't want to be copying <Jurisdiction Name>.” (Interview 19)

“There was actually one thing I want to go back to. Uhm, peer group and when I said that they don't necessarily influence each other, there is actually an element of...uh, wanting to not do or re-invent the same, re-invent whatever exists out there. So if another area is generally doing something...if it's something that they don't want to repeat doing, if it's very similar that might influence their decision to adopt it. So, it'll still, ultimately the decision is still, they feel that it's still theirs to make but it's the their senses that it'll be easier if they just do whatever that anyone else is doing and just recycle. And I think that is a good position to take, we don't want to duplicate and we want to use as much as we can. Uhm, so I mean, I think that occurred to me just as we were talking.” (Interview 18)

When questioned about possible impact of mimetic pressures on adoption decisions, immediate managers in Cluster 3 recognized that mimetic pressures could influence adoption and provided their view of how such impacts would materialize in their own organization. For example, according to Interviewee 14, mimetic pressures existed but only materialized for big vendor products by-passing a range of other solutions such as free and open source software. On the other hand, focusing on the actual mechanism with which mimetic influences would spread, Interviewee 16 argued that “people from outside” that are, external people with expertise who join the organization from other organizations played a crucial role in being agents of such mimetic pressures.

“Interviewer: When you said, other projects in the marketplace, do you think what other similar organizations are doing may have an influence?”

Interviewee: I'm not really, because, that's what I was trying to tell you right, like in Europe they have adopted open source big time, the public sector, if you look at <Jurisdiction Name> and <Jurisdiction Name> they are doing more and more COTS solutions, right, they have smaller vendors not big vendors, I am not talking about ORACLEs and others. Smaller vendors are actually delivering their niche solutions for the requirements. Whereas I see in <Organization Name>, you know, it's mostly the bigger vendors like ORACLEs and Microsoft who have major influence on the...on our technology decisions.” (Interview 14)

“Interviewer: What about what other organizations are doing?”

Interviewee: Uhm, yeah, I think that that also has an impact as well. So, if you do a scan, so for example, we are getting people out from outside, if they are coming in with a certain level of experience and expertise for a certain product or features.” (Interview 16)

Recalling her experiences in writing policies, a senior manager (Interviewee 20) in Cluster 3 confirmed that other similar jurisdictions were indeed sources of mimetic pressures. When asked about whether similar mimetic pressures would exist between different clusters, Interviewee 20 emphasized that it would depend on individual managers themselves and most likely be a function of their organizational connectedness.

“When I was writing standards we always did a scan and used you know, build up a contact list of what's happening in Ireland and the UK and California, <Jurisdiction Name>, <Jurisdiction Name> whatever there are you know, you know, scan the media, the Internet just even just to see where is there a bit of a buzz about mobile devices or you know open data or whatever the thing that is happening.” (Interview 20)

“Interviewer: Do you think uhm, they may be affected by uhm, what other parts of the organization are doing? Uhm, do they look at other similar units or other people whom they know and adopt something that those others have already adopted successfully?”

Interviewee: I would say...I would say that uhm, it's all a function of the individual manager and how well they are connected and how much time they have.” (Interview 20)

Both technical users as well as their immediate managers in Cluster 4 seemed to agree that successful use of particular technology solutions in other organizations could impact technology adoption decisions in their organization when certain conditions are met. For example, when asked to recall

adoption process with respect to a particular IT solution, Interviewee 28, a technical user, recalled that the actual process involved scan of similar organizations externally and the distribution of results showcasing success stories. Nevertheless, the interviewee also cautioned that in order for such success stories to create mimetic pressures the actual benchmarks must be within the same sector and resonate with the audience. At the immediate management level, Interviewee 27 talked about his own practice involving continuous screening of other jurisdictions with respect to the particular technology focus of his group and shared his preference for such benchmark solutions to be leveraged.

Interviewer: So, have they looked at those other organizations?

Interviewee: Yeah, I think so. Uhm, they've been, they certainly have. They've been...you know, e-mailing, here are some case studies from other companies and stuff" (Interview 28)

"(Referring to use of particular benchmarks or case studies) Uhm, to me those aren't as convincing because they are not necessarily you know <Particular Sector> examples and that sort of stuff." (Interview 28)

"If Australia is doing something really good we should adopt it. And so, I've got, from a personal point of view, I've got certain alerts set up in Google, right, that one of the alerts I have is anything with the term "<Particular Technology> Strategy"...so if Australia comes up with a new <Particular Technology> strategy, or the military comes up with a new <Particular Technology> strategy, I got a whole collection of <Particular Technology> strategies for implementing <Particular Technology> from around the world that I want to read to see what other people are doing, just to say hey maybe that's something we should adopt here or consider adopting. Because we don't have all the answers. We should leverage as much as possible." (interview 27)

5.1.1.3 Time-Ordered Matrix

Previously, while reporting the empirical results on compliance pressures, I have mentioned that the ongoing structural changes in Clusters may have had a magnifying effect on compliance pressures. Under this heading and relying on a time-ordered matrix, a historical and contextual background is constructed. Time-ordered matrices allow visual display of various event sequences and help build comprehensive chronologies. The time ordered-matrix depicted here has been constructed relying on

interview data as well as publicly available archival information that range from IT strategies, policies, and guidelines to various presentations and press releases. In an effort to provide a detailed perspective on IT governance, organizational structure and accountability shifts over time, the matrix lists a series of events and puts categorizes them chronologically. To allow comparisons over time, the matrix attempts to break the whole IT organization into its component parts, namely, business area specific IT Groups, IT Clusters and the Central or Corporate Group and lists key events that are thought to have played seminal roles in shaping this transformation.

While the actual matrix is made available as **Table 9** in **Appendix L**, the specific periods corresponding to different and distinct eras of IT governance, organization and accountability structures are listed and explained below. In particular, three distinct periods (independent era / cluster era / central-corporate era) have been identified. Each period is further explained below and help contextualize the occurrence of compliance pressures.

5.1.1.3.1 Independent Era (... - 1998)

Prior to 1998, the IT organization operated as a collection of independent and loosely-connected bundles of disparate organizational units. Each organizational IT unit was closely linked with a specific business area and served the IT related needs of that particular business. Each IT unit was independent in the sense that it enjoyed full flexibility on technology related decisions. These independent units were still loosely-connected under the umbrella of business specific structures that operated (and to a large extent still do) based on the nature of services provided to the public. The tight relationship between business and IT allowed domain specific knowledge to be acquired by IT units and resulted in design and development of fully-customized business solutions. There was a proliferation of such tailored-yet-unintegrated solutions across the organization. During this era -and despite the fact that it

controlled the process of internal appropriation of funds through annual fiscal planning exercises- the corporate centre was relatively weak. The IT environment was decentralized and accountability was spread across the organization. Due to existence of few organization-wide restrictions and organizational-unit flexibilities the hidden and surreptitious adoption potential of IT solutions were minimal.

5.1.1.3.2 Key Event (Feb/Mar 1998)

Early 1998 saw a significant change in the IT direction and vision of the organization. An IT Strategy appears to have played a significant role at this stage. Put together by a working group that included two internal IT committees as well as an industry panel that had heavy representation by the public sector participants, this IT strategy proposed full transformation of the IT organization through a number of sweeping changes that included establishment of an enterprise-wide common infrastructure, common policies and standards as well as governance and accountability changes with structural implications.

Common infrastructure meant an integrated network, an enterprise IT architecture and a bunch of standardization efforts that ranged from provision of common help desk services and standard desktops to common e-mail and a standard set of computer applications. Common policies and standards saw the creation of associated policies and standards around network, e-mail, desktop, and data management. The governance and accountability portion proposed fundamental organizational changes which included creation of a number of business/IT clusters with a CIO at the helm of each. This was the beginning of a new era for organizational IT.

5.1.1.3.3 Cluster Era (1998-2006)

The effects of IT strategy took immediate effect and significantly altered the IT landscape across the organization. Many independent and business area-specific IT units were moved to a related cluster through a sequence of re-organizations. Few units that remained under business areas were able to retain their in-depth domain-specific business knowledge. However, they lost significant flexibility on IT related decisions and became somewhat semi-independent. Many of the applications/solutions that had been produced during the independent era were consolidated at the cluster or corporate level.

The fall of the independent IT units corresponded to a related rise in power and influence of the IT clusters. They absorbed these previously independent units along with their associated budgets and other resources (including HR). Cluster existence was further legitimized by the creation of such cluster-level governance bodies as architecture core teams and architecture review boards as well as through establishment of Cluster hosted centres of excellence around IT platforms (e.g. .NET Centre of Excellence and JAVA Centre of Excellence). IT Clusters enjoyed certain flexibility for the local decisions they took (within the boundaries of corporate rules). However, they were still semi-independent in that all IT decisions with cross-cluster implications had to be approved by the appropriate corporate group. During this era, the previously decentralized IT environment turned into a more centralized mode where accountability was shared between the centre and the cluster organizations. However, despite centre's increasing level of power it was still not fully centralized. With rising restrictions governing the selection and use of IT solutions (at both cluster and corporate levels) hidden and surreptitious adoption potential significantly increased in this era.

5.1.1.3.4 Key Event (August 2006)

An important IT Directive was approved centrally in August, 2006. This new directive mandated

additional infrastructure and service consolidation which led to further centralization. Previously flexible, with this directive coming into power, clusters were required to use centrally enforced common components, applications and services. They were also asked to comply with corporate security and architecture standards as well as follow corporately designed project management processes. A massive infrastructure and service consolidation effort ensued.

5.1.1.3.5 Central/Corporate Era

Perhaps the biggest change in this period involved the creation of a centralized infrastructure organization. Infrastructure consolidation was the last blow to the few independent and business-area specific IT units which had survived the increasing levels of centralization as they lost the little flexibility around technology decisions and was forced to alter their preferences around what central infrastructure could support. As their dependence on cluster and corporate offerings increased, these previously independent units were forced to adopt a variety of corporate applications in the name of standardization and enterprise-wide compatibility.

Clusters were also feeling the pressure this time as the newly created central infrastructure services organization sucked in hundreds of positions that previously belonged to them. Creation of two new clusters out of the original seven further reduced their power through fragmentation. While cluster-level bodies continued to operate, clusters themselves were no longer fully in control of their local environments as they were bound by the corporate security, architecture and project management rules. With additional requirements around use of common components, applications (e.g. enterprise e-mail and desktop applications) and services (e.g. help desk and utility hosting services) offered by the centre, cluster flexibility on adoption decisions significantly decreased.

Meanwhile, the central organization became ever more powerful. Its initial policy-specific role was supplemented with a much more controlling one which dictated future directions and enforced these directions through corporate-governance bodies. The environment has become much more centralized. Proliferation of organization-wide rules and offerings resulted in a tight and inflexible environment with many one-size-fits-all type rules that negatively affect organizational unit level performance. Consequently, the potential for hidden and surreptitious adoption of non-sanctioned IT solutions further increased.

5.1.1.3.6 Other Recent Important Events (2009-2012)

In June 2009, the centre launched a corporately planned, centralized pool of IT professionals under the pretext of reducing reliance of external consultants. The idea was to create an internal pool of highly skilled group of IT professionals that would be shared among clusters to accommodate their IT project related needs. Even though this group was placed under one of the clusters, both the policy direction and implementation details were dictated from the centre. Intended or accidental, creation of this mobile work-force resulted in move of many highly-trained IT professionals from across all clusters into the pool which further drained experienced cluster workforce. Nevertheless, these moves happened through voluntary job applications due to availability of positions with better job classifications and higher-level pay in the central pool.

In March 2011, the centre officially opened a state of the art data centre as the centre piece of their infrastructure consolidation plan. With the final price tag of more than \$350 million, this flagship product has been used as rationale to force all clusters and the remaining business area-specific IT groups towards the use of central infrastructure and associated services. All existing data centres and major applications across clusters and business areas were given deadlines to complete their migration

to the giant data centre.

5.1.1.4 Conceptually-Clustered Matrices

Focusing on a number of interrelated concepts around the second-stage hidden and surreptitious adoption of IT solutions by technical users, a comprehensive display was developed for each of the four clusters/cases. These matrix-type displays are provided as **Table 10** in **Appendix M**. Each display has three major columns that contain interview-level data on adoption categories&process, adoption antecedents and possible moderators&mediators of hidden and surreptitious adoption. This data is further broken down by different categories of organizational users (e.g. technical users, immediate managers, corporate staff and senior managers) and further organized down to individual interviewee level. Interviewee responses are grouped in conceptual clusters and presented as various underlined headings. Under each heading, excerpts were further sub-clustered and tagged where appropriate (underlined tags are shown in parentheses where applicable). The analysis that follows is presented using the same conceptual categories (i.e. column headings) and sub-clusters and includes illustrative quotes from a selected cluster in order to maintain context and convey a consistent story. Additional quotes covering results from each cluster are provided in **Appendix M** and are referenced below under related headings.

5.1.1.4.1 Adoption Categories and Process

5.1.1.4.1.1 Top-down vs. User-driven Adoption Process

For formal adoption, there is clear evidence of the top down nature of adoption decisions where the upper management (cluster or the centre) "mandate what should be followed for a particular project", "without considering the needs of the groups" and "make the decisions for" organizational units and "may even procure products" for them (interviewee 01). This view is also reflected by interviewee 07,

by interviewee 05 who gives examples of occasions where "the senior management" "or the centre" pushes a particular solution as well as by interviewee 10 who openly admits that her adoption decisions are "corporate managed" to make sure that "everything is done exactly to corporate requirements".

"(Referring to corporate centre) They mandate what should be followed for a particular project." (Interview 01)

"Well, they'll make the decision for us. Make the decision for us on which route to go. I mean, it's pathetic. They may even procure the product (laughs). Not just leave it to the team to do it. They offer no choice." (Interview 01)

"My sort of shop is a little more unique than the rest of our shop right now because we are on a mainframe application still. So, it's much more, sort of, corporate managed. We have to make sure that we are...everything is done exactly to corporate requirements." (Interview 10)

"So, I would say the management, the senior management like <manager's name> or the centre are pushing the portal but we are not...I don't know how it is going to fit..." (Interview 05)

As quoted above this approach "offers no choice" to those individual units, is found to be "dictated in a very arbitrary way" resulting in lose of productivity which leads to "a natural reaction of" technical users and encourages them to start a user-driven adoption process "to do the things right" and "use something different to free up from those restrictions" (interviewee 01) and achieve "faster, efficient work" through the use of non-sanctioned tools with which they "have more experience" (interviewee 08).

"Well, one reason would be, that comes to mind, is trying to free from the decisions of the IT group, the <unit name> (the central IT service provider) or whoever defines, whoever creates all the environments that we are in from our desktops to our servers. (They are) dictated in a very arbitrary way." (Interview 01)

*"Interviewer: OK. Are there any occasions when a team member like you, a developer, can propose a tool?
interviewee: Of course, yes. Depending on, I mean, if someone have more experience with the tools and get more result, faster, efficient work, yeah, we adopt it and we use it." (Interview 08)*

On some occasions, technical users may talk to and convince their immediate managers to adopt non-sanctioned solutions as relayed by interviewee 02. On other, rarer, occasions, as hinted by interviewee 05, technical users may even be maintaining simultaneous environments running sanctioned and non-sanctioned solutions in parallel (more on this under the dual adoption heading below).

“So, we decided, I convinced the project manager and he was convinced, he said yes, fine...It was easy. And they wanted the application look like MS-Access...” (Interview 02)

“In the current environment no, it's more like these are the tools. And, I used Eclipse and other plug-ins to, you know, work, like a kind of to...uhm...complement let's say...complement the official tools (laughs) that, you know, I am using.” (Interview 05)

The top-down approach becomes more pronounced as projects become larger where "the decision is made at a higher level" (Interviewee 01). That being said, the top down initiation of adoption does not mean successful implementation as interviewee 01 admits that "it becomes really adopted" when "staff finds it useful". This was also manifested by the example given by interviewee 05 where top-down arranged training efforts on sanctioned tools weren't "taken seriously" and "was rejected" by technical users.

“Well, it depends on the level of the project. For small projects I decide. For the larger projects where I am not, I am just part of it but not the project manager than the decision is made at a higher level.” (Interview 01)

“And when the, I guess I would say with the staff finds it useful that it becomes really adopted.” (Interview 01)

“Everybody went to training at the time, you know, the Rational initiative, putting everybody into training. People didn't take it seriously here. I don't think, honestly maybe myself, I don't want to exaggerate, maybe two people took it seriously. But the rest, you know, the older, with the people that had been in this branch for longer, I don't want to say age group but people that are accustomed to what's happening here or in the <organization name> how things run before, they didn't take it seriously. I don't blame the actual tools. Maybe it's just...It was a transformation that was rejected in a way...Let's call it this way.” (Interview 05)

According to interviewee 01, and as quoted above, immediate managers have certain flexibility on smaller projects. However, non-sanction solution use does not appear to be limited to those small projects. As the projects get bigger, more critical and more visible sanctioned solutions can still be rejected as "people interpret the standards" and end up not following them (interviewee 01).

"Well, I guess, somehow, again it's particularly in the large projects, the interpretations are made. Or standards are simply not followed, people interpret the standards, part of the standards not totally the standards. Which is...like saying... you don't follow the standards (giggles)." (Interview 01)

Throughout the within case analysis stage similar illustrative statements have been captured and grouped for each cluster where applicable. These individual quotes are organized by Cluster / Role / Interview and can be seen under the Adoption Process heading in the Category & Process Column in **Table 10 (Appendix M)**.

5.1.1.4.1.2 User Rejection of Sanctioned Solutions

There may be many reasons why users reject sanctioned solutions. For example, interviewee 02 talks about an incident where management was keen on getting quick results and the sanctioned solution would simply "not be able to produce results very quickly". In other words, the rejection happened due to performance related concerns (for further discussion on these type of rejections please see the performance induced awareness discussion under the other factors heading in the adoption antecedents section below). A similar incident was communicated by interviewee 07 where the sanctioned tool was not able to perform the function (debugging) needed by the technical user forcing employee to search for a non-sanctioned alternative instead.

"He was pushing for JAVA. And I said, don't. Management wants the results very quickly

and JAVA, if you go into JAVA, although it is a technology of the future, but you will not be able to produce results very quickly” (Interview 02)

“...for instance like now, you are trying to, you know, debug a JAVA script application. And standard says that you must use Internet Explorer. And Internet Explorer does come with it's own debugger but it's not really smart enough. So, then, what would you do?

Interviewer: What do you do?

Interviewee: So, you use Firefox to do that. Sometimes like, uh, the industry standards are not <organization name> standards.” (Interview 07)

Another reason may likely involve occasions where sanctioned tools may be rejected because they are imposed in a top-down manner. This was clearly exemplified in the training incident mentioned by interviewee 05 earlier, where technical employees showed their reaction to the mandated and sanctioned toolset by not taking the training seriously. This view was echoed by interviewee 01 where he clearly stated that technical users would always resist the use of a sanctioned but inconvenient tool and avoid using it "even when it is being imposed on them".

“...otherwise they will always resist the use of it if it is not convenient. Therefore even when it is being imposed on them they don't use it.” (Interview 01)

Interviewee 10 thinks another reason behind such rejections (of sanctioned solutions) may involve the underlying "antiquated" standards that do not maintain currency with the state-of-the-art which causes technical users and their immediate managers to “ignore” those mandatory but old standards (the appeal of state of the art solutions to technical people is discussed under the coolness and popularity heading in the adoption antecedents section below). Finally, interviewee 10 argues that a sanctioned solution may also get rejected by technical users due to lack of proper enforcement, a factor I discussed under the Governance and Controllorship section under the other factors heading in the adoption antecedents section below.

“(Referring to how IT standards are developed in the centre) Well, I would hope it would be the most up-to-date information but in some cases it's probably based on a lot of input

that may be antiquated or, uhm, resources or researches that maybe not up-to-date and their maintaining old information and just re-using it because their focus hasn't been IT.” (Interview 10)

“...the standards are sometimes...I guess ignored...it's...the right term is ignored.” (Interview 10)

*“Interviewer: Do you know if there are any penalties for not complying with the IT policies and standards? In the <organization name>?”
Interviewee: Well, there are penalties to...at the director level. I don't think there's any penalties to us” (Interview 10)*

Throughout the within case analysis stage similar illustrative statements have been captured and grouped for each cluster where applicable. These individual quotes are organized by Cluster / Role / Interview and can be seen under the User Rejection heading in the Category & Process Column in **Table 10 (Appendix M)**.

5.1.1.4.1.3 Silent vs. Shared Hidden and Surreptitious Adoption

The prevalence of hidden and surreptitious adoption of IT solutions was a common occurrence throughout almost all interviews conducted in each separate cluster. As a result the excerpts provided throughout the conceptually clustered matrices in **Appendix M** is peppered with examples of hidden and surreptitious adoption of various IT solutions. A more in-depth look at these occurrences made further categorization of hidden and surreptitious adoption into sub-groupings possible.

On certain occasions technical employees adopt non-sanctioned solutions after they discuss the matter with their immediate managers. As mentioned above, interviewee 02 talked about an incident where he decided to adopt a non-sanctioned solution for performance related reasons and "convinced the project manager" to go forward with his proposed solution. When asked about management knowledge about his use of non-sanctioned solutions, interviewee 07 also indicated that his immediate management (but

not the corporate management) knew about his use. This was also the case with interviewee 08 who confirmed her willingness to go ahead with a non-sanctioned solution as long as her immediate management is in agreement. I termed those occasions shared hidden and surreptitious adoption to emphasize the fact that the non-sanctioned use is communicated by the technical user up to his/her immediate manager.

“So, we decided, I convinced the project manager and he was convinced, he said yes, fine...It was easy. And they wanted the application look like MS-Access...” (Interview 02)

“Interviewer: Does your immediate management know?”

Interviewee: Yes.

Interviewer: How about the high level, corporate management, like the guys in centre, do they know?”

Interviewee: Probably not.” (Interview 07)

“Interviewer: ...would you still go ahead with an innovative solution like JBOSS as long as you immediate management is in agreement?”

Interviewee: Yes (laughs).” (Interview 08)

However, this upwards communication appear to usually stop at that level. When asked about her potential reaction to such requests by technical users, interviewee 10 talked about a risk-based approach where she would "risk manage things and determine" whether it would be OK to proceed with such non-sanctioned solutions. She would only make it official and escalate it to upper management when she believes "there is a huge risk" (and even then she would still "advocate it").

“If the impact is minimal but the actual gain is going to be something that is a win for the organization or the client, then it's fine. I'd say it's fine. I risk manage the things and determine that it's OK we could go ahead.” (Interview 10)

“If obviously it's the opposite, there is not really an (unclear) to it and or there is a huge risk to it then I try to deter, I go to the senior management and see if I can get an approval.” (Interview 10)

“Interviewer: Would you always go to the senior management?”

Interviewee: Not if the risk is...only if the risk is great.” (Interview 10)

Therefore, on occasions when technical users approach their immediate managers with such requests, if the perceived risk is deemed to be acceptable, the non-sanctioned adoption will likely stay hidden from either the cluster or the corporate centre upper management ranks. The scenario passed on by interviewee 04 below may represent a rarity where, having initiated the change, the immediate manager then decided to proceed with senior management approvals.

“(When asked about how the adoption process unfolded and where approvals sought) For me it was from my project manager. I think where the initiation started and then he got approval at the senior management. That's how far as, as far as I know how it started and propagated.” (Interview 04)

“So, Agile development and Scrum methodology were the two in terms of methodology-wise. In terms of the tools, there are a lot of open source tools. Like PLONE, Python, Git, SVN, those things and Linux is one of the biggest ones which I have seen being adopted in the last year-and-a half. And it's been adopted pretty well. We are running about twenty servers on Linux now.” (Interview 04)

On that occasion, the rationale for upward communication may have been related to the scale of that particular operation where keeping twenty servers running a non-sanctioned operating system would be extremely difficult to hide from the upper management. Nonetheless, even when such higher-level approvals are sought, the technical employees may not wait for the seal of approval to start using non-sanctioned solutions in question. This was apparent when interviewee 06 openly admitted that on those occasions when she needs "to submit some process to go through formally", she would submit first and "start to use this quietly while waiting for that (approval) to come back".

“I think I would, like, if I do need to submit some process to go through formally I would submit that then I'll start to use this (laughs) quietly waiting for that to come back (laughs).” (Interview 06)

On other occasions, the technical users may adopt non-sanctioned solutions and choose to stay silent and "use them kind of secretly" (interviewee 05). As interviewee 01 put it eloquently, on those

occasions "the rule of thumb is not to make waves" or avoid signs that would "make it very obvious". Interviewee 05's under-the-radar type use of open source libraries from Apache may also be cited as an example of silent adoption of non-sanctioned solutions.

"Interviewer: (Referring to the lengthy approval process concerning non-sanctioned solution use) But would you be more willing to use them if those roadblocks didn't exist... Interviewee: Oh, of course, yeah. I would be much more...I would be much more, I would be more relaxed using them. Given that I have approvals and, they are, you know, certified or, you know they are the OK tools to use. Now, I do use them kind of secretly." (Interview 05)

"Well, I guess the rule of thumb is try not to make waves. Try not to.....(giggles)....make it very obvious." (Interview 01)

"Also, say utility, open source utilities, uhm...I've used certain libraries that maybe wasn't...I didn't...Let me put it this way, I sensed that it can't be part of the product but however I included them for convenience, ease of use and...So, open source libraries from Apache and so on and so forth." (Interview 05)

A technical employee's perception of his/her immediate manager's (and conversely, the immediate manager's perception of his/her senior manager's) technical capabilities may play a role in the ultimate decision to operate under shared or silent mode. This could be seen and felt when interviewee 04 claimed that even known (i.e. industry standard) non-sanctioned solution names "would sound funny to" the upper management, a view that was replicated by interviewee 05 in his claim of "lack of knowledge of the centre". Interviewee 05 gave another reason to justify his silence in the form of a missing intermediary role, "a team lead" in his team. The "absence of that role", that is, a technically savvy superior with whom the technical user would feel comfortable confiding to, interviewee 05 felt that "there was a disconnect" and decided to keep quiet. Whereas that intermediary role is usually assumed by the project manager, on that occasion, it might not have been possible due to non-technical nature of the project manager for the team.

"(Referring to what would happen if senior executives heard about adoption of non-

sanctioned solutions) I don't think they would be thrilled to hear about it. Because, again, even those known names would sound funny to them, like, what are you using? This is not the standard.” (Interview 04)

“There is a lack of knowledge of the centre...of the official...uhm...processes if you will from the central agency down to me, the developer level.” (Interview 05)

“Interviewer: When you used those complementary tools that have not been officially sanctioned or approved, do upper management know about them?

Interviewee: No, because there is a disconnect from...Unfortunately in our team there is no such a role as team lead.” (Interview 05)

“Interviewer: So, if there was a technical intermediary, like a technical lead, then those people would probably know, is that what you are saying?

Interviewee: Yeah, I would probably, you know, ask them for a direction, you know, and they would understand what I am actually trying to accomplish. And the technical difficulty of, you know, doing something, you know, using those tools versus the official tools.” (Interview 05)

Throughout the within case analysis stage similar illustrative statements showing occurrences of hidden adoption (and silent or shared hidden adoption where it could be identified) have been captured and grouped for each cluster where applicable. These individual quotes are organized by Cluster / Role / Interview and can be seen under the Hidden Adoption heading in the Category & Process Column in **Table 10 (Appendix M)**. Where possible, instances of silent and shared hidden adoption have also been specified in parentheses following each excerpt.

In addition to silent and shared types of hidden and surreptitious adoption, an additional category of non-sanctioned use has also surfaced during the interviews. Representing a potentially rare occurrence, this type of adoption involved parallel use of both sanctioned and non-sanctioned IT solutions and is further examined under the dual adoption heading below.

5.1.1.4.1.4 Dual Adoption and Non-Genuine Use of Sanctioned Solutions

A very interesting occurrence has been noted during interview 05 in Cluster 1 where, after having

performance and functionality problems with the sanctioned toolset, the technical user adopted non-sanctioned tools but kept the official toolset running for compliance purposes while he completed majority of the work using the non-sanctioned alternatives. In interviewee 05's words, he used a non-sanctioned "open source tool to get the job done and went back to" the official and sanctioned tool "to finish it off".

"So, to the tools I use Eclipse, I wanted to make that point because RAD (Rational Application Developer) couldn't do some functionality. Basically with Crystal Reports it couldn't support plug-ins with the version I am using. So, I used open source tool to get the job done and went back to, you know, RAD to finish it off. (Laughs) That's a point I wanted to mention." (Interview 05)

"In the current environment no, it's more like these are the tools. And, I used Eclipse and other plug-ins to, you know, work, like a kind of to...uhm...complement let's say...complement the official tools (laughs) that, you know, I am using." (Interview 05)

This dual (i.e. involving simultaneous use of sanctioned and non-sanctioned IT solutions in tandem) and non-genuine use of sanctioned alternatives represents an interesting hidden and surreptitious adoption instance. This occasion could well have been discarded as an episodic instance. However, interviewee 05 was able to provide further examples of similar kind of behaviour from other parts of the same organization (i.e. different clusters) where he worked previously.

"(Referring to his work in another Cluster) So, what we did, what we decided, we'll have an internal SVN (laughs) server sitting on a regular computer. Regular computer not a server. We did our daily work on that and once a week, at the end of the week <individual name>, you know, he uploaded everything to ClearCase. So, he merged to, on a weekly basis. Daily basis we used SVN and at the end of the week we just packed kind of a backup." (Interview 05)

Since these other occurrences have neither been initiated by the same technical user nor they involved the same IT solution, there is a good chance they reflect structural and cultural instances as opposed to idiosyncratic ones. During within case analysis a similar occurrence was also noted in Cluster 4 which

supports this suspicion. Relevant quotes can be seen under the Dual Adoption heading in the Category & Process Column in **Table 10 (Appendix M)**.

5.1.1.4.2 Hidden and Surreptitious Adoption Antecedents

5.1.1.4.2.1 Technical Factors: Sanctioned Negatives and Non-Sanctioned Positives

Throughout interviews in each cluster evidence was gathered on whether technical factors would impact second-stage adoption preferences of technical users. It is important to note that the category “Technical Factors” had been added as one of the cultural categories during expansion of analytic codes (ref. quadrant 2 review process) and was included as a separate code (i.e. “AA-TECH”) in the start list of codes (**Appendix B**). During interviews (ref. quadrant 3 discovery process), this category was found to be covering two opposing occurrences that are then subsequently captured with additional codes showing positive technical factors related to non-sanctioned alternatives as well as negative technical factors related to sanctioned solutions (i.e. “AA-TECH-PLUS” and “AA-TECH-MINUS” codes). These expanded codes can be seen in the final list of codes (**Appendix D**).

Hence, the results reported here is about the evidence focusing on positive technical factors quoted on non-sanctioned alternatives vs. negative technical factors related to sanctioned solutions. The interesting point to note upfront is that the mere availability of technical features did not appear to guarantee adoption. In most cases the sanctioned solutions with more technical features got dropped by technical users for non-sanctioned solutions with fewer technical features. This seemed to be at least partially due to additional complexity of and poor support on sanctioned solutions.

For example, the immediate managers in Cluster 1 talked about a few higher level elements shedding light onto the decision criteria used by themselves as well as by technical users as observed by them.

For instance, interviewee 01 talked about the importance of "ease-of-use" and "technical superiority" including stability and performance as key factors and argued that these factors would represent a "a big consideration" for any staff member. Speaking of the negatives related to sanctioned solutions, interviewee 01 also talked about how standardized products that are "dictated in a very arbitrary way" and did not cover project based needs for different project sizes resulting in "stiff and unproductive" results (the potential effects of project size is further discussed under the moderators and mediators section below).

"I think it's this, it's between the ease of use and the technical superiority." (Interview 01)

"Yes, that's a big consideration from any staff member, yes. The technical superiority....Stability, performance." (Interview 01)

"...whoever creates all the environments that we are in from our desktops to our servers. (They are) dictated in a very arbitrary way. And very stiff and unproductive in my opinion. So therefore it is kind of a natural reaction of people trying to use something different, trying to free up from those restrictions." (Interview 01)

Another immediate manager, interviewee 10 based her argument on the discrepancies between internal and external (i.e. industry) standards and emphasized strongly that internal "standards are not current". Calling them "antiquated", interviewee 10 went on to argue that such technical antiquity prevented the produced work from flowing "quickly and efficiently". According to interviewee 10, certain non-sanctioned solutions were preferred by technical users because they are easier to work with, advocated by knowledgeable outsiders and are more "agile" contributing to easier delivery of business solutions.

"A lot of the standards are not current and a lot of the developers we have today would like to maintain, sort of a currency of the technical world. So they find that it's, the tools or the standards are antiquated. And again, to keep them happy and make sure that we can produce and have work flow quickly and efficiently, the standards are sometimes...I guess ignored...it's...the right term is ignored." (Interview 10)

"Because many of times we have to go out to the, uhm, do RFSs and go out to the community and get consultants, they come in and who are very knowledgeable in both

applications, and JBOSS seems to be the preference, uhm, because of its ease, uhm, it's the way that you can actually work with the actual product and the deliverable is easier I understand. Uhm, much more if I could use this word: Agile.” (Interview 10)

Arguments put forward by technical employees were much more specific and detailed and focused on positive aspects of non-sanctioned solutions as well as on the corresponding negative sides of the mandated sanctioned ones.

For example, interviewee 02 talked about how his ultimate decision on a non-sanctioned solution was affected by his observations on the technical difficulties experienced by his colleagues with a sanctioned solution as well as by other industry examples showing successful use of a mature non-sanctioned alternative (popularity of solutions in the industry as a factor influencing adoption decisions was also mentioned by interviewee 08).

“(Referring to implementation of sanctioned solutions)...they were having a lot of difficulties in order to maintain those databases.” (Interview 02)

“(Talking about what impacted his decision to adopt the non-sanctioned solution) The only reason was that I have seen the success in the market.” (Interview 02)

“Success. One hundred percent success. I was sure that we will succeed, if we go this line of action.” (Interview 02)

“And the reason why, we had so many issues with Windows, so many issues that we ultimately decided to move to Linux. Corporate wise Linux is much more stronger, protected security-wise, so we feel comfortable.” (Interview 02)

“Interviewer: For example, you mentioned Eclipse, Eclipse is a very very...

Interviewee: popular

Interviewer: ...widely accepted, popular tool...” (Interview 08)

Interviewee 04 justified his decision to use a non-sanctioned solution on the basis of the stability and functionality of that particular non-sanctioned solution being on par with its sanctioned alternatives at a much lower price point (the effect of financial factors are further examined under the other factors

heading below). Interviewee 04 also highlighted the dramatic productivity gains that could be achieved using certain unsanctioned solutions over their sanctioned alternatives.

“I think a lot of times even in general day-to-day life, somethings, if something makes sense, I guess, a good conscience would generally lean towards it and say, you know, this is a very good alternative, it costs a lot less, it's as good as, for example take the example of Solaris, Linux would be as good as, or as stable as Solaris, it's pretty much based on the fundamentals of Solaris, not from the cost point of view or licensing, but stability wise, or functionality wise it's as comparable to AIX or Solaris, so, I think, generally, if it makes sense, and definitely save some money, it just seems like a good fit.” (Interview 04)

For interviewee 05, the choice was clear as the officially sanctioned tool had not been able to deliver the functionality he was looking for leaving no other easy option than picking a non-sanctioned alternative with the required functionality. In an effort to justify his preference favouring non-sanctioned solutions on a variety of other occasions, interviewee 05 cited simplicity, ease-of-development, ease-of-support and lighter process as well as the technological currency of the non-sanctioned solutions as main factors affecting his decision to go ahead with a non-sanctioned alternative, which, ultimately allowed him to achieve faster delivery times with less effort (the topic of performance induced awareness is described further under the other factors heading below).

“So, to the tools I use Eclipse, I wanted to make that point because RAD couldn't do some functionality. Basically with Crystal Reports it couldn't support plug-ins with the version I am using. So, I used open source tool to get the job done and went back to, you know, RAD to finish it off. (Laughs) That's a point I wanted to mention.” (Interview 05)

“Interviewee: Yeah, Subversion. And we used Git for...And Git, I liked Git the most.

Interviewer: And why is that?

Interviewee: It's very flexible, you can work in isolation without having to have that connection to the server. With ClearCase you could do the same. ClearCase is also a good tool...It has it's bads but, you know, it's a very good tool. Uhm...Git is much simpler for development and you don't need to follow certain steps, you do but it's a lighter process than ClearCase. Uhm...And it's the latest and greatest, faster much faster. There is other advantages too.” (Interview 05)

“Yeah, I, you know, like, ease of use for development, uhm, up-to-date technologies, you know, being able...the tools should support up-to-date technologies you know, you want to

use frameworks and libraries and things that...open source which, the whole industry are pouring effort into developing like, just yesterday I was reading about JBOSS identity...federated identity, it's really a new thing, uhm, and it's in the open source community now.” (Interview 05)

“So, new things, new technologies, makes delivering a product easier, you know, instead of say, you know, doing huge effort in coding, you know, there are things that, frameworks and tools that make it, you know, make the effort much less, much, in terms of coding, in terms of development, it makes it more enjoyable too. I don't think I mentioned that too. Uhm. So, less effort, enjoyable, uhm, if the, if those, if those standards were more up-to-date, you know.” (Interview 05)

Similarly, interviewee 06 had to move from a complex sanctioned software solution to a much lighter non-sanctioned alternative as his hardware could not handle the heavy official solution resulting in productivity losses. Speaking highly of the non-sanctioned alternative, interviewee 06 listed ease-of-use, convenience, simplicity, ease of finding support, cross-platform compatibility and up-to-date technology as well as her previous familiarity with the non-sanctioned alternative among factors that affected her selection, a concern that is also shared by interviewee 08 (the effects of past use of both sanctioned and non-sanctioned tools are looked at in the appropriate heading below). According to interviewee 06, the officially sanctioned tool was complicated, unfamiliar, too old and had a lengthy support cycle in comparison.

“(Referring to a non-sanctioned solution) It's easy to use, convenient like you don't have to make very complicated steps to make one simple thing happen, right. It's very easy to install, easy to set-up, easy to be adopted in the different environment no matter if you are familiar with Windows or Linux whatever. But it's very easy to use. Uhm, the other thing is, uhm, the developers like, the...how to say that...like the developers even if they are not familiar with the tool at the beginning it's very easy for them to get in, to know the basic stuff and the tutorials or the documentation is online and very easy to read. So that they won't have an excuse I don't know how to use it. Things like that.” (Interview 06)

“(Talking about a sanctioned solution) When I am debugging or deploying things on Websphere there are a lot of things set up how different, it's very complicated, hidden behind even there is these exceptions you need to go deep to figure out how to solve this problem maybe just configuration problem, maybe it's something in your code, it's so complicated.” (Interview 06)

“(Talking about a sanctioned solution) Or if you say I want to solve this particular problem in RSA (Rational Software Architect) there is very little answers out there. You probably need to contact IBM, call different phone calls to get your answer. Maybe not get it at all. But just the way you solve your problem is much harder than when you use those Eclipse and stuff.” (Interview 06)

“Depending on, I mean, if someone have more experience with the tools and get more result, faster, efficient work, yeah, we adopt it and we use it.” (Interview 08)

Sharing similar concerns, interviewee 07 had to move from a few sanctioned solutions to their non-sanctioned alternatives on a number of occasions on the basis of (lack of) technical functionality with the officially sanctioned solutions. When this lack of technical functionality started preventing him from performing his work functions duly, he moved to non-sanctioned alternatives which had the desired technical features. Justifying his decision further, interviewee 07 mentioned better security, wider availability of support, faster support times, compatibility issues, better extensibility as well as much faster development and delivery times among factors that encouraged him to use non-sanctioned solutions.

“Interviewee: For instance like now, you are trying to, you know, debug a JAVA script application. And standard says that you must use Internet Explorer. And Internet Explorer does come with it's own debugger but it's not really smart enough. So, then, what would you do?”

Interviewer: What do you do?”

Interviewee: So, you use Firefox to do that. Sometimes like, uh, the industry standards are not <Organization Name> standards.” (Interview 07)

“Ah, well, even though RAD (Rational Application Developer) or all those Rational tools are based on Eclipse but sometimes there is restriction you cannot add some plug-ins or you need to know exactly what is the based Eclipse version is being used for that particular RAD and then only you can do that and sometimes, you know, you cannot live with it because many times there are some well I shouldn't say bleeding edge but like the more latest tools with which, you know, make your life easier. They are not supported by RAD. So, if Eclipse is more extensible, so that's the reason you know people don't want to get tied to something with which they can't do their job.” (Interview 07)

Now, uhm, say if you are having a public facing application, and you know, because it is public information out there on all these companies which manage these vulnerability lists and uhm similar stuff right. They say that IE (Internet Explorer) is not secure and when

you have to trust your data to somebody and if you want to prevent data breaches so what do you do?” (Interview 07)

Similar illustrative statements have been captured and grouped for each individual cluster. These interview-level quotes are organized by Cluster / Role / Interview and can be seen under the Technical Factors headings in the Antecedents Column in **Table 10 (Appendix M)**. For clarity and where applicable, the nature of the quote as to whether it is referring to positive or negative factors related to non-sanctioned or sanctioned alternatives have been specified in parentheses with appropriate tags after each quote.

5.1.1.4.2.2 Previous Use: Past Experience with Sanctioned vs. Non-Sanctioned Solutions

Technical users who have previous experience with a solution tend to stick with that particular solution as opposed to trying out other available alternatives. Beyond this obvious observation, the interviews have provided a much more in-depth view of the inside dynamics past experience has with other factors that affect the occurrence of hidden and surreptitious adoption of IT solutions.

For interviewee 02 such past experience he had with a non-sanctioned solution helped him select that solution over its sanctioned alternative even though the sanctioned alternative was technically superior and represented a more current stream of technology. In his justification, interviewee 02 mentioned that the tight delivery timelines imposed by management could only have been met with the non-sanctioned solution.

“He was pushing for JAVA. And I said, don't. Management wants the results very quickly and JAVA, if you go into JAVA, although it is a technology of the future, but you will not be able to produce results very quickly.” (Interview 02)

“You see when management says we want the solution...very quickly, so immediately, to my experience which tool can give you the result right away. So, although the tool was older

but I knew this tool is much much faster can develop the application like (ORACLE) Forms.” (Interview 02)

“You see when management says we want the solution...very quickly, so immediately, to my experience which tool can give you the result right away.” (Interview 02)

On occasions when there is an established and entrenched sanctioned solution in place, previous experience with that sanctioned solution may work against its feasible sanctioned or non-sanctioned alternatives. According to interviewee 04, this creates an environment where people would likely oppose (or even fear) change even when better alternatives are offered and keep favouring existing sanctioned alternatives. This view was echoed by interviewee 06 who talked about a few occasions where specific non-sanctioned solutions were dropped in favour of other non-sanctioned solutions with which the technical users had previous experience. With interviewee 05 this behaviour was taken to the extreme where people who were accustomed to an older sanctioned solution rejected a newer sanctioned alternative that was presented to them.

“Sometimes we keep doing things because we don't know a better alternative. So, we just keep doing it and we get comfortable with it.” (Interview 04)

“I think, it's the...again the fear of unknown and the fear of change. Nobody likes to take the pain to change the policies and take responsibility for it. So, although they know or they might know that this is an industry standard, everybody is using it, there is support available for it, but just because this is something new, and they would think...OK, Windows is working fine, why do you want to go for Linux?” (Interview 04)

“(Talking about switching from one non-sanctioned alternative to another) Actually, uhm, there are two projects moving away from Git, one because of the vendor, uhm, the vendor is, <vendor name>, they use SVN and they moved away from Git. Another is the the new developed <business application name>, after I set up the framework and everything and then I leaved the project because the remaining team members they are not familiar with checking in and checking out so they are still like copying code like they didn't use, they build their own and then they copied the code to each other.” (Interview 06)

“Everybody went to training at the time, you know, the Rational initiative, putting everybody into training. People didn't take it seriously here. I don't think, honestly maybe myself, I don't want to exaggerate, maybe two people took it seriously. But the rest, you know, the older, with the people that had been in this branch for longer, I don't want to say

age group but people that are accustomed to what's happening here or in the <organization name> how things run before, they didn't take it seriously. I don't blame the actual tools. Maybe it's just...It was a transformation that was rejected in a way...Let's call it this way.” (Interview 05)

Both interviewee 07 and 08 reiterated their belief in the influence of previous experience on adoption decisions and provided examples of their selection of non-sanctioned tools over sanctioned alternatives on the basis of such past experience.

“(Referring to proclivity to re-use previously used solutions) Yeah, obviously, more likely. And it also, depends upon, you know, your past experience, so, uhm, in past I have worked with CBS, PBCS, ClearCase, Subversion and in most of the places, you know, they got rid of the ClearCase and moved to Subversion. So, naturally nobody questioned, you know, like why they stopped using ClearCase and moved to Subversion. And so, if you have more experience in something so you are also more inclined to use it, you know, whether it's standard or not.” (Interview 07)

“Well, I think it depends on developers' experience. For example, they do have been working on a tool, for example Eclipse tool a couple of years, they feel more comfortable and they are going to work more fast. This is I think is the major thing to impact why we use not following the <central unit name>, I mean <organization name> policy. This is my main point.” (Interview 08)

During within-case analysis similar illustrative quotes have been captured and grouped for each cluster. These individual quotes are organized by Cluster / Role / Interview and can be seen under the Previous Use (Past Experience) headings in the Antecedents Column in **Table 10 (Appendix M)**.

5.1.1.4.2.3 Coolness and Popularity Factor: The Lure of the Latest and Greatest Solutions

The interview results implied that technical users would like to get their hands on the latest and the greatest IT solutions. This attitude towards the trendy solutions introduces the risk of technical users being viewed by their managers as an easily swayed bunch who are eager to fall for the “tool-of-the-day” (interviewee 10).

“(Referring to her technical staff) I have a situation where it was just sort of like the tool-of-the-day they found out other people have access to and so they wanted to have access to it as well.” (Interview 10)

However, at a deeper level, the appeal of the new and shiny solutions may go much beyond cosmetics or mere bragging rights. Interview evidence indicated that technical users do not just “look at the buzz words”, they instead carefully evaluate what succeeds and what fails in the market and rely on this information to make their selections (interviewee 02). They also carefully watch for popular solutions with an eye on potential job prospects in the market (interviewee 04).

“See, I look...I don't look at the buzz words, I see the...what's happening in the market which has successful rates.” (Interview 02)

“And those tools if I look in the market now, to the job requirements, let's say Python is pretty prevalent. Every resume, the new ones, I mean, this is the tool of choice nowadays, so organizations are looking for developers who know these advanced tools.” (Interview 04)

The latest and the greatest solutions are assumed to possess many technological advantages, the most important of which is the speed with which they work translating to faster development times (interviewee 05). These new and innovative solutions also allow newer and fancier technological advancements to be used by technical users which also leads to faster and less effortless solution delivery (interviewee 05).

“Up-to-date tools allow us use those innovative, brand new, bleeding...maybe not bleeding edge...I wouldn't push it to the bleeding edge because we're going to bleed (laughs), uhm, so, ease of use for development, uh, you know, up-to-date, being able to use technology and at the end of the day, uhm, rapid and fast development. So, it shouldn't slow me as a developer.” (Interview 05)

“It's the newest thing. It's you know more innovative, you know, it's easier, not just easier, it's just that being on, you know, being there, being where the technology is going, you know, where it's happening, you know.” (Interview 05)

“Right now I would use JBOSS. Yeah. For it's easier for developers, you know, just drop

something and it deploys it and even JBOSS 7 application server, it's so fast and it uses multiple threading properly, it uses dual core so, it's a much faster start-up and shut down. And it has newer technologies, you know, EE6.” (Interview 05)

By following popular solutions, technical users feel that they are able to keep their technology up-to-date with the whole community and advance their skills (interviewee 06).

“Another factor often is, as technical people like developers you always want to keep with the new technologies right, you don't want to say I keep using the old things for years and years. Then if something new comes out and very very popular in the community that means it's really helpful like Maven, like before we don't even know what's Maven right, and now Maven has come out then I would say I would go with Maven not some other comparable tools. Personally I want to keep my technology up-to-date with the whole community. And almost all the cases if this is popular means this is the best or this is almost make your life much much easier, not going backwards. And the thing you developed, it's easier to be supported or it's easier to be compiled with other environment, it's not too old.” (Interview 06)

Statements illustrating the possible impact of popular, latest and greatest solutions on adoption have been captured and grouped for each cluster where applicable. These individual quotes are organized by Cluster / Role / Interview and can be seen under the Latest and Greatest (Coolness / Popularity) headings in the Antecedents Column in **Table 10 (Appendix M)**.

5.1.1.4.2.4 Other Factors

Financial Factors (budget availability): Unsurprisingly, immediate managers (who may have fiscal responsibilities) are more concerned about budgetary implications of adoption decisions than technical users. While such a statement may imply fiscal conservation which would present budgetary availability as a restricting factor in adoption related decisions, interviewee 10 suggests that budgetary availability can be a two-way street. In other words, adoption decisions may be affected by the availability of too much as well as too little funds. For example, on occasions when there is excess money in the budget towards fiscal year-end, the surplus might be spent carelessly on the most

expensive IT solutions in the market to make sure the budget is depleted.

“My experience is it's always been financial ... implications. Uhm, for whatever reason, whether <organization name> has purchased the rights to certain tools or is unable to buy more current applications or tools, uhm, it's always been the budgetary requirement or lack of budgetary availability. It's probably the reason why there is a discrepancy (between what standards dictate and actual solutions in use).” (Interview 10)

At the technical user level budgetary concerns do not appear to be playing a primary role in adoption decisions. This view is also shared by technical users themselves who admit that budgets only become an issue of concern at a high level (interviewee 08). That being said, some technical users still look for good value for money and value obtaining comparable features, functionality and stability at a lower pricing point (interviewee 04). For employees carrying this logic, open source solutions represent good choice as they are assumed to be free of any costs (interviewee 08).

“For example, I, high level from the, high level from the project manager they found the <organization name> standard tools is such and such and such and use the Rational tools but the problem in each <business area> they do have different budget. To buy and maintain license is very expensive. Depend on the budget of <business area>.” (Interview 08)

“It is a good fit, because if you are getting x amount of features or x number of features and the functionality and the stability for x amount of dollars compared to y amount of dollars then the less is better in that case. Or if you have to pay \$10 compared to \$10,000 it's definitely a good fit. Why would you pay tens of thousands of dollars where you can pay ten dollars?” (Interview 04)

“Uhm...For the tool of course it is free, I mean, for the developer if it's open source then of course that will be very good choice because you don't need to pay the money right?” (Interview 08)

Similar statements related to possible effect of financial concerns on adoption decisions have been captured and grouped for each cluster and can be seen under the Other Factors headings in the Antecedents Column in **Table 10 (Appendix M)**. These quotes are marked with the “budget related” tags in parentheses following each excerpt.

Fit with Existing Solutions: On a number of occasions interviewees at different roles hinted that technology adoption decisions may be affected by what other related or complementary solutions are already in place or what other higher level solutions have already been selected by the upper management.

For example, describing the strict IT environment and the compliance pressures exerted on her team, interviewee 10 felt the need to re-emphasize that the particular IT application she was responsible for "is a mainframe application" and that she needs to "make sure" that her team is "in line with the other applications that are on the mainframe" and that they are "in tuned as to what is required". It is important to note here that mainframes represent the pre-distributed era in computing where computing resources operated in a fully centralized manner. It is interesting to note this distinction as this example may offer an ironic glimpse into the future in the organization where computing is centrally controlled and coordinated (Please refer back to the time-ordered matrix and the accompanying analytic text for context).

"Uhm, more the developers have it because again it's a mainframe application and we need to make sure we are inline with the other applications that are on the mainframe so, they are much more in tuned as to what is required." (Interview 10)

This observation is also supported at the technical user level. For example, interviewee 05 talked about an occasion where relying on a non-sanctioned set of tools and technologies his team successfully completed a legacy business application modernization project. Even though these non-sanctioned tools allowed them to provide functionality that would not have been possible with the sanctioned alternatives, and despite the faster completion times, the team discovered to their horror that their project was shelved as it did not fit into an upper-management preferred "portal solution".

“Like <Manager's Name> is pushing portal solution, portal solution, portal solution, right, and you know, with <System Name> or even with the <System Name>, you know, the case management component that those guys 10-15 of them worked on 7-8 months which is being thrown away. I am assuming they don't want to bother re-factoring those to portal solution. And now they are doing the mistake of developing things temporarily and then re-developing things in the portal environment. So, I would say the management, the senior management like <manager's name> or the centre are pushing the portal but we are not...I don't know how it is going to fit...that question.” (Interview 05)

Similar statements pointing to possible impact existing solutions may have on new adoption decisions have been captured and grouped for each cluster and can be seen under the Other Factors headings in the Antecedents Column in **Table 10 (Appendix M)**. These quotes are marked with the “fit with existing systems” tags in parentheses following each excerpt.

Governance and Controllorship: Earlier on, under the compliance pressures heading, I looked at the potential effect implicit and explicit compliance pressures may have on hidden and surreptitious adoption of IT solutions and found evidence at management and technical user levels about such pressures. Consequently, relying on a number of observations, I was able to show that existence of cluster or corporate level policies, procedures, standards and best practices might contribute to compliance pressures. However, I believe further analysis on this topic may be beneficial as mere existence of policies or standards may not guarantee such compliance pressures all the time for all actors. For example, a policy or a standard may exist but unless actors who are supposed to be obeying such policies are a. aware of such policies/standards and b. know that they are being strictly enforced, mere existence may or may not result in compliance pressures. While the former factor (awareness) is analyzed under a separate heading under the possible moderators and mediators section below, here I focus on the effect of enforcement (or lack thereof).

One question that specifically drilled down on this issue checked whether interviewees knew about penalties for non-compliance or whether they heard about anyone being punished for not following a standard or a policy. The responses were consistent across interviewees with slight differences in beliefs between management and technical user levels. For example, at the technical user level, interviewee 02 did not believe such penalties existed. Similarly, interviewees 04 and 06 were not aware of any penalties either.

“Interviewer: Are there any penalties with not complying with an organizational policy or standards? Interviewee: I don't think so.” (Interview 02)

“Interviewer: Are you aware of any penalties for not complying with organizational policies and standards?

Interviewee: I am not aware of that.” (Interview 04)

“Interviewer: Do you know if there are any penalties for not complying the corporate policies?

Interviewee: (gesture indicating no)

Interviewer: No?

Interviewee: No, I don't know anything (laughs).” (Interview 06)

While not rejecting the possibility of penalties, interviewee 07 admitted he had not heard about any penalties himself. On the other hand, interviewee 08 suspected that there would be penalties but had not heard of anyone who was subjected to punishment for non-compliance.

“Interviewer: Do you know if there are any penalties for not complying with <Organization Name> IT standards or policies?

Interviewee: I haven't heard of anything.” (Interview 07)

“Interviewer: Do you know if there are any penalties for not complying with corporate policies?

Interviewee: No.

Interviewer: You don't know or there are no penalties?

Interviewee: Probably they do have penalties but I don't know for the details.

Interviewer: OK. Have you heard of anybody who was punished because that person used an unapproved tool?

Interviewee: No, I haven't. At least I haven't heard any. Did you heard that? I don't know (laughs).” (Interview 08)

The immediate management replies were slightly different in that both interviewee 01 and interviewee 10 believed that penalties existed but while interviewee 01 argued that they existed only in theory and did not have any serious practical implications, according to interviewee 10 penalties only applied at the director level and did not have any implications for immediate managers.

“Interviewer: What are the penalties for not complying with an organizational policy or not following an IT standard?”

Interviewee: (laughs)

Interviewer: Are there any?”

Interviewee: I guess in theory, there are. But in practice I am not so sure how serious that is. I guess lately they have tried to impose more standards.” (Interview 01)

“Interviewer: Do you know if there are any penalties for not complying with the IT policies and standards? In the <organization name>?”

Interviewee: Well, there are penalties to...at the director level. I don't think there's any penalties to us.” (Interview 10)

Consequently, none of the interviewees believed that non-compliance on his/her part would have any serious implications for himself/herself. This is not surprising considering lack of proper enforcement of rules across the organization historically (which may now be changing thanks to the centralization efforts). Similar statements were captured and recorded for each cluster which support the possibility that lack of proper governance structures and enforcement may impact adoption decisions. These excerpts have been captured and grouped by Cluster / Role / Interview and can be seen under the Other Factors headings in the Antecedents Column in **Table 10 (Appendix M)**. The particular quotes are marked with the “governance and accountability” tags in parentheses following each excerpt.

Performance Induced Awareness: As discussed under the technical factors heading in the antecedents section above, on numerous occasions, when technical users adopted a non-sanctioned solution, they

had valid technical reasons to do so. For example, on many occasions the sanctioned solutions did not provide the technical functionality anticipated by technical users or simply fell short of their expectations in terms of features or ease-of-use leading to sub-optimal performance.

On those occasions when technical users operate under performance related pressures (meeting delivery timelines, quality of applications developed and so on...) their receptiveness for alternatives will likely be heightened. At those times, if they are already familiar with certain alternative solutions, they might be more likely to give them a try (please see the heading on previous use under the antecedents section above for a more detailed discussion on this).

In cases technical users do not already have a tested-and-tried alternative at hand, they may still look for other alternatives with the objective of improving their job performance or reducing their work load. For example, interviewee 01 branded this as "a natural reaction" for technical users "to free up from those restrictions" imposed on them by the sanctioned solutions.

"...all the environments that we are in from our desktops to our servers. (They are) dictated in a very arbitrary way. And very stiff and unproductive in my opinion. So therefore it is kind of a natural reaction of people trying to use something different, trying to free up from those restrictions." (Interview 01)

This was apparent in the market or industry scanning behaviour exemplified by many interviewees. For example, interviewee 02 talked about his scanning the market looking for successful products. Similarly, interviewees 04, 05 and 07 all talked about their familiarity with industry standards and how it affected their solution preferences. All these incidents point to possibility of increased user awareness due to lacklustre performance attributable to use of sanctioned solutions.

"The only reason was that I have seen the success in the market." (Interview 02)

“See, I look...I don't look at the buzz words, I see the...what's happening in the market which has successful rates.” (Interview 02)

“(Referring to industry standard status of certain non-sanctioned solutions) So, although they know or they might know that this is an industry standard, everybody is using it, there is support available for it, but just because this is something new, and they would think...OK, Windows is working fine, why do you want to go for Linux?” (Interview 04)

“Yeah, I, you know, like, ease of use for development, uhm, up-to-date technologies, you know, being able...the tools should support up-to-date technologies you know, you want to use frameworks and libraries and things that...open source which, the whole industry are pouring effort into developing like, just yesterday I was reading about JBOSS identity...federated identity, it's really a new thing, uhm, and it's in the open source community now.” (Interview 05)

“...Sometimes like, uh, the industry standards are not <organization name> standards.” (Interview 07)

“(Referring to industry standard status of certain non-sanctioned solutions) Uhm, they are (industry) standards because they are easy-to-use and they have been widely adopted, there is a vibrant community supporting the application and it's open source so anybody can join...” (Interview 07)

In each successive cluster, statements have been captured that pointed to the possibility that user awareness of alternative non-sanctioned solutions could be heightened because of performance concerns with existing sanctioned solutions. These quotes have been grouped for each cluster by organizational role as well as by individual interviewee number and can be seen under the Other Factors headings in the Antecedents Column in **Table 10 (Appendix M)**. These quotes are marked with the “performance induced awareness” tags in parentheses following each excerpt.

5.1.1.4.3 Possible Moderators and Mediators

5.1.1.4.3.1 Technical Knowledge/Skill Level: Technical Users vs. Management

The interviewees at the immediate management level agree that technical knowledge and skill level may play an important role in shaping adoption preferences. For example, according to interviewee 01

the "skillset" as well as "knowledge and understanding of technologies" (or lack thereof) will affect adoption of solutions. This view is shared by interviewee 10 who thinks that in some cases "level of knowledge" may be the sole determiner of adoption.

“Interviewer: And what do you think may cause this discrepancy between corporate policies which mandate something and what your team comes up with as a preferred solution?”

Interviewee: Well, I think it is something along the lines of what we said before. I think it's this, it's between the ease of use and the technical superiority. So it is difficult to standardize on something that covers all the possibilities. It depends a lot on the project. And the skillset as well of the people, to adopt certain solutions. Therefore the imposition of a standard is could be possibly difficult. As much less productive than finding the solution that we tailor to the specific project. ” (Interview 01)

“Interviewer: (Referring to technical user adoption preferences) And what do you think makes them prefer something on top of an alternative?”

Interviewee: In some cases it's just level of knowledge. In some cases it is again just preference or word-of-mouth.” (Interview 10)

Members of each organizational role (immediate managers, technical users...) perceive the upper levels and in particular the participants of corporate standard making process (i.e. corporate staff and senior decision makers) to have less technical knowledge than themselves. Interviewee 01 talked about his disapproval of the upper management "belief" "that they know better" due to their positional authority.

“I guess there is also the belief at least in some parts of the upper management that they know better. They know better therefore they are supposed to influence or provide directly to the staff what should be used. Because from their position, they should know. I believe that is a false perception. But I have sensed that that happens from the management. So, (imitating the upper management) 'we at our level we should know what tools to use or what direction to give to the staff and what to procure to use in their projects'. Which, again, I believe is a wrong concept but I sense that it happens.” (Interview 01)

This view is even more prevalent among the technical users. For example, referring to his experience with a technical approval body, interviewee 02 boasted that he "could tell them anything" and that they would not know the actual implementation details. Interviewee 02 went on to argue that the corporate

centre did not "know what is happening in the market" and that "they are not aware of the technology" as "top guys are not very technical". This view was shared by interviewee 07 who suspected that at higher levels "the people are not exposed to current R&D and the what's in and what's out in the industry".

"But of course those guys are not technical, you know, we could tell them anything. Right. They wanted to see, OK, this is (garbled) is going to look like this. Behind what's happening...of course, nobody knows (i.e. they did not know what was the underlying technology)." (Interview 02)

"The corporates, you know, they are not aware of the technology. They don't know. They don't know what is happening in the market. The technical people knows what's happening in the market." (Interview 02)

"(Referring to standard makers at higher levels) I think one reason is that in the <organization name> because if not the people are not exposed to the current R&D and the what's in and what's out in the industry. So, people will not know." (Interview 07)

Perception of lack of technical knowledge at the higher levels was also voiced by interviewee 04 who, within the context of new and innovative solutions, argued that even the commonly used industry solutions would be foreign to the upper management in the centre to the extent that "those known names would sound funny to them". The same perception was shared by interviewee 05 who openly complained about technically inaccurate decisions made by his senior manager as well as the "lack of knowledge of the centre" concerning the needs at "the developer level".

"Interviewer: What would the really upper management, the ones who put those rules in place about the use of certain software packages etc. would think if they know that, in places in the organization, such software solutions as Python or Linux or Git and so on is being used?"

Interviewee: I don't think they would be thrilled to hear about it. Because, again, even those known names would sound funny to them, like, what are you using? This is not the standard. But, it will take a little bit of time to change the mentality and develop that perception that no it's not a bad thing to do." (Interview 04)

"There is a lack of knowledge of the centre...of the official...uhm...processes if you will from the central agency down to me, the developer level..." (Interview 05)

The perception related to "upper management" being disconnected from lower levels has surfaced many times during interviews at both management and technical user levels. While it was not especially surprising to come across such claims by technical users who presumably have less understanding of issues and concerns beyond the technical realm, it was interesting to see them at the management level. For example, interviewee 01 talked about how the centre imposed configurations, changes and security "in a generic way" and "without considering the specific needs of the groups, particularly the development groups". Interviewee 10 made a similar argument and suspected that central upper management decisions was "probably based on a lot of input that may be antiquated" and did not consider "the actual detailed issues and concerns that affect" work at lower, technical levels.

"...how the changes, patches to the systems are ordered or imposed of the security around it, which is imposed in a generic way without considering the specific needs of the groups. Particularly the development groups." (Interview 01)

"Top-down generally is more high-level, they don't look at the actual detailed issues and concerns that affect what we do. What a type of work that we do. And have a vested interest in ensuring it's done accurately. Because even the more, the most minor things that may be overlooked cause the biggest problems for us in the end." (Interview 10)

"Well, I would hope it would be the most up-to-date information but in some cases it's probably based on a lot of input that may be antiquated or, uhm, resources or researches that maybe not up-to-date and their maintaining old information and just re-using it because their focus hasn't been IT." (Interview 10)

Technical users' confidence in their knowledge and skills was apparent throughout most of the interviews. Furthermore, there was sufficient evidence to show that highly skilled users (or even ones who may not have top-of-the-line technical skills but maintain confidence in their technical skills regardless) will be less likely to bend under compliance pressures and more likely to use non-sanctioned solutions. For example, when asked about his willingness to use non-sanctioned solutions on mission critical projects (which are more likely to be scrutinized and thus would be under greater

compliance pressures) interviewee 05's favourable position on non-sanctioned alternatives were not affected. Interviewee 06 showed a similar reaction when she was asked if her preference on a non-sanctioned development tool would be affected if she was aware of corporate standards mandating alternative sanctioned solutions. Her stance was not affected and she comfortably admitted that she "would still go ahead with" her preferred solution. Same kind of behaviour was observed with interviewee 07 who indicated his willingness and inclination to use non-sanctioned solutions "whether it's standard or not" and with interviewee 08 who tied developer familiarity, experience and "strength" to continued use of a non-sanctioned development tool even under compliance pressures.

"Interviewer: So, would you be more willing to use it on a larger project or a smaller project or would it matter?"

Interviewee: To me it wouldn't matter. But I am saying maybe the centre, or whoever pushes those, put those IT standards, think that, you know, more mature product is safer, you know, more secure." (Interview 05)

"Interviewer: When you have adopted Git or Eclipse if you knew that there was a corporate standard saying that you shouldn't be using anything but ClearCase or Rational Application Developer, uhm, how would that affect your decision? Would you be more likely or less likely to go ahead with Git?"

Interviewee: I would still go ahead with Git (laughs).

Interviewer: You would still go ahead?"

Interviewee: Yeah. It just makes your daily life easier, right. And then, it would help get your job done faster. It's the...the two are the...serve you for the same purpose, why not take the easier way to do that?" (Interview 06)

"And so, if you have more experience in something so you are also more inclined to use it, you know, whether it's standard or not." (Interview 07)

"Uhm, actually it's depend on, it's not...from actually depend on the developer experience. If they just prefer using open source like Eclipse, Eclipse and IT tools they are more familiar with that because then they have lots of experience to do I mean adding the plug-in and more future for Eclipse, for the developer who have a very strong I mean background of science they'll probably like using Eclipse." (Interview 08)

Where applicable, statements in similar tone and content have been captured and grouped for each cluster which illustrate the effect of technical knowledge as a possible moderator and/or

mediator on adoption decisions. As earlier, these individual quotes are organized by Cluster / Role / Interview and can be seen under the Technical Knowledge headings in the Moderators and Mediators Column in **Table 10 (Appendix M)**. At times, and to avoid duplication, if a particular quote has already been listed earlier under another related heading (i.e. Technical Factors or as another Moderator/Mediator) it may not have been repeated.

5.1.1.4.3.2 Project Size, Visibility and Criticality

Evidence from observations at management and technical user levels hinted that project size, visibility and criticality (i.e. perceived risk) may likely play a moderating role on the effect of external and internal pressures on adoption decisions.

For example, immediate managers have repeatedly emphasized the importance of project size and risk. When asked about the level of decision making for adoption related decisions, interviewee 01 clarified that "for small projects" he was the one who would be making the adoption decision opening the door to possible non-sanctioned solution use. Interestingly, interviewee 01 kept the door open for non-sanctioned solution utilization in larger projects by admitting that "interpretations are made" even in large projects. In comparison, interviewee 10 explained she followed a more risk-based approach and stated that she would be fine with non-sanctioned solution use "if the impact is minimal" whereas in an opposite scenario involving "huge risk" she would "go to the senior management" for approvals thus making hidden and surreptitious adoption a practical impossibility.

"Well, it depends on the level of the project. For small projects I decide. For the larger projects where I am not, I am just part of it but not the project manager than the decision is made at a higher level." (Interview 01)

"Well, I guess, somehow, again it's particularly in the large projects, the interpretations are made. Or standards are simply not followed, people interpret the standards, part of the

standards not totally the standards. Which is...like saying... you don't follow the standards (giggles).” (Interview 01)

“First try to determine what's the impact. If the impact is minimal but the actual gain is going to be something that is a win for the organization or the client, then it's fine. I'd say it's fine. I risk manage the things and determine that it's OK we could go ahead. If obviously it's the opposite, there is not really an (unclear) to it and or there is a huge risk to it then I try to deter, I go to the senior management and see if I can get an approval. If there is any slight chance of it being, uh, me misinterpreting it but there is a gain to it and if we could get an approval.” (Interview 10)

*“Interviewer: (On occasions involving possible adoption of non-sanctioned solutions) Would you always go to the senior management?
Interviewee: Not if the risk is...only if the risk is great.” (Interview 10)*

For technical users decision factors involved size along with visibility of projects. For example, interviewee 02 was comfortable breaking the "chain of hierarchy" and using non-sanctioned solutions for "small", "internal" or "invisible" (sic) projects where he had full control over activities. However, for organization-wide projects he quickly deferred the decision responsibility to managers.

“Depending on the size of the project or depending on the nature of the project. If it is a very visible project or it's very small invisible (sic) project, OK? I can give you example of what we have: <business application name>, it's a small thing, which is internal, right? We take care of our activities, you see. So, for that, any technology we can use, it doesn't matter. But if the project, if the nature is <jurisdiction name> wide, <organization name> wide, then I think the corporate policy is important. And maybe the manager will not accept. Other than the policy.” (Interview 02)

For interviewee 04 it also was about size as he admitted that he "probably wouldn't bother going through that lengthy procedure" (for approvals) "if it's a very trivial thing". Interviewee 05 was also more comfortable using non-sanctioned solutions for "medium-to-small size" projects as well as "for applications that are under the radar". That being said, interviewee 05 also admitted that he would also consider using non-sanctioned solutions for larger or even mission critical projects.

“...I would be very inclined to fight my way through and if I found that OK it's a tedious and lengthy process but eventually I'll get to it I will do it because it just makes a lot of

sense. If it's a very trivial thing, I probably wouldn't bother going through that lengthy procedure..." (Interview 04)

"(Referring to adoption of a non-sanctioned methodology) Agile was great experience for medium-size maybe project, medium-to-small size. Agile, in terms of, you know, methodologies." (Interview 05)

"(About his willingness to use non-sanctioned solutions in small vs. large projects) ...yeah, I would be willing for...uhm...for applications that are under the radar, let's say. You know, uhm...you know, internal applications maybe." (Interview 05)

"Interviewer: So, would you be more willing to use it on a larger project or a smaller project or would it matter?

Interviewee: To me it wouldn't matter. But I am saying maybe the centre, or whoever pushes those, put those IT standards, think that, you know, more mature product is safer, you know, more secure." (Interview 05)

Size, visibility (e.g. internal vs external applications) and criticality were all considerations for interviewee 06 who stated that for smaller, less-visible (e.g. internal), or less critical projects she would be more willing to choose non-sanctioned alternatives despite internal and external pressures. Interviewee 06 provided examples that illustrated how bigger projects would be more susceptible to external (e.g. vendor) or internal (e.g. upper management) pressures.

"For deployment, like especially the big, big projects I probably would think OK because this goes to production, very very big project like <business application name>, uhm, but if it's just internal application I would still go with JBOSS. I used them both in the last year when I am debugging or deploying things on Websphere there are a lot of things set up how different, it's very complicated, hidden behind even there is these exceptions you need to go deep to figure out how to solve this problem maybe just configuration problem, maybe it's something in your code, it's so complicated. And also it's very heavy like stuff but JBOSS is like lightweighted and logings are more clear, the setup is much easier, so I'd say if it's not a very critical, big project like <business application name>, I would still would choose JBOSS." (Interview 06)

Interviewee 07 was the only technical user in Cluster 1 who was indifferent to the moderating effects of project size stating he "would keep on using those tools" as long as the tools make him "more productive and do more work".

“Interviewer: About those innovative tools that you use, uhm, does it matter how big or small the project is? Would you feel more comfortable using those unapproved tools for smaller projects as opposed to big ones? Does it matter?”

Interviewee: I don't think so. No. As long as I am able to be more productive and do more work I would keep on using those tools.” (Interview 07)

Sample illustrative statements involving other organizational roles (e.g. corporate staff and senior managers) and capturing differing contexts have been recorded and grouped for each cluster where applicable. These individual quotes are organized by Cluster / Role / Interview and can be seen under the Project Size, Visibility and Criticality headings in the Moderators and Mediators Column in **Table 10 (Appendix M)**.

5.1.1.4.3.3 Awareness: Sanctioned vs. Non-Sanctioned Alternatives

The concept of awareness represents a double-edged sword in hidden and surreptitious adoption realization. One of its edges, awareness of formal rules (policies, procedures, standards, best practices...) will likely have an inverse relationship with adoption of non-sanctioned solutions. That is, the more aware technical users become of formal rules, their tendency to break those rules and use non-sanctioned solutions will likely depreciate. The other edge concerns the awareness of alternative, non-sanctioned solutions. In comparison, this second form of awareness will likely have a direct relationship with hidden and surreptitious adoption possibilities in that the more aware technical users become of industry standard and technically superior non-sanctioned solutions, the more likely they become to reject sub-optimal sanctioned solutions and opt for the non-sanctioned alternatives.

The manager-level interviews have shown that immediate managers are not fully aware of the standards. Interviewee 01 admitted his quasi familiarity with organizational rules while interviewee 10 linked such awareness and knowledge of rules to adoption of IT solutions. It is possible that the

interpretation of standards mentioned by interviewee 01 during his talk on large projects (please see the relevant discussion above) may be attributable to this lack of awareness. The topic of awareness becomes especially important in light of interviewee 01's classification of availability (of formal solutions) as a driver of adoption. Naturally, awareness of such solutions is a co-requisite to those formal solutions being offered in the first place. Manager level lack of awareness of official rules was further demonstrated by interviewee 10's lack of knowledge on penalties for non-compliance.

“Well, I think that the drivers of this is that the people making the decisions are not fully aware of the standards or they don't even care about the standards.” (Interview 01)

“Because that is the big driver, what is available.” (Interview 01)

“(Referring to adoption of non-sanctioned solutions) I don't think there's any penalties to us. Other than our managers telling us that we are not supposed to be using it. They would want our compliance and that we need to make changes I am assuming, well I guess that would be the penalty itself.” (Interview 10)

At the technical user level, there was plenty of evidence showing high levels of awareness concerning alternative solutions. A corresponding low level of awareness concerning formal rules was also observed throughout the interviews (which is not really surprising considering the low level of awareness of rules at the management level). For example, interviewee 02 talked about low awareness of alternative solutions by the corporate centre before boasting about his wide awareness of successful solutions in the market and its contribution to his adoption preferences. Nevertheless he also openly admitted his low level of awareness around corporate rules in his earlier days (no evidence -beyond his assurances that he would now follow corporate standards- was gathered to show his awareness of rules has since increased).

“The corporates, you know, they are not aware of the technology. They don't know. They don't know what is happening in the market. The technical people knows what's happening in the market.” (Interview 02)

“Interviewee: The only reason was that I have seen the success in the market. You see, I did not based on what the corporate is asking. At that time I was new. I did not know there was a corporate policy. Now I know the corporate policy more. That we have to go into these lines of business...(corrects himself) those line of products. Infrastructure .NET or JAVA. At that time I didn't know that much.

Interviewer: If you knew, would you have acted differently?

Interviewee: No.

Interviewer: OK. Why is that?

Interviewee: Success. 100 percent success. I was sure that we will succeed, if we go this line of action.” (Interview 02)

Similarly, interviewee 04 was equally forthcoming in admitting his low level of knowledge on corporate standards as he provided evidence showing his high awareness of non-sanctioned solutions in the market. Interestingly, at the same time, he also admitted his willingness to follow corporate rules (which highlights the importance of awareness once more). As a testament to the positive impact awareness (of non-sanctioned solutions) may have on hidden and surreptitious adoption, interviewee 04 talked about how vendors (of non-sanctioned solutions) could use success stories to create awareness of their offerings. He also suggested that such success stories could be used to draw attention to outdatedness of corporate rules.

“Well, I mean, I know some of the standards but not thoroughly informed on, you know...I was never informed like exactly of this is the standard and this is what you cannot deviate from. So, I've never received those strict guidelines.” (Interview 04)

“If it's a policy I cannot use Linux in production in the government I would certainly just not do it.” (Interview 04)

“I follow articles, I follow the webcasts, magazines...Or anything of my interest. I see something on Linux, an Oracle side or the new development and innovation, I read up on it. I don't say that I particularly follow that but if something catches my eye I read it. If you have an open eye you can't miss it nowadays. You can't be unaware.” (Interview 04)

“Yeah, vendors could play a role in this...(smiles) I think they need to cause some more awareness. How they do it is up to them. But how they have done it previously I am not sure. But of course the vendors have to shine a little extra especially vendors who are trying to make growth so, and they can use examples of places which have already adopted. So, let's say Red Hat could take our example and say hey this branch is running fine. Leverage our use of Linux. Portray it to the centre.” (Interview 04)

A similar pattern of low awareness of corporate rules and a relatively high awareness around non-sanctioned industry alternatives was observed with remaining technical users in Cluster 1.

“(Referring to technical users' tendency to ignore policies) Being a typical developer, you know, yeah whatever, another policy. It probably does have some penalties. I don't know to what extent. (laughs)” (Interview 05)

“Interviewer: (Referring to corporate IT standards) Do you think everybody follows those standards?”

Interviewee: I don't think so, at least I am not following them. I don't even know the details of all the rules.” (Interview 06)

“Interviewer: When you went ahead with Subversion or Eclipse, did you know that there was a standard in place saying that you should be using RAD or ClearCase?”

Interviewee: No, I haven't checked it out. Or even I don't know. Nobody told me. No, nobody.” (Interview 08)

As part of the within case analysis, illustrative statements pointing to the possible impact of awareness have been gathered in each cluster. These individual quotes have been grouped by Cluster / Organizational Role / Interview Number and organized for reference under the Awareness headings in the Moderators and Mediators Column in **Table 10 (Appendix M)**. For further reference, the nature of awareness (e.g. awareness of sanctions, awareness of non-sanctioned alternatives and so on...) have been tagged and provided in parentheses after each excerpt where applicable.

5.1.1.4.3.4 Availability of Help and Support

Throughout the interviews help and support availability emerged as an important factor which may likely affect second-stage adoption of non-sanctioned IT solutions by technical users. This finding was not totally surprising as the extant research is already clear on the facilitating role of this factor on organizational adoption of technological innovations. Nevertheless, this study provides an in-depth view into the effects of various elements of help and support in scenarios involving hidden and

surreptitious adoption of IT solutions.

The effect of help and support availability was apparent at both management as well as technical user levels. For example, at the management level, interviewee 10 pointed to the importance of having knowledgeable technical users internally as well as the availability of help and support via external consultants and through external communities.

“...because again, it's not a, it's a process or a product that not only the folks that are very well versed in the products here but consultants are also advocating and the masses are actually advocating one product over another there's got to be some justification in it.” (Interview 10)

This view highlighting the importance of both internal and external sources as providers of help and support was also supported at the technical user level. Interviewee 02 talked about the positive impact well-versed internal users may have on adoption and also emphasized the possibility of access to self help through online means which, among other things, include such sources as "Google", "forums and blogs" as well as online communities.

“If I am a manager, and if I know my resources are very well in this tool I'll tell them let's use them more.” (Interview 02)

“But nowadays that friend can be Google too. You know Google is, has enhanced our pace of work to a very higher level. Before we used to look for books, this and that, now in seconds we find the answers.” (Interview 02)

“Mostly, it will be the forums, blogs and these information, like for example, Oracle has it's own forum where you can go, log as anybody and start asking questions. And the people will give you the answer.” (Interview 02)

According to interviewee 04 on occasions where internal expertise lacked, the availability of external help could be a substitute for help and support. Interviewee 05's story on his move away from a sanctioned solution showed that availability of help and support not only encouraged adoption of non-

sanctioned solutions but where it fell short of user expectations it also discouraged continued use of sanctioned solutions as well.

“...if I know I have a solution then if I don't have expertise on that I may have to hire somebody. That would open another gate of approvals...” (Interview 04)

“Another thing with maybe ClearCase (sanctioned solution), it could be the tool, it could be the support to the tool too. Because, right now, in our branch there is no expert, let's say, uhm, that, uhm, like an admin person. I'll give you an example, I might be converting <business application version> to a newer version. So, I need to create a new component or whoever the ClearCase admin needs to create a new component on the server to start a new, the new development and the source code under that component. I'm not sure if there is (laughs) like <colleague name> knew how to do that so now...So, like a I guess, it prevents me, it's concerning for me. I'd rather...So, to give, to put it in a different way...Git (non-sanctioned solution) is, I could administer Git myself, versus having this tool that it's not really administered, there is no...(laughs)...you know what I mean?” (Interview 05)

On the topic of potential sources of support interviewee 05's testimony was similar to earlier accounts and confirmed the importance of having access to an expert for help and support purposes. Interestingly, interviewee 05, 06 and 07 all agreed on the relatively lower quality of support provided by vendors of sanctioned tools and praised the ease with which help and support could be obtained on sanctioned or non-sanctioned solutions alike on the Internet through various communities.

*“Interviewer: Would you be more willing to use it if there was a community of interest?
Interviewee: Yeah, definitely, yeah. I would be more, knowing, you know, there is support, there is people you can...they can help you, you know. I believe everything has been done before. So, you can always ask someone else's or, you know, for getting...how did you do it? what happened? what were the...what's to avoid? what were the harder parts, you know...So, I do. So, it would be a support and more comfortable and confident, uhm, layer or, you know, a group to rely on.” (Interview 05)*

“Or if you say I want to solve this particular problem in RSA (Rational Software Architect) there is very little answers out there. You probably need to contact IBM, call different phone calls to get your answer. Maybe not get it at all. But just the way you solve your problem is much harder than when you use those Eclipse and stuff.” (Interview 06)

“The important thing is there are a lot of solutions out there. Like if you have come up with a problem, just Google on line, there's a lot of developers out there, they have similar issues with you, they are using Eclipse like free, they are not using RSA.” (Interview 06)

“...for instance working with the IBM. Now, like I was telling you earlier that there is one small issue it's almost now two months I am working with IBM and still they don't know, you know, how to fix it. So, if a commercial tool cannot solve the problem and the vendor does not know how to fix it, so what good is that tool even though, you know, I am paying them for support and have purchased that.” (Interview 07)

“Interviewer: (Referring to obtaining support on a non-sanctioned solution) So, in comparison, would you be able to find support on like Eclipse easier?”

Interviewee: Yes. If...Because it's open source right so there are so many public forums and most likely, the issue you are experiencing somebody else has already experienced. And if not, you can always post a question and sooner or later you would get an answer.” (Interview 07)

Despite these supportive testaments to the positive role of help and support in shaping adoption decisions, interviewee 04 was still not certain whether industry acceptance and availability of support would be sufficient to overcome resistance at higher levels on the basis of "fear of unknown and fear of change". While interviewee 04 questioned the ultimate effect of availability of help and support on initial adoption decisions, interviewee 05 argued that the provision of help and support on non-sanctioned solutions by commercial players (as opposed to online communities) would likely help overcome fear and resistance at higher levels. This view was also shared by interviewee 04 who suggested that commercial vendors could play a similar role by creating awareness around non-sanctioned solutions in the right circles (i.e. by targeting decision makers).

“I think, it's the...again the fear of unknown and the fear of change. Nobody likes to take the pain to change the policies and take responsibility for it. So, although they know or they might know that this is an industry standard, everybody is using it, there is support available for it, but just because this is something new, and they would think...OK, Windows is working fine, why do you want to go for Linux?” (Interview 04)

“It might be fear of taking the risk of trying something new, in other words, you know, covering your behind. Uhm, there might also be reason of support, you know, so, that might be their argument but it's not the reality, because the newer tools, Eclipse whatever all the open source tools, you could have, you could buy an open, you know, licence, support license, that's right.” (Interview 05)

“Yeah, vendors could play a role in this...(smiles) I think they need to cause some more

awareness. How they do it is up to them. But how they have done it previously I am not sure. But of course the vendors have to shine a little extra especially vendors who are trying to make growth so, and they can use examples of places which have already adopted. So, let's say Red Hat could take our example and say hey this branch is running fine. Leverage our use of Linux. Portray it to the centre.” (Interview 04)

Finally, interviewee 06's example where her team moved away from one successful and non-sanctioned tool to another non-sanctioned tool due to lack of familiarity and tight delivery timelines showed that even on occasions where initial second-stage adoption was materialized and help and support was at hand this still did not guarantee continued use.

“Actually, uhm, there are two projects moving away from Git, one because of the vendor, uhm, the vendor is, <vendor name>, they use SVN and they moved away from Git. Another is the the new developed <business application name>, after I set up the framework and everything and then I leaved the project because the remaining team members they are not familiar with checking in and checking out so they are still like copying code like they didn't use, they build their own and then they copied the code to each other.” (Interview 06)

During within-case analysis similar illustrative statements emphasizing the potential effect of help and support availability have been captured and grouped for each cluster where applicable. These individual quotes are organized by Cluster / Role / Interview and can be seen under the Help and Support Availability headings in the Moderators and Mediators Column in **Table 10 (Appendix M)**.

5.2 Cross Case Analysis (multiple-case data displays)

5.2.1 Exploratory and Descriptive Displays

5.2.1.1 Case-Ordered Display: Internal and External Influences (Cross-Cluster View)

During within case analysis evidence confirming or rejecting the existence of various internal and external influences was collected within the boundaries of each case. At this stage, building upon the results of the preceding case-specific analysis, a case-ordered display was created to look at cross-cluster occurrence of these internal and external influences. The case-ordered display for internal and

external influences display case-by-case data and rank each influence into a category based on confirming or disconfirming evidence collected at the case level.

Initially, four separate interim matrix displays were created to look at interview-level data for each of the four clusters. Each row in a matrix correspond to evidence gathered via a particular interview and each of the six data columns was used to capture existential data on a particular internal or external pressure. In other words, in cluster-specific displays, each cell was used to capture evidence confirming or disconfirming the existence of a particular pressure in a given cluster. Sample displays are provided in **Appendix N** under the Internal and External Influences heading. For each column, a separate data file was created to list direct interview quotes for a given pressure in a specific cluster. Creation of the data files was done using the analysis module of a qualitative data analysis tool which allowed slicing of coded interview transcripts along many dimensions involving specific codes or descriptors. A total of 24 data files were created (6 pressures x 4 clusters). The collective length of the excerpt data were 112 pages. Each data file pulled and grouped relevant data excerpts from individual interviews. Each excerpt was clearly marked with a number of descriptors (interview number, date and interviewee characteristics among others) which made it possible to tie individual excerpts to a particular interview.

The data files were then exported to text format and then read (and in many cases re-read many times) in great detail in a word processor to decide whether there was sufficient evidence to be able to argue that a particular internal or external pressure materialized in a given cluster. In cases where sufficient positive or negative evidence was found for a given interview in a cluster, in the relevant interim matrix display that cell was marked with a positive (i.e. 'Y') or a negative (i.e. 'N') indicator to highlight existence of that pressure. On rare occasions, cells had to be marked with both positive and negative indicators where both kinds of evidence was quoted by the interviewee. Nonetheless, these rare

occasions did not necessarily indicate conflicting accounts on part of a given interviewee. Mostly, they were simply accounts of different occurrences involving different contexts. When it was not possible to find either positive or negative evidence the cell was marked with a neutral indicator (i.e. 'Blank') to indicate that no evidence of either kind was found. The decision not to count the number of occurrences of positive or negative indicators on a specific pressure for a given cluster was deliberate. Each of these occurrences may reflect different contexts and involve a variety of actors and a simple quantitative counting exercise would turn them into equal apples (or oranges). Instead, collective evidence at the interviewee level was taken into consideration in context before a positive or a negative indicator was awarded.

The indicators in the interim matrices were then aggregated in a case ordered display (see **Table 11** below) to create cluster level categorical magnitude scores for each pressure. The rows show each of the four clusters while the columns list individual pressures under two generic categories (internal and external). The magnitude scores were calculated using a quantitative scheme which involved calculation of three percentage scores for each pressure in a given cluster. These percentages were based on the ratio of the number of interviews where a type of indicator was recorded for a cluster to the total number of interviews in that cluster. For example, out of the eight interviews conducted in Cluster 1, seven interviews had sufficient evidence that confirmed existence of compliance pressures. Two interviews had disconfirming evidence (with only one overlapping with another interview where positive evidence was also found). As a result 88 percent (7/8), 25 percent (2/8) and 0 percent (0/8) was marked on the relevant cell (Cluster 1 x Compliance Pressures) in the case-ordered matrix. Once all cells were populated, categorical magnitude scores were calculated. These scores were based on the calculated ratio differences between positive and negative indicators and an interval 5-point scale corresponding to categorical values that range between HIGH and LOW was utilized to indicate the

score (scale provided in matrix legend).

Table 11 - Case-Ordered Display: Internal and External Influences (Cross-Cluster)

		Internal									External								
		Compliance Pressures			Identification Pressures			Internalization Pressures			Coercive Pressures			Normative Pressures			Mimetic Pressures		
Cluster 1		HIGH			HIGH			MOD-LOW			HIGH			HIGH			HIGH		
		88 %	25 %	0 %	100 %	0 %	0 %	25 %	75 %	0 %	100 %	0 %	0 %	100 %	0 %	0 %	75 %	13 %	13 %
Cluster 2		HIGH			HIGH			MOD			HIGH			MOD-HIGH			MOD-HIGH		
		100 %	0 %	0 %	67 %	0 %	33 %	33 %	33 %	67 %	100 %	0 %	0 %	33 %	0 %	67 %	67 %	33 %	0 %
Cluster 3		HIGH			HIGH			MOD-LOW			HIGH			MOD-HIGH			HIGH		
		100 %	25 %	0 %	75 %	0 %	25 %	25 %	50 %	25 %	75 %	0 %	25 %	50 %	0 %	50 %	75 %	0 %	25 %
Cluster 4		HIGH			HIGH			MOD			MOD-HIGH			MOD-HIGH			MOD-HIGH		
		63 %	0 %	38 %	100 %	0 %	0 %	25 %	38 %	38 %	63 %	13 %	25 %	50 %	0 %	50 %	38 %	0 %	63 %

Percentage of interviews in this Cluster in which existence of this particular pressure is confirmed or acknowledged (A)

Percentage of interviews in this Cluster in which existence of this particular pressure is disconfirmed or denied (B)

Percentage of interviews in this Cluster in which existence of this particular pressure is neither confirmed nor denied

HIGH : A - B is (0.60 to 1.00]
 MODERATE-HIGH: A - B is (0.20 to 0.60]
 MODERATE : A - B is (-0.20 to 0.20]
 MODERATE-LOW : A - B is (-0.60 to -0.20]
 LOW : A - B is [-1.00 to -0.60]

A variety of supporting evidence on compliance related pressures was collected throughout most of the interviews leading to its ranking in the HIGH category for all four clusters. Evidence has shown that compliance pressures might have been affected by certain external pressures such as coercive and mimetic isomorphism. The situation was similar for identification pressures where collected evidence confirmed the wide-spread existence of this kind of pressure in all four clusters resulting in a HIGH ranking in each cluster. Nonetheless, a reverse argument was true for internalization pressures where a significant percentage of interviewees rejected the view that internalization pressures may have a positive effect on occurrence of hidden and surreptitious adoption. Consequently, clusters received either LOW or MODERATE-LOW rankings in this category. Further, as shown in the cross-case display, existence of all three types of external pressures (coercive, normative and mimetic) was also confirmed by collected evidence. Despite cluster-level magnitude differences, all clusters provided ample evidence to lead to HIGH or MODERATE-HIGH category rankings (two highest ranked categories) for each of the three external pressures. Normative pressures had all positive and no negative indicators and hence were highly consistent in all four clusters. Nevertheless, alongside the confirming evidence found in all clusters, the effect of coercive pressures was called into question in one cluster where disconfirming evidence (or counter arguments) was also encountered. For mimetic pressures, the situation was similar where despite evidence confirming existence of this kind of pressure in all four clusters, disconfirming evidence was also voiced in two clusters weakening what would otherwise have been a universally supported categorization.

5.2.1.2 Case-Ordered Display: Adoption Categories and Process (Cross-Cluster View)

Building upon the case-specific evidence gathered during within case analysis, a case-ordered, matrix-type display was created to investigate cross-cluster evidence confirming or rejecting the occurrence of

hidden and surreptitious adoption of IT solutions, and to look at evidence across clusters related to the processes and categories of hidden and surreptitious adoption.

The data reduction exercise started with the creation of interim spreadsheet files (also matrix type displays) for each cluster where columns reflected six headings organized under two top categories (adoption process and adoption categories). The rows were organized under four top categories corresponding to four clusters and each category listed individual interviews as rows which were then used to record positive or negative evidence related to the appropriate column headings. Sample displays are provided in **Appendix N** under the Adoption Categories and Process heading. As with the previous case-ordered display, for each column, a separate data file was created to list direct interview quotes for a given adoption process or category in a specific cluster. Creation of the data files was done using the analysis module of a qualitative data analysis tool which allowed slicing of coded interview transcripts along many dimensions involving specific codes or descriptors. A total of 24 data files were created ((2 processes + 4 hidden adoption categories) x 4 clusters). The collective length of the excerpt data were 65 pages. Each data file grouped relevant data excerpts from individual interviews. Each excerpt was marked with a number of descriptors (interview number, date and interviewee characteristics among others) so that excerpts could be tied to a particular interview.

The data files were exported to a format that could be read in a word processor and were then used to look for confirming or disconfirming evidence in each cluster of occurrence of adoption processes as well as categories. Each data cell was marked with a positive (i.e. 'Y') or a negative (i.e. 'N') indicator to highlight existence of (or lack thereof) the investigated factor. On a single occasion, one cell had to be marked with both positive and negative indicators where both kinds of evidence was quoted by the interviewee. When it was not possible to find either positive or negative evidence cells were marked

with a neutral indicator (i.e. 'Blank') to indicate that no evidence of either kind was found.

The positive and negative indicators along with the “Blanks” were then aggregated in a case ordered display (shown below in **Table 12**) to create cluster level categorical magnitude scores for relevant adoption processes and categories. This matrix type case-ordered display has rows corresponding to each of the four clusters while its columns list types of adoption processes and categories. Two adoption processes (top-down vs. user-driven) as well as three hidden adoption categories (silent, shared and dual) were shown. A fourth column corresponding to a pre-hidden adoption category (user rejection) was also added under the hidden adoption categories heading. The magnitude scores were calculated using a similar quantitative scheme as earlier which involved calculation of the three percentage scores for each column in a given cluster. These percentages were based on the ratio of the number of interviews where a type of indicator was recorded for a cluster to the total number of interviews in that cluster. For example, out of the eight interviews conducted in Cluster 4, six interviews had sufficient evidence that confirmed existence of shared hidden and surreptitious adoption in that cluster. No disconfirming evidence was found and in the remaining two interviews neither positive nor negative evidence was evident. As a result 75 percent (6/8), 0 percent (0/8) and 25 percent (2/8) were marked on the relevant cell (Cluster 4 x Shared Hidden and Surreptitious Adoption) in the case-ordered matrix. Once all cells were populated, categorical magnitude scores were calculated. These scores were based on the calculated ratio differences between positive and negative indicators and an interval 5-point scale corresponding to categorical values that range between HIGH and LOW was utilized to indicate the score (scale provided in matrix legend). A sixth category (N/A) had to be created to mark occasions where neither confirming nor disconfirming evidence was available (3 cells were in this N/A category).

Table 12 - Case-Ordered Display: Adoption Categories and Process (Cross-Cluster)

		Adoption Process									Adoption Categories								
		Top-down Adoption			User-driven Adoption			User rejection of Sanctioned Solutions			Silent Hidden and Surreptitious Adoption			Shared Hidden and Surreptitious Adoption			Dual Adoption and Non-Genuine Use		
		HIGH			HIGH			HIGH			MOD			HIGH			MOD		
Cluster 1		63	0	38	63	0	38	63	0	38	13	0	88	88	13	13	13	0	88
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Cluster 2		HIGH			HIGH			HIGH			MOD-HIGH			MOD-HIGH			N/A		
		67	0	33	67	0	33	67	0	33	33	0	67	33	0	67	0	0	100
Cluster 3		HIGH			MOD-HIGH			MOD-HIGH			HIGH			MOD-HIGH			N/A		
		75	0	25	50	0	50	25	0	75	75	0	25	50	0	50	0	0	100
Cluster 4		HIGH			N/A			MOD-HIGH			MOD-HIGH			HIGH			MOD		
		88	0	13	0	0	100	50	0	50	38	0	63	75	0	25	13	0	88
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%

Percentage of interviews in this Cluster in which existence of this particular process or category is confirmed or acknowledged (A)

Percentage of interviews in this Cluster in which existence of this particular process or category is disconfirmed or denied (B)

Percentage of interviews in this Cluster in which existence of this particular process or category is neither confirmed nor denied

HIGH : A – B is (0.60 to 1.00]
 MODERATE-HIGH: A – B is (0.20 to 0.60]
 MODERATE : A – B is (-0.20 to 0.20]
 MODERATE-LOW : A – B is (-0.60 to -0.20]
 LOW : A – B is [-1.00 to -0.60]
 N/A : A and B are both 0

In all four clusters there was ample evidence pointing to the existence of a top-down formal adoption process put in place by the central organization. In addition to the supportive evidence collected across

clusters, no negative evidence was observed in any cluster (i.e. when asked, no interviewees disagreed with the existence of a top-down technology adoption process). Consequently, the top down category received a consistent HIGH ranking across all four clusters. Interestingly, the second category under the adoption process heading, that is, user-driven adoption was also observed through positive indicators in three of the four clusters. Furthermore, no negative indicators was present in any of the clusters resulting in MODERATE-HIGH to HIGH rankings in three of the four clusters (the fourth cluster received an NA ranking).

User rejection of sanctioned solutions was prevalent in all four clusters. The magnitude ranged from 25 percent positive indicators at the low-end in Cluster 3 to 67 percent positive evidence in Cluster 2. Clusters 4 and 1 were slotted in between these two clusters with 50 percent and 63 percent positive evidence rates respectively. With no negative indicators in any of these clusters the magnitude scores fared high with two clusters ranked at MODERATE-HIGH and the remaining two at HIGH.

Two types of hidden and surreptitious adoption (silent and shared) were observed in each of the four clusters. Evidence pointing to shared hidden and surreptitious adoption was more common than its silent alternative in Cluster 1 and Cluster 4 (the difference in magnitude was greater in Cluster 1). In Cluster 1 the shared type ranked HIGH while the silent adoption was two notches below at MODERATE. In Cluster 4 rankings were closer as shared adoption ranked HIGH while silent adoption was only a category below at MODERATE-HIGH. Collectively these two clusters accounted for about 70 percent of all coded interviews. In Cluster 2 the magnitude scores were ranked similarly (both achieved a MODERATE-HIGH ranking) and only in Cluster 3 there was more evidence of the silent type hidden and surreptitious adoption. Evidence of dual adoption and non-genuine use was only encountered during two separate interviews in Cluster 1 and Cluster 4 and due to limited magnitude of

positive indicators, the dual type hidden and surreptitious adoption was only able to achieve a MODERATE ranking in each of these clusters. Nevertheless, one of these interviews cited other references in at least one other cluster indicating this interesting occurrence may indeed be a cross-cluster phenomenon. Unfortunately, the cited cluster was not covered as a separate case in this dissertation. In the absence of independent verification by that other cluster, this hint was not taken into consideration when magnitude scores were calculated.

5.2.1.3 Case-Ordered Display: Antecedents of Hidden and Surreptitious Adoption (Cross-Cluster View)

During within-case analysis, detailed case-specific evidence was examined and analyzed with regards to various antecedents of hidden and surreptitious adoption of IT solutions by technical users. At this stage, cross-case evidence is examined in aggregate form to look at occurrence and intensity of these antecedents across clusters.

The case-ordered display on antecedents is the result of a multi-stage data reduction process. This process began with the creation of individual data files that bundled all excerpts related to a particular antecedent for each cluster. For example, for the “Coolness and Popularity” factor, four data files were created for each of the four clusters. Within each file, all excerpts which are tagged with the relevant codes (e.g. AA-SHINY – please refer to the code definitions for a detailed description of this code) were grouped and listed in full length. Each excerpt was marked with a number of descriptors (interview number, date and interviewee characteristics among others) so that excerpts could be tied to a particular interview. The data files were initially created within the qualitative data analysis tool and later were exported to a word processor readable format for further analysis. A total of 36 data files were created (9 factors x 4 clusters). The collective length of the excerpt data were 140 pages.

Four interim displays in the form of a spreadsheet file corresponding to four clusters/cases were then created to aggregate confirming / disconfirming evidence for each of the nine factors across four clusters. Sample displays are provided in **Appendix N** under the Antecedents of Hidden and Surreptitious Adoption heading.

The columns of the file were marked with individual factor names while rows were marked with individual interview numbers grouped under their respective clusters. As each data file was read in detail, the existence of positive (i.e. 'Y') or negative (i.e. 'N') evidence related to that particular factor was marked at the interview level in a designated cell. This was done in a non-mutually exclusive manner. In other words, for a given interview it was possible to find both positive and negative evidence. Even though this was an extremely rare occasion (it materialized in only one instance in this particular matrix) this treatment was still necessary in order not to suppress any kind of evidence in light of opposite type of evidence. After all, on certain occasions these instances may provide opportunities for further enquiry (mostly though, they reflect non-conflicting accounts that are due to contextual differences). When it was not possible to find either positive or negative evidence the relevant cell was marked with the neutral 'Blank' indicator to indicate that no evidence of either kind was found. As with the creation of earlier case-ordered cross-case displays I specifically avoided the temptation to count instances of positive and negative evidence but instead aimed to capture the holistic view held by the interviewee on each factor based on observations in context.

Next, the individual, interview-level evidence marked in the spreadsheet was aggregated in a case-ordered display shown in **Table 13** below. The rows of this matrix display show each of the four clusters while the columns present a number of factors that are believed to affect the occurrence of

hidden and surreptitious adoption. These factors were grouped under four higher-level headings: technical factors, past experience/previous use, coolness and popularity, and other factors.

While interview level data got rolled up to a cluster-level, magnitude scores were created for each factor in each cluster. Magnitude scores were calculated in a similar manner as with the earlier case-ordered displays. This process involved calculation of three percentage scores for each of the nine factors in a given cluster. The first score reflected percentage of interviews in a cluster in which existence of a particular antecedent is confirmed or acknowledged. The second score showed percentage of interviews in the same Cluster where existence of that particular antecedent is disconfirmed or denied. The third score was the percentage of interviews where existence of the antecedent in question was neither confirmed nor denied. This last percentage was for occasions where either the topic in question was not discussed or could not be meaningfully interpreted to award a clean positive or negative evidence score.

Once all cells were populated, categorical magnitude scores were calculated. These scores were based on the calculated ratio differences between positive and negative evidence and an interval 5-point scale corresponding to categorical values that range between HIGH and LOW was utilized to indicate the score (scale provided in matrix legend). Similar to the previous display, a sixth category (N/A) had to be created again to mark occasions where neither confirming nor disconfirming evidence was available. As mentioned above, only one cell was in this N/A category.

**Table 13 - Case-Ordered Display:
Antecedents of Hidden and Surreptitious Adoption (Cross-Cluster)**

Technical Factors			Past Experience / Previous Use			Coolness and Popularity			Other Factors																	
Sanctioned Solutions (Negative Aspects)			Non-Sanctioned Solutions (Positive Aspects)			Use of Sanctioned Solutions			Use of Non-Sanctioned Solutions			Non-Sanctioned Solutions			Financial and Budgetary			Fit with Existing Solutions			Governance and Accountability			Performance Induced Awareness		
HIGH			HIGH			MOD-HIGH			MOD-HIGH			HIGH			MOD-HIGH			MOD-HIGH			HIGH			HIGH		
75%	0%	25%	100%	0%	0%	38%	0%	63%	50%	0%	50%	63%	0%	38%	50%	13%	50%	38%	0%	63%	75%	0%	25%	100%	0%	0%
HIGH			MOD-HIGH			MOD-LOW			HIGH			MOD-HIGH			MOD-HIGH			N/A			HIGH			HIGH		
67%	0%	33%	33%	0%	67%	0%	33%	67%	67%	0%	33%	33%	0%	67%	33%	0%	67%	0%	0%	100%	67%	33%	0%	67%	0%	33%
HIGH			HIGH			MOD-HIGH			HIGH			MOD-HIGH			HIGH			HIGH			HIGH			HIGH		
100%	0%	0%	75%	0%	25%	50%	0%	50%	100%	0%	0%	25%	0%	75%	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
HIGH			HIGH			MOD-HIGH			HIGH			MOD-HIGH			MOD-HIGH			HIGH			HIGH			HIGH		
63%	0%	38%	63%	0%	38%	50%	0%	50%	100%	0%	0%	50%	0%	50%	63%	13%	25%	75%	0%	25%	88%	0%	13%	88%	0%	13%

Percentage of interviews in this Cluster in which existence of this particular antecedent is confirmed or acknowledged (A)

Percentage of interviews in this Cluster in which existence of this particular antecedent is disconfirmed or denied (B)

Percentage of interviews in this Cluster in which existence of this particular antecedent is neither confirmed nor denied

HIGH : A – B is (0.60 to 1.00]
 MODERATE-HIGH : A – B is (0.20 to 0.60]
 MODERATE : A – B is (-0.20 to 0.20]
 MODERATE-LOW : A – B is (-0.60 to -0.20]
 LOW : A – B is [-1.00 to -0.60]
 N/A : A and B are both 0

Ranking on technical antecedents provided a cross-cluster view on two distinct factors. The first focused on cross-cluster evidence in relation to sanctioned solution use and captured instances where interviewees talked about their technical experiences with the mandated, sanctioned solutions. The instances reflecting technical deficiencies with sanctioned solutions were marked with a positive indicator. For this factor, the aggregated magnitude scores were universally HIGH across all clusters. The focus of the second factor was on cross-cluster evidence with regards to non-sanctioned solution use and investigated instances where interviewees discussed their experiences with those non-sanctioned solutions from a technical point of view. Occasions reflecting technical superiority of non-sanctioned solutions were marked with positive indicators. Again, all clusters with the exception of one (Cluster 2) received HIGH magnitude scores for this factor. Cluster 2 score was just a notch below at MODERATE-HIGH.

Next category looked at the aggregated evidence with regards to the possible effect of past experience on adoption. Two factors in this category investigated the effects of previous use of sanctioned as well as non-sanctioned solutions. Past use of both sanctioned and non-sanctioned solutions appeared to have a relatively strong influence on hidden and surreptitious adoption decisions. The magnitude scores for sanctioned solution use were in MODERATE-HIGH category for all but one cluster (in Cluster 2 the score was MODERATE-LOW). Nevertheless, the effect of previous use of non-sanctioned solutions was much higher as three out of four clusters received HIGH magnitude scores for this factor. The magnitude score of the remaining cluster was only slightly lower at MODERATE-HIGH.

The coolness and popularity factor investigated the possible effects of interviewee perceptions of a solution on the hidden and surreptitious adoption of that particular solution. In particular this factor looked at aggregated cross-cluster evidence to figure out whether a non-sanctioned solution would have

higher chances of getting adopted due to its popularity and “coolness” (i.e. because it is perceived as the latest and the greatest or “leading edge” by its potential users). The magnitude scores for this category ranged from MODERATE-HIGH (in three clusters) to HIGH indicating support for this view in all clusters.

The last category heading covered four factors that emerged out of a generic category (Other) which was originally created to host all factors that could not be accommodated by any of the existing categories. These factors are (in no particular order) financial and budgetary, fit with existing solutions, governance&accountability and performance induced awareness.

Financial and budgetary factors pooled cross-cluster evidence with regards to the possible effect of financial factors on hidden and surreptitious adoption. Evidence gathered under this factor covered occasions where budgetary factors contributed to IT solution preferences in general and hidden and surreptitious adoption in particular. For example, budgetary pressures could encourage adoption of a non-sanctioned solution due to its much lower acquisition cost structure. Conversely, a temporary abundance of financial resources may contribute towards adoption of sanctioned but expensive alternatives in an effort to take advantage of a centrally appropriated budget that would otherwise be clawed back by the centre. This particular factor received MODERATE-HIGH magnitude scores in three of the four clusters. In the remaining cluster, the effect was even higher where the score was HIGH.

The column on fit with existing solutions zoomed in on the effect of previous solutioning (actual term used in multiple interviews) efforts on future preferences. Such were the occasions when a particular solution was edged over its alternatives because it would “fit better” with the existing IT solutions in

place. This factor received HIGH magnitude scores in Clusters 3 and 4 and a MODERATE-HIGH score in Cluster 1. In Cluster 2, there was no clear evidence confirming or rejecting the existence of this factor.

The last two factors, governance&accountability and performance induced awareness were both universally supported with HIGH magnitude scores across all four clusters. The former, investigated the possible effects of loose governance structures and lack of clear accountability on hidden and surreptitious adoption of non-sanctioned solutions. The interviews have clarified that the absence of clear and simple governance structures around IT solution provision as well as lack of penalties and accountability for non-compliant behaviour positively contributed towards decisions to adopt non-sanctioned solutions. The latter, looked at a possible antecedent of awareness, a strong moderator that is itself further investigated as a category heading under the moderators and mediators case ordered display below. The interviews have clarified that the occasions where use of sanctioned solutions contributed towards sub-optimum interviewee job or task performance (e.g. use of a mandated sanctioned tool slows down the technical user and risks not meeting task or project deadlines), this occurrences may encourage the technical users to search for alternative solutions and eventually lead to adoption of non-sanctioned solutions in a hidden and surreptitious manner.

5.2.1.4 Case-Ordered Display: Possible Moderators and Mediators (Cross-Cluster View)

Building upon the more in-depth but case-specific analysis of the same factors that was carried out as part of the within case analysis effort in Stage 2, an exploratory cross-case matrix display was created to look at aggregated evidence across clusters on possible moderators and/or mediators of hidden and surreptitious adoption of non-sanctioned IT solutions. Although the level of detail provided in the aggregated cross-cluster matrix display does not go down to the individual interview level (i.e. no

interview level quotes were provided), the case ordered display serves a higher order purpose by looking at the repeat occurrence and relative magnitude of each factor in different clusters.

The case-ordered display on potential moderators and mediators is the product of an iterative data reduction effort that started with gathering of relevant excerpts on each type of factor in a number of data files. Created at a cluster level, each data file listed full-length excerpts related to a particular factor (a total of 24 files corresponding to 6 factors in 4 clusters were created). The collective length of the excerpt data were 102 pages. Because each excerpt was marked with a number of descriptors it was possible to tie the excerpts to individual interviews. As with earlier data files, the excerpts were created with the help of a qualitative data analysis tool and then exported to a word processor readable format.

As each data file was read in detail, interim matrix displays were created in a spreadsheet. Each interim matrix was then used to aggregate confirming/disconfirming evidence on that particular factor for a given cluster. These interim matrices were similar in appearance to earlier ones in that their columns were marked with various factor names while rows showed individual interview numbers grouped under their respective clusters. Sample displays are provided in **Appendix N** under the Possible Moderators and Mediators heading. For consistency, the marking of collected evidence was completed in a similar manner with the earlier matrices. This consistent approach also shaped the aggregation of interview-level evidence into cluster-level magnitude scores and involved calculation of three percentage scores and associated ratios. The resulting case-ordered display was organized in matrix form as with earlier displays and is provided in **Table 14** below. The rows were organized to show various clusters and columns listed a number of factors. These factors were grouped under four higher-level headings: technical knowledge and skill; project size, visibility and criticality; awareness; and availability of help and support.

Table 14 - Case-Ordered Display: Potential Moderators and Mediators (Cross-Cluster)

		TECHNICAL KNOWLEDGE & SKILL						PROJECT SIZE, VISIBILITY & CRITICALITY			AWARENESS						AVAILABILITY OF HELP & SUPPORT		
		TECHNICAL USER (positive)			MANAGER (negative - perception)						SANCTIONS (low awareness)			NON-SANCTIONED (high awareness)					
		HIGH			HIGH			MOD-HIGH			HIGH			HIGH			HIGH		
Cluster 1	Cluster 1	100%	0%	0%	75%	0%	25%	75%	25%	13%	100%	0%	0%	88%	0%	13%	88%	0%	13%
	Cluster 2	HIGH			MOD-HIGH			HIGH			HIGH			MOD-HIGH			HIGH		
	Cluster 2	67%	0%	33%	33%	0%	67%	100%	0%	0%	67%	0%	33%	33%	0%	67%	67%	0%	33%
	Cluster 3	HIGH			HIGH			MOD-HIGH			HIGH			HIGH			HIGH		
	Cluster 3	75%	0%	25%	75%	0%	25%	75%	25%	25%	100%	0%	0%	75%	0%	25%	75%	0%	25%
Cluster 4	Cluster 4	HIGH			MOD-HIGH			HIGH			MOD-HIGH			HIGH			HIGH		
	Cluster 4	63%	0%	38%	25%	0%	75%	88%	13%	13%	63%	25%	38%	75%	0%	25%	63%	0%	38%

Percentage of interviews in this Cluster in which existence of this particular factor is confirmed or acknowledged (A)

Percentage of interviews in this Cluster in which existence of this particular factor is disconfirmed or denied (B)

Percentage of interviews in this Cluster in which existence of this particular factor is neither confirmed nor denied

HIGH : A – B is (0.60 to 1.00]
 MODERATE-HIGH: A – B is (0.20 to 0.60]
 MODERATE : A – B is (-0.20 to 0.20]
 MODERATE-LOW : A – B is (-0.60 to -0.20]
 LOW : A – B is [-1.00 to -0.60]

The first category, technical knowledge and skill, was used to analyze two complementary factors corresponding to interviewees' actual technical skill levels as well as interviewee perception of the skill level of their managers (for technical users, the manager was their immediate manager; for immediate managers, it was the senior manager and so on...). While evidence collected during within-case analysis has shown that skill level of technical users had an effect on a number of adoption antecedents and/or on internal/external influences, the case-ordered display here has clarified that the influence of this factor was evident across all clusters. This factor received consistent HIGH magnitude scores in every one of the four clusters. The situation was similar, albeit at slightly lower magnitude scores when evidence related to perceived technical skill level of managers was evaluated. The technical users' perception of the technical skill level of the manager to whom they reported was found to affect the existence and strength of certain adoption antecedents as well as of internal/external influences across all clusters. This effect was consistent across all four clusters while two clusters received HIGH magnitude scores, the remaining two was awarded MODERATE-HIGH scores.

Another factor that was found to affect not only the strength of internal/external social pressures but also the type of hidden and surreptitious adoption (when it materialized) involved the size, visibility and criticality of the projects within which non-sanctioned solutions were considered in the first place. The influence of this factor was also confirmed during the previous stage of analysis. The cross-cluster view provided by the case-ordered display here further confirmed the existence of this factor in all clusters. Magnitude scores were between MODERATE-HIGH (Clusters 1 and 3) and HIGH (Clusters 2 and 4).

Awareness category hosted two factors that operated in tandem. The first, awareness of formal rules

and mandated sanctioned solutions was shown to have an inverse relationship with non-sanctioned solution use during within-case analysis. The cross-case analysis confirmed that this factor was prevalent in all four clusters and have thus received HIGH magnitude scores in three out of the four clusters (Clusters 1, 2, and 3). The remaining cluster's score was only marginally lower at MODERATE-HIGH. Evidence collected on the second factor, awareness of non-sanctioned solutions was also shown to influence technical user preferences towards these alternative solutions during within-case analysis. Cross-case analysis clarified without doubt that this factor was apparent in all four clusters. While Clusters 1, 3, and 4 received HIGH magnitude scores, Cluster 2 received a MODERATE-HIGH ranking.

Finally, cross-case analysis have provided further support to the isolated, single-cluster findings in the previous stage and strongly confirmed that availability of help and support was indeed an important factor for the occurrence of hidden and surreptitious adoption. In light of all positive indicators in significant number of interviews, each one of the four clusters received HIGH magnitude scores consistently.

5.2.2 Explanatory and Causal Displays

5.2.2.1 Case-Ordered Predictor-Outcome Matrix: Internal and External Influences on Hidden and Surreptitious Adoption (Cross-Cluster View)

In the previous stage of analysis, cross-cluster existence of various types of internal and external pressures was evaluated. While the case-ordered matrix developed earlier helped confirm or disconfirm existence (and, to an extent, magnitude) of these factors, due to its high-level and aggregate nature, it was silent on why such factors came into being in the first place. At this stage, a case-ordered predictor-outcome matrix was developed to look at the rationale as to why these pressures

materialized. By allowing to zoom in on those instances where each type of internal and external pressure occurred, by providing a rich contextual view into each occurrence and by permitting validation across multiple clusters, the explanatory qualitative analysis helped uncover the most likely antecedents of and contributors to the occurrence of hidden and surreptitious adoption for each type of influence.

A matrix type display was prepared to accommodate the cross-cluster findings and to ease observation of similarities and differences across different clusters. Four columns were created to capture synthesized data from each cluster and six rows were reserved to accommodate the internal and external influences.

For each type of influence a separate data file was created to capture cross-cluster evidence. Each data file grouped all excerpts related to a particular influence across all clusters (each excerpt had a number of identifiers that tied it to a particular cluster). For example, there was a data file on compliance pressures, another file for identification pressures and so on...The collective length of the excerpt data were 110 pages as they included all excerpts tagged with relevant code families (all codes with the prefix AA-INT or prefix AA-EXT) related to internal and external pressures. In comparison, and despite significant overlap, the within-case checklist and conceptually-clustered matrices prepared in earlier stages included the most illustrative sample excerpts from a specific cluster.

The data extraction was completed using a qualitative data analysis software and the files were then exported to a word processor readable format for further analysis. Each data file was read in detail with the objective of creating a synthesis of recurring factors of each predictor (influence). As each file was read, patterns and recurrences were noted and when accumulated evidence warranted, synthesized

factors were captured and entered into the appropriate cell of the predictor-outcome matrix. For example, the cross-cluster data file on internal identification pressures had sufficient evidence to mark the importance of existence of certain key individuals for a non-sanctioned solution to be adopted. While the terminology used in each individual interview differed (some confirmed the positive effect of a technically knowledgeable user, some talked about an influential expert and others referenced a champion) there was a clearly discernible presence of a respected individual who was instrumental in the creation of identification pressures in each cluster. Where there was confirming evidence this was thus marked with the synthesized pattern worded as "There is a knowledgeable person / expert / champion". A similar logic was followed for each influence.

On occasions when such synthesized patterns occurred in at least three of the four clusters they were highlighted in **bold**. On other occasions where evidence was found in half of the clusters (2 out of 4) they were highlighted in *bold and italic* text. Where the synthesized pattern was only observable in one cluster, these synthesized patterns were still noted but were not highlighted and left in normal text. The highlighted (**bold** or *bold and italic*) synthesized patterns were used as the basis of the causal network exercise that followed and are explained in more detail under the causal network heading below.

The resulting matrix is provided in **Table 15** below.

**Table 15 - Case-Ordered Predictor-Outcome Matrix:
Internal and External Influences on Hidden and Surreptitious Adoption (Cross-Cluster)**

		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Internal Influences (Why do they exist?)	Compliance	<ul style="list-style-type: none"> -Informal roadblocks -Approval process -Fit with existing solutions -Policies -Standards -Support concerns -Legal implications and worries -External pressure (vendors) -Top-down pressure -Procurement restrictions 	<ul style="list-style-type: none"> -Standards -Policies -Approval process -Lack of sufficient technical skills -Top-down pressure -Procurement restrictions -Centralization -Legal implications and worries 	<ul style="list-style-type: none"> -Existence of policies -Procurement restrictions -Centralization -Standards and standardization -Budget approvals -Legal implications and worries -Lack of sufficient technical skills -Fit with existing solutions -Security concerns -Architectural approvals -Approval process -Project approvals 	<ul style="list-style-type: none"> -Established Approval processes -Policies -Legal implications and worries -Architectural approvals -Project approvals -Procurement restrictions -Manager preferences -Fit with existing solutions
	Identification	<ul style="list-style-type: none"> -There is a knowledgeable person / expert / champion -A community of practice exists -Precedence exists elsewhere in the organization -Ease with which support/training can be found -Ubiquity of relevant info in forums, blogs, discussion boards... -Peer influence - Someone I know uses it 	<ul style="list-style-type: none"> -There is a knowledgeable person / expert / champion -Precedence exists elsewhere in the organization -Peer influence - Someone I know uses it -A community of practice exists -Ubiquity of relevant info in forums, blogs, discussion boards... -Ease with which support/training can be found 	<ul style="list-style-type: none"> -Ubiquity of relevant info in forums, blogs, discussion boards... -A community of practice exists (vendor-independent) -There is a knowledgeable person / expert / champion -Precedence exists elsewhere in the organization -Peer influence - Someone I know uses it -Ease with which support/training can be found 	<ul style="list-style-type: none"> -A community of practice exists -Ease with which support/training can be found -There is a knowledgeable person / expert / champion -Peer influence - Someone I know uses it -Ubiquity of relevant info in forums, blogs, discussion boards... -Precedence exists elsewhere in the organization
	Internalization	-N/A	-N/A	-N/A	-N/A

**Table 15 - Case-Ordered Predictor-Outcome Matrix:
Internal and External Influences on Hidden and Surreptitious Adoption (Cross-Cluster)**

		Cluster 1	Cluster 2	Cluster 3	Cluster 4
External Influences (Why do they exist?)	Coercive	<ul style="list-style-type: none"> -Lobbying efforts by large vendors -Vendor pressure on top executives -Vendor pressure on upper management -Vendor incentives to top executives -Vendor "marketing talk" -Vendor influence on policy makers (consulting reports) -Vendor influence on technical users (consultant push) -Perception of safer choice -Support fears -Integration fears -Security fears -Lack of technical knowledge 	<ul style="list-style-type: none"> -Vendor pressure on top executives -Vendor pressure on upper management -Vendor "marketing talk" -Lobbying efforts by large vendors -Vendor influence on policy makers (consulting reports) 	<ul style="list-style-type: none"> -Vendor influence on policy makers (consulting reports) -Vendor pressure on top executives -Vendor pressure on upper management -Lobbying efforts by large vendors -Vendor incentives to top executives -Support fears -Lack of technical knowledge 	<ul style="list-style-type: none"> -Vendor influence on policy makers (consulting reports) -Vendor influence on technical users (consultant push) -Vendor "marketing talk" -Integration fears -Vendor pressure on upper management -Vendor incentives to top executives
	Normative	<ul style="list-style-type: none"> -Professional designations and memberships -Industry norms and standards -Previous experience/training at school or work -Close peer or community preferences 	<ul style="list-style-type: none"> -Close peer or community preferences -Professional designations and memberships -Previous experience/training at school or work 	<ul style="list-style-type: none"> -Industry norms and standards -Close peer or community preferences -Professional designations and memberships -Previous experience/training at school or work 	<ul style="list-style-type: none"> -Close peer or community preferences -Industry norms and standards -Previous experience/training at school or work
	Mimetic	<ul style="list-style-type: none"> -Follow industry leads as safer choice -Follow similar organizations -Copy successful implementations elsewhere -Counterpart effect: Follow colleagues 	<ul style="list-style-type: none"> -Counterpart effect: Follow colleagues -Follow similar organizations (requires relationship, also NIHS*) <p>*NIHS: Not invented here syndrome</p>	<ul style="list-style-type: none"> -Follow industry leads as safer choice -Follow similar organizations (sanctioned only) -Counterpart effect: Follow colleagues -Copy successful implementations elsewhere 	<ul style="list-style-type: none"> -Follow similar organizations -Copy successful implementations elsewhere -Counterpart effect: Follow colleagues (or references)

5.2.2.2 Case-Ordered Predictor-Outcome Matrix: Antecedents of Hidden and Surreptitious

Adoption (Cross-Cluster View)

During exploratory cross-case analysis existence of a number of antecedent variables were confirmed across four clusters. Following up on this finding, at this stage a case-ordered predictor-outcome matrix was developed to have an in-depth look at each kind of antecedent in context, and investigate the circumstances and factors surrounding each occurrence.

A matrix type display was prepared to accommodate the cross-cluster findings and to ease observation of similarities and differences across different clusters. The data columns of the display were reserved for each of the four clusters while the data nine rows were organized under four headings (technical factors, past experience, coolness and popularity, other factors) to reflect the antecedents themselves. Cross cluster excerpts on a particular antecedent were grouped together in a data file which was then subjected to in depth analysis to identify a list of synthesized patterns that explained why that antecedent contributed to the occurrence of of hidden and surreptitious adoption at a particular cluster. The analysis continued with the same antecedent in a different cluster until all clusters were covered only to move onto a different antecedent until no antecedents were left and all clusters covered. A total of 139 pages of excerpt data were created and analyzed this way. The synthesized patterns were then compared across four clusters to highlight patterns that occurred in multiple clusters. When a particular synthesized pattern occurred in at least three of the four clusters, it was highlighted in **bold text**. For example, excerpts on the effect of past experience with non-sanctioned solutions showed a consistent synthesized pattern across three of the four clusters where interviewees suggested that their past experiences were initiated and influenced by recommendations of consultants. This particular synthesized pattern ("**Recommended by consultants**") was thus highlighted in **bold text**. When such

occurrences were limited to 2 clusters they were highlighted in ***bold and italic text***. For example, a number of interviewees mentioned the importance of working with state of the art and latest and greatest IT solutions. Such solutions were considered cool (or hot depending on how you look at them) among technical users. One factor that contributed to the perception of coolness among technical users was about the popularity of a solution within the greater IT community. This synthesized pattern (“***Popular in the community***”) was confirmed in many interviews and occurred consistently in two of the four clusters and was thus highlighted in ***bold, italic text***. If a synthesized pattern was only observable in one cluster, it was listed in normal text. The highlighted synthesized patterns were instrumental in the creation of a cross cluster causal network and they will be explained in greater detail under that network display. The case-ordered predictor outcome matrix on hidden and surreptitious adoption antecedents have been provided in **Table 16** below.

Table 16 - Case-Ordered Predictor-Outcome Matrix: Antecedents of Hidden and Surreptitious Adoption (Cross-Cluster)					
		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Technical Factors	Sanctioned	-do not fit problem at hand -are not flexible and restrictive -difficult/time consuming to maintain <i>-do not allow fast delivery</i> -are less secure <i>-lack required functionality</i> -difficult to learn and implement <i>-do not have good support</i> -require new hardware to work -technically complicated and heavy -are based on old and antiquated standards	-difficult to learn and implement -difficult/time consuming to maintain <i>-do not have good support</i> -are not flexible and restrictive -do not fit problem at hand -technically complicated and heavy	-are based on old and antiquated standards -are not flexible and restrictive -difficult/time consuming to maintain -difficult to learn and implement -technically complicated and heavy -do not fit problem at hand	-are based on old and antiquated standards -are not flexible and restrictive -do not fit problem at hand -difficult to learn and implement -difficult/time consuming to maintain <i>-do not allow fast delivery</i> <i>-lack required functionality</i> -technically complicated and heavy

**Table 16 - Case-Ordered Predictor-Outcome Matrix:
Antecedents of Hidden and Surreptitious Adoption (Cross-Cluster)**

		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Past Experience	Non-Sanctioned	<ul style="list-style-type: none"> -Simple and easy to setup and use -Has lighter, agile process -Superior and stable performance -More secure -Has required functionality -Offers more features -Allows faster development times -Allows flexibility -Offers latest technology -Has great/fast community support 	<ul style="list-style-type: none"> -Simple and easy to setup and use -Has required functionality -Allows faster development times 	<ul style="list-style-type: none"> -Has lighter, agile process -Simple and easy to setup and use -Has required functionality -Allows faster development times -Offers latest technology -Allows flexibility -Superior and stable performance 	<ul style="list-style-type: none"> -Superior and stable performance -Simple and easy to setup and use -Has lighter, agile process -Allows faster development times -Allows flexibility -Offers latest technology -Has great/fast community support
	Sanctioned	<ul style="list-style-type: none"> -Don't know a better alternative -Got comfortable with it -Don't like change/fear of change -Established, big vendor product (coercive pressure) -Fits with the existing technology stack -Got formal training on it at work -Was happy with it previously (senior management) 	<ul style="list-style-type: none"> -My peers recommended it (senior management) 	<ul style="list-style-type: none"> -Don't know a better alternative -Got comfortable with it -Don't like change/fear of change -Established, big vendor product (coercive pressure) -Fits with the existing technology stack -Was happy with it previously (senior management) 	<ul style="list-style-type: none"> -Consulting reports recommended it (policy makers) -Had a resource who had previous experience -Fits with the existing technology stack -Established, big vendor product (coercive pressure)
	Non-Sanctioned	<ul style="list-style-type: none"> -Used it previously with success -Better than other alternatives I tried -Found it to be more flexible -Makes me work faster -Familiar and comfortable with it -Recommended by consultants 	<ul style="list-style-type: none"> -Used it previously with success -Familiar and comfortable with it 	<ul style="list-style-type: none"> -Used it previously with success -Familiar and comfortable with it -Makes me work faster -Recommended by consultants 	<ul style="list-style-type: none"> -Familiar and comfortable with it -People don't like change -Better than other alternatives I tried -Used it previously with success -Makes me work faster -Recommended by consultants

**Table 16 - Case-Ordered Predictor-Outcome Matrix:
Antecedents of Hidden and Surreptitious Adoption (Cross-Cluster)**

		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Other Factors	Coolness Non-Sanctioned	<ul style="list-style-type: none"> -More prevalent in the market -The tool of choice -Let's you learn a skill in high demand <i>-The latest and the greatest</i> <i>-Up-to-date and innovative</i> <i>-More enjoyable, has aesthetic appeal</i> -Where future of technology is <i>-Popular in the community</i> 		<ul style="list-style-type: none"> -Let's you learn a skill in high demand <i>-More enjoyable, has aesthetic appeal</i> 	<ul style="list-style-type: none"> -Let's you learn a skill in high demand <i>-The latest and the greatest</i> <i>-Up-to-date and innovative</i> <i>-Popular in the community</i>
	Financial	<ul style="list-style-type: none"> -Licenses are expensive -Depends on the budget/funding 	<ul style="list-style-type: none"> -Depends on the budget/funding 	<ul style="list-style-type: none"> -Depends on the budget/funding -Licenses are expensive <i>-Affects the approval process</i> <i>-Concerns senior managers</i> 	<ul style="list-style-type: none"> -Depends on the budget/funding -Licenses are expensive <i>-Affects the approval process</i> <i>-Concerns senior managers</i>
	Fit	<ul style="list-style-type: none"> -Has to fit well/be in line with existing applications or components 		<ul style="list-style-type: none"> -Has to fit well/be in line with existing applications or components -Must consider legacy systems 	<ul style="list-style-type: none"> -Must integrate across multiple domains -Has to fit well/be in line with existing applications or components -Ties well with other products from the same vendor
	Governance	<ul style="list-style-type: none"> -No penalties for non-compliance (lack of enforcement) 	<ul style="list-style-type: none"> -No governance / controllership authority to ensure compliance in clusters -Unclear and arbitrary rules/processes (open for interpretation) -No penalties for non-compliance (lack of enforcement - except maybe lack of endorsement) 	<ul style="list-style-type: none"> -No governance / controllership authority to ensure compliance in clusters -No penalties for non-compliance (lack of enforcement) -Unclear and arbitrary rules/processes (open for interpretation) 	<ul style="list-style-type: none"> -Unclear and arbitrary rules/processes (open for interpretation) -No penalties for non-compliance (lack of enforcement) -No governance / controllership authority to ensure compliance in clusters

**Table 16 - Case-Ordered Predictor-Outcome Matrix:
Antecedents of Hidden and Surreptitious Adoption (Cross-Cluster)**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Performance	<ul style="list-style-type: none"> -Helps me get the job done effectively -Helps with timely delivery -Accomplish more cheaper -Makes me work faster than with its alternatives -Has functionality that lacks in sanctioned solutions 	<ul style="list-style-type: none"> -Helps me get the job done effectively -Accomplish more cheaper -Helps with timely delivery -Makes me work faster than with its alternatives 	<ul style="list-style-type: none"> -Helps with timely delivery -Makes me work faster than with its alternatives -Helps me get the job done effectively -Accomplish more cheaper 	<ul style="list-style-type: none"> -Helps with timely delivery -Accomplish more cheaper -Makes me work faster than with its alternatives -Helps me get the job done effectively -Has functionality that lacks in sanctioned solutions

5.2.2.3 Case-Ordered Predictor-Outcome Matrix: Possible Moderators and Mediators of Hidden and Surreptitious Adoption (Cross-Cluster View)

Previous analysis have confirmed the cross-cluster existence of a number of possible moderators and mediators. The predictor-outcome matrix developed here is an attempt to take a more in-depth look at the factors that might be influencing the individual or collaborative effects of these moderators and mediators on hidden and surreptitious adoption of IT solutions by technical users.

Similar to the previous two predictor-outcome matrices, a matrix type display was created to accommodate cross-cluster findings. Cluster specific data were aligned in columns and rows were organized to show six moderators and mediators grouped under four categories (technical knowledge and skill; project size, visibility and criticality, awareness, and, availability of help and support). Each cell was used to list synthesized patterns concerning a particular moderator/mediator in a specific cluster. The underlying data was excerpted from coded interview transcripts and for each moderator/mediator type, a cross-case data file was created. The resulting six data files had a total of

92 pages of interview excerpts. Each data file was then read in detail to list and synthesize recurring patterns on a specific moderator/mediator. Since individual excerpts were marked with a number of descriptors, it was possible to tie each excerpt to a cluster. Synthesized patterns were marked and listed for each cluster first. Once all four clusters were covered on a particular synthesized pattern, cross-cluster comparisons were then made to evaluate recurrences. As had been the case earlier, when a particular synthesized pattern occurred in at least three of the four clusters, it was highlighted in **bold text**; when it occurred in two clusters it was highlighted in *bold, italic text* and so on. The results have been listed in the predictor outcome matrix shown in **Table 17** below and contributed to the creation of a cross-cluster causal network which is elaborated on next. Since recurring synthesized patterns were explained in great detail in context as part of the upcoming causal network discussion, they are not explained here to avoid duplication.

**Table 17 - Case-Ordered Predictor-Outcome Matrix:
Moderators and Mediators of Hidden and Surreptitious Adoption (Cross-Cluster)**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Technical Knowledge & Skill Technical User	<u>Highly skilled users:</u> -More aware of non-sanctioned alternatives -More likely to question mandated solutions -Less likely to conform to mandated solutions -More confident of success in cases of non-sanctioned use -More likely to try out new and innovative solutions -More confident in their ability to solve problems on their own -Less influenced by the project size during non-sanctioned use	<u>Highly skilled users:</u> -More aware of non-sanctioned alternatives -Less likely to conform to mandated solutions -More likely to try out new and innovative solutions -More confident of success in cases of non-sanctioned use	<u>Highly skilled users:</u> -More aware of non-sanctioned alternatives -Less likely to conform to mandated solutions -More likely to try out new and innovative solutions -More confident in their ability to solve problems on their own -More confident of success in cases of non-sanctioned use -Less influenced by the project size during non-sanctioned use	<u>Highly skilled users:</u> -More confident in their ability to solve problems on their own -More aware of non-sanctioned alternatives -More likely to try out new and innovative solutions

**Table 17 - Case-Ordered Predictor-Outcome Matrix:
Moderators and Mediators of Hidden and Surreptitious Adoption (Cross-Cluster)**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Project Size, Visibility & Criticality	<p><u>Upper management:</u> -Lacks practical IT knowledge -Not aware of new technology <i>-Think they know IT</i> <i>-Comfortable with/influenced by large vendor solutions</i> -Reluctant to try non-sanctioned solutions -Do not consider needs of technical users <i>-Makes wrong selections</i></p>	<p><u>Upper management:</u> -Lacks practical IT knowledge -Do not consider needs of technical users -Not aware of new technology <i>-Makes wrong selections</i></p>	<p><u>Upper management:</u> -Lacks practical IT knowledge -Do not consider needs of technical users <i>-Think they know IT</i> -Reluctant to try non-sanctioned solutions <i>-Comfortable with/influenced by large vendor solutions</i></p>	<p><u>Upper management:</u> -Reluctant to try non-sanctioned solutions -Do not consider needs of technical users -Lacks practical IT knowledge -Not aware of new technology</p>
	<p>-Project size makes a big difference -For smaller/non-visible/internal projects I can make the decision -More difficult to break the rules on larger projects -Standardized sanctioned solutions are for larger projects -Senior management approval needed if the risk is too high</p>	<p>-Project size makes a big difference -More difficult to break the rules on larger projects -Standardized sanctioned solutions are for larger projects -Senior management approval needed if the risk is too high</p>	<p>-Project size makes a big difference -For smaller/non-visible/internal projects I can make the decision -Standardized sanctioned solutions are for larger projects -More difficult to break the rules on larger projects</p>	<p>-Project size makes a big difference -More difficult to break the rules on larger projects -For smaller/non-visible/internal projects I can make the decision -Standardized sanctioned solutions are for larger projects -Senior management approval needed if the risk is too high</p>

**Table 17 - Case-Ordered Predictor-Outcome Matrix:
Moderators and Mediators of Hidden and Surreptitious Adoption (Cross-Cluster)**

		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Awareness	Sanctions (Rules)	<ul style="list-style-type: none"> -<i>More likely to use sanctioned alternatives</i> -More likely to ask for approvals -Less likely to be aware of and use non-sanctioned solutions -Rules get interpreted at the immediate manager level 	<ul style="list-style-type: none"> -Rules get interpreted at the immediate manager level 	<ul style="list-style-type: none"> -<i>More likely to use sanctioned alternatives</i> -Less likely to be aware of and use non-sanctioned solutions -Rules get interpreted at the immediate manager level 	<ul style="list-style-type: none"> -Rules get interpreted at the immediate manager level -Less likely to be aware of and use non-sanctioned solutions -Senior level is more aware of sanctions
	Non-Sanctioned Solutions	<ul style="list-style-type: none"> -Performance concerns (with sanctioned solutions) increase awareness of alternatives -<i>More technical people are more aware of alternatives</i> -Internet (forums, blogs, tutorials...) increase awareness of alternatives -Work with outside consultants increase awareness -Knowledge of official rules will reduce it -Past experience increase awareness 	<ul style="list-style-type: none"> -Performance concerns (with sanctioned solutions) increase awareness of alternatives 	<ul style="list-style-type: none"> -Performance concerns (with sanctioned solutions) increase awareness of alternatives -<i>More technical people are more aware of alternatives</i> -Internet (forums, blogs, tutorials...) increase awareness of alternatives 	<ul style="list-style-type: none"> -Performance concerns (with sanctioned solutions) increase awareness of alternatives -Internet (forums, blogs, tutorials...) increase awareness of alternatives

**Table 17 - Case-Ordered Predictor-Outcome Matrix:
Moderators and Mediators of Hidden and Surreptitious Adoption (Cross-Cluster)**

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Availability of Help and Support	-Internet (forums, blogs, tutorials, wikis, Google...) is a major source of help and support	-Lack of commercial support on certain non-sanctioned solutions is a show stopper for management	-Access to help& support builds confidence in non-sanctioned solutions	-Lack of commercial support on certain non-sanctioned solutions is a show stopper for management
	-Access to help&support builds confidence in non-sanctioned solutions	-Lack of proper support on sanctioned solutions is an incentive to try non-sanctioned alternatives	-Lack of timely help and support can reverse a decision to use a non-sanctioned tool	-Access to help& support builds confidence in non-sanctioned solutions
	-Lack of proper support on sanctioned solutions is an incentive to try non-sanctioned alternatives		-Lack of commercial support on certain non-sanctioned solutions is a show stopper for management	-Internet (forums, blogs, tutorials, wikis, Google...) is a major source of help and support
	-Provision of support by an expert or community adds to identification pressures internally or normative pressures externally		-Internet (forums, blogs, tutorials, wikis, Google...) is a major source of help and support	-Provision of support by an expert or community adds to identification pressures internally or normative pressures externally
	-Lack of timely help and support can reverse a decision to use a non-sanctioned tool		-Lack of proper support on sanctioned solutions is an incentive to try non-sanctioned alternatives	-Lack of timely help and support can reverse a decision to use a non-sanctioned tool
	-Lack of commercial support on certain non-sanctioned solutions is a show stopper for management		-Provision of support by an expert or community adds to identification pressures internally or normative pressures externally	

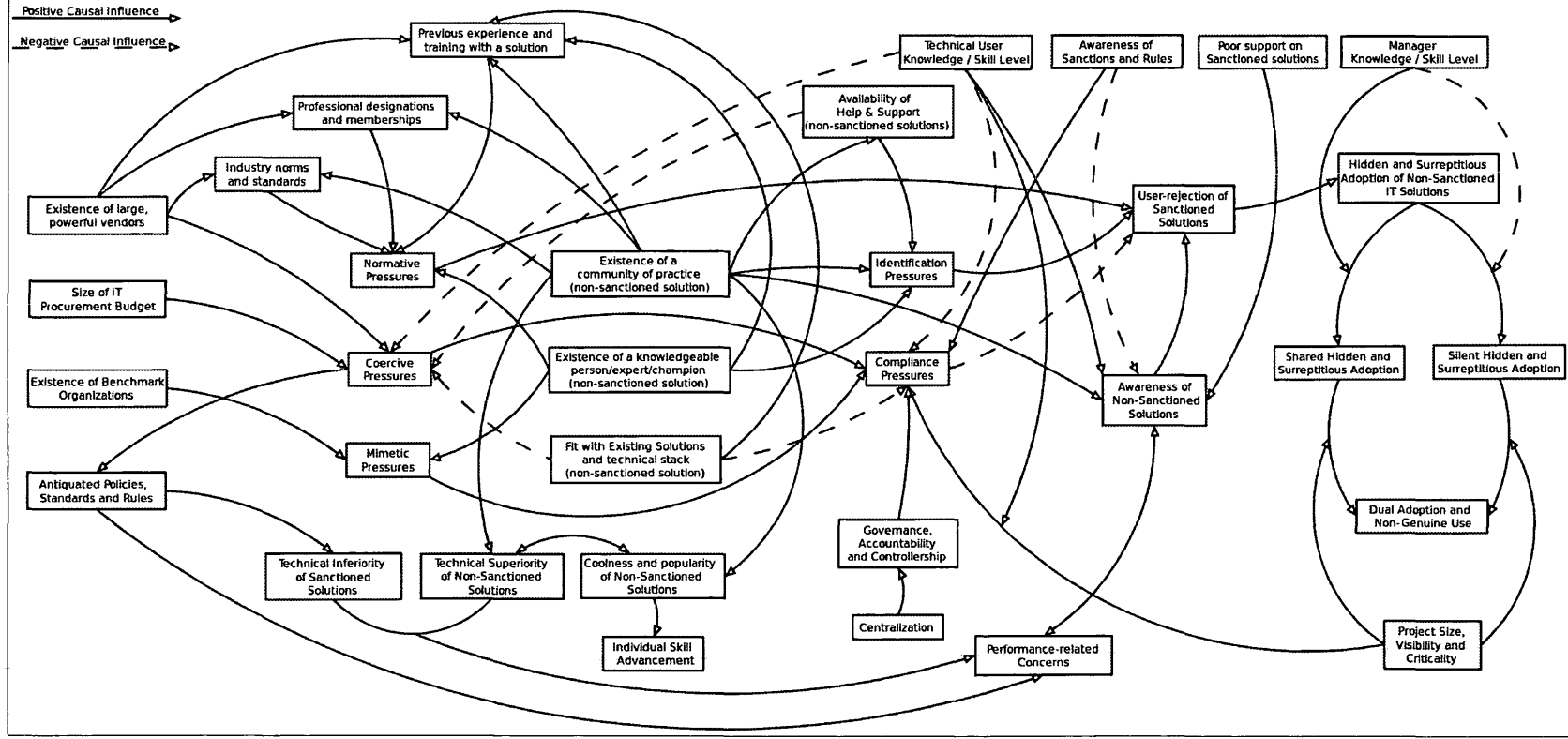
5.2.2.4 Causal Network: Hidden and Surreptitious Adoption of IT Solutions (Cross-Cluster View)

Building upon the findings of case-ordered displays prepared during the preceding exploratory cross-case analysis and directly flowing from the results of the predictor-outcome matrices completed as part of the ongoing explanatory analysis, a cross-cluster causal network diagram was prepared in this final stage of analysis. The network display shows all variables that are estimated to be the strongest predictors of the occurrence of second-stage hidden and surreptitious adoption of IT solutions by technical users in large organizational settings as well as the observed or inferred causal relationships among those variables. The causal network brings together a number of variables that have been verified across several clusters. The display was created as a result of a multi-step process.

This process started with the review of the case-specific interim and preliminary causal network diagrams prepared as part of the within-case analysis. While the underlying data have been reported in various matrices during within-case analysis, these cluster-specific interim diagrams are not included in reporting of results to prevent confusion due to existence of multiple causal networks.

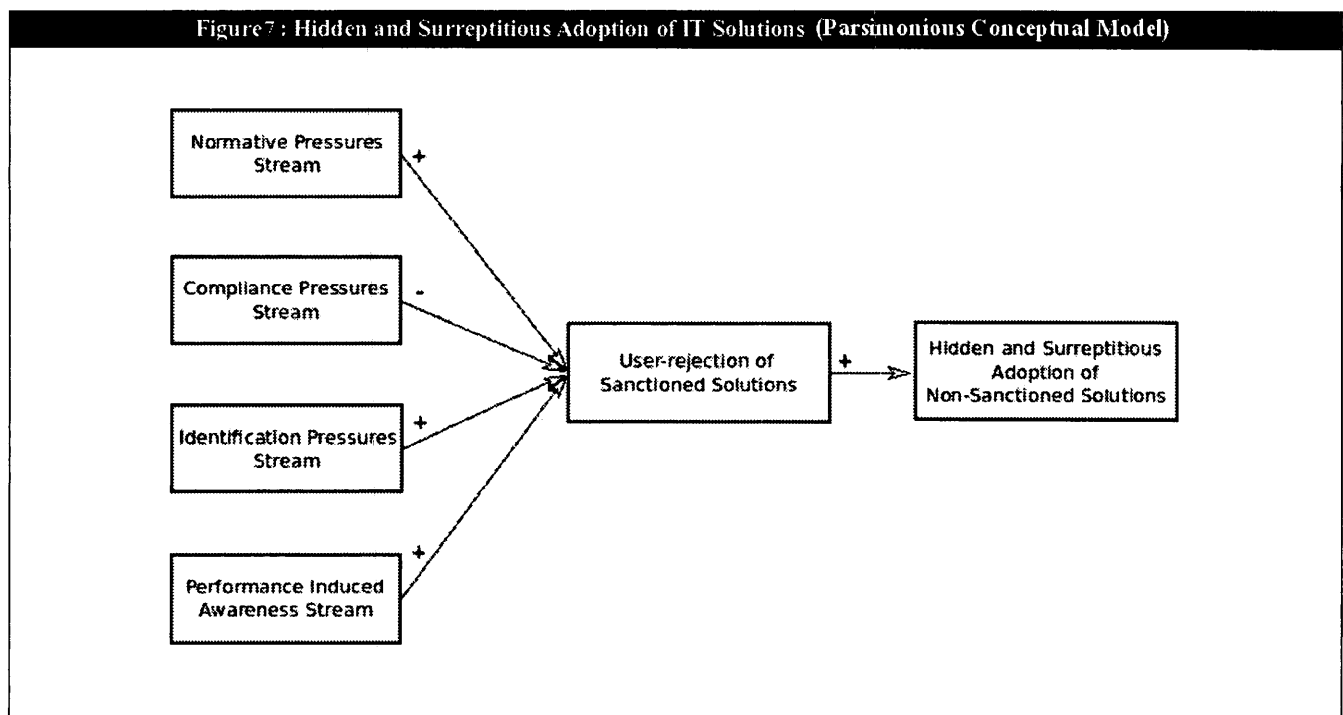
The multi-step process then continued with cross-cluster validation of predictor variables in cross-case exploratory analysis and further matured with the contextual expansion around those predictor variables during explanatory analysis. The process got finalized with the placement of the highlighted (recurring) synthesized patterns in causal streams leading up to hidden and surreptitious adoption. The resulting cross-case causal network diagram is provided in **Figure 6** below.

Figure 6: Cross-Cluster Causal Network Diagram



Each causal stream is thought to have a significant influence on the user rejection of sanctioned solutions and might contribute positively or negatively towards occurrence of hidden and surreptitious adoption of non-sanctioned solutions.

As suggested in Miles and Huberman (1994) these causal streams were defined by going two steps back from the outcome measure, that is, the occurrence of hidden and surreptitious adoption and are explained in more detail below under the respective headings. It is important to note however that these causal streams should not be seen as alternative routes to hidden and surreptitious adoption. Instead, they should be accepted as accumulated influences which, in aggregate, define the ultimate occurrence (or lack thereof) of hidden and surreptitious adoption of non-sanctioned solutions. This view is reflected in the parsimonious model shown in **Figure 7** and further explained below .



5.2.2.4.1 Stream 1: Normative Stream

Cross-cluster evidence has shown that rejection of sanctioned solutions and the subsequent adoption of non-sanctioned solutions in a hidden and surreptitious manner by technical users can be influenced by normative pressures. While the theoretical relationship between normative isomorphism and hidden and surreptitious adoption was discussed early on in Chapter 2, the empirical data have provided a much more detailed picture of the inner workings of normative isomorphism in a large institutionalized environment.

The interviews have helped uncover four potential sources of normative pressures. First involved the impact of industry norms and standards. All other influences being equal, when faced with a technical adoption decision, technical users were more likely to choose solutions which they believed were in line with the industry norms and standards. While these norms and standards were, during initial theorizing, assumed to be heavily influenced by large and powerful vendors, this assumption has not been validated empirically. Evidence gathered through interviews has shown that most IT solutions that are perceived as industry norms and standards by technical users did not involve products of large vendors who had the resources to control market directions. Instead these solutions were predominantly non-sanctioned alternatives where free and open source solutions heavily represented.

The second source was the effect of professional designations and memberships. All other influences being equal, technical users were more likely to choose solutions they had certifications on or otherwise affiliated with through their membership in a user group. This effect was in turn under the influence of two opposing forces. One was the effect of powerful vendors which pushed vendor-bound certifications or encouraged memberships in vendor-controlled user groups. This force naturally

encouraged use of mainly sanctioned solutions (most sanctioned solutions were products of large vendors). The other was the more powerful effect of various communities of practice. Mostly online, these free communities appeared to offer vendor-independent designations, had much larger membership and favoured non-sanctioned solutions.

The third source was the effect of previous experience and training of a technical user. All other things being equal, technical users were more likely to choose solutions they had past experience with or had training on. This particular effect itself was the product of four different forces. The first force involved the influence of large and powerful vendors which, through commercial events and via third party partners, offered training on solutions they offered (again, this category mostly included sanctioned products). This force was balanced by the influence of widely used and trusted communities of practice. These communities, offered free online training and increased the possibility that a particular user will be more familiar with the solutions they advocated (mostly unsanctioned solutions). The third force involved having a knowledgeable person or champion at hand who would act as an on demand source of training. The fourth factor was the fit between the solution being considered and the existing technology stack. The higher the fit, the higher the likelihood that a particular user would spend the time and energy to receive training on that solution (which would lead to higher normative pressures for continued use).

The fourth source was the direct effect of the existence of a knowledge person/expert/champion. All other things being equal, the technical users were more likely to choose solutions that are also used by a knowledgeable individual they knew. In addition to its indirect, mediated effect through previous experience/training, the presence of a knowledgeable person has proven to affect the forming of normative pressures. This may have been due to technical user perceptions with regards to the

credibility of that person and the belief that he/she would be making well-informed selections (i.e. whatever the knowledgeable person uses gets being treated as the norm).

5.2.2.4.2 Stream 2: Identification Stream

There was sufficient evidence across clusters to argue that identification pressures may contribute to user rejection of sanctioned solutions and the corresponding hidden and surreptitious adoption of non-sanctioned solutions by technical users.

Two potential sources have been found to influence the build up of identification pressures in favour of non-sanctioned solutions. The first involved existence of knowledgeable persons, experts or champions. Evidence has shown that technical users were influenced by such individuals and as part of their on-going relationship with them adopted various solutions that these people advocated or used themselves.

The second source originated from various communities of practice on non-sanctioned solutions and affected identification pressures either directly or via provision of help and support through these communities (i.e. it's effect was mediated by the availability of help and support). The influence these communities had on technical users was similar to the influence of knowledgeable individuals in that it also was relationship based. In other words, in an effort to maintain an ongoing relationship to a community, technical users adopted solutions championed by these communities. Evidence has also suggested that vendor-independent communities appeared to fuel identification pressures much better than commercially-backed ones. Provision of help and support through these communities further helped increase identification pressures by elevating the level of association between the helped and the helping communities.

5.2.2.4.3 Stream 3: Compliance Stream

A major influence which, when materialized, worked against the occurrence of hidden and surreptitious adoption of IT solutions involved the internal compliance pressures. The compliance pressures themselves were the result of a complex web of positive and negative sources of pressure. Evidence has helped uncover a sophisticated web of relationships that involved five sources of positive pressures (i.e. factors which increased the compliance pressures thereby reducing the possibility of user rejection of sanctioned solutions) as well as two sources of negative pressures (i.e. factors which reduced the compliance pressures thereby increasing the possibility of user rejection of sanctioned solutions). These seven contributing factors to compliance pressures are explained below.

The first contributing source was the awareness among technical users of the existing sanctions and rules. These involved knowledge of existing formal policies, standards, procedures and best practices that favoured and sanctioned certain solutions over others. Evidence has shown that this awareness was relatively low among technical users. When technical users did not possess sufficient knowledge and awareness of such rules, they were less likely to bound to pressures of compliance with the logic that one would not expect any punishment for breaking a rule he/she is not aware of, nor would expect any rewards for following a rule he/she has not heard of. Even though there appeared to be a positive relationship between the level of the technical person in the organizational hierarchy and the awareness he/she possessed, even at higher levels such awareness was still vague enough to lead to common (mis)interpretation of rules. In any case the current state of awareness among technical users helped reduce compliance pressures and contributed positively to the occurrence of hidden and surreptitious adoption of non-sanctioned solutions.

The second source was conceptually related to the first one in that it also involved policies, standards, procedures and best practices but instead of looking at awareness of such rules among technical users, it evaluated the effect of organizational governance, accountability and controllership structures which helped enforce such formal rules. The logic was simple, technical users may not be aware of sanctions or formal rules but as long as there are formal structures in place to enforce such sanctions and rules this would lead to increased compliance pressures among technical users. Naturally, increased centralization leads to stricter control structures and enforcement mechanisms. Nevertheless, the collected evidence has shown severe deficiencies in the existing governance, accountability and controllership structures at the cluster level which further helped reduce compliance pressures.

The third source was the effect of project size, visibility and criticality. The bigger, more visible or more critical a project became, the more higher-level scrutiny it received thereby increasing the compliance pressures on technical users. While smaller, out-of-the radar type projects got away with non-sanctioned solution use easily, others with external components were expected to closely follow applicable rules. There were exceptions where non-sanctioned solutions were used in bigger or more critical projects. However, on those occasions, the non-sanctioned use was never kept hidden from and always happened under the watch of a senior-level executive. These exceptions almost always caught the attention of the central authority in time and was shut down afterwards.

The fourth source was related to the effect of coercive external pressures. These coercive pressures themselves originated from a number of factors. One obvious factor was the existence and involvement of large and powerful IT vendors. On occasions when officially mandated sanctioned solutions happened to be product offerings by large and powerful vendors, the adoption and use of these solutions were closely tracked by these technology vendors and thereby increased compliance

pressures. The higher the value of the offer the higher the coercive pressure became. In other words, the magnitude of the coercive and the resulting compliance pressures were directly related to the size of the IT procurement budget where big ticket items caused higher external coercive pressures which in turn contributed towards elevated levels of internal compliance pressures. Two counter forces had a balancing effect on coercive pressures. One balancing factor was the level of technical knowledge and skill possessed by the technical user. Evidence has shown that highly technical users were less susceptible to coercive pressures of IT vendors and the resulting internal compliance pressures. It is most likely that this immunity was only applicable when technical users were endowed with deep technical skills and expertise. The other was related to the fit between non-sanctioned alternatives and the existing technology stack. On occasions when alternative, non-sanctioned solutions complemented the existing technology stack the vendor-push for sanctioned offerings appeared to have lesser effect.

The fifth source originated from the external mimetic pressures. The existence of mimetic pressures were dependent upon two factors themselves. One concerned the existence of a benchmark organization. The other was the existence of an expert. On both occasions the solutions used by these organizations or individuals who are perceived to be successful became taken for granted and copied. According to collected evidence, in the case of experts, most copied solutions belonged to the non-sanctioned kind (though, this does not preclude any sanctioned solution to be promoted or preferred by experts in general). The external benchmark organizations had both sanctioned and non-sanctioned solutions, though, the latter kind was more prevalent.

The remaining two sources, technical user knowledge/skill level and fit with existing technology stack, both had a negative influence on compliance pressures. Furthermore, each of these two influences had a direct as well as an indirect effect on compliance pressures. In either case, the indirect effect was

mediated through coercive pressures which had been discussed above. Direct effects worked similarly. Technical users with deep technical knowledge and skill were less susceptible to internal compliance pressures and felt at ease even when compliance pressures existed. The situation was helped further when the non-sanction solution in question fit well with the existing technology stack.

5.2.2.4.4 Stream 4: Performance Induced Awareness Stream

This final stream towards hidden and surreptitious adoption involved occasions where performance issues with sanctioned solutions led to increased user awareness of non-sanctioned alternatives ultimately resulting in user rejection of the sanctioned solutions for the higher performance non-sanctioned ones. Evidence has shown that five separate sources may have contributed to user awareness of non-sanctioned solutions, though, one particular source, performance related concerns, is suspected to play a bigger role than the rest.

First source was poor support on sanctioned solutions. While an official requirement mandating support contracts and associated service level agreements had already been in place, cross-cluster evidence indicated widespread dissatisfaction among technical users about the effectiveness of the service they received from sanctioned solution vendors. Despite receiving prompt acknowledgement on the issues, technical users were still concerned about the amount of time it took for their issues or problems to be resolved. On occasions issues lingered for weeks and months before a solution was presented (if at all). In the meantime, operating under operational concerns, technical users became more aware of alternative non-sanctioned solutions out of desperation and in an effort to address an immediate business problem.

As the second source, various communities of practice on non-sanctioned solutions played an

extremely critical role in building awareness on the non-sanctioned solutions they advocated. These user communities were commonly used and relied on by the technical user community. Search engines played an integral part in locating the appropriate community on a particular problem.

The third source was related to technical users' own knowledge and skill levels. Users who possessed deep technical knowledge and/or had advanced technical skills appeared to have an acute sense and awareness of alternative non-sanctioned solutions. Conversely, the fourth source, awareness of sanctions and rules, had a negatively effect on awareness of non-sanctioned solutions. Technical users who were relatively more aware of formal sanctions and existing rules were on average and all else being equal were less likely to search for non-sanctioned alternatives.

Finally, strongest source originated from performance concerns with mandated sanctioned solutions. When asked about the rationale for their preference of non-sanctioned alternatives over sanctioned ones, on many occasions, technical users clearly justified their choice on the basis of significant on-the-job performance differences and emphasized superiority of non-sanctioned solutions. It is important to note here that technical superiority in this context was used an umbrella term that accommodated various aspects of quality including ease of use, simplicity, ease of support and technical feasibility. In other words, technical sophistication alone did not automatically translate into technical superiority but instead, in the absence of sufficient support structures, could easily become a disadvantage leading to technical inferiority. Two factors appeared to significantly contribute towards perception of superiority of a solution: existence of communities of practice around that solution and popularity of that particular solution in the technical community. Both these factors gave non-sanctioned solutions an edge over their sanctioned, commercially-backed alternatives. Similarly, a factor that contributed towards perception of technical inferiority was the existence of antiquated policies, standards and rules.

Technical users unanimously agreed that these standards and rules were in severe need of refreshing and updating. The wider the gap between perceived technical inferiority of sanctioned solutions and the technical superiority of non-sanctioned alternatives the higher the performance related concerns became leading to greater awareness of non-sanctioned solutions and the ultimate rejection of sanctioned alternatives.

5.2.2.4.5 Types of Hidden and Surreptitious Adoption

Two distinct kinds of hidden and surreptitious adoption were observed through cross-cluster evidence.

One involved occasions where technical users, having rejected a sanctioned solution, proceeded with the adoption of a non-sanctioned solution in utmost secrecy (silent stream). The solutions that became subjects of silent hidden and surreptitious adoption tended to be less visible and behind-the-scenes. For example, on a number of occasions technical users admitted using restricted open source libraries despite being aware of those restrictions. On those occasions the adoption decision was not shared even with the immediate manager. There might be several reasons for this behaviour. One involves the perception that such non-compliant behaviour would have little or no chance of being discovered by the authorities. The second is related to perceived technical skill and knowledge level possessed by the immediate manager to whom the technical user reported. The lower the perceived technical skill level of the immediate manager the less likely the user became to share the non-compliant behaviour with his/her manager due to higher risk of "not being understood".

The other kind, the shared stream, involved occasions where the non-compliant behaviour was shared with the immediate manager (but not beyond the immediate manager and no higher-level approval was sought). Those occasions mostly involved solutions that were somewhat more visible (e.g. the

integrated development environment or the application server a programmer uses) and also involved less technical knowledge/skill gaps between the user and his/her immediate manager.

On rare occasions, the adoption of non-sanctioned solutions was observed to run in parallel with the continued use of sanctioned, rejected solutions (Dual Adoption and Non-Genuine Use). On those occasions technical users relied on non-sanctioned solutions to complete actual work but maintained a symbolic use of sanctioned tools to show compliance. This interesting phenomenon appeared to occur within the confines of projects with higher visibility. By their nature, these projects were under the closer watch of various approval bodies and the continued use of sanctioned solutions was most likely an effort to obtain necessary approvals for project continuance.

This chapter provided a detailed account of the results obtained as a result of the process with which the collected empirical data were analyzed. As detailed in the previous chapter this process started with the collection of unprocessed raw data (Pre-Analysis Stage), continued with the preparation of transcripts (Analysis Prep-Stage), processing and filtering via excerpts (Stage 1A), and processing and enrichment of the excerpts (Stage 1B). The subsequent in-depth analysis involved both within case (Stage 2) and cross case (Stage 3) stages. The within case analysis started with the creation of a variety of exploratory and descriptive displays (Stage 2A) and continued with preparation of several explanatory displays (Stage 2B). Similarly, building upon the single-case evidence, the cross-case analysis developed a synthesis of observations across all clusters through preparation and analysis of exploratory/descriptive (Stage 3A), and later, explanatory/causal (Stage 3B) displays. In the following final chapter these findings will be further evaluated for their limitations as well as quality and their implications for theory, practice and future research will be discussed.

CHAPTER SIX: DISCUSSION AND CONCLUSION

Individual adoption of technological innovations is a well-explored and mature research stream in the information systems discipline. While less mature than individual adoption, research focusing on organizational adoption of IT solutions represents a growing and healthy stream of research. Organizational adoption has commonly been conceptualized as a two step process leading to four potential adoption/non-adoption scenarios that can be investigated in organizational settings. Nevertheless, existing academic research has placed great emphasis on certain scenarios while neglecting others. Second-stage rejection of mandated solutions and the subsequent adoption of non-sanctioned solutions in a hidden and surreptitious manner by technical users represents one such scenario. Despite a wealth of anecdotal evidence pointing to potential for structural and cultural roots for such occurrences, this particular category of adoption has been ignored in extant research. In this dissertation, I tried to zoom in on this particular scenario and explored possible internal and external antecedents of hidden and surreptitious adoption in large, hierarchical organizational settings.

First, existing research on individual and organizational technology adoption was briefly reviewed, research gap validated and research question was clarified in Chapter 1. The thorough literature review that followed in Chapter 2 not only confirmed the research worthiness of the topic but also it provided further theory direction that helped establish a solid theory base. In order to do so, appropriate concepts were selectively borrowed from relevant literature on technology adoption and institutional theory. This involved extension of the conventional decoupling concept in the form of a multi-layer decoupling argument, a broader conceptualization proposal for the concept of social influence and development of

a number of testable hypotheses for possible internal and external antecedents of hidden and surreptitious adoption. Selections regarding research design and the high-level methodology were clarified and justified in great detail in Chapter 3. Among others, various selections regarding coding, sampling, context bounding and process were explained in Chapter 3. Focusing on the analysis of collected data, Chapter 4 described a multi-stage analysis process to guide the implementation. Following the same procedural order described in Chapter 4 the actual results of the analysis are reported and illustrated through examples in Chapter 5. In this final chapter these results are further discussed and elaborated on. In addition to discussion of various elements that may have impacted the quality of findings, particular emphasis has been placed on implications for practice and future research.

6.1 Hidden and Surreptitious Adoption of IT Solutions

Hidden adoption of organizational IT solutions, that is, the second-stage, technical user initiated, surreptitious adoption of IT tools, applications, processes, methodologies or best practices following prior and genuine managerial rejection, presents a complex and fascinating organizational occurrence. This exploratory dissertation confirmed that the anecdotal evidence that triggered this study did not represent episodic or idiosyncratic instances but instead was part of a structural and cultural phenomenon that occurred when certain factors were in place. Consequently, based on an empirical investigation involving four semi-independent IT clusters of a large public sector organization this dissertation provided preliminary insights on factors which influence the occurrence of hidden and surreptitious adoption in institutionalized organizational settings.

The recurring empirical evidence traced across multiple clusters helped uncover a variety of

contributing factors with a complex web of relationships among them. In particular, the analysis identified four complementary causal streams that may affect the occurrence and magnitude of hidden and surreptitious adoption. The following discussion elaborates further on each stream. After a brief mention of the theoretical underpinnings of a stream, conclusions will be discussed in light of empirical evidence linking to a number of factors which contribute to that particular causal stream. The implications will then be interpreted for various stakeholders involved in the situation.

6.1.1 Normative Causal Stream

External pressures of normative isomorphism is known to affect organizational adoption of IT solutions (Gosain 2004, Lai et al. 2006, Liang et al. 2007). This dissertation provided further insights on the inner-workings of normative isomorphism. Evidence has confirmed that four factors contribute to external normative pressures: industry norms/standards, professional designations/memberships, previous experience/training, and existence of a knowledge person/expert/champion.

The effect of industry norms and standards on technology adoption decisions was expected. Technical user preference for solutions that are perceived as “industry standards” can easily be justified on many grounds that range from the perceived ease with which support and training can be obtained on commonly used solutions, to influence of peers and even risk reduction. However, the relative strength of factors which affect forming of norms and standards (which in turn influence adoption preferences of technical users) was counter-intuitive. Even though the original conceptualization of these factors included both powerful external vendors effects as well as the potential influence of industry associations/consortia and independent professional networks, the relative strength of external powerful vendors was expected to surpass the strength of independent industry associations and networks. Nonetheless, the evidence has shown that most industry norms and standards involved predominantly

vendor-independent (and in this organization, non-sanctioned) solutions (e.g. Eclipse IDE, SVN code repository, Linux OS, agile development methodologies and various open source libraries as well as development frameworks). On many occasions, the centrally sanctioned solutions and organization-wide standards were observed to be in direct conflict with industry norms and standards. This raises the possibility that organizational standards sanctioning certain big-vendor solutions or policies restricting use of otherwise industry standard non-sanctioned solutions may have been the products of a dysfunctional selection mechanism in the centre. In light of technical user perceptions supporting this view, it is quite natural to suspect that the coercive influence efforts by powerful vendors may have played a role in this selection and resulted in a list of sanctioned solutions where large vendors were disproportionately represented.

Technical users had a tendency to choose solutions they had certifications on or otherwise affiliated with through their membership in user groups/communities. This influence appear to have been recognized and heavily taken advantage of by large commercial vendors as most of these vendors already introduced designations linked to their products (e.g. Oracle DBA, Microsoft Certified Solutions Developer, Sun/Oracle certified Java Developer, IBM Certified Application Developer and so on...). In comparison, vendor-independent communities (Apache Foundation, Eclipse Foundation, the Linux Foundation and so on...) command larger membership figures but certain exceptions aside (e.g. Scrum Foundation) do not appear to offer any certifications or professional designations. Nevertheless, technical users appeared to be acutely aware of the distinction between belonging to a vendor-sponsored user group versus an independent community or a user group, and valued the the vendor-neutral communities more.

Technical users are more likely to choose solutions they are familiar with. This familiarity may be due

to past experience with or previous training on a solution. Evidence has clarified that there was no single avenue to create familiarity and that users build familiarity with a particular solution via different avenues. One avenue involves the marketing efforts by large vendors. Vendors are known to create familiarity with their offerings by way of offering limited-time trial or developer versions of their products as well as through trade shows and events where free teaser-training is provided. Another route involves the effect of user communities. These online communities not only create awareness around best-of-breed solutions that are vetted by great number of users but they also provide free-of-charge training and support. Due to large number of active users and ease-of-access to subject matter experts these communities appear to have become the number one source of answers for technical users. These communities have access to a much larger and unfiltered audience than commercial vendors. In comparison, vendor efforts represent a much more focused undertaking and mostly target technical users at a much later stage in their professional lives (i.e. only when they are part of an existing or potential client organization). Therefore, communities of interest/practice have significantly greater chances of creating familiarity with the solutions they advocate much early on in the career of a technical user. On occasions when there is a knowledgeable person or champion at hand, a third avenue becomes feasible as these on-site experts assume the role of an internal community of practice as they provide support and training to interested colleagues, which over time, helps build familiarity with solutions supported by them. Since these individuals themselves would have a much greater chance of being affected by user / practitioner communities, they mostly advocate industry standard solutions. The obvious exception involves use of professional technology evangelists by vendors. In addition to its indirect effect via previous experience / training, the presence of knowledgeable people / experts / champions has also proven to have a direct effect on the forming of normative pressures due to perceived credibility and trust these individuals carry in the eyes of other technical users.

The practical implications of the normative causal stream are further evaluated in **Table 18** below for various stakeholders .

Table 18 – Implications for Practice (Normative Causal Stream)

Implications for: the Organization	Implications for: Commercial Vendors	Implications for: Independent Industry Bodies
<ul style="list-style-type: none"> The tension between external industry standards and internally sanctioned solutions can be eased by creating a transparent selection mechanism. The trust in the selection system can further be increased by allowing input at all levels. 	<ul style="list-style-type: none"> Proprietary solutions may be aligned with industry standards. Membership in industry consortia is an option. Preferred solutions can be evaluated as benchmarks and company offerings can be modified to build upon and offer the key features of these benchmark solutions (sometimes, less can be more). 	<ul style="list-style-type: none"> While representing best-of-breed solutions, the independent industry bodies (e.g. foundations) lack the end-to-end capabilities offered by commercial vendors which puts them at a disadvantage in the enterprise solutions sphere. These bodies may consider alliances or strategic partnerships with similar bodies offering complementary solutions.
<ul style="list-style-type: none"> Memberships in external communities of interest or practice is a great indication of solution preferences of technical users. External communities that command higher membership numbers with technical users in the organization may be supported or sponsored. These preferred solutions may be evaluated and even sanctioned. Creation of internal user groups to mimic these communities may further help with internal knowledge creation/retention. Standardization on vendor-bound solutions without valid rationale will fuel perceptions of biased selections and go against the impartial approach public sector organizations are expected to follow. 	<ul style="list-style-type: none"> Vendor-specific designations and certifications help with marketing efforts and should not be seen as separate lines of businesses with a profit mandate. If at all possible, provision of such designations and certifications at cost (or even free of charge) would likely more than compensate the lost training/certification expenses in increased license sales as well as in maintenance and support contracts. 	<ul style="list-style-type: none"> Provision of training and introduction of varying levels of designations/certifications can be considered. The resource issue may be resolved with a volunteer-based model. Any kind of partnerships with commercial vendors could seriously hurt community trust.

Table 18 – Implications for Practice (Normative Causal Stream)

Implications for: the Organization	Implications for: Commercial Vendors	Implications for: Independent Industry Bodies
<ul style="list-style-type: none"> • By creating awareness and familiarity on mandated sanctioned solutions the central or cluster IT organizations would be able to increase normative pressures on technical users. For all new technical hires orientation sessions may include sessions on sanctioned solutions. For seasoned technical users periodic refresher training on updated standards and policies may serve a similar purpose. 	<ul style="list-style-type: none"> • Technical users can be targeted much earlier on in their careers or even before they start their professional lives. Universities and other providers of technical training may be furnished with free technical user copies of key solutions to create familiarity. This would help build a relationship with potential future clients before they become targets of competitors. Recruitment of technically superior users from among these as professional evangelists should also be considered. 	<ul style="list-style-type: none"> • Provision of top-of-the-line help and support through community forums and user groups may be key in building trust with potential users. Technically superior community members may be used as moderators of user forums/groups and creation and enforcement of quality metrics around support may be considered. Cross-community partnerships and alliances may help increase potential user familiarity. Education providers may also be invited to include training on community based best-of-breed products in their curriculum. Recruitment of non-professional technology evangelists may be considered. These people would likely have a stronger effect on technical people due to their perceived impartiality and vendor independence.

6.1.2 Identification Causal Stream

Cross-cluster evidence has shown that identification pressures positively contribute to user rejection of sanctioned solutions and the subsequent adoption of non-sanctioned solutions in a hidden and surreptitious manner.

Two possible sources have been found to contribute to identification pressures in favour of non-sanctioned solutions: knowledgeable persons / experts / champions and communities of interest / practice.

It has been long known that user groups or communities of interests as well as technology gurus or champions may contribute to identification processes (Chakrabarti 1974, Lind et al. 1989, Rogers 1995, Zaltman and Duncan 1977). Nevertheless, this research has provided preliminary evidence showing that not all user communities or persons with knowledge and expertise generate same levels of conformity among technical users. In particular, technical users treated vendor-independent communities and vendor-neutral experts with much greater respect and have shown greater attraction towards maintaining an on-going relationship with these communities or persons. Consequently, identification pressures due to communities of interest / practice and knowledgeable persons / experts / champions was found to be much greater than their vendor-sponsored counterparts.

The practical implications of the identification causal stream are further evaluated in **Table 19** below for various stakeholders.

Table 19 – Implications for Practice (Identification Causal Stream)

Implications for: the Organization	Implications for: Commercial Vendors	Implications for: Independent Industry Bodies
<ul style="list-style-type: none"> Maintaining greater control over access to outside communities or persons may help initially control build up of such identification pressures favouring non-sanctioned solutions. However, this solution may likely be short lived as it will risk creating employee dissatisfaction and lead to lower job performance. Technical users are known to be more productive when they operate with fewer restrictions and when they perceive they maintain greater control over their environment. 	<ul style="list-style-type: none"> Whereas professional evangelists can be used to create familiarity with solution offerings, they will not be able to command either respect or trust at the same level as their vendor-neutral counterparts. Similarly, company sponsored user groups may be used as a platform for disseminating information on the newest solution offerings but they will hardly be seen as a trusted platform by users evaluating competing solutions. Instead of directly sponsoring these groups or persons, an alternative route may involve developing associations with independent communities as well as experts who are known to command respect and following among technical crowds. These communities and experts may be invited to comment and provide feedback on the solutions being planned. 	<ul style="list-style-type: none"> In order to maintain the devout following they presently enjoy, these communities need to continue deliver quality help and support to the community and maintain their independence. Potential partnership and association opportunities with other independent community organizations must be carefully evaluated and should only proceed if supported by the majority of existing community members.

6.1.3 Compliance Causal Stream

Previous research has confirmed existence of explicit as well as implicit sources of internal pressures of compliance in organizational settings (Astebro 1995, Chatterjee et al. 2002, Kerr and Newell 2003, Mark and Poltrock 2003, Russell and Hoag 2004). This dissertation has found evidence to suggest that compliance pressures was a major force against the occurrence of hidden and surreptitious adoption of non-sanctioned solutions. Furthermore, a number of positive and negative sources of compliance pressures as well as the relationships among them have been identified. The discussion below reviews these sources and suggests a number of insights and implications.

Evidence suggests that technical users are only superficially aware of the detailed content of existing organizational policies, standards, procedures and best practices. Even at higher levels in the organization managers in technical roles did not appear to have sufficient and detailed knowledge of rules and their responsibilities around those rules. This lack of knowledge and understanding commonly leads to misinterpretation of rules in favour of commonly used practices. Furthermore, significant gaps in enforcement capabilities were identified. These gaps pointed to various deficiencies in organizational governance, accountability and controllership structures. As explained earlier, both effects act in coordination to reduce compliance pressure build up on technical users and contribute positively to the possibility of adoption of non-sanctioned alternative solutions.

Task or project size, visibility and criticality / risk have been found to contribute to compliance pressures among technical users. For small, internal or otherwise non-visible projects, or for projects that are perceived to be less critical or risky technical users were found to be more willing to bend or all together ignore the rules and rely on non-approved, non-sanctioned solutions more often. Because bigger, more-visible and/or critical or risky projects required more coordination with corporate bodies, required higher budgets and/or involved more resources, they were somewhat better scrutinized and thence created elevated compliance pressures among technical users.

This view is also supported in the existing literature. The adoption of technological innovations can be initiated by recognition of new technological innovations with potential to increase performance, a process that is commonly referred to as technology push, as well as by sub-optimal performance necessitating corrective action by users in an alternative process known as needs-pull (Chau and Tam 2000, Fischer 1980, Munro and Noori 1988). It is commonly claimed that the latter scenario -whereby

user needs initiate corrective action- would account for a much higher percentage of technological innovations and thus present a more prevalent model (Langrish 1972, Myers and Marquis 1969). Building upon the need-pull driven adoption model, it can be argued that the hidden and surreptitious adoption of IT solutions is best considered not in isolation but instead within the context of a business task or a project that would necessitate this kind of adoption in order to overcome a problem or a performance related concern.

Once the occurrence of hidden and surreptitious adoption is seen within the context of a business task or a project, it would then be possible to start conceptualizing the potential for task or project related characteristics as potential moderators on various external and internal pressures of social influence. Size, visibility and criticality of a task or project represents one such characteristic. Even though there may be disagreements among academics as to which variables are best suited to measure task or project size, there appears to be common agreement that increased size contributes towards increased complexity and risk which then negatively affects project performance (Brooks Jr. 1995, McFarlan 1981, Sauder et al. 2007).

Therefore task or project size, visibility and criticality has the potential to be a significant moderator of social influence pressures both externally or internally. For example, for smaller tasks or projects that are perceived as less risky, managers would likely be less susceptible to external pressures of isomorphism and more willing to turn a blind eye to adoption of non-sanctioned IT solutions. For similar reasons, technical users engaged in tasks or projects that are believed to be less risky may themselves be less likely to be bound to internal pressures of compliance and more likely to experiment with alternative IT solutions.

Both coercive and mimetic external pressures are found to contribute to internal compliance pressures.

Evidence has confirmed that external coercive pressures had a direct relationship to the existence of large and powerful IT vendor interests. When these vendors had a number of officially mandated and sanctioned solutions, the compliance pressures appeared to increase. The magnitude of coercive pressures were suspected to be proportional to the monetary value of solutions in question. This is in line with existing literature and adds further support the existing findings confirming coercive pressures of vendors (Chwelos et al. 2001, Curtis and Payne 2008, Dos Santos and Peffers 1998, Lefebvre and Lefebvre 1993).

However, the evidence has indicated that two other influences had a balancing effect on coercive vendor pressures: knowledge/skill level possessed by technical users and fit between alternative non-sanctioned solutions and the existing technology stack. On occasions when technical users were endowed with deep technical knowledge and understanding they appeared to be less affected by the external coercive pressures. This may be related to technical users' ability to generate convincing technical arguments in favour of alternative non-sanctioned solutions. Similarly, on occasions when such non-sanctioned solutions fit well with the existing technology stack, technical users were somewhat less affected by the coercive vendor pressures. This may also be related to technical users' enhanced ability to create counter technical arguments against commonly used vendor positions on solution compatibility.

The external mimetic pressures were found to originate from two separate sources. One involved existence of benchmark organizations and is confirmatory to existing literature on uncertainty induced

imitation of organizations that are perceived as successful (Sharma et al. 2007, Sharma et al. 2008, Tingling and Parent 2002). Collected evidence has shown that these copied solutions belonged to both sanctioned and non-sanctioned categories though the latter category appeared to have been represented slightly more. The other source of influence involved availability of and access to a knowledgeable person/expert/champion. Nonetheless, majority of copied solutions in this category belonged to the non-sanctioned kind.

The practical implications of the compliance causal stream are further evaluated in **Table 20** below for various stakeholders.

Table 20 – Implications for Practice (Compliance Causal Stream)		
Implications for: the Organization	Implications for: Commercial Vendors	Implications for: Independent Industry Bodies
<ul style="list-style-type: none"> Through mandatory orientation and periodic refresher training sessions awareness of existing rules and responsibilities among technical users can be heightened. This will help create compliance pressures by making sure that the technical users understand implications of following or breaking the rules. Cluster or corporate architectural or other approval bodies can be given further enforcement powers (e.g. being able to approve/reject procurement activities related to solutioning). However, this practice may also run the risk of forever hiding creative and innovative solutions/practices and create a culture of mediocrity. 	<ul style="list-style-type: none"> Vendor representatives for particular client organizations can be given specific training on organization-specific rules involving company products. These representatives in turn can be used to increase awareness among client technical staff of rules protecting and sanctioning vendor solutions. This will help build compliance pressures, guard sanctioned company solutions and help minimize non-compliance. 	<ul style="list-style-type: none"> Independent industry bodies can prepare and make available technical reports comparing most commonly used commercial solutions to their own. Such impartial comparisons will likely counter balance compliance pressures by way of increasing normative and identification pressures as well as through increasing technical user awareness of best-of-breed non-sanctioned solutions.

Table 20 – Implications for Practice (Compliance Causal Stream)

Implications for: the Organization	Implications for: Commercial Vendors	Implications for: Independent Industry Bodies
<ul style="list-style-type: none"> • Even though existing rules do not grant smaller projects a fast approval track, operational concerns usually result in rules not being as strictly enforced on smaller projects. Strict enforcement of all applicable rules without regard to project size or criticality may likely overwhelm the existing approval hierarchy and create backlogs around architectural approval bodies. A better alternative may involve a complete re-think of the existing governance, accountability and controllership structures to allow a tiered system of approvals. 	<ul style="list-style-type: none"> • Since bigger projects will be more likely to follow corporate rules and rely on sanctioned solutions, large integration or legacy renewal projects and end-to-end enterprise solutions can be promoted to convert as many smaller projects as technically feasible into larger and more visible projects. On the downside, these larger projects would likely involve a lot more complexity and run significantly higher risks of project failure. 	<ul style="list-style-type: none"> • Even though the best-of-breed solutions may lack the end-to-end integration capabilities provided by large commercial solutions, they also lack complexity and are generally much easier to use. These features may be promoted to compare core features of these solutions to commercial alternatives. Also, whereas these best-of-breed solutions lack end-to-end integration capabilities they mostly are on par or better than their commercial alternatives in terms of their scalability. These strong points can be used to market these solutions to wider corporate audiences. Research confirming higher failure rates among larger projects can be quoted to encourage break down of larger projects into smaller components.
<ul style="list-style-type: none"> • Ironically, the big vendor solutions that are selected and sanctioned as “safer” alternatives appear to carry a much higher probability to lead to vendor lock-in scenarios. While smaller vendors would lack the business intelligence resources and/or analytic capabilities to track down and take advantage of cross-selling opportunities (nor they would have many products to cross-sell), larger vendors appear to be taking advantage of their vast customer relationship teams and business intelligence capabilities to offer complementary solutions or end-to-end enterprise solutions. This creates a huge vendor lock-in risk with larger vendors. 	<ul style="list-style-type: none"> • Technical users who possess deep technical knowledge across many domains and who have experience with a variety of competing products appear to minimize the effect of coercive pressures. These users may be targeted by carefully planned product development campaigns and their inputs into new product development projects may be sought. They can also be recruited as professional evangelists. 	<ul style="list-style-type: none"> • Compliance with vendor-neutral standards can be promoted to minimize potential for vendor lock-in. Flexibility of vendor-independent and/or standard compliant solutions may be emphasized. Independently prepared solution evaluation reports and comparative studies can be widely circulated. Solutions complying with cross-vendor standards can be awarded with compliance seals or otherwise endorsed.

6.1.4 Performance Induced Awareness Causal Stream

Earlier research has shown that many innovations are adopted because current techniques are perceived as unsatisfactory, in other words, when a performance gap exists (March and Simon 1958). This performance gap between expected and actual performance is known to be a strong impetus to seek an innovation (Rogers 1995). For example, extensive research on motivations of open source software developers has shown that user dissatisfaction with existing software applications is a strong motivator to become open source user-developers (Bonaccorsi and Rossi 2004, Hertel et al. 2003, von Krogh and von Hippel 2003). Furthermore, we also know that innovative and skillful users who perceive certain innovations as important for their performance will adopt innovations even without management influence and support (Leonard-Barton and Deschamps 1988).

Evidence has shown widespread dissatisfaction among technical users with the quality of help and support they received on sanctioned solutions. Despite mandatory support contracts and service level agreements, technical users were mostly dissatisfied with the pace of support they received on sanctioned solutions and commonly voiced their concerns about the amount of time it took for their issues or problems to be resolved. Combined with several other quality related concerns about sanctioned solutions which, among others included lack of ease-of-use, implementation difficulties, and complexity, these issues fuelled increasing concerns among technical users. In comparison, common availability of various communities of practice around certain non-sanctioned solutions as well as the popularity of those solutions in the greater technical user community helped these non-sanctioned solutions to be perceived as technically more feasible and superior alternatives.

The wider the gap between perceived technical inferiority of sanctioned solutions and the technical

superiority of non-sanctioned alternatives the higher the performance related concerns became leading to greater awareness of non-sanctioned solutions. Combined with day-to-day operational concerns this was one of the primary reasons why technical users developed a higher awareness towards alternative non-sanctioned solutions which they believed would solve the immediate business problems or issues at hand. This is logical. After all, in order for an IT solution to be considered for adoption in the first place and be weighed against its alternatives later on, the users must be aware of the innovative solution as well as of its alternatives. Indeed, awareness is commonly conceptualized as an important precedent of other processes in innovation adoption in general and a crucial prerequisite to the development of specific perceptions towards a particular innovation which may lead to eventual adoption (Agarwal and Prasad 1998, Bharati and Chaudhury 2006, Kwon and Zmud 1987, Rogers 1995). It is important to note that awareness in this context does not mean mere acknowledgement but instead implies possession of a favourable attitude towards a particular innovation.

This dissertation confirmed the important and critical role communities of interest/practice played in building awareness on non-sanctioned solutions. The ease with which these communities can be located via modern search engines and accessed quickly further helped popularizing certain unsanctioned solutions. As mentioned a few times earlier, the technical knowledge and skill level of the employee also played a key role here whereby users with deep technical skills also appear to be more aware of alternative non-sanctioned solutions.

The practical implications of the performance induced awareness causal stream are further evaluated in **Table 21** below for various stakeholders.

Table 21 – Implications for Practice (Performance Induced Awareness Causal Stream)

Implications for: the Organization	Implications for: Commercial Vendors	Implications for: Independent Industry Bodies
<ul style="list-style-type: none"> Existence of a support and maintenance contract and an associated service level agreement does not guarantee delivery of timely and effective service. Presently no feedback mechanisms exist to evaluate vendor performance on support and maintenance. Proper mechanisms must be put in place to gather, evaluate and act on user feedback on vendor performance. Vendors which do not meet expected quality service standards should be penalized. It is ironic that on most occasions availability and delivery of community help and support on non-sanctioned solutions received not only acknowledgement but also much higher appreciation by the technical user community than the paid support agreements. 	<ul style="list-style-type: none"> In terms of its importance, provision of timely and quality help and support on existing solutions should be treated on par with pre-sales marketing efforts. The key issue appears to be having the ability to direct non-standard and advanced technical issues to subject matter experts within acceptable time periods. 	<ul style="list-style-type: none"> Since, delivery of community-based help and support received high praise of technical users on both quality and timeliness, this model should continue to be promoted. Availability of expert users as well as the number of community participants appear to be key in maintaining quality help and support service.

6.2 Implications for Future Research

This dissertation fills a significant gap in the information systems literature by addressing a previously ignored yet practically common technology adoption scenario. Organizational technology adoption research stream has traditionally relied on a two-step adoption conceptualization involving a managerial-level initiation decision and a subsequent user-level implementation (Frambach and Schillewaert 2002, Gallivan 2001, Rogers 1995, Zaltman et al. 1973). In its effort to uncover the antecedents of hidden and surreptitious adoption of organizational IT solutions, this dissertation

unveiled a much more complex process at work which involves formal as well as informal aspects that have traditionally been overlooked or simplified by the conventional two-step view.

The concept of hidden and surreptitious adoption that has been introduced in this exploratory dissertation deserves further investigation. While this dissertation has provided a theoretical base and developed a conceptual model to explain this type of adoption, the occurrence of hidden and surreptitious adoption have been empirically tested for only a particular type of setting (semi-autonomous IT Clusters of a large public sector organization), involving certain actors (IT knowledge workers that perform technical duties), carrying out certain events (software development and maintenance) and focusing on a limited set of processes (business modelling, requirements gathering, systems modelling/architecture, coding, testing, bug fixing, systems integrating, deployment, maintenance and performance tuning). The conceptual model that has been proposed in this dissertation can be tested in many other settings, involving different kind of actors who, as part of their job roles and responsibilities, focus on other business events and perform other sets of business processes.

Nevertheless, hidden and surreptitious adoption will be very hard to identify through common self-report measures used in the adoption literature. For this very reason, the empirical investigation of hidden and surreptitious adoption would present an excellent opportunity for other, well-planned qualitative studies. Ethnographic studies that permit continuing and unobtrusive on-site observation appear to be particularly suitable for the study of hidden and surreptitious adoption. Other study designs may also be possible. For example, the methodological approach taken in this dissertation involved development of a standardized instrument which were then put into use through semi-structured and in-depth qualitative interviews. Because this research design would allow the researcher

to get closer to different layers of actual actors (internal users, management, external constituents and so on...), helps establish trust, and build rapport at a personal level, it could also be suitable to explore the occurrence of hidden and surreptitious adoption in other settings.

Another methodological alternative that can be considered for future empirical investigation of hidden and surreptitious adoption concerns the realm of action research. As argued previously, the occurrence of hidden and surreptitious adoption can be seen as a consequence of (or a reaction to) a much deeper organizational problem, and that action research may offer a suitable methodology to explore the antecedents of hidden adoption as those antecedents may point to real-world problems encouraging the occurrence of hidden adoption in a surreptitious manner. Several factors can be cited for the suitability of insider action research (Brannick and Coghlan 2007, Coghlan 2007a/b, Coghlan and Brannick 2010, Coghlan and Holian 2007, Torbert 1976). First and foremost, hidden and surreptitious adoption is a real event that must be managed in real time within a proposed organizational setting. Second, this real time occurrence provides opportunities for both effective action and learning for the proposed organization. Furthermore, the concept of hidden and surreptitious adoption has very high potential to contribute to the development of new theory. Despite the simultaneous concern with “bringing about change in organizations, in developing self-help competencies in organizational members and adding to scientific knowledge” (Coghlan and Brannick 2010), action research does not necessarily mean sacrificing either “high standards for developing theory” or “empirically testing propositions organized by theory” (Coghlan 2007a). Future research may thus consider action research as a viable methodology for empirical investigation of hidden and surreptitious adoption in organizational settings.

This dissertation took advantage of an opportunity to explore the role of institutional theory in IS adoption and usage. Traditionally, the use of institutional theory has been rare in information systems

diffusion research with a few notable exceptions (King et al. 1994, Teng et al. 2002 and Teo et al. 2003). Indeed, the use of institutional theory in IS research has already been highlighted as having great research potential (Srivastava et al. 2009). Furthermore, instead of adopting institutional theory as the sole guiding theoretical lens, this dissertation took a much more thorough and deeper theoretical route to craft a broader conceptualization by combining two separate streams of research under the umbrella concept of social influence (Kelman 1958, 1961). The concept of social influence was found to be particularly suitable for the exploration of hidden and surreptitious adoption as it provides an established and relevant theoretical base with which the factors affecting adoption in multi-layer, complex institutionalized environments can be investigated. Even though the use of social influence in technology adoption research is not new, its previous conceptualizations offered limited characterizations. For example, Fishbein and Ajzen's (1975) "subjective norm" construct did not break down social influence into its contributing elements. Similarly, Thompson et al.'s (1991) "social factors" construct focused largely on internalization process at the expense of others. Other attempts to achieve broader conceptualizations were also limited. For example, Tingling and Parent (2002) called for a broader external categorization through use of institutional theory (DiMaggio and Powell 1983, Meyer and Rowan 1977, Scott 1995) but only focused on the cultural-cognitive elements and mimetic isomorphism. Representing the first attempt in its kind, this dissertation proposed the broadest possible conceptualization of social influence by proposing the use of appropriate characterizations of both internal as well as external factors in combination. In addition, for internal factors, instead of relying on isolated processes or bundled definitions as had been the case in previous research, this dissertation proposed full characterizations through all three processes of compliance, identification, and internalization. Similarly, departing from the previous focus in IS research on cultural cognitive elements and mimetic isomorphism, for external factors, this dissertation expanded the characterizations of institutional theory to include normative as well as regulative pillars. The use of

internal and external factors in a complementary manner represents a unique approach and may carry much potential beyond the exploration of hidden and surreptitious adoption.

This dissertation expanded the concept of decoupling (Westphal and Zajac, 1994; 2001, Tilsik, 2010) and introduced the notion of multi-layer decoupling. The conventional use of decoupling provides much insight into external-internal distancing in organizational settings but falls short of providing similar insights for internal distancing possibilities between management and user levels. Taking up on this point, and using hidden and surreptitious adoption of IT solutions as an illustration, this dissertation juxtaposed the conventional decoupling concept with the two-step organizational adoption model to arrive at an expanded, multi-layer view of decoupling. The concept of multi-layer decoupling can be applied to a range of other organizational scenarios over and beyond technology adoption and deserves further exploration in future research.

The empirical evidence collected in this dissertation showed that antecedents of hidden and surreptitious adoption lead to deliberate user rejection of sanctioned solutions which is then followed by hidden and surreptitious adoption of non-sanctioned alternatives. In other words, technical users do not blindly adopt non-sanctioned alternatives before first trying out corporately mandated sanctioned solutions. Since the topic of user rejection of organizationally mandated technologies has already been sufficiently explored in a number of other studies (Brown et al. 2002, Gruenfeld and Foltman 1967, Hartwick and Barki 1994, Ram and Jung 1991, and Rogers 1995) further research investigating the link between the user-rejection of sanctioned solutions and user-acceptance of non-sanctioned alternatives would be beneficial. In particular, identification of circumstances leading to non-sanctioned solution use (as opposed to use of other sanctioned alternatives or use of substitute solutions) would be extremely useful.

Technology standardization is generally portrayed as a beneficial effort (Hurd and Isaak 2005, Na et al. 2004, Nidumolu 1996). Many firms today adopt standardized tools and techniques for their software development and maintenance practices with the hope of reducing risk (of sprawling technological footprints, ever increasing training expenses, non-interchangeable technical staff and so on...). Nevertheless, this dissertation has unveiled a potential dark side of technology standardization. Cross-case evidence has shown that under the coercive influence of powerful external vendors, such technology standards run a significantly higher risk of leading to sanctioning of antiquated and technically inferior solutions. In itself this interesting observation deserves a follow-up study that would explore the specific circumstances that might lead to realization of negative aspects of standardization as opposed to its already proven benefits.

This dissertation has found sufficient evidence to argue that non-sanctioned IT solutions that become subjects of hidden and surreptitious adoption involve both proprietary and open source alternatives. Nevertheless, open source software tools and techniques were much more frequently represented as objects of hidden adoption than their proprietary counterparts. There may be many reasons why open source software is disproportionately represented here. For one, these solutions hardly ever make their way into sanctioned lists due to lack of commercial support. Also, they are easy to use and many technical users may already have certain familiarity with these tools and techniques due to previous use at educational institutions. The fact that open source tools do not require any purchase could also play a significant role as freedom from procurement red tape would practically eliminate any kind of budgetary approval requirement that would be applicable with proprietary alternatives. Regardless of its cause, the hidden and surreptitious adoption of open source software solutions at the expense of their proprietary alternatives presents an interesting research avenue that would be worth exploring in

future research.

Finally, throughout this dissertation the focus has been on the antecedents of hidden and surreptitious adoption. Future research should pay attention to the organizational consequences of this type of adoption. In particular, future research should focus on those potential occasions where hidden and surreptitious adoption leads to positive innovation and favourable organizational outcomes and isolate factors contributing to these occurrences.

6.3 Limitations and Quality of Findings

As with any research project of its size and complexity, this dissertation may also be open to criticism on the basis of several limitations that may have affected the overall quality of work. The following quality of findings discussion aims to identify several of these factors.

6.3.1 Objectivity

The first and perhaps the most important limitation concerns the objectivity and replicability of findings. This issue has been one of the major limitations of qualitative research projects. In an effort to provide sufficient evidence to prove that this dissertation is no more susceptible to researcher biases than any other respected quantitative benchmark, the methodology section was intentionally kept very detailed and provided a detailed log of the methods and processes utilized. A step-by-step account involving data collection, processing, filtering, enrichment, analysis and reduction was provided to allow a complete traceback and audit trail for the whole process. Findings and conclusions have been supported by and linked to various sorts of displays. Furthermore, the raw data has been retained will be made available to other researchers within the 6-year data retention period and as allowed by the

signed confidentiality agreements.

6.3.2 Reliability

Another limitation that most qualitative studies are prone to involves reliability and dependability of findings. By design, this dissertation was crafted to highlight similarities and differences across data sources. The replicated multi-case approach was specifically selected so that occurrences of parallel findings and converged observations could easily be pooled in cross-case analysis so that a solid argument can be made in support of reliability. Also, throughout the data collection close proximity was maintained to theory through clearly established analytic categories and constructs. The data collection and analysis process and procedures were uniformly applied with no exceptions or divergences by the sole researcher. Various filtering mechanisms were put in place to ensure content quality. For example, interview candidates have been scanned to eliminate potential interviewees who did not possess the necessary knowledge and/or experience (e.g. interviewees with less than 6 months tenure). Nevertheless, the consistency and stability of findings due to a single researcher also contributed to one of the weaknesses in reliability in that the coding process was implemented by one researcher and with no coding checks to show inter-rater agreement.

6.3.3 Internal Validity

Differing from the conventional view and its associated sub-categories (e.g. convergent, discriminant, content validity and so on...), internal validity in qualitative studies is often questioned of the basis of the credibility and authenticity of findings in the eyes of study participants. This dissertation has taken a number of measures to ensure high internal validity. First and foremost, throughout the research project findings were closely linked to the skeleton analytic categories established in prior theory and showed high levels of coherence. All measures have been specifically designed to reflect this strong tie.

Second, during cross case analysis clearly stated rules were followed to confirm or negate cross-cluster occurrences. Any negative evidence was made explicit and seen as an opportunity to search for alternative explanations. Third, the matrix type displays were highly used and made available in a series of tables to allow thick descriptions without overwhelming the reader in the body of the text. Finally, the preliminary study results were shared with a cross-cluster committee and high level executives in the host organization for validation purposes and despite showing high levels of non-conformance to corporate rules were found to represent an accurate picture of the organization.

6.3.4 External Validity

Even though generalization of findings to other settings is not one of the prime concerns of qualitative research, transferability of findings to other settings present a severe limitation to many otherwise well-designed qualitative studies.

This dissertation have taken several steps to minimize the potential effects of this limitation. For example, the definition of hidden and surreptitious adoption has been tightened early on in the first two chapters of text and the data collection has been bounded accordingly. In particular, the characteristics of the various actors taking part in the occurrence of hidden and surreptitious adoption is described in detail to permit case-by-case comparisons.

There has been considerable variation in demographics and the background of interviewees supporting the possibility that the findings could be applied in broader contexts involving similar actors. Similarly, the technology platforms across clusters showed considerable variability allowing a range of diverse technologies to be evaluated for hidden and surreptitious adoption further extending generalizability potential of findings .

Throughout the text full length interview quotes and thick descriptions have been provided to allow the reader to evaluate the fittingness and transferability of the findings to alternative settings. Sampling strategy was explicitly described and applied through a multiple-case design to make it easier for the reader to gauge other possible settings, actors, events and processes that the findings could be extended to.

Findings were generic enough and mostly congruent with the prior theory which provided further support to the potential applicability of findings to other possible settings, a practice which was further encouraged in the future research section of the dissertation. Finally, and perhaps more importantly, when summary findings were shared with representatives across nine clusters, the results were found to be consistent with their experiences.

6.3.5 Practical Application

Over and beyond its scientific value, the overall value of research may also be questioned on the basis of its practical application. This dissertation has, from the ground up, been designed to be accessible to non-academic audiences. Thus, the theorizing sections aside, the use of informal, conversational style as well as its lack of academic or technical jargon was intentional. In addition to its contribution to theory, the dissertation has also been aimed at creating practically actionable knowledge. This was exemplified earlier in this section through evaluation of a number of practical implications for a variety of stakeholders (**Tables 18** through **21**). The overall summary results are also scheduled to be presented to an executive level committee in the host organization.

6.4 Conclusion

The hidden and surreptitious adoption of IT solutions represent a real and common organizational occurrence that has been overlooked in extant technology adoption research. By creating a synthesis of two previously separate streams of research, this dissertation brought together two distinct sets of factors under the umbrella concept of social influence. In an empirical study a conceptual model was developed and further refined.

The findings not only confirmed the organization-wide prevalence of hidden and surreptitious adoption but they also helped uncover a complex web of factors that collectively defined the occurrence and magnitude of hidden and surreptitious adoption in large institutionalized settings. Further analysis of findings suggested that four complementary causal streams acted together and contributed towards the realization of hidden and surreptitious adoption.

Normative stream was found to have been fed by four potential sources that involved impact of industry norms and standards, professional designations and memberships, past experience and existence of knowledgeable persons or champions. The identification stream was influenced by two sources that involved existence of knowledgeable persons or champions and various communities of practice on non-sanctioned solutions. Compliance stream accommodated a variety of sources that contributed to compliance pressures as well as ones that helped reduce them. The former category included awareness among of technical users of existing sanctions (formal policies, standards and so on); existence of governance, accountability and controllership structures; project size, visibility and criticality as well as external coercive and mimetic pressures. The latter category included technical user knowledge and skill level as well as perceived fit between the adoption candidate IT solutions and

the existing technology stack in the organization. Finally, representing an influence of great magnitude, performance induced awareness stream was found to have been primarily fed by performance related concerns but was also affected by such secondary sources as poorly supported sanctioned solutions, existence of communities of practice on non-sanctioned solutions and technical user knowledge and skill level. Conversely, awareness of sanctions among technical users was found to create a counter force against these secondary sources.

Two distinct kinds of hidden and surreptitious adoption were observed through cross-cluster evidence. The first kind involved occasions where technical users, having rejected a sanctioned solution, proceeded with the adoption of a non-sanctioned solution in utmost secrecy (silent type). The other kind, the shared stream, involved occasions where the non-compliant behaviour was shared with the immediate manager but was still kept hidden from the upper management.

The concept of hidden and surreptitious adoption that has been introduced and explored in this dissertation along with its underlying theoretical framework deserve further research and it is my hope that the ideas and suggestions provided in this preliminary research effort will help create a healthy stream of future research in this domain.

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APPENDICES

Appendix A: Sample Interview Questionnaire

Date : Place :
Time : Interviewer :

Biographical Questions

Interviewee Name :
Sex :
Apparent Age (Y/M/S) : (Y: Young, M:Middle-aged, S:Seasoned)
Position Title :
Organizational Unit :

Q1. How long have you been with the <organization name>?

Q2. How long have you been in your current position as a <.....>?

Q3. Where else did you work in the <organization name>? Where else did you work before you joined the <organization name>?

Q4. Have you had any exposure to work in other IT Clusters?
(If yes) Have you noticed any technological or structural differences between <those different IT Clusters>?

Q5. What's the highest level of education you have completed? Did you have a focus area or specialty?

Q6. On a scale of 1 (having minimal technical skills) to 10 (being extremely technical) how would you rank your IT skill level in general?

Adoption Process and Categories

We are now going to talk about how various IT solutions are adopted in your unit. When I say IT solutions, I mean various IT tools, products, methodologies and processes. By adoption, I mean the process through which these IT solutions come to be used in your area.

Examples of tools and products (to be tailored to the interviewees technical specialty): An integrated development environment (EDI) like Eclipse or MS-Visual Studio, a content management system like PLONE or Stellent or MS-Sharepoint, version control tool like Git or Subversion OR ClearCase, an automated testing tool like Rational Functional Tester or Selenium.

Examples of methodologies and processes: A software engineering methodology like Rational Unified Process (RUP) or Microsoft Solutions Framework (MSF) or Extreme Programming (XP), a software engineering model like Capability Maturity Model Integration (CMMI), an IT service management (ITSM) and control framework like ITIL or COBIT.

Q7. Can you tell me how various IT products or processes make their way into your team's operations?

Q8. When would you say an IT product or process “has been adopted” in your unit?

Planned prompt: Would you say it is adopted when management decides to go ahead with a solution?

Planned prompt: What would be the role of users? Would they (users in your team) have a say?

Q9. Who initiates the adoption process?

Planned prompt: Can there be any occasions where an IT solution is proposed by technical users?

Planned prompt: On those occasions (where technical users initiate the adoption) would their needs be always in line with what the management would have preferred?

Q10. In your view what differentiates a successful IT adoption from an unsuccessful one?

Use floating prompts to drill down into the elements of what the interviewee perceives as successful vs unsuccessful adoption?

Q11. When an IT solution is listed as an <organization name> standard (example: <sample standard no>) does that mean everyone will be using it all the time? (If the answer is no, Why? When do you think people would use non-standard or non-sanctioned solutions?)

Planned prompt: They view it as technically superior?

Planned prompt: They are encouraged by people they trust to try something different?

Planned prompt: This is what they have used in the past in other organizations or at school?

Planned prompt: They like to be different?

Q12. While performing their day to day duties (developing software, performing maintenance, fixing bugs), do technical users ever rely on software applications or processes that are not officially sanctioned by the centre or by the immediate management?

Planned prompt: What does management think about this?

Planned prompt: In general does this work out well?

Now I would like you to focus on those possible occasions where your team members are considering using a product or process despite unfavourable reaction by the upper management.

Example 1: Your lead developer comes to you and says “I know we are supposed to use ClearCase as a code repository but it is very cumbersome to use and requires a lot of administration. We are considering using Apache Subversion instead.”

Example 2: The management wants you to switch all internal websites to MS-SharePoint. Even though your team has received the introductory training they still prefer to use another content management system which they believe would be much easier to maintain.

I am going to present you with a number of what/if scenarios. Tell me if you think the team will be more or less likely to go ahead with their decision under these what/if scenarios?

Compliance / Coercive Isomorphism / Mimetic Isomorphism

What if there are corporate IT policies and standards in place restricting the use of the IT solution which users would like to implement.

Example 1: ClearCase is a standard for Java environments.

Example 2: MS-Sharepoint is being proposed as one of the standard CMS solutions.

Q13. How would this affect the team's intention to go ahead with their proposed IT solution?

Q14. What can cause this discrepancy between existing corporate IT policies and user preferences?

Q15. What factors can influence forming of corporate I&IT policies and standards?

Planned prompt: What role (if any) would the vendor community have on the forming of corporate IT policies and standards?

Planned prompt: Would the IT policies and standards used by other similar organizations have an effect on the corporate policies/standards?

What if there are various informal roadblocks put in place by (upper) management.

Example 1: While there is a corporate standing agreement in place to ease the procurement of ClearCase (from IBM), use of Subversion may be subjected to a lengthy approval process.

Example 2: While a large number of MS-Sharepoint user licenses have already been procured, use of an alternative solution may require exception approvals or might require additional “non-standard” infrastructure arrangements to be made.

Q16. How would this affect the team's intention to go ahead with their proposed IT solution?

Q17. What can cause this discrepancy between (upper) management and actual user preferences?

Q18. What factors can influence (upper) management preferences for IT solutions?

Planned prompt: How about the vendor community?

Planned prompt: How about the preferences of other managers/executives in similar roles? Why?

Q19. What are the penalties for not complying with an organizational policy?

Identification

What if there is a knowledgeable individual at hand with regards to the IT solution users would like to implement.

Example 1: While many of your developers have heard about but not used Subversion, your lead developer is a Subversion guru and commonly regarded as an expert by his peers.

Example 2: The webmaster of the branch has expert knowledge on the content management system being proposed.

Q20. How would this affect the team's intention to go ahead with their proposed IT solution? Why?

Confirm the difference between a community of interest and a centre of excellence.

What if there is an <organization name> community of interest (or a user group) with regards to the IT solution users would like to implement.

Example 1: In a different Cluster than yours there is a Subversion user group that maintains an Intranet website and organizes regular meetings and training events.

Example 2: You have heard in a recent corporate IT event that users of the proposed content management system are considering forming an internal community of interest to share their experiences.

Q21. How would this affect the team's intention to go ahead with their proposed IT solution? Why? (Compare confidence level with the previous answer)

What if there is an <organization name> centre of excellence (COE) with regards to the IT solution users would like to implement.

Example 1: An IT Cluster has sponsored a COE for open source solutions.

Example 2: The same vendor which produces the proposed content management system has sponsored a corporate COE for their solutions .

Q22. How would this affect the team's intention to go ahead with their proposed IT solution? Why? (Compare confidence level with the previous answer)

Normative Isomorphism

What if a competing IT solution has already been implemented in many other IT Clusters and has become a corporate norm (one which management supports).

Example 1: Many other Clusters have already standardized their code repositories on ClearCase with success.

Example 2: Many other Clusters have already moved their content to MS-SharePoint.

Q23. How would this affect the team's intention to go ahead with their proposed IT solution? Why?

Planned prompt: What if the team's proposed IT solution has also found some following in the IT organization? (so, there is precedence and the team would not be the only one in the <organization name> to implement it if they went ahead)

Example 1: There is at least one other IT Cluster using Subversion extensively as their code repository.

Example 2: The proposed content management system has an established but scattered user base across the organization.

How would this affect the team's intention to go ahead with their proposed IT solution? Why?

Internalization

Q24. Do you think users may select a particular IT solution despite management reaction on pure ideological grounds? (use the open source software example)

Example 1: Subversion is open source.

Example 2: PLONE, Wordpress, Joomla or Drupal can be given as examples of CMS.

Q25. What else do you think may have an affect on these kind of occurrences where users go ahead and use an IT solution despite managerial push-back?

Q26. On occasions when technical users implement solutions that are not sanctioned by their corporate upper management: What happens when the solution works out well? What happens when it does not work out well?

Appendix B: Provisional Start List of Codes

General Category	Individual Codes	Actual Code	Associated Interview Questions
Adoption Category	AC: Formal Adoption	AC-FORM	All
Adoption Category	AC: Hidden Adoption	AC-HIDE	All
Adoption Category	AC: User Rejection	AC-REJE	All
Adoption Process	AP: Top-down	AP-TOP	Q7-Q12
Adoption Process	AP: Bottom-up	AP-BOT	Q7-Q12
Adoption Antecedents	AA: Technical Factors	AA-TECH	Q10-Q18, Q20-Q23, Q25
Adoption Antecedents	AA: Internal - Compliance	AA-INT-COMP	Q13, Q14, Q16, Q17
Adoption Antecedents	AA: Internal - Identification	AA-INT-IDENT	Q20-Q22
Adoption Antecedents	AA: Internal - Internalization	AA-INT-INTER	Q24
Adoption Antecedents	AA: External - Coercive Isomorphism	AA-EXT-COER	Q14, Q15, Q17, Q18
Adoption Antecedents	AA: External - Normative Isomorphism	AA-EXT-NORM	Q15, Q18, Q23
Adoption Antecedents	AA: External - Mimetic Isomorphism	AA-EXT-MIME	Q15, Q18, Q23
Adoption Antecedents	AA: Other	AA-OTHER	All
Adoption Consequences	AC: Adoption Consequences	AC-RESULT	Q12, Q26

Appendix C: Provisional Code Definitions

Cat.	Individual Codes	Actual Code	Code Definitions
Adoption Category	AC: Formal Adoption	AC-FORM	Formal adoption happens when management initiated adoption of a tool, product, process or methodology does not get rejected by technical users. Formal adoption represents a happy day scenario for management and can be used as an indication that the corporate IT policies, standards and procedures are aligned with the needs and wants of technical users. This code captures incidents of formal adoption.
	AC: Hidden Adoption	AC-HIDE	Hidden adoption happens when a technical user rejects a sanctioned tool, product, process or methodology and adopts a non-sanctioned alternative. This code captures incidents of silent hidden adoption.
	AC: User Rejection	AC-REJE	User rejection points to occasions when technical users reject corporately mandated tools, products, methodologies or processes. The rejection runs parallel to (i.e. either followed by, or on occasions, preceded by hidden and surreptitious adoption of alternative solutions. This code captures incidents of user rejection of mandated solutions.
Adoption Process	AP: Top-down	AP-TOP	The top-down scenario refers to occasions when the adoption process is initiated and strictly controlled by the upper management. In other words, the upper management, through various organizational means (i.e. IT policies, procedures, formal best-practices or standards), decides what solutions to be used and when to be used down to the level of initial acquisition and provision of ongoing maintenance and support. This code captures incidents of top-down adoption.

Cat.	Individual Codes	Actual Code	Code Definitions
	AP: Bottom-up	AP-BOT	The bottom-up scenario refers to occasions when the adoption process is initiated by the actual technical users. This scenario may lead up to the formal recognition and organizational adoption of these alternative solutions (e.g. revision of the existing policies, procedures and standards to include these alternative solutions) or it may lead to temporary or permanent hidden and surreptitious adoption if such formal recognition does not take place. This code captures incidents of bottom-up adoption.
Adoption Antecedents	AA: Technical Factors	AA-TECH	Evidence of actual or perceived technical features of a solution playing a role in the occurrence of hidden and surreptitious adoption of tools, products, methodologies or processes.
	AA: Internal - Compliance	AA-INT-COMP	Evidence of explicit and/or implicit pressures for compliance in favour of mandated tools, products, processes or methodologies (and against any alternatives). Examples of explicit pressures include corporate IT policies, procedures and standards mandating use of certain solutions. For example, corporate IT standards may restrict use of open source solutions or favour solutions offered by certain vendors at the expense of others. Implicit internal pressures include overt signs of support by upper management in favour of sanctioned solutions or deliberate acts to hinder deviance from "approved" solutions. For example, requests for approvals involving unsanctioned solutions may be severely criticized or be subjected to unnecessarily lengthy approval processes. The technical users may accept this influence either because they expect to receive approval/rewards for doing so, or because they would like to avoid possible punishment/disapproval due to non-compliant behaviour.

Cat.	Individual Codes	Actual Code	Code Definitions
	AA: Internal - Identification	AA-INT-IDENT	Evidence of desired association with technologically capable individuals (e.g. technology evangelists) or organizational user communities. For example, technical users may feel a lot more positive towards adopting a non-sanctioned solution when there is a knowledgeable individual they can rely on or have an association with a user group related to the particular unapproved solution they are considering.
	AA: Internal - Internalization	AA-INT-INTER	Evidence of occurrence of hidden and surreptitious adoption of non-sanctioned IT solutions based on the subject solution's congruency with adopter's value system. For example, a technical user may choose a particular developmental tool purely based on it's free/open source software (i.e. non-proprietary) status.
	AA: External - Coercive Isomorphism	AA-EXT-COER	Evidence of coercive pressures by powerful external partners that are in favour of existing, sanctioned solutions. For example, large technology vendors may "strongly encourage" the continued use of their products. Similarly, a powerful business partner (in the case of a public organization this can be another public entity) may promote certain technological solutions on the basis of compatibility and standardization between two (or more) entities.
	AA: External - Normative Isomorphism	AA-EXT-NORM	Evidence showing solution preferences of technical users may be affected by binding expectations that are based on social obligation. For example, a DBA may choose ORACLE as opposed to IBM's DB2 because he/she is a certified ORACLE developer. External vendors may therefore provide various incentives for their accreditation or certification schemes to be accepted and followed at the corporate level. It is important to note that normative isomorphism may work for or against the occurrence of hidden adoption depending on whether such norms support sanctioned or non-sanctioned solutions.

Cat.	Individual Codes	Actual Code	Code Definitions
	AA: External - Mimetic Isomorphism	AA-EXT-MIME	Evidence of mimetic behaviour shaping upper management preferences. For example, during times of technological uncertainty (i.e. in times of rapid technological change) upper management may choose to imitate those other organizations that are perceived as successful and decide what solutions would be sanctioned accordingly.
	AA: Other	AA-OTHER	Any other potential adoption antecedents that have not been captured by the existing codes in this category.
Adoption Consequences	AK: Adoption Consequences	AK-RESULT	This code captures the aftermath of hidden adoption and looks at the potential consequences of hidden and surreptitious adoption for technical users, their immediate managers, the upper management (e.g. the policy makers) and the organization as a whole. Are there any penalties involved if something goes wrong and the word gets out? What happens when everything goes well? Would policy makers consider revising the existing corporate policies and standards to sanction what has previously been unsanctioned? Would the organization benefit in the end in either scenario?

Appendix D: Finalized List of Codes

General Category	Individual Codes	Actual Code	Associated Questions
Adoption Category	AC: Formal Adoption	AC-FORM	All
Adoption Category	AC: Hidden Adoption - Silent	AC-HIDE-SILENT	All
Adoption Category	AC: Hidden Adoption - Shared	AC-HIDE-SHARED	All
Adoption Category	AC: User Rejection	AC-REJE	All
Adoption Category	AC: Dual Adoption (Non-genuine use)	AC-DUAL	All
Adoption Process	AP: Top-down	AP-TOP	Q7-Q12
Adoption Process	AP: Bottom-up	AP-BOT	Q7-Q12
Adoption Antecedents	AA: Technical Factors - Positive (alternative)	AA-TECH-PLUS	Q10-Q18, Q20-Q23, Q25
Adoption Antecedents	AA: Technical Factors - Negative (existing)	AA-TECH-MINUS	Q10-Q18, Q20-Q23, Q25
Adoption Antecedents	AA: Previous Use	AA-PAST	Q9, Q11-Q18, Q23, Q25
Adoption Antecedents	AA: Previous Use (Sanctioned Solutions)	AA-PAST-SANCTIONED	Q9, Q11-Q18, Q23, Q25
Adoption Antecedents	AA: Previous Use (Unsanctioned Solutions)	AA-PAST-UNSANCTIONED	Q9, Q11-Q18, Q23, Q25
Adoption Antecedents	AA: Latest and Greatest	AA-SHINY	Q7, Q9-Q23, Q25
Adoption Antecedents	AA: Internal - Compliance	AA-INT-COMP	Q13, Q14, Q16, Q17
Adoption Antecedents	AA: Internal - Identification	AA-INT-IDENT	Q20-Q22
Adoption Antecedents	AA: Internal - Identification (setting example)	AA-INT-IDENT-PRECEDENT	Q20-Q22

General Category	Individual Codes	Actual Code	Associated Questions
Adoption Antecedents	AA: Internal - Identification (source of support)	AA-INT-IDENT-SUPPORT	Q20-Q22
Adoption Antecedents	AA: Internal - Internalization	AA-INT-INTER	Q24
Adoption Antecedents	AA: External - Coercive Isomorphism	AA-EXT-COER	Q14, Q15, Q17, Q18
Adoption Antecedents	AA: External - Normative Isomorphism	AA-EXT-NORM	Q15, Q18, Q23
Adoption Antecedents	AA: External - Mimetic Isomorphism	AA-EXT-MIME	Q15, Q18, Q23
Adoption Antecedents	AA: Other	AA-OTHER	All
Adoption Antecedents	AA: Other (Budget related)	AA-OTHER-BUDGET	All
Adoption Antecedents	AA: Other (Fit with existing systems)	AA-OTHER-FIT	All
Adoption Antecedents	AA: Other (Governance and controllership)	AA-OTHER-GOVERNANCE	All
Adoption Antecedents	AA: Other (Performance)	AA-OTHER-PERFORMANCE	All
Moderators & Mediators	MM: Technical Knowledge (Tech. User)	MM-KNOWS-USER	Q3, Q5, Q6, Q9, Q11, Q13, Q14, Q16, Q17, Q21, Q22
Moderators & Mediators	MM: Technical Knowledge (Management)*	MM-KNOWS-MGMT	Q8-Q10, Q12, Q14, Q17, Q18
Moderators & Mediators	MM: Project Size, Visibility and Criticality	MM-PROJE	Q11-Q13, Q16, Q23, Q25
Moderators & Mediators	MM: Awareness - Organizational Rules	MM-AWARE-RULES	Q4, Q7, Q9-Q11, Q15, Q19, Q23
Moderators & Mediators	MM: Awareness - Alternative Solutions	MM-AWARE-ALTER	Q4, Q7, Q9, Q10, Q12, Q14, Q17, Q23, Q25
Moderators & Mediators	MM: Availability of Help and Support	MM-HELP	Q13, Q16, Q20-Q23, Q25
Adoption Consequences	AK: Adoption Consequences	AK-RESULT	Q12, Q26
Essential Quotes	EQ: Essential Quotes	EQ-QUOTES	All

*As perceived by the technical user.

Appendix E: Finalized Code Definitions

Cat.	Individual Codes	Actual Code	Code Definitions
Adoption Category	AC: Formal Adoption	AC-FORM	Formal adoption happens when management initiated adoption of a tool, product, process or methodology does not get rejected by technical users. Formal adoption represents a happy day scenario for management and can be used as an indication that the corporate IT policies, standards and procedures are aligned with the needs and wants of technical users. This code captures incidents of formal adoption.
	AC: Hidden Adoption - Silent	AC-HIDE-SILENT	Silent hidden adoption happens when a technical user adopts a non-sanctioned tool, product, process or methodology quietly and even without asking permission from his/her immediate manager. The tools or products that are subject to this kind of adoption tend to be invisible to anybody but the actual user. For example, a developer may silently adopt an open source code library in his/her daily work or start using a non-standard compiler without telling anyone. This code captures incidents of silent hidden adoption.
	AC: Hidden Adoption - Shared	AC-HIDE-SHARED	Shared hidden adoption happens when a technical user (or a group of technical users) adopts a non-sanctioned tool, product, process or methodology after receiving formal or informal approval from his/her immediate manager. While the tools, products, processes or methodologies that are subject to this kind of adoption can stay largely invisible to corporate decision makers, they tend to be somewhat visible within the technical user's workgroup (including his/her immediate manager). For example, a development team may start using an unapproved agile development methodology or decide to adopt a non-sanctioned software version control tool after discussing their intentions with their immediate manager. This code captures incidents of shared hidden adoption.

Cat.	Individual Codes	Actual Code	Code Definitions
	AC: User Rejection	AC-REJE	User rejection points to occasions when technical users reject corporately mandated tools, products, methodologies or processes. The rejection runs parallel to (i.e. either followed by, or on occasions, preceded by hidden and surreptitious adoption of alternative solutions. This code captures incidents of user rejection of mandated solutions.
	AC: Dual Adoption (Non-genuine use)	AC-DUAL	In an effort to maintain compliance to corporate IT policies, procedures and standards, technical users sometimes formally appear to be using the sanctioned tools, products, methodologies or processes (a.k.a. Non-genuine use) while in reality they surreptitiously adopt alternative solutions to support their actual work. As a result, dual environments are maintained. For example, a developer may use Eclipse IDE for all his/her code work only to import the code into corporately mandated RSA or RAD EDIs. This code captures incidents of dual adoption.
Adoption Process	AP: Top-down	AP-TOP	The top-down scenario refers to occasions when the adoption process is initiated and strictly controlled by the upper management. In other words, the upper management, through various organizational means (i.e. IT policies, procedures, formal best-practices or standards), decides what solutions to be used and when to be used down to the level of initial acquisition and provision of ongoing maintenance and support. This code captures incidents of top-down adoption.
	AP: Bottom-up	AP-BOT	The bottom-up scenario refers to occasions when the adoption process is initiated by the actual technical users. This scenario may lead up to the formal recognition and organizational adoption of these alternative solutions (e.g. revision of the existing policies, procedures and standards to include these alternative solutions) or it may lead to temporary or permanent hidden and surreptitious adoption if such formal recognition does not take place. This code captures incidents of bottom-up adoption.

Cat.	Individual Codes	Actual Code	Code Definitions
Adoption Antecedents	AA: Technical Factors - Positive (alternative)	AA-TECH-PLUS	Evidence of actual or perceived technical superiority of alternative solutions that are subject to hidden and surreptitious adoption in comparison with the officially sanctioned tools, products, methodologies or processes.
	AA: Technical Factors - Negative (existing)	AA-TECH-MINUS	Evidence of actual or perceived technical inferiority of officially sanctioned tools, products, methodologies or processes in comparison with alternative solutions that are subject to hidden and surreptitious adoption.
	AA: Previous Use	AA-PAST	Evidence indicating preference of a tool, product, methodology or a process is related to a technical user's previous experience with that particular solution. For example, a DBA may prefer ERWin over ER/Studio because he/she has previously used the former but not the latter.
	AA: Previous Use (Sanctioned Solutions)	AA-PAST-SANCTIONED	Evidence indicating preference of a sanctioned tool, product, methodology or a process is related to a technical user's previous experience with that particular sanctioned solution. For example, a DBA may prefer ERWin over ER/Studio because he/she has previously used the former but not the latter.
	AA: Previous Use (Unsanctioned Solutions)	AA-PAST-UNSANCTIONED	Evidence indicating preference of non-sanctioned a tool, product, methodology or a process is related to a technical user's previous experience with that particular non-sanctioned solution. For example, a developer may prefer Eclipse over IBM RAD because he/she has previously used the former but not the latter.

Cat.	Individual Codes	Actual Code	Code Definitions
	AA: Latest and Greatest	AA-SHINY	Evidence showing preferences of a technical user may be affected by “state-of-the-art” status of a solution (i.e. technology coolness factor). For example, an IT architect may choose to deploy an application on Amazon EC2 (cloud infrastructure) instead of on physical servers of the organization because cloud computing is generally perceived as being leading edge in the IT realm.
	AA: Internal - Compliance	AA-INT-COMP	Evidence of explicit and/or implicit pressures for compliance in favour of mandated tools, products, processes or methodologies (and against any alternatives). Examples of explicit pressures include corporate IT policies, procedures and standards mandating use of certain solutions. For example, corporate IT standards may restrict use of open source solutions or favour solutions offered by certain vendors at the expense of others. Implicit internal pressures include overt signs of support by upper management in favour of sanctioned solutions or deliberate acts to hinder deviance from “approved” solutions. For example, requests for approvals involving unsanctioned solutions may be severely criticized or be subjected to unnecessarily lengthy approval processes. The technical users may accept this influence either because they expect to receive approval/rewards for doing so, or because they would like to avoid possible punishment/disapproval due to non-compliant behaviour.
	AA: Internal - Identification	AA-INT-IDENT	Evidence of desired association with technologically capable individuals (e.g. technology evangelists) or organizational user communities. For example, technical users may feel a lot more positive towards adopting a non-sanctioned solution when there is a knowledgeable individual they can rely on or have an association with a user group related to the particular unapproved solution they are considering.
	AA: Internal - Identification (Setting Example)	AA-INT-IDENT-PRECEDENT	Evidence of technologically capable individuals (e.g. technology evangelists) or organizational user communities being used as examples of precedent.

Cat.	Individual Codes	Actual Code	Code Definitions
	AA: Internal - Identification (Source of Support)	AA-INT-IDENT-SUPPORT	Evidence of technologically capable individuals (e.g. technology evangelists) or organizational user communities being used for source of support.
	AA: Internal - Internalization	AA-INT-INTER	Evidence of occurrence of hidden and surreptitious adoption of non-sanctioned IT solutions based on the subject solution's congruency with adopter's value system. For example, a technical user may choose a particular developmental tool purely based on its free/open source software (i.e. non-proprietary) status.
	AA: External - Coercive Isomorphism	AA-EXT-COER	Evidence of coercive pressures by powerful external partners that are in favour of existing, sanctioned solutions. For example, large technology vendors may "strongly encourage" the continued use of their products. Similarly, a powerful business partner (in the case of a public organization this can be another public entity) may promote certain technological solutions on the basis of compatibility and standardization between two (or more) entities.
	AA: External - Normative Isomorphism	AA-EXT-NORM	Evidence showing solution preferences of technical users may be affected by binding expectations that are based on social obligation. For example, a DBA may choose ORACLE as opposed to IBM's DB2 because he/she is a certified ORACLE developer. External vendors may therefore provide various incentives for their accreditation or certification schemes to be accepted and followed at the corporate level. It is important to note that normative isomorphism may work for or against the occurrence of hidden adoption depending on whether such norms support sanctioned or non-sanctioned solutions.

Cat.	Individual Codes	Actual Code	Code Definitions
	AA: External - Mimetic Isomorphism	AA-EXT-MIME	Evidence of mimetic behaviour shaping upper management preferences. For example, during times of technological uncertainty (i.e. in times of rapid technological change) upper management may choose to imitate those other organizations that are perceived as successful and decide what solutions would be sanctioned accordingly.
	AA: Other	AA-OTHER	Any other potential adoption antecedents that have not been captured by the existing codes in this category.
	AA: Other (Budget related)	AA-OTHER-BUDGET	Examples which illustrate budgetary concerns influencing adoption decisions.
	AA: Other (Fit with existing systems)	AA-OTHER-FIT	Examples which show the influence of perceived fit with existing solutions on adoption preferences.
	AA: Other (Governance and controllership)	AA-OTHER-GOVERNANCE	Examples which show how governance and controllership (or lack thereof) may influence adoption decisions.
	AA: Other (Performance)	AA-OTHER-PERFORMANCE	Examples which illustrate performance related issues affecting adoption preferences.

Cat.	Individual Codes	Actual Code	Code Definitions
Moderators & Mediators	MM: Technical Knowledge (Tech. User)	MM-KNOWS-USER	<p>This code captures evidence of deep technical knowledge moderating (i.e. defining existence of) or mediating (i.e. existing as an intermediary) the relationship between adoption antecedents and hidden adoption as well as among the adoption antecedents themselves. For example, while a technical user with deep technical knowledge of alternative technological solutions may disregard organizational policies and surreptitiously adopt those alternative solutions, a user with only superficial knowledge may choose to accept pressures for internal-compliance and use sanctioned solutions instead (in this example, technical knowledge acts as a moderator on the relationship between internal-compliance (AA-INT-COMP) and hidden adoption(AC-HIDE-SILENT or AC-HIDE-SHARED)). On another occasion, a technical user who believes that the officially sanctioned tools are inferior to their unapproved alternatives may go on to learn more and develop deep technical knowledge on those unsanctioned tools before surreptitiously adopting them (in this example, technical knowledge acts as a mediator between negative technical factors (AA-TECH-MINUS) and hidden adoption (AC-HIDE-SILENT or AC-HIDE-SHARED)).</p>
	MM: Technical Knowledge (Management)*	MM-KNOWS-MGMT	<p>This code captures evidence related to whether and how technical users' perception of their managers' technical knowledge affects the relationship between adoption antecedents and hidden adoption as well as among the adoption antecedents themselves. For example, when management is perceived to be technically capable, technical users may be more prone to implicit internal pressures for compliance (AA-INT-COMP). This code can also be a determiner of whether adoption falls under silent (AC-HIDE-SILENT) or shared (AC-HIDE-SHARED) hidden adoption types with the logic that technical users may be more willing to communicate upwards if they feel there will be a common ground of communication. In other words, on occasions when technical users perceive their immediate manager to be technically capable, they will be more willing to discuss their intentions to adopt an unsanctioned solution.</p>

Cat.	Individual Codes	Actual Code	Code Definitions
	MM: Project Size, Visibility and Criticality	MM-PROJE	This code captures evidence related to the potential effect of project size, visibility and criticality on the relationship between adoption antecedents and hidden adoption as well as on the relationship among adoption antecedents themselves. For example, technical users may be more open to trying out those state-of-the-art (AA-SHINY) solutions on projects that are “off the radar screen” which may lead to potential hidden adoption (in this case MM-PROJE will be a moderator on the relationship between the technology coolness factor (AA-SHINY) and hidden and surreptitious adoption (AC-HIDE-SILENT or AC-HIDE-SHARED)).
	MM: Awareness - Organizational Rules	MM-AWARE-RULES	This code captures evidence of level of awareness and familiarity of technical users and their immediate managers with the organizational IT strategies, policies, procedures, standards and best practices. It is suspected that deep awareness of corporate rules may have an adverse influence on the occurrence of hidden and surreptitious adoption as a moderator or a mediator. For example, a technical user with deep knowledge and awareness of corporate IT policies and standards may not even consider adopting unsanctioned alternative solutions whereas another technical user with only superficial awareness may choose to interpret existing IT policies and standards and be more open to those unsanctioned alternatives. It is important to note that this provision depends also on the language in which such IT policies , standards and so on is written (i.e. whether they are restrictive or flexible in tone).
	MM: Awareness - Alternative Solutions	MM-AWARE-ALTER	This code captures evidence of level of awareness and familiarity of technical users and their immediate managers with those alternative and unsanctioned solutions in the first place. It is suspected that increased levels of awareness may lead to higher levels of consideration of those unsanctioned alternatives in comparison with officially sanctioned solutions.

Cat.	Individual Codes	Actual Code	Code Definitions
	MM: Availability of Help and Support	MM-HELP	This code (which may be a subset of awareness) looks at whether the ease with which support can be obtained on unsanctioned solutions may influence the relationship among adoption antecedents or between adoption antecedents and hidden and surreptitious adoption.
Adoption Consequences	AK: Adoption Consequences	AK-RESULT	This code captures the aftermath of hidden adoption and looks at the potential consequences of hidden and surreptitious adoption for technical users, their immediate managers, the upper management (e.g. the policy makers) and the organization as a whole. Are there any penalties involved if something goes wrong and the word gets out? What happens when everything goes well? Would policy makers consider revising the existing corporate policies and standards to sanction what has previously been unsanctioned? Would the organization benefit in the end in either scenario?
N/A	EQ: Essential Quotes	EQ-QUOTES	Illustrative quotes that capture the essence of discussion.

*As perceived by the technical user.

Appendix F: Descriptive Interview Information

Interview Number	Cross Cluster Exposure	Nature of Education	Positional Tenure (months)	Education Level	Interview Dates	Organizational Tenure (months)	Gender	Age	IT Cluster	IT Skill Level	Role
01	Y	Non-IT	72	University - Graduate - Masters	06/03/2012	108	M	M	1	8	Immediate Manager
02	N	IT	114	University - Undergraduate	07/03/2012	114	M	M	1	8	Technical User
03	Y	Non-IT	27	University - Graduate - Masters	08/03/2012	123	F	M	2	NA	Corporate
04	N	Non-IT	18	University - Undergraduate	09/03/2012	18	M	Y	1	9	Technical User
05	Y	IT	60	University - Undergraduate	13/03/2012	84	M	Y	1	8	Technical User
06	N	IT	18	University - Graduate - Doctoral	14/03/2012	18	F	Y	1	10 - Expert	Technical User
07	N	Non-IT	18	University - Undergraduate	15/03/2012	18	M	M	1	10 - Expert	Technical User
08	Y	IT	24	University - Undergraduate	16/03/2012	51	F	Y	1	8	Technical User
09	Y	Non-IT	20	University - Graduate - Doctoral	21/03/2012	132	F	M	2	NA	Corporate
10	N	Non-IT	42	University - Undergraduate	22/03/2012	408	F	M	1	6	Immediate Manager
11	N	IT	4	University - Graduate - Masters	23/03/2012	4	F	M	1	NA	Immediate Manager
12	Y	Non-IT	51	University - Undergraduate	08/05/2012	206	F	M	2	NA	Corporate
13	Y	IT	31	University - Graduate - Masters	11/05/2012	129	M	Y	2	NA	Corporate
14	Y	IT	57	University - Graduate - Masters	04/06/2012	89	M	Y	3	10 - Expert	Immediate Manager
15	Y	IT	2	University - Graduate - Masters	13/06/2012	85	M	Y	2	7	Immediate Manager
16	N	IT	12	University - Graduate - Masters	13/06/2012	43	M	Y	3	9	Immediate Manager
17	Y	IT	180	University - Undergraduate	15/06/2012	180	M	Y	3	6	Technical User
18	Y	IT	12	University - Graduate - Masters	03/07/2012	108	M	Y	2	8	Corporate
19	Y	IT	6	University - Graduate - Masters	04/07/2012	30	M	M	2	8	Senior Manager
20	Y	Non-IT	6	University - Graduate - Masters	12/07/2012	252	F	M	3	6	Senior Manager
21	Y	Non-IT	NA	NA	01/08/2012	NA	M	M	4	NA	Senior Manager
22	Y	IT	42	University - Graduate - Masters	03/08/2012	96	M	M	4	8	Immediate Manager
22	Y	IT	42	University - Graduate - Masters	13/08/2012	96	M	M	4	8	Immediate Manager
23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
24	Y	Non-IT	68	University - Graduate - Masters	13/08/2012	144	M	M	4	9	Senior Manager
24	Y	Non-IT	68	University - Graduate - Masters	27/08/2012	144	M	M	4	9	Senior Manager
25	Y	IT	42	University - Undergraduate	15/08/2012	108	F	M	4	7	Technical User
26	Y	IT	12	University - Graduate - Masters	22/08/2012	36	M	M	4	8	Technical User
27	Y	IT	132	University - Graduate - Masters	23/08/2012	240	M	M	4	7	Immediate Manager
28	N	IT	44	University - Undergraduate	23/08/2012	92	M	M	4	8	Technical User
29	N	IT	60	University - Undergraduate	23/08/2012	156	M	M	4	7	Technical User
30	Y	Non-IT	14	High School	27/08/2012	24	M	M	4	8	Immediate Manager

Appendix G: Sample Informed Consent Form

Informed Consent Form for In-person Interview

Hi, my name is Altay Aksulu. I am a PhD Candidate at York University in the Schulich School of Business. I am presently conducting a research study entitled: Hidden and Surreptitious Adoption of Organizational Information Systems. My contact information and that of the professor who is supervising this work is provided below.

The purpose of this research is to explore potential factors that might affect the existence and dissemination of a form of user-initiated adoption of organizational information systems. This research involves collection of qualitative data through face-to-face interviews. The interview data will only be used anonymously and be presented to a dissertation committee as part of a doctoral dissertation.

I am therefore asking if you would agree to participate in my research by answering a few questions and talking to me about your relevant experiences regarding adoption and use of various technological innovations in your work environment. The estimated time commitment for each interview is between 30 and 60 minutes.

It is usual in these kind of interviews for interviewees to feel anxious about the substance of the interview. It is important to re-emphasize that the interview contents will be kept anonymous and no personal data which might jeopardize the privacy of interviewees will be publicized. Sometimes, the interviewees may also feel discomfort about the time commitment required for the interviews thinking that it might attract management criticism. In an effort to minimize such discomfort, the researcher has obtained the necessary approvals from appropriate management levels.

It is hoped that this research will shed light on a previously unexplored, non-mainstream adoption scenario and will clarify factors affecting these kind of adoptions. Subsequently, recognition of hidden and surreptitious adoption may lead to further research into the organizational consequences of this interesting phenomenon. This research will provide the interviewees with an opportunity to reflect on their individual insights, experiences and share their side of the story in their own terms.

Your participation in the study is completely voluntary. Should you choose not to volunteer, this decision will not influence the relationship you may have with the researcher or study staff or the nature of your relationship with York University either now, or in the future. Furthermore, you can stop participating in the study at any time, for any reason, if you so decide. Your decision to stop participating, or to refuse to answer particular questions, will not affect your relationship with the researcher, York University, or any other group associated with this project. In the event you withdraw from the study, all associated data collected will be immediately destroyed wherever possible.

The interview documentation including any notes taken or recordings made during the interview will not be associated with any personally identifiable information. Any notes or recordings made by the researcher will be stored in encrypted form and be accessed only by the researcher or designated and

confidentiality-bound members of the research team. Following the initial retention period concerning its primary use as dissertation research material, the research data will be archived in encrypted form in electronic media and be kept by the researcher for purely research purposes (i.e. to support potential future publications in academic journals) for six more years. Following this period, the raw data will be erased using commercial grade data shredding software. Confidentiality will be provided to the fullest extent possible by law.

Should you have any questions about this research in general or your role in the study, please feel free to contact the researcher, Altay Aksulu, at aaksulu@schulich.yorku.ca or dissertation supervisor Prof. Dr. David Johnston at johnston@rogers.com. You may also contact the graduate program director, Prof. Dr. Eileen Fischer at the Administrative Studies Program - Faculty of Graduate Studies at 416 736 2100 (ext. 77957).

This research has been reviewed and approved by the Human Participants Review Sub-Committee, York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines. If you have any questions about this process, or about your rights as a participant in the study, you may contact the Senior Manager and Policy Advisor for the Office of Research Ethics, 5th Floor, York Research Tower, York University, telephone 416-736-5914 or e-mail ore@yorku.ca

I, _____, consent to participate in the doctoral dissertation research study entitled "Hidden and Surreptitious Adoption of Organizational Information Systems" conducted by Altay Aksulu. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form. My signature below indicates my consent.

Signature (Participant)	Date	Signature (Researcher)	Date

Appendix H: Contact summary Form

Type of Contact :
Interviewee Name :
Phone :
Sex :
Apparent Age (Y/M/S) :
Position Title :
Organizational Unit :
IT Cluster :
Date :
Site :
Blocked Time :
Recoded Interview Length :
Interviewer :

The main issues that struck me in this contact (i.e. surprises):

Other salient, interesting, illuminating or important aspects:

Questions that need to be deleted, modified or added in subsequent interviews:

Appendix I: Evolving List of Codes

Evolving List of Codes: New / Revised Codes that have been added during analysis of Cluster 1, 2, and 3 interviews are shown in **bold**, *italic* and underlined text. No new codes were required during analysis of Cluster 4 data.

General Category	Individual Codes	Actual Code	Associated Questions
Adoption Category	AC: Formal Adoption	AC-FORM	All
Adoption Category	AC: Hidden Adoption - Silent	AC-HIDE-SILENT	All
Adoption Category	AC: Hidden Adoption - Shared	AC-HIDE-SHARED	All
Adoption Category	AC: User Rejection	AC-REJE	All
Adoption Category	AC: Dual Adoption (Non-genuine use)	AC-DUAL	All
Adoption Process	AP: Top-down	AP-TOP	Q7-Q12
Adoption Process	AP: Bottom-up	AP-BOT	Q7-Q12
Adoption Antecedents	AA: Technical Factors - Positive (alternative)	AA-TECH-PLUS	Q10-Q18, Q20-Q23, Q25
Adoption Antecedents	AA: Technical Factors - Negative (existing)	AA-TECH-MINUS	Q10-Q18, Q20-Q23, Q25
Adoption Antecedents	AA: Previous Use	AA-PAST	Q9, Q11-Q18, Q23, Q25
<i>Adoption Antecedents</i>	<i>AA: Previous Use (Sanctioned Solutions)</i>	<i>AA-PAST-SANCTIONED</i>	<i>Q9, Q11-Q18, Q23, Q25</i>
<i>Adoption Antecedents</i>	<i>AA: Previous Use (Unsanctioned Solutions)</i>	<i>AA-PAST-UNSANCTIONED</i>	<i>Q9, Q11-Q18, Q23, Q25</i>
Adoption Antecedents	AA: Latest and Greatest	AA-SHINY	Q7, Q9-Q23, Q25
Adoption Antecedents	AA: Internal - Compliance	AA-INT-COMP	Q13, Q14, Q16, Q17
Adoption Antecedents	AA: Internal - Identification	AA-INT-IDENT	Q20-Q22
<i>Adoption Antecedents</i>	<i>AA: Internal - Identification (setting example)</i>	<i>AA-INT-IDENT-PRECEDENT</i>	<i>Q20-Q22</i>

General Category	Individual Codes	Actual Code	Associated Questions
<i>Adoption Antecedents</i>	<i>AA: Internal - Identification (source of support)</i>	<i>AA-INT-IDENT-SUPPORT</i>	<i>Q20-Q22</i>
Adoption Antecedents	AA: Internal - Internalization	AA-INT-INTER	Q24
Adoption Antecedents	AA: External - Coercive Isomorphism	AA-EXT-COER	Q14, Q15, Q17, Q18
Adoption Antecedents	AA: External - Normative Isomorphism	AA-EXT-NORM	Q15, Q18, Q23
Adoption Antecedents	AA: External - Mimetic Isomorphism	AA-EXT-MIME	Q15, Q18, Q23
Adoption Antecedents	AA: Other	AA-OTHER	All
<i>Adoption Antecedents</i>	<i>AA: Other (Budget related)</i>	<i>AA-OTHER-BUDGET</i>	<i>All</i>
<i>Adoption Antecedents</i>	<i>AA: Other (Fit with existing systems)</i>	<i>AA-OTHER-FIT</i>	<i>All</i>
<i>Adoption Antecedents</i>	<i>AA: Other (Governance and controllership)</i>	<i>AA-OTHER-GOVERNANCE</i>	<i>All</i>
<u>Adoption Antecedents</u>	<u>AA: Other (Performance)</u>	<u>AA-OTHER-PERFORMANCE</u>	<u>All</u>
Moderators & Mediators	MM: Technical Knowledge (Tech. User)	MM-KNOWS-USER	Q3, Q5, Q6, Q9, Q11, Q13, Q14, Q16, Q17, Q21, Q22
Moderators & Mediators	MM: Technical Knowledge (Management)	MM-KNOWS-MGMT	Q8-Q10, Q12, Q14, Q17, Q18
Moderators & Mediators	MM: Project Size, Visibility and Criticality	MM-PROJE	Q11-Q13, Q16, Q23, Q25
Moderators & Mediators	MM: Awareness - Organizational Rules	MM-AWARE-RULES	Q4, Q7, Q9-Q11, Q15, Q19, Q23
Moderators & Mediators	MM: Awareness - Alternative Solutions	MM-AWARE-ALTER	Q4, Q7, Q9, Q10, Q12, Q14, Q17, Q23, Q25
Moderators & Mediators	MM: Availability of Help and Support	MM-HELP	Q13, Q16, Q20-Q23, Q25
Adoption Consequences	AK: Adoption Consequences	AK-RESULT	Q12, Q26
<i>Essential Quotes</i>	<i>EQ: Essential Quotes</i>	<i>EQ-QUOTES</i>	<i>All</i>

Appendix J: Context Charts

Figure 5 – Context Chart (Cluster 1)

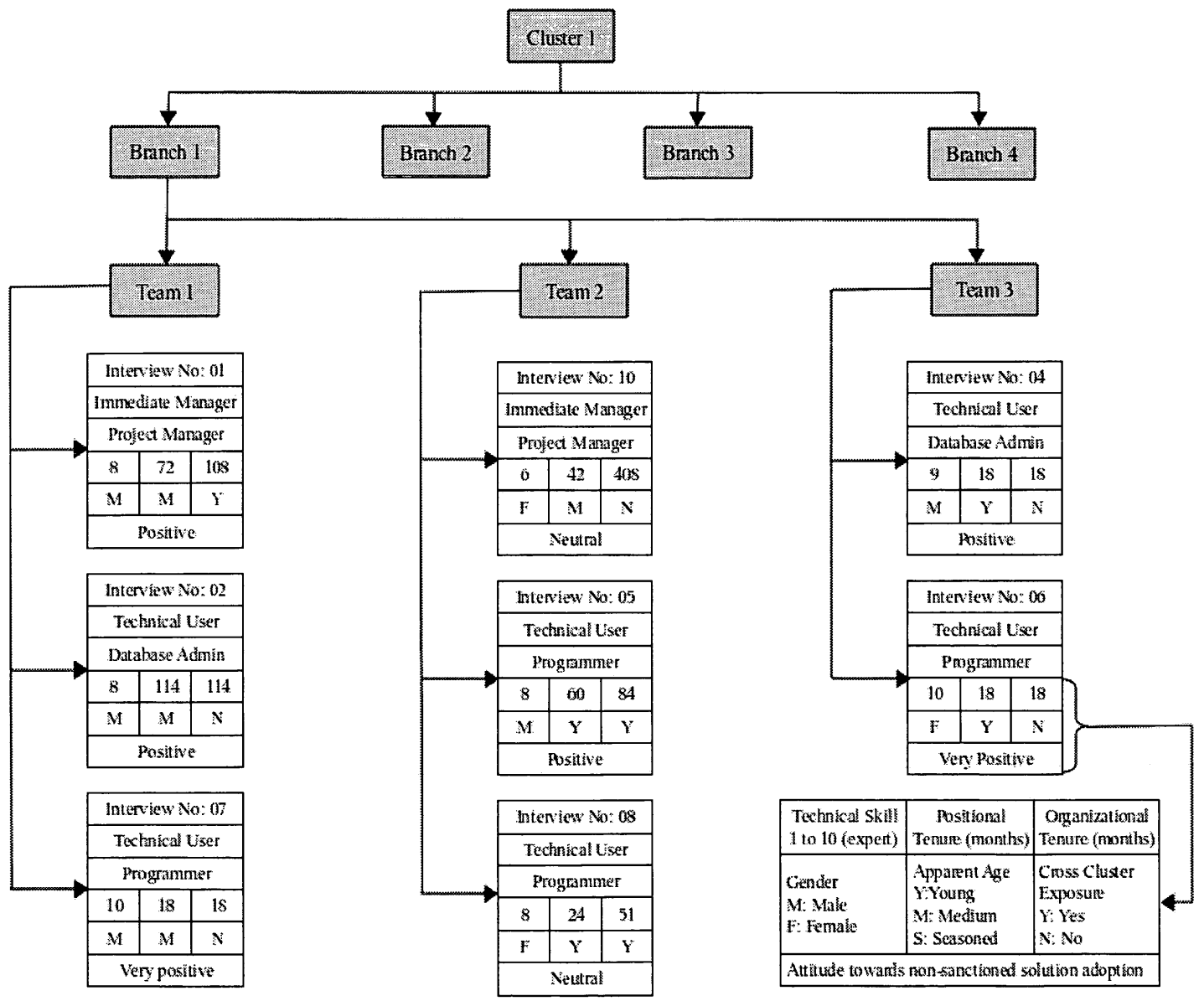


Figure 5 – Context Chart (Cluster 2)

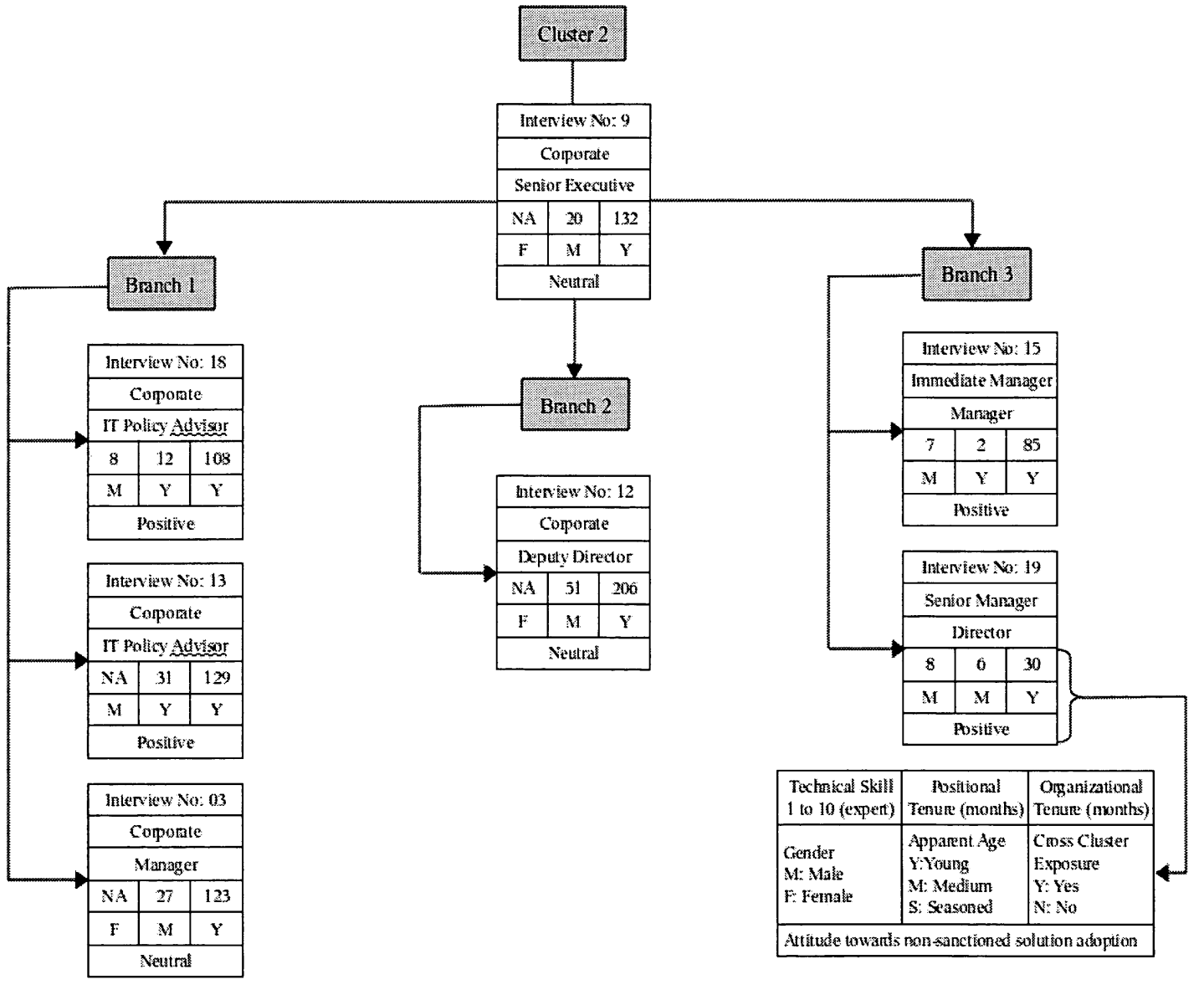


Figure 5 – Context Chart (Cluster 3)

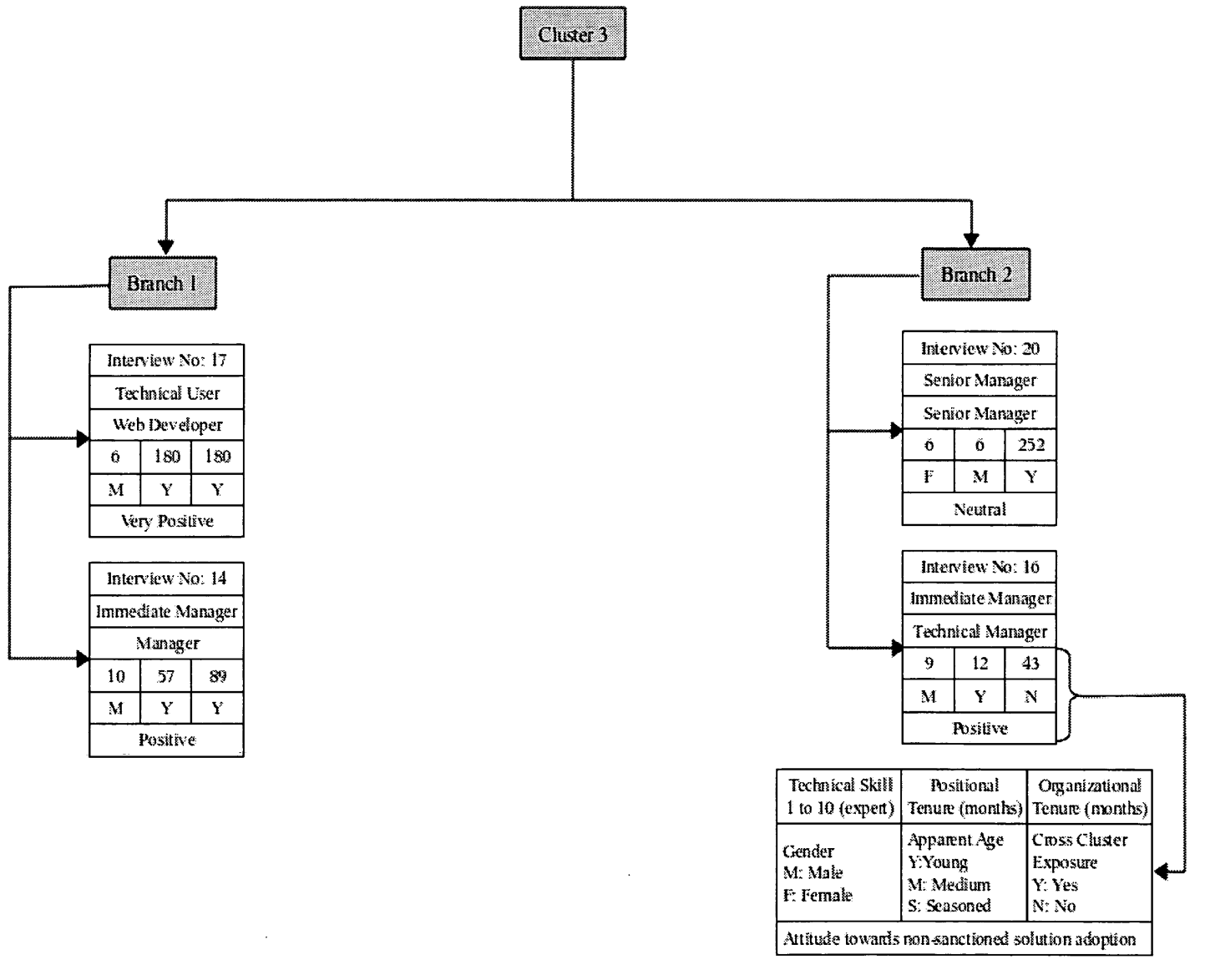
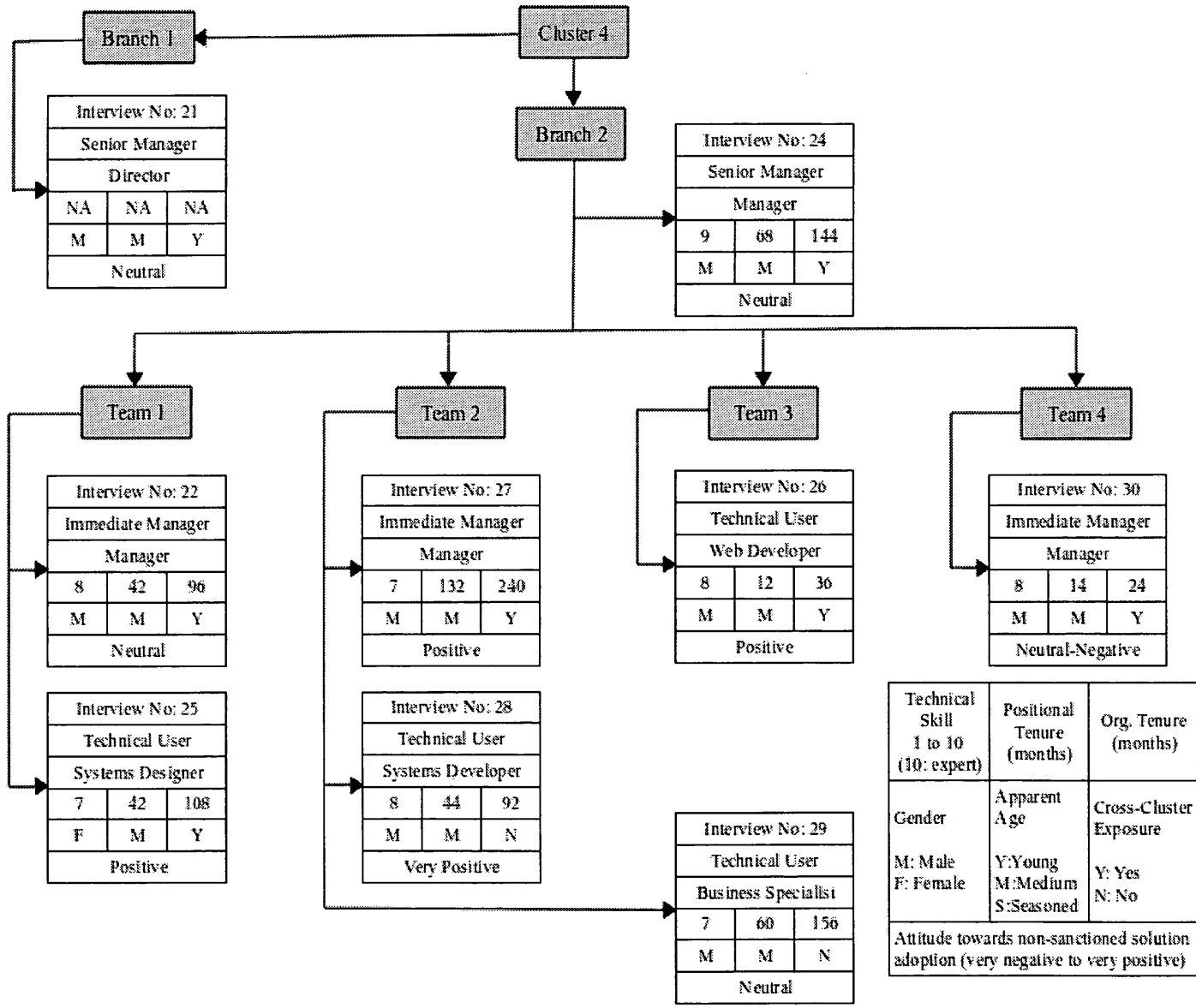


Figure 5 – Context Chart (Cluster 4)



Appendix K: Checklist Matrices

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
Internal: Compliance	<p>Sample Excerpts:</p> <p>“No, of course, you see, I will follow corporate standards, because I can, in the back of my mind, I will be thinking, that if I follow this procedure or this technology, if anything happens down the road, after two years, people is going to go for my throat. They say, hey, why did you do that? So, in order to protect myself, the order should come higher than my level. Like people who would be involved, like the project manager, manager, director or the CEO.” (Interview 02)</p> <p>“They say, OK this is the thing and just do it.” (Interview 02)</p> <p>“For small things...Aaaaahhh...I guess I will have to test the waters. If my senior manager says yes, sure put the request in, I would like to try that.” (Interview 04)</p> <p>“It would definitely intimidate me a little bit that OK this is a standard already in place.” (Interview 04)</p> <p>“I would be much more...I would be much more, I would be more relaxed using them. Given that I have approvals and, they are, you know, certified or, you know they are the OK tools to use. Now, I do use them kind of secretly.” (Interview 05)</p> <p>“Q: Would you be more comfortable if the standards did not exist at all? A: Yeah, that for sure (laughs).” (Interview 06)</p> <p>“Somebody like high-level need to make decision where to deploy what environment in use. I'd go with their decision because I am not the one who can make the decisions.” (Interview 06)</p> <p>“Yes, go ahead if they (referring to rule makers) want (me) to please use the standard tools for our developer environment I'm fine. I'm totally fine.” (Interview 08)</p>	<p>Sample Excerpts:</p> <p>“It is safer, offers better support and integration of products, which is kind of putting all the eggs in one basket but that's what I sense from the upper management.” (Interview 01)</p> <p>“Well, they'll make the decision for us. Make the decision for us on which route to go. I mean, it's pathetic. They may even procure the product (laughs). Not just leave it to the team to do it. They offer no choice.” (Interview 01)</p> <p>“I guess in the architecture review. Any small changes should go to the ARB (Architecture Review Board) and ACT (Architecture Core Team) checkpoints. Even in existing applications you make a change and you are subject to review and apply, you know, TRAs (Threat Risk Assessments) and PIAs (Privacy Impact Assessments) and that type of tools. And I sensed that in the last year or two there has been a big push to do that for any small changes or any small projects even.” (Interview 01)</p> <p>“My sort of shop is a little more unique than the rest of our shop right now because we are on a mainframe application still. So, it's much more, sort of, corporate managed. We have to make sure that we are...everything is done</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>“If they have standard it's fine. I accept it, I can use it.” (Interview 08)</p> <p>“Uhm, if they want to follow, I mean, depend on the policy, how policy to be a used it for each of the developer, I mean, depend on that. Depend on how the management, I mean project manager, how they control the environment. How they say, I want the this is standard tool to be used we have to use it, right?” (Interview 08)</p>	<p>exactly to corporate requirements.” (Interview 10)</p>
Internal: Identification	<p>Sample Excerpts:</p> <p>“But these corporate...they don't give us any confidence. We feel much more confidence by the information provided by them in the community.” (Interview 02)</p> <p>“If I have somebody who is already exceptionally expert in that thing I would definitely get his input. I would try to work, convince him to use this tool or his expertise in developing this prototype.” (Interview 04)</p> <p>“You know if it's something new which has not been formally approved and implemented, I guess the...., if the COI (Community of Interest) exists, that would be a positive aspect in making my decision.” (Interview 04)</p> <p>“I think you keep your eyes and ears open and if you follow, you know, articles in the web and you talk to people or, even if you walk into a university talk to students, they would tell you, you know, what teachers have been talking about, what have they been taught at school.” (Interview 04)</p> <p>“Q: Let's say you are not really familiar with innovative IT solution, like Git, and I was going to ask you whether the existence of a person who is knowledgeable nearby would have an effect? So, access to an expert... A: Yeah, yeah, definitely. Uh, because it makes my job as a developer...At the end of the day tools should help me as a developer, help me and make it faster and easier.” (Interview 05)</p> <p>“Q: Would you be more willing to use it if there was a</p>	<p>Sample Excerpts:</p> <p>“Well, oh, definitely, having a knowledgeable person would go a long way to adopt the solution.” (Interview 01)</p> <p>“Because we can really, in a community, we can influence what type of tools, products or processes are of interest and make sure that everything is considered. Again, I am not sure whether the same is true for the centre of excellence.” (Interview 01)</p> <p>“Well, if I find out that some other cluster is using what I am trying to use I will certainly try to use that as an argument. Yes, it will help my argument, that is true.” (Interview 01)</p> <p>“But in any case it would be helpful to know that somebody is using what I would like to use.” (Interview 01)</p> <p>“Well, I think if...having access to a knowledgeable individual will have positive effect because it would give them more information about the product that</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>COI (community of interest)? A: Yeah, definitely, yeah. I would be more, knowing, you know, there is support, there is people you can...they can help you, you know. I believe everything has been done before. So, you can always ask someone else's or, you know, for getting...how did you do it? what happened? what were the...what's to avoid? what were the harder parts, you know...So, I do. So, it would be a support and more comfortable and confident, uhm, layer or, you know, a group to rely on.” (Interview 05)</p> <p>“Yeah, because the deadline is so close. Like just the end of month they need to do it fast. That's why they...But if there are some people who really knows how to do it who can help them out when they have the problems I think we can we can still keep that so I am saying basic training is very important to keep those new software.” (Interview 06)</p> <p>“I would try to experiment it myself. I would try to do a POC (proof of concept) and see if it's good enough and then probably I would engage an expert.” (Interview 07)</p> <p>“I think if there is someone who has already known it, it's better to talk to him and learn it right? It's better yeah.” (Interview 08)</p>	<p>they would like to use. The people will know if there is a higher risk or lower risk they may not have considered. So, for me it's much more positive situation.” (Interview 10)</p> <p>“Q: That's a good point. According to the standard that I mentioned, <Standard Number>, yours is a JAVA shop and the standard application server for the JAVA shop is Websphere. Uhm, knowing this, do you think that your developers would still pick an innovative solution like JBOSS? A: Yeah, yes. Q: And what may cause them behave like that? A: Because many of times we have to go out to the, uhm, do RFSs and go out to the community and get consultants, they come in and who are very knowledgeable in both applications, and JBOSS seems to be the preference, uhm, because of its ease, uhm, it's the way that you can actually work with the actual product and the deliverable is easier I understand. Uhm, much more if I could use this word: Agile.” (Interview 10)</p>
Internal: Internalization	<p>Sample Excerpts:</p> <p>“Q: What I am asking is whether a user would select Linux because it is open source. Because that particular user has a, follows the open source mentality, thinks that it is better than proprietary and would that be a basis of decision? A: No,I don't think so. ” (Interview 02)</p> <p>“Keeping in mind that people have been in the</p>	<p>Sample Excerpt:</p> <p>“Q: Do you think those technical users would adopt a technical solution, an innovative technical solution, purely based on ideological grounds? A: No.” (Interview 10)</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>government for a while, they have a set mentality about certain things, I don't think ideology would play a factor there." (Interview 04)</p> <p>"It does have an influence but sooner or later bad products disappear even in the open source community. Uhm, even initially if people and groups, you know, say because it's ideology I am going to use it but then they realize it's making their life hell and it drops it goes it disappears. Or it transforms into uhm, you know, a different product or a different project you know." (Interview 05)</p> <p>"I don't consider myself a rebel. I'd like to confirm you know." (Interview 05)</p> <p>"Q: Do you think technical users may select a particular IT solution despite potential reaction from really upper management on pure ideological grounds? For example, would somebody pick Git just because it's open source? Even if it was a bad technical solution? A: No, I don't think so. I wouldn't do that. Nothing, you choose something because it is good. (unclear) not just open source." (Interview 06)</p> <p>"Q: Do you think technical users would select a particular solution, innovative solution, purely based on ideological grounds? For example, would somebody select Git or Subversion just because it's open source? A: Probably not. Like I mentioned, so the idea is to solve the problem, you know, like how effectively and how easily you can solve the problem." (Interview 07)</p> <p>"Q: Do you think technical users might adopt certain technologies or solutions purely based on ideological grounds meaning, for example, would somebody go ahead and use Subversion just because it's open source? A: Uhm, not really. I think it should depend not just on open source, sometimes having an inexpensive, I mean, license but have more feature the tool it's very, I mean, helping the developer doing more faster. It's not just open source. Depend on tools." (Interview 08)</p>	
External: Coercive	Sample Excerpts:	Sample Excerpts:

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>“I think there's some big guys up there. They just go and talk to these big guys. And then they make the corporate policy.” (Interview 02)</p> <p>“For example, if I am the CEO of Microsoft, I am going to talk to the CEO of Ministry and hey buddy, buddy, couple of general lunches and golf, you know, matches, free matches, and OK, this is my corporate policy we will use Windows. ” (Interview 02)</p> <p>“Yes, yes, definitely it will have effect. Because these top guys are usually not very technical. So, when, suppose you are a friend of mine, right, and you come with some product. I would feel more comfortable buying from you rather than buying from someone which I don't know.” (Interview 02)</p> <p>“ They were very comfortable with Microsoft. They were very comfortable with Solaris or AIX or people working there were all up for these two or three big giants. Everybody was happy and comfortable with that they wrote the policies saying OK this is the standard this is tested through them.” (Interview 05)</p> <p>“Yeah...In our environment, being in the, you know, in the <organization name> and the public service I believe there is...there is politics involved. Uhm, there is financial politics. There is a pie, a budget, and I believe they wan't to give slices to the private sector, for example IBM, uhm, you know, and other slices. So, basically distributing the pie, the budget money to the private sector, which is, in a way, I do think and believe it's a government mandate in a way, distributing the wealth and that's going back to economics classes. Government is supposed to distribute the wealth among...in the society, right?” (Interview 05)</p> <p>“For version control, uhm, we always use Git for our projects. And they also suggest to use SVN because of the vendors.” (interview 06)</p> <p>“Uhm, to me all those rules are maybe the products from big companies” (Interview 06)</p> <p>“And if they hear only what these big corporates are telling them, right, like what Microsoft, because Microsoft and IBM and you know even now Google, they have lots</p>	<p>“Also the, I think, the perception that it is safer, from a political viewpoint to follow certain leads in the industry.” (Interview 01)</p> <p>“If you say it's IBM or it's Microsoft, I mean, they are...I guess, nobody can accuse you of saying who knows them or what have they done obviously. ” (Interview 01)</p> <p>“(referring to big vendors) So, therefore they (decision makers) tend to follow the products that are derived from any of those companies. Because it is simply easier or safer.” (Interview 01)</p> <p>“Yes, big influence. Big influence. The lobby of the big companies is...it's very important.” (Interview 01)</p> <p>“Well, I guess they have a big presence at higher levels of the government. That is all something equivalent to the lobbyists in Washington, DC, something like that.” (Interview 01)</p> <p>“Q: What about the vendor community? Do you think they may have an influence? A: ... To some degree they would have influence. Again it depends on their background, if they are Canadian and if they are affiliated possibly to some...government that's in power. That might be of some influence.” (Interview 10)</p> <p>“I think they have a requirement or the government wants to make sure that, uh, they support certain applications or certain businesses.</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>of marketing dollars, right. So, they can really push their products, and as far as other industries are concerned, I mean, they really don't listen to all these, you know, big marketing talk. So, they go by what the product delivers. So, they go by that.” (Interview 07)</p>	<p>They have a requirement to do so. Supporting Canadian manufacturers and things like that versus other manufacturers from abroad.” (Interview 10)</p>
External: Normative	<p>Sample Excerpts:</p> <p>“See, I look...I don't look at the buzz words, I see the...what's happening in the market which has successful rates.” (Interview 02)</p> <p>“Success is more important. And I told him, see, Oracle tool, which is form, is established tool and Oracle is still maintaining it. Because they know that this product works.” (Interview 02)</p> <p>“Not the...I did not look at the Cluster or to corporate. I looked what's happening out there. And I says, do they have successful projects? Do they, Are they running it successfully for some period of time? If they can run there, we can run here too.” (Interview 02)</p> <p>“But, I guess when they are sure that no, this is a good, industry-proven alternative and they are confident, they would go for it.” (Interview 04)</p> <p>“And those tools if I look in the market now, to the job requirements, let's say Python is pretty prevalent. Every resume, the new ones, I mean, this is the tool of choice nowadays, so organizations are looking for developers who know these advanced tools.” (Interview 04)</p> <p>“I think you keep your eyes and ears open and if you follow, you know, articles in the web and you talk to people or, even if you walk into a university talk to students, they would tell you, you know, what teachers have been talking about, what have they been taught at school.” (Interview 04)</p> <p>“OK, this is a proven thing in the states and they have been using it for years, then it must be OK to adopt this.” (Interview 05)</p> <p>“The important thing is there are a lot of solutions out</p>	<p>Sample Excerpts:</p> <p>“Also the, I think, the perception that it is safer, from a political viewpoint to follow certain leads in the industry.” (Interview 01)</p> <p>“Because many of times we have to go out to the, uhm, do RFSS and go out to the community and get consultants, they come in and who are very knowledgeable in both applications, and JBOSS seems to be the preference, uhm, because of its ease, uhm, it's the way that you can actually work with the actual product and the deliverable is easier I understand. Uhm, much more if I could use this word: Agile.” (Interview 10)</p> <p>“...because again, it's not a, it's a process or a product that not only the folks that are very well versed in the products here but consultants are also advocating and the masses are actually advocating one product over another there's got to be some justification in it.” (Interview 10)</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>there. Like if you have come up with a problem, just Google on line, there's a lot of developers out there, they have similar issues with you, they are using Eclipse like free, they are not using RSA (IBM Rational Software Architect)." (Interview 06)</p> <p>"Personally I want to keep my technology up-to-date with the whole community." (Interview 06)</p> <p>"Sometimes like, uh, the industry standards are not <organization name> standards." (Interview 07)</p> <p>"Q: What are some other considerations that you have when picking up a tool? A: Uhm, depends on tools within the market. If it's very popular..." (Interview 08)</p>	
External: Mimetic	<p>Sample Excerpts:</p> <p>"The only reason was that I have seen the success in the market." "In the market. Still, if you look closely Forms are the most...still there, out there." (Interview 02)</p> <p>"Like, you know, everybody is moving towards Linux. Big companies like Oracle is moving to Linux. They recently introduced a new product called Oracle Appliances. It is to host RAC (Real application clusters) system, which runs only on Linux." (Interview 02)</p> <p>"Not the...I did not look at the Cluster or to corporate. I looked what's happening out there. And I says, do they have successful projects? Do they, Are they running it successfully for some period of time? If they can run there, we can run here too." (Interview 02)</p> <p>"I think this could be a big influence if, I mean, I'm sure if we see Federal Government using Linux and Python and all that that could be a good card to play." (Interview 04)</p> <p>"Because if whoever is making this policy says well, OK, this is a proven thing in the States and they have been using it for years, then it must be OK to adopt this. Not really based on what's going to help you on a daily basis or what's really good for thousand developers on a lower level." (Interview 05)</p>	<p>Sample Excerpts:</p> <p>"It certainly would give ammunition to those that want to, you know, adopt a new standard from say the Federal if they say well if the Federal Government has done it then the <organization name> could follow it. So it is a good precedent." (Interview 01)</p> <p>"Maybe, managers, may be even above that. May be at the directors level. They influence, they do influence each other, yes." (Interview 01)</p> <p>"There is an effect particularly at the management level seems to be more keen on that type of things - on finding out what other clusters are doing. At the staff level, I don't think it is. Sometimes it may happen." (Interview 01)</p> <p>"I find that hard to believe because other organizations are very much up-to-date in their</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 1)

Influence	Organizational Roles	
	Technical User (6)	Immediate Manager (2)
	<p>“Yeah. That's one thing. Like in Canada. And another thing with <system name> happened that they started looking to the States. Ah, for, like California they have a <industry name> system, BC, they have a <industry name> system. So, they were looking...Oh what are they doing? And maybe we can copy it.” (Interview 05)</p> <p>“But the companies are like IBM have more reputations with all the banks, governments they are more comfortable with that.” (Interview 06)</p> <p>“But, uhm, if somebody or some peer company or peer government start using them and very successfully probably they will consider.” (Interview 06)</p> <p>“Because if somebody else is doing so they would feel comfortable, you know, because if like one public sector is doing so it must be good enough because if they are doing it so, it's more likely that they would follow.” (Interview 07)</p>	<p>tools and their IT practices and we seem to be very far behind. So, I don't think they have that much of an influence in the sense that we are supposed to run with them but...no I don't. I don't think it does.” (Interview 10)</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 2)

Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
Internal: Compliance	<p>Sample Excerpts:</p> <p>“But in terms of, in relative terms some clusters have access to more, uhm, tools, uhm, more development tools, more access to more innovation, uhm, options. Uhm, they have, they put it to...well, before all of the server consolidation, some clusters and areas had, uhm, their own data centres and their own areas where they could, uhm, try things out before actually, uhm, investing and creating, uhm, projects around them. And that ability is significantly diminished since.” (Interview 18)</p> <p>“Uhm, managers generally don't suggest</p>	<p>Sample Excerpts:</p> <p>“I can't go and police everybody. It should say mandated. Actually, now the directive does say, uhm, any tool must be approved by the Corporate CIO. So <person name>, if someone wants to come in with a tool that's different from whatever we bring in, they need to get that approval from the Corporate CIO.”</p>	<p>Sample Excerpts:</p> <p>“Part of it is...the centre, uhm, establishing the standards without knowing what's happening at the coalface so to speak.” (Interview 19)</p>

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Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
	<p>things. Uh, from what I've experienced, my experience has been that the managers get caught up in more providing direction than in actual providing that level of guidance around what should be used or what should not be used. Uhm, a lot of that is also...uh...a lot of that has also been uhm...determined by what is standard, what is available in the <Organization Name> to for acquisition, purchase of what not..." (Interview 18)</p> <p>"On, in terms of higher level direction, it usually comes from the top, so executive sponsors, I wouldn't even say...like director level perhaps, it usually comes from like the CIO or director that provides that high level champion of the new technology. Without that nothing usually moves." (Interview 18)</p> <p>"It depends on...uhm...the project. The size of the project, the visibility of the project and whether using something else would significantly impact the project itself. Or whether it would just be in to supplement the project. So if it was something that was much more visible, uhm...my sense is that they would definitely, uh, defer to the standard. Because questions will be asked if otherwise and it will be more likely that they'll need to justify not using it versus using it. Uhm, and if they feel strongly that tool is, that would definitely benefit them then they would go through the whole process but they understand how much of an administrative overhead burden that might involve if they were to go that route trying to get an exemption." (Interview 18)</p> <p>"I think people tend to use, my experience, I think people tend to use what's available to them, what they've been told, uhm if their skill level a little lower. As their skill level elevates they are kind of a little bit more uh willing to explore different</p>	<p>(Interview 15)</p> <p>"Q: So, you think that the term "mandated" would have a different effect? A: Oh, yeah. I think so. Because then you can hold their feet to the fire and then if they use their own tool that's one thing I just want the money. At the end of the day I'm paying for this tool and I have a cost neutral organization. I need to get money for whatever tool I'm implementing." (Interview 15)</p> <p>"Legal (department) has been somewhat of a kind of think in the box type of problem for us. Uh, so, they have a lot of comments and concerns but they don't have a lot of suggestions." (Interview 15)</p> <p>"Supply chain (department) is another issue because we can't, we can't release an RFP, we can't release an RFQ, and do any of that procurement without going through them or without using their standards and templates and what not." (Interview 15)</p>	

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Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
	<p>options. Because they are more comfortable with it and with I guess accepting the risk of trying something different. To a point, once they become a manager I think their stance would change (laughs)” (Interview 18)</p> <p>“I think that they uhm, I think that their inclination would be to the quickest sort of route. And depending on how visible it is uh, the project I mean, the benefits would have to be pretty significant for them to go through the rigour and it does seem that (unclear) amount of rigour that's needed, so, uh, I would not say that they would completely rule it out but the benefits need to be pretty significant (to go outside sanctioned lists).” (Interview 18)</p>		
Internal: Identification	<p>Sample Excerpts:</p> <p>“Q: OK. Uhm...what kind of things influence their decision? Because you mentioned one thing, you said, they stick with something they used in the past because they know how it works etc. Uhm, do they look for example, other people... A: Yes, to their peer group.” (Interview 18)</p> <p>“So, uhm, when you asked the question who else would they tell or who else they inform, they would probably tell their peer group if they think that it is useful tool that their peer group would uhm find helpful.” (Interview 18)</p> <p>“...the communities of interest do expose the users to other options, what other people are doing. In that way it does influence them.” (Interview 18)</p> <p>“...they choose to or take upon themselves to adopt it themselves because they see the value. Not because of any kind of peer pressure.” (Interview 18)</p>	<p>Sample Excerpts:</p> <p>“But what happened was, you had one person in <Cluster Name> saying, oh no no, let's implement Microsoft Project, it's great. And they were selling it to the other Clusters. And then the other Clusters jumped on board and said, well, this guy is saying it's great and there is a loophole around to get this, we are going to go on that path and do that.” (Interview 15)</p> <p>“OK, uhm, I don't know. It depends on how good that centre of excellence is at doing agile or .NET or, because the .NET centre of excellence to me is a joke right now.</p>	<p>Sample Excerpts:</p>

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Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
	<p>“So, again searching the Internet, the biggest source of information is usually forums. Uhm, and it's usually starts with a questions and then following with a bunch of answers that may or may be not conflict with each other. And you try to sort of figure out what the best solution is or the trend is. Uh, similarly with who else is doing it, at the time I had a very large circle of friends and colleagues not all working in the <Organization Name>. But, who I knew were in technical areas. And I would ask them what they would be doing or how they would do it.” (Interview 18)</p>	<p>Uh, because of their track record, even <Branch Name> tried to use them to create our solution for our integrated business tool and they failed miserably. You have Sharepoint service out of <Cluster Name> and we brought them into trying to do some stuff with Sharepoint, they even brought in Microsoft experts and they couldn't do it. We had an intern an he did it. And it was nothing for him.” (Interview 15)</p> <p>“Q: Do you think having a knowledgeable individual has an effect that you can tap into as a resource? A: Definitely. I mean, yeah, if you have the right skill set, you are going to get the right things done.” (Interview 15)</p>	
Internal: Internalization	<p>Sample Excerpts:</p> <p>“I can't think of an example within the <Organization Name> but I do have some friends who tend to do one thing or another because either it's open source or because they believe in...I would characterize them as, uhm, anti-establishment, so they don't, they choose not to do the Microsoft solution because it's Microsoft. So, they would opt for the other thing without even looking at how good Microsoft is for example, because they just don't like Microsoft philosophically.” (Interview 18)</p>	<p>Sample Excerpts:</p>	<p>Sample Excerpts:</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 2)

Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
	<p>“Q: And does that affect their selection of the technical solutions? A: I would say so. Uhm...I think it influences them. I don't think it would be an overwhelming decision factor for them. Q: Can you think of a specific example that you've come across? A: No.” (Interview 18)</p>		
External: Coercive	<p>Sample Excerpts:</p> <p>“Interviewee: So, you are asking me what in my opinion influences CIOs decisions? Interviewer: Yes. Interviewee: Uhm, so, part of my experience in <Cluster Name> was actually to work as the EA (Executive Assistant) to CIO. So, I think I have a bit of a insight into that perspective. Interviewer: It's great (laughs). Interviewee: (Laughs) Definitely their peer group. So, other CIOs, uhm, vendors, their senior management team...uhm, and their own experiences.” (Interview 18)</p> <p>“Interviewer: The other thing you mentioned was vendors. So, how do vendors influence this process? Interviewee: ..I am not sure how much I can say, uhm...it depends on the vendor I suppose, uhm, many vendors I've seen are very, they are very familiar with thow the government works, and they use that to their advantage. Uhm, they may book meetings directly with the CIOs. Uh, they may book meetings directly with the deputy <position name>, or the <position name> themselves and use that as a lobbying point to influence the decisions of the CIOs of the organization. It depends on the vendors. Sometimes their goal in getting a meeting with the <position name> will just be to get a meeting with the CIOs.” (Interview 18)</p>	<p>Sample Excerpts:</p> <p>“So, it was a mandatory VOR but because Microsoft, uhm, as a standard set of tools they were able to get it through that so, they worked around some of these...” (Interview 15)</p> <p>“I think it just was the tool that was picked. Because of the requirements, because of the vendor coming in and saying they could do all these great things, uhm, you know, it just happened that they were the tool that was chosen.” (Interview 15)</p> <p>“So after the fact when things weren't working out as well as they could have been, I think the vendor was trying to cover that up and do a lot of schmoozing rather than delivering.” (Interview 15)</p> <p>“Q: So, in light of what you said, how do you</p>	<p>Sample Excerpts:</p> <p>“Q: Do you think the vendor community may have an influence on this or not? A: Uhm, possibly I'd even say probably. And I have, it seemed to be the kind of things that came out of consultations and information that was fed in through sources like the vendor community.” (Interview 19)</p>

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Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
		<p>think the folks in the centre came up with the gating process? A: You know what, it's all driven by, originally Chartwell came in and they did their whole business architecture stuff and some consultants came in and said this is what your architecture should look like and these are some artifacts and you just paid for and steal everything” (Interview 15)</p>	
External: Normative	<p>Sample Excerpts: “So, when someone gets certified with something that's their knowledge, that's their experience, they are very much familiar with it. I think a better test of that would be if they were to be certified in two things, how they choose between them. Because now they would have knowledge of both things now how do they choose? They would not necessarily default to one. They would...choose between one of the other equally picking on what they think the best fit would be.” (Interview 18)</p>	<p>Sample Excerpts: “So, I was involved a little bit with the Curam and Siebel, uhm, discussions, uhm, and we did look at other agencies and other, uhm, governments that have been either using or have gone through the implementation and how easy it was.” (Interview 15)</p>	<p>Sample Excerpts:</p>
External: Mimetic	<p>Sample Excerpts: “Interviewee: So, you are asking me what in my opinion influences CIOs decisions? Interviewer: Yes. Interviewee: Uhm, so, part of my experience in <Cluster Name> was actually to work as the EA (Executive Assistant) to CIO. So, I think I have a bit of a insight into that perspective. Interviewer: It's great (laughs).</p>	<p>Sample Excerpts:</p>	<p>Sample Excerpts: “Uhm, I'm sure they do environmental scans try to find out what other jurisdictions are doing but honestly uhm, often it seems to me that there is a not-invented-here</p>

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Influence	Organizational Roles		
	Corporate (5)	Immediate Manager (1)	Senior Manager (1)
	<p>Interviewee: (Laughs) Definitely their peer group. So, other CIOs, uhm, vendors, their senior management team...uhm, and their own experiences.” (Interview 18)</p> <p>“Interviewer: How about other similar organizations? Do they look at other similar organizations and see what they are doing?</p> <p>Interviewee: We would like to say that. Uhm, we do use other organizations more so than others. But in some ways, in some areas we lead, so there is no other organization out there that does the same thing. It is also harder to get information about what other organizations are doing. So, unless you know someone who knows someone who knows someone else, it's a little bit difficult to find out really what technologies are being used. There are some good relationships that are being build.” (Interview 18)</p> <p>“There was actually one thing I want to go back to. Uhm, peer group and when I said that they don't necessarily influence each other, there is actually an element of...uh, wanting to not do or re-invent the same, re-invent whatever exists out there. So if another area is generally doing something...if it's something that they don't want to repeat doing, if it's very similar that might influence their decision to adopt it. So, it'll still, ultimately the decision is still, they feel that it's still theirs to make but it's the their senses that it'll be easier if they just do whatever that anyone else is doing and just recycle. And I think that is a good position to take, we don't want to duplicate and we want to use as much as we can. Uhm, so I mean, I think that occurred to me just as we were talking.” (Interview 18)</p>		<p>syndrome going on uhm, so it tends to push the other way sometimes. You know, it almost like, we can't choose that one because we don't want to be copying <Jurisdiction Name>.” (Interview 19)</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
Internal: Compliance	<p>Sample Excerpts:</p> <p>“And then there is licensing which is why we did not (deploy) virtualbox because you can't...you have to license, you have to pay for it if you are going to use it commercially. So we ended up deploying VM-Ware player everywhere to run the VMs we are using...” (Interview 17)</p> <p>“If you can get something for no cost then you don't even necessarily have to ask anyone. And depending on the cost, the approval process can be anywhere from annoying to...basically impossible.” (Interview 17)</p> <p>“I've had managers who got the (unclear) convictions and who have actually like postpone stuff for a long time because they didn't want to go against standards. Personally my view is if the standard is obviously not designed for my scenario and adhering to the standard would either cost my clients far too much or it just outright kill the project if the clients couldn't afford it then ignore the standard.” (Interview 17)</p> <p>“So with Perl, that was around before the, those standards being around so, we are using that for years. (Referring to permissions) No not really, because we already had code bases established for</p>	<p>Sample Excerpts:</p> <p>“Again, because I have that background in risk management as a certified risk manager and (unclear) in terms of I tend to get involved in those to ensure that we don't have issues with corporate security, we don't have issues with policy people, so you know, any of that.” (Interview 14)</p> <p>“Uhm, with Siebel in place we know that we have a standard tool in place, we know that everyone has to work with Siebel. Siebel comes with its own best practices and standards.” (Interview 14)</p> <p>“In terms of, if you look at different methodologies, in terms of project management you have the PMBOK, so that's applied without any, what you call exceptions, in terms of project management methodology.” (Interview 14)</p> <p>“Here again, I don't know, whether it's a vendor or whatever right, I've seen that we are very very close in terms of adopting or opening up to new technologies, uhm, sometimes back they tried saying that OK you can use it in dev and test environment but before you go to production you need to have your CIO's approval and what not.” (Interview 14)</p> <p>“...it took time to for it to go to the Corporate CIO because it had to go to the CIO, I did a CIO briefing so</p>	<p>Sample Excerpts:</p> <p>“But basically, you, if a corporate VOR (vendor of record agreement) exists, you must use it period. All it has to do is exist.” (Interview 20)</p> <p>“Interviewer (follow-up question): If they know that a policy exists, uhm, if you compare the two scenarios one is there is a policy in place they know that there is a policy and in the other scenario there is no policy uhm, under which scenario do you think they will be more likely to experiment and find something new, innovative to meet those operational pressures? Interviewee: Oh, when no policy of course.” (Interview 20)</p>

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Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
	<p>that and had it deployed on various servers. There can be huge roadblocks if you are trying to do anything with ITS especially around Zone 1. Uhm, doing anything with ITS is a road block in itself.” (Interview 17)</p> <p>“They are actively prevented by the way our policies are, all our policies are towards creating these unmodifiable, monolithic mega systems. And everyone has to use the same thing nobody can actually customize for the work that they are actually doing. And you are not allowed to automate anything of your daily tasks. Unless you go around and outside the system.” (Interview 17)</p> <p>“Uhm, I actually got the first Linux computer and introduced there. Uhm, essentially a co-worker had been trying to do it through official channels and get approval. And in my case I just installed it on a spare machine and asked the networking guys. Before the centralization they were on the same floor, I just walked over and asked them to set me up on the network and I had a sort of work justification for it, they just did it and it worked.” (Interview 17)</p> <p>“I wanted to use open source libraries which is some of which we had already used but it was just after the current open source policy they had been...the manager said no, no you can't. This is typically the approval process is to (unclear) go find something commercial and</p>	<p>that my CIO could go and inform the Corporate CIO. So got that exemption but, I would say there are roadblocks in terms of the process not being clear in the first place itself.” (Interview 14)</p> <p>“They say, hey remove it or else we are not signing it off, right. Do it or it doesn't go live.” (Interview 14)</p> <p>“And then there will be some reviews with our enterprise architects to make sure that we are sort of, uhm, everything is being, uhm, followed there.” (Interview 16)</p> <p>“...So you have to balance between the end users' requirements, so are we able to meet their requirements? Can we maintain the solution? So, do we have the skills, knowledge, expertise in house to actually implement and maintain that solution? Does it fit with our existing technology stack? And then are there any security concerns or privacy impacts, things that can happen from choosing that techno, that solution.” (Interview 16)</p> <p>“Interviewer: (referring to the approval process for non-sanctioned tools) Did you, uhm, know what that process would have included? Interviewee: At that point in time no. Interviewer: No. OK. Interviewee: Now I do. At that point in time, no I didn't. Interviewer: OK. Knowing what you know now, would you have gone ahead?</p>	

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Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
	<p>couldn't find anything for some very small project and I ended up wasting probably my salary would have dwarfed by far the amount that would have cost to actually pay for a half-decent commercial library for what I was trying to do. Because there was nothing good, it just, still management thing no, no, you can't just use the open source because it's too, the approval process is too horrible.” (Interview 17)</p>	<p>Interviewee: No (laughs).” (Interview 16)</p>	
Internal: Identification	<p>Sample Excerpts:</p> <p>“Interviewer: Do you look at what others doing usually? Does it give you like hints? Does it help you pick the solution? Interviewee: It can. If a group has actual dedicated resources and they are struggling with them and if it's a product that's known to be difficult then yeah, or a system is known to be difficult then just yeah, if you are a small shop you need to avoid that at all costs. Because you can't afford the maintenance bit.” (Interview 17)</p> <p>“Investigating technologies in general there are a lot of stuff happening in blogs and social media where you see prominent developers investigating stuff right. I might give that a try, see the types of projects that are being developed. Uhm...you know actually, actually do some toy project and see what it's like to deploy, see what it's like to developing.” (Interview 17)</p>	<p>Sample Excerpts:</p> <p>“So having, you know, a knowledgeable source right, let's say I want to use an open source library, I can, you know, say hey, you know what, ABC in corporate whatever innovation or standards, do you think, is this product have any security issues, security holes? Have you guys looked at it? They may say yeah, we have looked at it you know we have been in the process of certifying it, you know, go ahead and use it in your dev and test, by the time we'll have it in you know...” (Interview 14)</p> <p>“Interviewer: If you know that some other clusters are also playing with it, how would that affect your decision? Would you feel more comfortable? Less comfortable? Interviewee: Definitely, I would feel more comfortable.” (Interview 14)</p> <p>“So, you know, I have my own reason saying that, you know, hey you know what, I've looked at it, I</p>	<p>Sample Excerpts:</p>

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Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
	<p>“I belonged to various user groups over time when my schedule allows. And the...the longest and the most consistent one being probably the Linux user group just because they have an active mailing list.” (Interview 17)</p> <p>“What I've noticed is the user groups surrounding sort of the commercial platforms, they tend to be sort of vendor sponsored whether it's say we know that Microsoft or ORACLE or they are, you know, companies that make money off consulting or training or whatever right. Those ones doesn't seem to have as active as sort of a user community. There is a community of people in those companies, but then there is sort of the attendees who tend to be sort of you know corporate developer types. There is generally not much interaction in the community at large. Unlike the open source groups, uhm, because there is no vendor there, people are a lot more connected with each other and treated a lot more like they should be treated.” (Interview 17)</p> <p>“Interviewer: Yeah, so, on those occasions when things change too quickly again when you are evaluating those innovative solutions, would having access to a knowledgeable individual help? Interviewee: Sure. interviewer: Do you have, uhm, friends across <Organization Name> you consult with, or</p>	<p>understand you have issues with support but there is a huge community out there who are supporting this.” (Interview 14)</p> <p>“I think someone else in the Cluster was already using SVN anyways so, we said we'll just use that.” (Interview 16)</p> <p>“I think that made it a bit easier too because someone else was already using it. So we already knew OK, it's supported so we can just...” (Interview 16)</p> <p>“Interviewer: So, if I am understanding you correctly, you are saying that the fact that somebody else is using that tool elsewhere helps. Interviewee: Yes, definitely. Interviewer: The fact that you have used that tool elsewhere earlier so that experience with that helps. Interviewee: Yes, yes.” (Interview 16)</p> <p>“OK, so, if the <Cluster Name> Cluster is using it and I have a very, I'd have to have a very good reason for this, so, let's say for example, there was a piece of technology that my client wanted, my client is footing the bill and someone else was using it already and implemented it successfully then I would leverage whatever mechanism they used to bring that in. But only if it met the criteria that the client is paying for it, and the standard technology didn't meet the requirements.” (Interview 16)</p> <p>“Interviewee: So, when they run into a problem we do have, for</p>	

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Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
	<p>outside <Organization Name>? AM: Yeah.” (Interview 17)</p>	<p>example in here we do have different, within our cluster they have people they go to. So we do have different working groups they are across the Cluster and across different branches. Interviewer: OK, do they go to people they know, who are experts? Interviewee: Yes, I would say so.” (Interview 16)</p>	
Internal: Internalization	<p>Sample Excerpts: “Interviewee: I personally, I , I...I do gravitate towards that ideologically yes, uhm, I do prefer open systems that respect my privacy, so, and at home I use Linux partly for ideological reasons, partly because I can configure it just to have it my way. Interviewer: At home? Interviewee: Yeah. Interviewer: How about at work? Interviewee: At work, uhm...probably, well Firefox as opposed to Chrome for that reason. In terms of, in terms of systems I build they tend to be more pragmatic.” (Interview 17)</p>	<p>Sample Excerpts: “Interviewer: For example, do you think a technical user would pick a solution just because it's open source...regardless of its qualities? Interviewee: Uhm, not really. Because if you look at the open source community or open source solutions there are huge number of solutions where people have started some work, left it in between and never really worked on it.” (Interview 14) “Interviewer: OK. Uhm, do you think users, technical users would select a particular IT solution purely based on ideological grounds? Interviewee: What do you mean? Interviewer: For example, would somebody select, uhm, Git just because it's open source? Regardless of the technical functionality. Interviewee: You mean a technical user? Interviewer: Yeah. Interviewee: Yes, I think that I have seen that happen. Interviewer: So they would pick solutions because it's open source regardless of the technical aspects?</p>	<p>Sample Excerpts:</p>

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Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>Interviewee: I've seen recommendations like that happen. (Unclear) people have said OK, I like this project because, and their reasoning, you could tell the reasoning is more geared towards what that product was meant to be instead of the real, instead of meeting the actual requirements.</p> <p>Interviewer: Do you recall like an example?</p> <p>Interviewee: (Sighs)...Not specifically." (Interview 16)</p>	
External: Coercive	<p>Sample Excerpts:</p> <p>"Interviewer: So do you think vendors may have an influence? Interviewee: There is definitely an influence there yes. And there is definitely representing outside interest rather than <Organization Name> interest and than there is the pathology of the way we structure the centre and the <Organizational Units>. The people in the centre are in the bubble." (Interview 17)</p> <p>"And then there is other things where in certain cases I am pretty sure there was some corruption involved. Because I can remember one standard where two joint standards for rather inappropriate software for whatever ended up getting picked and the guy who ran through one of those standards two months later he left and worked for one of the vendors. And then about a year later he flipped over to work for the other vendor uhm (laughs) and the CIO at the time was sacked sometime after that." (Interview 17)</p>	<p>Sample Excerpts:</p> <p>"I see in <Organization Name>, you know, it's mostly the bigger vendors like ORACLEs and Microsoft who have major influence on the...on our technology decisions." (Interview 14)</p> <p>"Uhm, with Siebel in place we know that we have a standard tool in place, we know that everyone has to work with Siebel. Siebel comes with its own best practices and standards." (Interview 14)</p> <p>"(explaining outdated standards) larger companies, like Microsoft or ORACLE it's difficult for them to adopt because it will break, it won't have compatibility with their applications, they can't make it compatible with their applications. They have invested millions and millions of dollars into their own you know, product or toolset for which they haven't reaped the benefit yet." (Interview 14)</p> <p>"The vendor community that's large vendors are not open to this</p>	<p>Sample Excerpts:</p>

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Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>kind of unique, uhm, you know, making sure that their tools or platforms are compatible with these components. Or giving people that freedom to go and hey you know what can you think of it or can you come up with new ideas..” (Interview 14)</p> <p>“Here again, I don't know, whether it's a vendor or whatever right, I've seen that we are very very close in terms of adopting or opening up to new technologies, uhm, sometimes back they tried saying that OK you can use it in dev and test environment but before you go to production you need to have your CIO's approval and what not.” (Interview 14)</p> <p>“Interviewer: How about the vendor community out there? Do you think they may have an influence on the forming of corporate policies? Interviewee: Uhm, I would say they do. Because I have seen many times, we look at Gartner, Forrester in terms of research right. And I would say not on the processes but more on tools and technology standards.” (Interview 14)</p> <p>“But I don't know why we decided to make .NET and J2EE as our development standards. Because when you talk about .NET it's huge like, I can do it in C#, VB.NET, you know, it has JAVA.NET, and J++, you know, it's a huge huge thing right to look at. So, when they chose that those are the platforms I am pretty sure it is an influence of Microsoft, or you know, whatever that vendor</p>	

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>community is to influence to, you know, to choose them as, you know, the standard platform.” (Interview 14)</p> <p>“So, we have not really achieved, you know, in terms of the technology footprint but I am pretty sure that vendors do have that influence whether it's Gartners or it's Microsofts and ORACLEs...” (Interview 14)</p> <p>“Interviewer: OK. So, uhm, why do you think that they picked ClearCase (the sanctioned solution) in the first place? Interviewee: That I have, because, I'll be honest with you, I think I know the reason why is because it's IBM. And because it has a vendor and because they can get probably a support agreement for that. Whereas SVN is open source they couldn't get support agreement for that. Here we use Visual Source Safe (another sanctioned solution) which is by Microsoft. We do have a support agreement in place for it.” (Interview 16)</p> <p>“Interviewer: Do you think, uhm, vendors may have an influence on the forming of the policy? Interviewee: I think they do. I think vendors will have a huge influence on policies because they get to the <Senior Management Council> table whereas your software developers don't. So, I think that has a huge influence.” (Interview 16)</p> <p>“I think vendors do play an influence on these, basically like I said before, I think they are getting</p>	

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>themselves at the <Senior Management Council> table and I think they are talking up their solutions.” (Interview 16)</p>	
External: Normative	<p>Sample Excerpts:</p>	<p>Sample Excerpts:</p> <p>“So, is it being widely used? Wide in the user community. That is something that I would look for. If I am looking it for my, not just for my research or to play with it but to actually use in real world.” (Interview 14)</p> <p>“Uhm, with Siebel in place we know that we have a standard tool in place, we know that everyone has to work with Siebel. Siebel comes with its own best practices and standards.” (Interview 14)</p> <p>“I think if you tell them that hey you should not be using, you know, open source IDE, probably they understand but if it's a library, hey it's just a library right? It's ease of use, functionality is there right, I don't have to re-write, and it's a library, the whole world is using it, why not us? Right?” (Interview 14)</p> <p>“Uhm, well see, the problem with the corporate if you look at it they are more theoretical in their approach. Which is in terms of, uhm, what I should say, policies, processes, right, they are not looking at in terms of, like the world outside right, it's changing very rapidly, very agile.” (Interview 14)</p> <p>“If you look at it, I don't know, where on <Organization Name></p>	<p>Sample Excerpts:</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>Intranet to find about, you know, that I should not be using open source libraries. If I go on my Cluster Net, I don't see it anywhere there. If I go on the default Intranet page like <Intranet Name> I don't see anywhere there. I have to dig deeper into whatever those <IT Standards> standards are, or, you know, somewhere on the corporate site to find out, find that information, right. So, as a developer I am not looking at that every day-in day out. I am probably looking at some forums or, you know, I would have modified my home page to google.com” (Interview 14)</p> <p>“Probably they would have people who have all these, you know, different certifications like CRISC, CISAs and you know what not, right. They are more of from a, they come from a theoretical perspective, right, so they are trying to look at things more from a process perspective, from what the PMBOK says or what COBIT says what Val IT says, they are looking at theoretical material to define those processes. They are not looking at any kind of practical what you call implementations, because they haven't come from those areas, right.” (Interview 14)</p> <p>“One of the thing here is that if you box them into using specific tools and technologies, right, I have found that with a lot of ORACLE Forms developers, right. Uhm, it was a very good toolset, technology you know, (unclear) a lot of good developers, now the small group in <Cluster Name>, I</p>	

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>have been trying to encourage them to come out of that, right, but they're so focused into that toolset that they can't come out of it. They don't want to come out of it. For them that's the best tool in the world to their development.” (Interview 14)</p> <p>“I've reading that there has been some people in the industry who has been using it to automate tests. So, I am looking to see how we could best go about doing that.” (Interview 16)</p> <p>“Several years ago a bunch of different managers across the <Organization Name> met and decided what made the most sense from the BI (Business Intelligence) perspective for people who, because this was still a nascent industry, just sort of what the industry stack was at that point in time and it turned out that IBM was at the forefront, their DB2 and COGNOS stacks and Informatica. That's really where that sort of came from.” (Interview 16)</p> <p>“Interviewer: What about what other organizations are doing? Interviewee: Uhm, yeah, I think that that also has an impact as well. So, if you do a scan, so for example, we are getting people out from outside, if they are coming in with a certain level of experience and expertise for a certain product or features.” (Interview 16)</p>	
External: Mimetic	Sample Excerpts:	<p>Sample Excerpts:</p> <p>“I think if you tell them that hey</p>	<p>Sample Excerpts:</p> <p>“Interviewer: Do</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>you should not be using, you know, open source IDE, probably they understand but if it's a library, hey it's just a library right? It's ease of use, functionality is there right, I don't have to re-write, and it's a library, the whole world is using it, why not us? Right?" (Interview 14)</p> <p>"If you look at, I am just looking at some of the other countries in Europe, they use open source for many of their stuff. They've adopted Joomla, they've adopted... whatever open source tool you can think of they have adopted them all within public sector environment." (Interview 14)</p> <p>"Interviewer: When you said, other projects in the marketplace, do you think what other similar organizations are doing may have an influence? Interviewee: I'm not really, because, that's what I was trying to tell you right, like in Europe they have adopted open source big time, the public sector, if you look at <Jurisdiction Name> and <Jurisdiction Name> they are doing more and more COTS solutions, right, they have smaller vendors not big vendors, I am not talking about ORACLEs and others. Smaller vendors are actually delivering their niche solutions for the requirements. Whereas I see in <Organization Name>, you know, it's mostly the bigger vendors like ORACLEs and Microsoft who have major influence on the...on our technology decisions." (Interview 14)</p>	<p>you think uhm, they may be affected by uhm, what other parts of the organization are doing? Uhm, do they look at other similar units or other people whom they know and adopt something that those others have already adopted successfully? Interviewee: I would say...I would say that uhm, it's all a function of the individual manager and how well they are connected and how much time they have." (Interview 20)</p> <p>"When I was writing standards we always did a scan and used you know, build up a contact list of what's happening in Ireland and the UK and California, <Jurisdiction Name>, <Jurisdiction Name> whatever there are you know, you know, scan the media, the Internet just even just to see where is there a bit of a buzz about mobile devices or you know open data or whatever the thing that is happening."</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 3)

Influence	Organizational Roles		
	Tech User (1)	Immediate Manager (2)	Senior Manager (1)
		<p>“Interviewer: What about what other organizations are doing? Interviewee: Uhm, yeah, I think that that also has an impact as well. So, if you do a scan, so for example, we are getting people out from outside, if they are coming in with a certain level of experience and expertise for a certain product or features.” (Interview 16)</p>	<p>(Interview 20) “Uhm, but I would say anybody writing a...policy or standard, if in the right mind, would get the great policies and the standards and summon understanding of how they are working in other areas if they could because it's a lot easier to share than not. Social media policy was probably a good, I think it's a guideline actually, good one where recently there have been quite a lot of looking at what was done in other jurisdictions and how you can articulate you know just that reasonably in a policy about a certain technology.” (Interview 20)</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
Internal: Compliance	<p>Sample Excerpts: “And regardless of what's underneath uhm, and I think they, another cluster's already produced something and they had</p>	<p>Sample Excerpts: “If there are no strict constraints around me, if I can meet the project timelines and stuff, I will do, I will try to get my project done. So, it's</p>	<p>Sample Excerpts: “I think that policy was more influenced by risk-averse lawyers, OK, not</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
	<p>it tightly coupled with the infrastructure itself, and we were forced to use that and I am like...you can't use this because they have portal and we don't have portal and I'm like how am I going to put this in my physical diagram now right, so that's where like you kind of think that the architects are there and they have some thing that...it's like...when somebody is like...so hands on and so working...like at the code level and...it just doesn't like...you just don't see eye-to-eye right. So...and it's not just me like a lot of the folks over here that's the...there was somewhere there was like a gap between the real architects and the people who were on the floor..." (Interview 25)</p> <p>"So, that's, I've seen people bending over some of the processes uhm, with the timelines and yeah for sure but then I don't, I am not sure from the tools perspective, I don't think uhm, that happens because you don't think there is any other tool that people may.....uhm...unless they use some open (source)...no, we are very strict on using anything is...so, internally we say that if any open source tool is like a product needs to be used, or a package needs to be used, uhm, I know there is an open source policy that you have to go through..." (Interview 25)</p> <p>"In WebSphere I found it was very very easy but then what it does also at the same time, it will bind you with WebSphere like</p>	<p>not that if there are strict constraints which I sign up to abide that, I might. But if not, if there is some flexibility I see there is in scope, if I can, If I see that the project can be done in time by the slight deviation, I might push as a project manager, but that's my prerogative. That's something different. It varies from individual to individual, to what level of deviation they will take it." (Interview 22)</p> <p>"Uhm, depending upon the constraints imposed on them, they might say, it's not fair on you folks to impose to push ten different constraints on me and still expect me to finish on this date. No, if I follow, if I adhere to these constraints manager, you change my date...Oh then maybe, we will kind of change..." (Interview 22)</p> <p>"So, trying to work out where the boundaries are, find those boundaries more effectively. And, and then, you know, put that as part of the value stream approval process as part of our project development work." (Interview 30)</p> <p>"Uhm, keeping up-to-date with obviously with VORs (vendor-of-record arrangements) that are available." (Interview 30)</p> <p>"Interviewer: What happens on one of those occasions, (when) a team member proposes something that is non-standard, that is non-sanctioned by the policies or the procedures? What would you do? Interviewee: Uhm...I think...that's an interesting one, I think it would</p>	<p>really truly understanding what the impact or the benefits would be rather of open source, OK. So, it was almost kind of like a necessary evil to go through. That is the was that I kind of view it right. It was more about don't use open source. It's kind of what the message to the IT community was because there is risks associated with it right, you could be liable right." (Interview 24)</p> <p>"So, if you've got well-established processes that expects certain tools to be used because the tools are often hand-off points right, between parties, then they will be forced into using the tools that are predominantly prescribed by the Cluster right, or the organization." (Interview 24)</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
	<p>with everything. Because behind the scenes it starts putting the IBM code. The plug-in that it comes with, it will do that.” (Interview 26)</p> <p>“Interviewer: One of the things you said was, you said, for those toolsets, uhm, there is going to be a move to IBM Rational. Interviewee: Yep. Interviewer: Who initiated that move? Where did that come from? Interviewee: Uhm, that was, it was...I don't know how they split it up, but it's sort of, like a...sub-project of the BSS transformation... Interviewer: OK. Interviewee: ...to kind of consolidate those tools, you know, make sure everyone is using the same tools. Uhm, so... Interviewer: So, were the developers consulted? Or did it come top-down? Interviewee: Uhm, it was more of a top-down. A lot of, at least from our perspective, that I would say a lot of the BSS transformation steps have been top-down.” (Interview 28)</p> <p>“I mean, for instance, if...you know you have the suite of, you know, half a dozen products and one manager really likes the one product in that suite and makes a, you know, strong case for that, then, you know, the other products, even though they may not fulfil what, you know, the other groups want then they have to come fall in line...” (Interview 28)</p>	<p>turn round and.....and look at the business process it was trying to solve. Uhm, I mean, I find the policies and procedures that we have to be...broad enough to pretty much account for, as long as, you stick with a certain technological stack, uhm...to be.....flexible enough to meet my business, uhm, technology requirements.” (interview 30)</p> <p>“In terms of making sure there is architectural compliance and there is project compliance with my group, uhm, I would expect that as part of a solution delivery even for smallest projects there would have been some, uhm, linkage into that. So, in terms of, uhm...you know the gate keepers kind of going through I would expect, I would hope that is going to keep us work, I certainly challenge all of my staff to, if not be aware of the penalties, be aware of what uhm, toolsets are, uhm...are standard.” (Interview 30)</p>	

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
Internal: Identification	<p>Sample Excerpts:</p> <p>“When it comes to that I may look at somebody already using it like if another developer using it, oh it's easy for me to learn because I can just sit with him for a day and then he is going to tell me how to use this or if it's something I have used in previous projects...” (Interview 25)</p> <p>“We did go and check whether there is other products out there like there is a findbugs all that other things that, that was just like us going into like O'Reilly books and then just going into Internet and seeing whether all other things out there and then what does this do and what this doesn't do kind of a thing.” (Interview 25)</p> <p>“Interviewer: Do they look at other, knowledgeable individuals or groups within their surrounding areas? Interviewee: Yeah, yes, yes. Interviewer: They do? Interviewee: Yes, they do. So (unclear) developer, most of the time the new developer will not come to us at least but he will go to other developer.” (Interview 26)</p> <p>“Interviewer: How would you get your questions answered? Where do you go? Interviewee: Yeah, so, uh...forums, user forums, right. Interviewer: User forums?”</p>	<p>Sample Excerpts:</p> <p>“Interviewee: And given that the maturity of Apache that our gang and the folks who are actually...uhm... Interviewer: The Apache Foundation? Interviewee: Foundation. So, they...because of the trust they have we are allowing them to use the Apache products.” (Interview 22)</p> <p>“..So, we understand it is a developer who is trying to use those libraries they should be able to figure it out themselves, mostly. Around the functions which they are using it. Uh, but whenever we update the product to the next version, we get those updated, because, they are taking care of the uh, the latest updates of those products. For example, if there is a library for version for example, JAVA 1.2, when JAVA 1.4 comes they are upgrading it to that version and releasing it. Apache Foundation. So, because of the trust we are saying we use that. And...given the developer people available in the market with that skillset it is not a huge risk to kind of use these products. But again, there might be other one-offs at some places if you download and use it and if that shop is closed or if that guy, these folks are gone, then we will be at bigger risks. So, in those situations, we better look, have someone who can provide support.” (Interview 22)</p> <p>“Interviewer: So, whenever they</p>	<p>Sample Excerpts:</p> <p>“Developers nowadays are equipped with a whole bunch of tools they can literally get for free right. So, if you are looking at JAVA development you can get you can get an Eclipse-based tool uhm, literally for free of the Internet right, through the various communities of practice right that are out there. Uhm, in addition to that people develop supporting tools around those products.” (Interview 24)</p> <p>“(referring to non-sanctioned solutions) They are very easy to use it because they are very, they are very popular within developer community. And there is generally a lot of support for them...Ok, so, if you are having problems you know integrating your IDE (Integrated development Environment) into you know, into one</p>

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Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
<p>Interviewee: Yeah, yeah, user forums are, if you (unclear) and then if they don't find answer and if you are really stuck then they just throw away then just move onto another tool, (laughs) you know.” (Interview 26)</p> <p>“Interviewer: Do you think having access to a knowledgeable individual may affect others' decisions too?</p> <p>Interviewee: Uhm...uh...it is certainly to an extent. Uhm, so again, I mean my background is software development so, I have certainly seen a lot of the stuff that I developed being taken on by other people and, you know, copying my stuff and that sort of stuff. And, you know, I've seen their maturity kind of increase a bit, just because they've been working with, you know, a different, you know, they see it and so they experience it and work with it and uh, so...we are sort of that...that...you know, on the job learning going on.” (Interview 28)</p> <p>“Interviewer: (referring to adoption of quoted non-sanctioned solutions) So, how do you think this, or do you know how this got started, who initiated it?</p> <p>Interviewee: Uhm.....my understanding was it was our head, <Name of Director> at the time was our head and he came in from the outside...and decided a lot of the processes needed to change and started the transformation. And uh...with that came agile and Kanban and RTC,</p>	<p>need, let's say, support, do they go and talk to each other?</p> <p>Interviewee: Oh, yeah. If a particular...in the morning, 9 o'clock (unclear) happens, if if a particular thing is holding an individual they will raise it, I am stuck at this point because of I don't know, I haven't used this particular uh PDF generator, this particular function I am stuck, that's why I got, I am getting delayed I spent (unclear) times today. OK, who else? You...spend an hour with <Developer Name>(?)” (Interview 22)</p> <p>“Interviewer: (Referring to adoption of quoted non-sanctioned solutions) But, who initiated it, originally?</p> <p>Interviewee: Uh, that came, here is an interesting point, uhm.....that, in the Cluster we hired a new head...and that new head came in and brought with him...this...new approach. That's what he had done in his previous job. He came in and changed our organization tremendously...Uhm...we are still paying the price for it and he has left. He has moved on...and doing the same thing somewhere else now...” (Interview 27)</p> <p>“Interviewer: Do they get affected by their peers? What they are doing, what they are using...?</p> <p>Interviewee: Uhm...if I am doing my job right yes. If I am encouraging innovation, if I am encouraging people to talk, if I am encouraging people to communicate across the group, uhm...yes” (Interview 30)</p>	<p>of these open source repositories, you can get help online right. I mean there's millions of users out there that you know, through some kind of chat forums, wikis, whatever right, I mean there is definitely a lot of support.” (Interview 24)</p> <p>“That's probably why they use a lot of the...popular open source tools, because they can get the support from their peers and their colleagues in the broader community of practice.” (Interview 24)</p> <p>“And what better way to do it than with open source where you have a very large community base that can help you out if you are in a pinch.” (Interview 24)</p> <p>“So, again, depending on what you are doing, yes, and again, it's ease of use, you know, you don't have to buy the application server it's free right. Lot's of support for it, it's the same thing</p>	

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Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
	<p>a lot of the IBM tools that...uh, RTC is really the only one I've had exposure to..." (Interview 29)</p> <p>"And we do have a lot of <specific technology> experts in our shop that have been there long before the CoE (Centre of Excellence) existed. So, a lot of people that...that I get phone calls every day to talk about <specific technology>...with people. Uhm, what can be done, what can't be done. Uhm.....we definitely...any Google Maps development, we do get a lot of calls about people that are doing development in Google Maps." (Interview 29)</p>		<p>with the development tools." (Interview 24)</p>
Internal: Internalization	<p>Sample Excerpts:</p> <p>"Interviewer: Do you think technical users would select a particular technology solution purely based on ideological grounds? For example, would somebody use an open source product because it's open source? Interviewee: ...No, I don't think so. Somebody sees values in it, somebody sees some value in it." (Interview 26)</p> <p>"Interviewer: Do you think technical users would pick an open source solution purely based on ideological grounds, just because it's open source? Interviewee: Uh.....uh, I don't think so. Just because it's open source, no. If there is a product out there which is licensed, I think they do prefer because you have like you can go with maintenance and support and</p>	<p>Sample Excerpts:</p> <p>"Interviewer: OK. Uhm, do you think technical users would pick a particular solution purely based on ideological grounds? For example, would somebody pick a solution just because it is open source? Interviewee: Uhm.....I don't know if they would do that uhm, you know, I don't, I mean, I would like to think that people are more pragmatic than that." (Interview 30)</p>	<p>Sample Excerpts:</p>

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Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
	<p>everything else.” (Interview 25)</p> <p>“Interviewer: For example, do you think a developer would pick an open source solution just because it is open source. Interviewee: We have one developer that would (laughs). ... Interviewee: Yeah, uhm...I don't think that we have that environment here. Uhm...when I say that one developer, he is not making decisions so, it doesn't generally happen. But...if he were making decisions he would probably have gone that one. Yeah, I would say that wouldn't happen here.” (Interview 29)</p> <p>“Interviewer: Do you think technical users pick a particular solution purely based on ideological grounds? For example, would somebody pick a solution just because it's open source? Interviewee: Uhm...some people might, yeah...sure...uhm.....I don't know of any specific examples but, I know there is people that certainly favour that and uhm, I don't know necessarily if it's from an ideological perspective or more of a cost perspective.” (Interview 28)</p>		
External: Coercive	<p>Sample Excerpts:</p> <p>“(referring to the effect of outside consultants) So, they have like...so, and the reason being, because, there are so many consultants, the problem here,</p>	<p>Sample Excerpts:</p> <p>“Mostly I think those folks who are putting together standards definitely they go for sure with their experience. And also they I believe with some of these</p>	<p>Sample Excerpts:</p> <p>“(referring to external influences on selection of sanctioned tools) The big players like</p>

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Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
<p>again, is I think, that the consultants we got that we get is from.....so many different organizations, right. So, and everybody comes from a different background.” (Interview 26)</p> <p>“Interviewer: How about uhm, the vendor influence? Do you think the vendors influence... Interviewee: Of course, vendors always have a big influence right. Interviewer: And how so? Interviewee: Because I've seen in every, it's not in even, not so much in...I am not so much sure of this but I have seen in my previous one, vendor always have big influence on the toolsets and everything else that we use.” (Interview 26)</p> <p>“Interviewer: Why did you move from ClearCase to RTC? Interviewee: ...I think, what IBM is coming out with this Jazz thing, they want to, they are promoting the toolset which will want you to do end-to-end integration from right from requirements to the end of uh...what do you call, the testing and... Interviewer: Build? Interviewee: ...yeah, testing and build right.” (Interview 26)</p> <p>“Interviewer: How about the effect of the vendor community out there? Interviewee: Yeah, well, maybe that's sort of one area where I would be a bit, you know, suspicious or uh...you know I would say maybe that's some...that would be where</p>	<p>standards they called in, uhm...colleague folks from outside. Uh, one or two consultants, experienced consultants who have work experience in other industries, and several industries. So that, I think they used that help in following the standards to an extent.” (Interview 22)</p> <p>“Like, it's interesting because few years ago there's multiple studies, and a lot of the enterprise architecture and all of the project management standards and so forth, you know, they are driven by these big corporate reports that are kind of odd(?), uhm, like project management in particular. If you go back to the original study that was released back (unclear) they dealt with projects that were 100 million dollar projects. And they had a number of recommendations for 100 million dollar projects. Somebody has come along and said, looked at those recommendations and said, let's apply it to everything. They haven't scaled it, right. And that scalability is often a challenge. So, maybe there is a corporate standard that...again.....needs to be...scaled to the situation.” (Interview 27)</p> <p>“...well, the leadership stuff in the morning, down in <Location Name> Room and then, uhm.....you could get in through the, I haven't seen any of those for a while. Because they started becoming, in my opinion, more vendor-driven.” (Interview 27)</p> <p>“And there is a strong tendency to, uhm, bring in external IT</p>	<p>your IBMs, your ORACLES, your Software AGs, they've all kept up in terms of their application servers kind of being the leaders of the pack, OK. And if you look at some of the, like the you know the Gartner Analysis, Forester Analysis they're always in the leader quadrant, OK. Their products are always there in the leader quadrant.” (Interview 24)</p>	

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Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
	<p>maybe some of the bias comes in.” (Interview 28)</p> <p>“I mean, for instance, if...you know you have the suite of, you know, half a dozen products and one manager really likes the one product in that suite and makes a, you know, strong case for that, then, you know, the other products, even though they may not fulfil what, you know, the other groups want then they have to come fall in line...” (Interview 28)</p>	<p>consultants to develop and internal IT resources to function and do that kind of work.” (Interview 30)</p> <p>“I mean, we have a lot of, I mean, we spend, we buy a lot of technology, you know, so they want to stick with that as well as, yeah, I think this, I think it's, I don't feel there is any undue pressure I don't feel that there is any, uhm.....there is anything nefarious going on if that's what you are asking.” (Interview 30)</p>	
External: Normative	<p>Sample Excerpts:</p> <p>“Uh, same thing like past experience and the ease of development in their mind and I think primarily...if they think the standards are a little outdated then...then, uhm, I think the onus should be on the standard side also that you know they should keep it as current as possible with industry.” (Interview 26)</p> <p>“If you study the outside industry you find out of 10, 8 people are using, before they come to <Organization Name>, they were already using that tool, right, before they come to <Organization Name>. So, when they come to <Organization Name>, naturally they want to use that tool, because they have more comfort level, their use in past and if you have tight project deadlines, then you know, you want to go with the fastest way you can.” (Interview 26)</p>	<p>Sample Excerpts:</p> <p>“Mostly I think those folks who are putting together standards definitely they go for sure with their experience. And also they I believe with some of these standards they called in, uhm...colleague folks from outside. Uh, one or two consultants, experienced consultants who have work experience in other industries, and several industries. So that, I think they used that help in following the standards to an extent.” (Interview 22)</p> <p>“Interviewer: (Referring to preference of industry standards over company standards by technical users) I am trying to figure out why they are preferring the outside as opposed to inside? Interviewee: ...Uhm.....I mean why I do it is, it's because there is a wealth of information out there that...uhm.....would you rather go to the corner store...a corner store, a mom-and-pop corner store</p>	<p>Sample Excerpts:</p> <p>“I think the community of practice outside the <Organization Name> is much much bigger, it's much much more vast if you would, and the amount of expertise collectively is much much greater than what the <Organization Name> can ever provide. So, when you're talking about millions of users that are contributing right, to you know, improving the use of JAVA or you know, telling you know, how to do certain things it's techniques, tips, tricks, whatever it is...<Organization</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
		for...uhm.....a plumbing fixture, or would you rather go to home depot? You get a lot more variety at home depot.” (Interview 27)	<p><i>Name</i>> cannot compete with that, OK. And these would be you know, kind of generic problems around you know, how do I code something, I am getting this type of error when I am trying to do this right, and those are very specific you know, to perhaps to JAVA language itself, and you know, how to do certain things you know, while you are coding.” (Interview 24)</p> <p>“(Referring to use of non-sanctioned solutions) They are very easy to use it because they are very, they are very popular within developer community. And there is generally a lot of support for them...Ok, so, if you are having problems you know integrating your IDE into you know, into one of these open source repositories, you can get help online right. I mean there's millions of users out there that you know, through some kind of chat</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
			forums, wikis, whatever right, I mean there is definitely a lot of support.” (Interview 24)
External: Mimetic	<p>Sample Excerpts:</p> <p>“Interviewer: Do you think that they look at or they might look at other, what other similar organizations are doing and use them as benchmarks? Interviewee: Ah, yeah, I think so. Yeah.” (Interview 28)</p> <p>“Interviewee: I mean there's probably a lot of factors and that's not to say that the existing methodology wasn't working but I think one of it is just in a sense modernization. Uhm...that other organizations are moving towards a more lean approach to development. Interviewer: So, have they looked at those other organizations? Interviewee: Yeah, I think so. Uhm, they've been, they certainly have. They've been...you know, e-mailing, here are some case studies from other companies and stuff” (Interview 28)</p> <p>“(Referring to use of particular benchmarks or case studies) Uhm, to me those aren't as convincing because they are not necessarily you know <Particular Sector> examples and that sort of stuff.” (Interview 28)</p>	<p>Sample Excerpts:</p> <p>“Interviewer: (Referring to external effects on selection of sanctioned solutions by decision makers) Do you think they may be affected by what other similar organizations are doing? For example... Interviewee: Yeah, definitely. Interviewer: ...somebody is writing a policy... Interviewee: Definitely. Interviewer: ...they look at other levels of governments... Interviewee: Definitely. Interviewer: OK. Interviewee: Definitely.” (Interview 27)</p> <p>“If Australia is doing something really good we should adopt it. And so, I've got, from a personal point of view, I've got certain alerts set up in Google, right, that one of the alerts I have is anything with the term "<Particular Technology> Strategy"...so if Australia comes up with a new <Particular Technology> strategy, or the military comes up with a new <Particular Technology> strategy, I got a whole collection of <Particular Technology> strategies for implementing <Particular Technology> from around the world that I want to read to see what other people are doing, just to say hey maybe that's</p>	<p>Sample Excerpts:</p>

Table 8 - Checklist Matrix: Internal and External Influences (Cluster 4)

Influence	Organizational Roles		
	Tech User (4)	Immediate Manager (3)	Senior Manager (2)
		<p>something we should adopt here or consider adopting. Because we don't have all the answers. We should leverage as much as possible." (interview 27)</p> <p>“(Referring to effect of external examples) I mean if you, I mean, if you...anytime you are procuring a large, or you want to enter a relationship, you know, you want, you know reference of other customers, you want to have people cite uhm, real life examples” (Interview 30)</p>	

Appendix L: Time-Ordered Matrix

Table 9 - Time-Ordered Matrix: IT Governance, Organization and Accountability			
Time Periods	... - 1998	1998 - 2006	2006 - present
Stage	Independent Era	Cluster Era	Central/Corporate Era
Key events and occurrences	-February/March 1998, Information Technology Strategy kick starts standardization and integration efforts	-Creation of IT Clusters -Consolidation of business area specific IT resources under IT Clusters commences -August 2006, Information Technology Directive mandates infrastructure and service consolidation	-Creation of a centralized infrastructure organization -Consolidation of hundreds of IT positions under the central infrastructure group -June 2009, Creation of a central pool of a mobile IT workforce -2010, shared data centre opens
IT Organization	Business Area Specific IT Groups	-Numerous -Business focused -Domain specific knowledge -Almost fully-independent -Full flexibility on adoption decisions -Many applications with little integration	-Fewer, most moved to IT Clusters -Business focused -Domain specific knowledge -Semi-independent -Loses flexibility on adoption decisions -Application consolidation at Cluster level
	IT Clusters	-None.	-Even fewer, only few survived -Business focused, unique business -Highly domain specific knowledge -Dependent on Cluster and Corporate -Little flexibility on adoption decisions -Corporate applications
		-Powerful IT Clusters (7 in total) -More resources including HR -Creation of Cluster-level governance bodies -Manages own infrastructure -Semi-independent -Some flexibility on adoption decisions -Clusters bundle around tech platforms -Establishment of Centres of Excellence	-More fragmented (9), less powerful -Loses some resources to centre -Cluster-level bodies continue -Uses centrally provided infrastructure -Semi-independent with less say -Less flexibility on adoption decisions -Approved enterprise platforms

Table 9 - Time-Ordered Matrix: IT Governance, Organization and Accountability

Time Periods		... - 1998	1998 - 2006	2006 - present
Stage		Independent Era	Cluster Era	Central/Corporate Era
	Corporate Centre	<ul style="list-style-type: none"> -Policy-focused with little or no enforcement capability -Few (if any) enterprise-wide standards -Toothless and weak 	<ul style="list-style-type: none"> -Creation of Corporate-governance bodies enhance enforcement capability -Establishment of Centres of Excellence -Enterprise Standards -Gains power 	<ul style="list-style-type: none"> -Dictates future direction and tries to enforce it through corporate-governance bodies -Enterprise Standards (stale) -All powerful, controls infrastructure
	Centralization	<ul style="list-style-type: none"> -Decentralized -Accountability is spread 	<ul style="list-style-type: none"> -Balanced (clustered) -More Cluster-level accountability 	<ul style="list-style-type: none"> -Centralized -More central accountability
	Possibility of Hidden and Surreptitious Adoption of IT Solutions	<ul style="list-style-type: none"> -Low -Few organization-wide rules -No need to hide, free to choose 	<ul style="list-style-type: none"> -Moderate -More cluster-wide rules to obey -More rules to break but still manageable 	<ul style="list-style-type: none"> -High -Organization-wide rules -Tight, one-size-fits-all type rules start affecting organizational unit level performance negatively

Appendix M: Conceptually-Clustered Matrices

Table 10 - Conceptually-Clustered Matrix: Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)		
Category & Process	Antecedents	Moderators and Mediators
Immediate Manager (Interviewee 01)		
<p><u>Hidden Adoption</u></p> <p>“Well, I guess, somehow, again it's particularly in the large projects, the interpretations are made. Or standards are simply not followed, people interpret the standards, part of the standards not totally the standards. Which is...like saying... you don't follow the standards (giggles).”</p> <p>“Well, I guess the rule of thumb is try not to make waves. Try not to..... (giggles)....make it very obvious.” <u>(silent adoption)</u></p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“...otherwise they will always resist the use of it if it is not convenient. Therefore even when it is being imposed on them they don't use it.”</p> <p><u>Adoption process</u></p> <p>“Well, it depends on the level of the project. For small projects I decide. For the larger projects where I am not, I am just part of it but not the project manager than the decision is made at a higher level.”</p> <p>“And when the, I guess I would say with the staff finds it useful that it becomes really adopted.”</p>	<p><u>Technical Factors</u></p> <p>“But typically they (technical users) are looking for things like ease of use or I would say whatever the environment provides.”</p> <p>“Yes, that's a big consideration from any staff member, yes. The technical superiority....Stability, performance.” <u>(positive – non-sanctioned)</u></p> <p>“I think it's this, it's between the ease of use and the technical superiority.” <u>(positive – non-sanctioned)</u></p> <p>“...whoever creates all the environments that we are in from our desktops to our servers. (They are) dictated in a very arbitrary way. And very stiff and unproductive in my opinion. So therefore it is kind of a natural reaction of people trying to use something different, trying to free up from those restrictions.” <u>(negative – sanctioned)</u></p> <p>“Oh, certainly would make me less productive, definitely. ” <u>(negative – sanctioned)</u></p> <p>“...how the changes, patches to the systems are ordered or imposed of the security around it, which is imposed in a generic way without considering the specific needs of the groups. Particularly the development</p>	<p><u>Technical Knowledge</u></p> <p>“Interviewer: And what do you think may cause this discrepancy between corporate policies which mandate something and what your team comes up with as a preferred solution? Interviewee: Well, I think it is something along the lines of what we said before. I think it's this, it's between the ease of use and the technical superiority. So it is difficult to standardize on something that covers all the possibilities. It depends a lot on the project. <u>And the skillset as well of the people, to adopt certain solutions.</u> Therefore the imposition of a standard is could be possibly difficult. As much less productive than finding the solution that we tailor to the specific project. ” <u>(technical user)</u></p> <p>“I think it is lack of knowledge or understanding of the technologies.” <u>(management)</u></p> <p>“I guess there is also the belief at least in some parts of the upper management that they know better. They know better therefore they are supposed to influence or provide directly to the staff what should be used. Because from their position, they should know. I</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
<p>“They mandate what should be followed for a particular project.” <u>(top down adoption)</u></p> <p>“Well, they'll make the decision for us. Make the decision for us on which route to go. I mean, it's pathetic. They may even procure the product (laughs). Not just leave it to the team to do it. They offer no choice.” <u>(top down adoption)</u></p> <p>“Well, one reason would be, that comes to mind, is trying to free from the decisions of the IT group, the <unit name> (the central IT service provider) or whoever defines, whoever creates all the environments that we are in from our desktops to our servers. (They are) dictated in a very arbitrary way.”<u>(top down adoption)</u></p> <p>“Well, how equipment is configured, how the changes, patches to the systems are ordered or imposed of the security around it, which is imposed in a generic way without considering the specific needs of the groups. Particularly the development groups.” <u>(top down adoption)</u></p>	<p>groups.” <u>(negative – sanctioned)</u></p> <p>“Because, as I said before, there are implications in terms of the productivity, the performance, or the stability that you say that I know this is the way to go.” <u>(negative - sanctioned)</u></p> <p><u>Other Factors</u></p> <p>“Interviewer: What are the penalties for not complying with an organizational policy or not following an IT standard? Interviewee: (laughs) Interviewer: Are there any? Interviewee: I guess in theory, there are. But in practice I am not so sure how serious that is. I guess lately they have tried to impose more standards.” <u>(governance and accountability)</u></p> <p>“...all the environments that we are in from our desktops to our servers. (They are) dictated in a very arbitrary way. And very <u>stiff and unproductive</u> in my opinion. So therefore it is kind of a natural reaction of people trying to use something different, trying to free up from those restrictions.” <u>(performance related concerns)</u></p>	<p>believe that is a false perception. But I have sensed that that happens from the management. So, (imitating the upper management) we at our level we should know what tools to use or what direction to give to the staff and what to procure to use in their projects. Which, again, I believe is a wrong concept but I sense that it happens.” <u>(management)</u></p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Well, it depends on the level of the project. For small projects I decide. For the larger projects where I am not, I am just part of it but not the project manager than the decision is made at a higher level.”</p> <p>“Well, I guess, somehow, again it's particularly in the large projects, the interpretations are made. Or standards are simply not followed, people interpret the standards, part of the standards not totally the standards. Which is...like saying... you don't follow the standards (giggles).”</p> <p>“So it is difficult to standardize on something that covers all the possibilities. It depends a lot on the project.”</p> <p>“Interviewer: Are there any occasions when this gets initiated by the users? Like a team member coming to you and saying we should really be using this? Interviewee: Yes, yes there are occasions. Again these are more</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
		<p>in the smaller projects.”</p> <p><u>Awareness</u></p> <p>“Well, I think that the drivers of this is that the people making the decisions are not fully aware of the standards or they don't even care about the standards.” <u>(awareness - sanctioned)</u></p> <p>“But typically they are looking for things like ease of use or I would say whatever the environment provides.” <u>(awareness - sanctioned)</u></p> <p>“Because that is the big driver, what is available.” <u>(awareness - sanctioned)</u></p> <p>“Except that those things are not sometimes so clearly advertised.”<u>(awareness - non-sanctioned)</u></p>
Immediate Manager (Interviewee 10)		
<p><u>Hidden Adoption</u></p> <p>“...the standards are sometimes...I guess ignored...it's...the right term is ignored.”</p> <p>“If the impact is minimal but the actual gain is going to be something that is a win for the organization or the client, then it's fine. I'd say it's fine. I risk manage the things and determine that it's OK we could go ahead.” <u>(silent adoption)</u></p> <p>“If obviously it's the opposite, there is not really an (unclear) to it and or</p>	<p><u>Technical Factors</u></p> <p>“A lot of the standards are not current and a lot of the developers we have today would like to maintain, sort of a currency of the technical world. So they find that it's, the tools or the standards are antiquated. And again, to keep them happy and make sure that we can produce and have work flow quickly and efficiently, the standards are sometimes...I guess ignored...it's...the right term is ignored.” <u>(negative - sanctioned)</u></p>	<p><u>Technical Knowledge</u></p> <p>“Interviewer: (Referring to technical user adoption preferences) And what do you think makes them prefer something on top of an alternative? Interviewee: <u>In some cases it's just level of knowledge.</u> In some cases it is again just preference or word-of-mouth.” <u>(technical user)</u></p> <p>“Well, I would hope it would be the most up-to-date information but in some cases it's probably</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
<p>there is a huge risk to it then I try to deter, I go to the senior management and see if I can get an approval.” <u>(shared adoption)</u></p> <p>“Interviewer: Would you always go to the senior management? Interviewee: Not if the risk is...only if the risk is great.” <u>(silent adoption)</u></p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“Interviewer: OK. So, when an IT solution is listed as an <organization name> standard, for example in the document, <standard name> standards document, <standard number>, does that mean everybody will be using it all the time? Interviewee: No. Interviewer: No? Interviewee: No.”</p> <p><u>Adoption process</u></p> <p>“My sort of shop is a little more unique than the rest of our shop right now because we are on a mainframe application still. So, it's much more, sort of, corporate managed. We have to make sure that we are...everything is done exactly to corporate requirements.” <u>(top down adoption)</u></p>	<p>“Because many of times we have to go out to the, uhm, do RFSs and go out to the community and get consultants, they come in and who are very knowledgeable in both applications, and JBOSS seems to be the preference, uhm, because of its ease, uhm, it's the way that you can actually work with the actual product and the deliverable is easier I understand. Uhm, much more if I could use this word: Agile.” <u>(positive – non-sanctioned)</u></p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“I have a situation where it was just sort of like the tool-of-the-day they found out other people have access to and so they wanted to have access to it as well.”</p> <p><u>Other Factors</u></p> <p>“Uhm, more the developers have it because again it's a mainframe application and we need to make sure we are <u>inline with the other applications</u> that are on the mainframe so, they are much more in tuned as to what is required.” <u>(fit with existing systems)</u></p> <p>“My experience is it's always been financial ... implications. Uhm, for whatever reason, whether <organization name> has purchased the rights to certain tools or is unable to buy more current applications or tools, uhm, it's always been the budgetary requirement or lack of</p>	<p>based on a lot of input that may be antiquated or, uhm, resources or researches that maybe not up-to-date and their maintaining old information and just re-using it because their focus hasn't been IT.” <u>(management)</u></p> <p>“And typically, from the bottom-up, the bottom is more detailed. They would have a better peripheral, uhm, experience or knowledge of whatever is being adopted then something than, you know, top-down.” <u>(technical user)</u></p> <p>“Top-down generally is more high-level, they don't look at the actual detailed issues and concerns that affect what we do. What a type of work that we do. And have a vested interest in ensuring it's done accurately. Because even the more, the most minor things that may be overlooked cause the biggest problems for us in the end.” <u>(management)</u></p> <p>“Because again, it's not a, it's a process or a product that not only the folks that are very well versed in the products here but consultants are also advocating and the masses are actually advocating one product over another there's got to be some justification in it.” <u>(technical user)</u></p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“First try to determine what's the impact. If the impact is minimal</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>budgetary availability. It's probably the reason why there is a discrepancy." (<u>budget related</u>)</p> <p>"Interviewer: Do you know if there are any penalties for not complying with the IT policies and standards? In the <organization name>?" Interviewee: Well, there are penalties to...at the director level. I don't think there's any penalties to us" (<u>governance and controllership</u>)</p>	<p>but the actual gain is going to be something that is a win for the organization or the client, then it's fine. I'd say it's fine. I risk manage the things and determine that it's OK we could go ahead. If obviously it's the opposite, there is not really an (unclear) to it and or there is a huge risk to it then I try to deter, I go to the senior management and see if I can get an approval. If there is any slight chance of it being, uh, me misinterpreting it but there is a gain to it and if we could get an approval."</p> <p>"Interviewer: Would you always go to the senior management? Interviewee: Not if the risk is...only if the risk is great."</p> <p>"It depends on the circumstances again. If the risks are high then they will not use it. But if the risks are low then they probably would use the non-standard tool."</p> <p><u>Awareness</u></p> <p>"In some cases it's just level of knowledge." (<u>awareness - non-sanctioned</u>)</p> <p>"Interviewer: OK. And you mentioned penalties at the director level. What are those? Interviewee: Oh, I am sure it's part of their performance. Ensuring that their performance level ensures that they meet the government standards or the standards they are expected to be compliant with." (<u>low awareness - sanctions</u>)</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
		<p>“I don't think there's any penalties to us. Other than our managers telling us that we are not supposed to be using it. They would want our compliance and that we need to make changes I am assuming, well I guess that would be the penalty itself.” (<u>low awareness - sanctions</u>)</p> <p><u>Help and Support Availability</u></p> <p>“...because again, it's not a, it's a process or a product that not only the folks that are very well versed in the products here but consultants are also advocating and the masses are actually advocating one product over another there's got to be some justification in it.”</p>
Technical User (Interviewee 02)		
<p><u>Hidden Adoption</u></p> <p>“So, we decided, I convinced the project manager and he was convinced, he said yes, fine...It was easy. And they wanted the application look like MS-Access...” (<u>shared adoption</u>)</p> <p>“Interviewer: Did he ask for any approvals? Interviewee: ...No...We went to this meeting with technical architects team. ARB (architecture review board) or ACT (architecture core team). You know this presentation. We went to all these teams. We went to one centre where there was a...<organizational unit name> was</p>	<p><u>Technical Factors</u></p> <p>“...they were having a lot of difficulties in order to maintain those databases.” (<u>negative - sanctioned</u>)</p> <p>“You see when management says we want the solution...very quickly, so immediately, to my experience which tool can give you the result right away. So, although the tool was older but I knew this tool is much much faster can develop the application like forms.” (<u>positive - non-sanctioned</u>)</p> <p>“He was pushing for JAVA. And I said, don't. Management wants the results very quickly and JAVA, if</p>	<p><u>Technical Knowledge</u></p> <p>“But of course those guys are not technical, you know, we could tell them anything. Right. They wanted to see, OK, this is (garbled) is going to look like this. Behind what's happening...of course, nobody knows (i.e. they did not know what was the underlying technology).” (<u>management</u>)</p> <p>“The corporates, you know, they are not aware of the technology. They don't know. They don't know what is happening in the market. The technical people knows what's happening in the</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
<p>there, there was about 20 <position name> were there and we presented this to them. This whole thing. But of course those guys are not technical, you know, we could tell them anything. Right. They wanted to see, OK, this is (garbled) is going to look like this. Behind what's happening...of course, nobody knows.”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“He was pushing for JAVA. And I said, don't. Management wants the results very quickly and JAVA, if you go into JAVA, although it is a technology of the future, but you will not be able to produce results very quickly”</p> <p><u>Adoption Process</u></p> <p>“So, we decided, I convinced the project manager and he was convinced, he said yes, fine...It was easy. And they wanted the application look like MS-Access...” <u>(user-driven adoption)</u></p>	<p>you go into JAVA, although it is a technology of the future, but you will not be able to produce results very quickly” <u>(negative - sanctioned)</u></p> <p>“The only reason was that I have seen the success in the market.” <u>(positive - non-sanctioned)</u></p> <p>“Success. One hundred percent success. I was sure that we will succeed, if we go this line of action.” <u>(positive - non-sanctioned)</u></p> <p>“Success is more important. And I told him, see, Oracle tool, which is form, is established tool and Oracle is still maintaining it. Because they know that this product works.” <u>(positive - non-sanctioned)</u></p> <p>“They went from version to version to version to another version. And now it is on the Net. Before, it was not on the Net. Now it is on the Net. That means this product is, has established it's name in the market. So, let's go by this one. And he was convinced.” <u>(positive - non-sanctioned)</u></p> <p>“And the reason why, we had so many issues with Windows, so many issues that we ultimately decided to move to Linux. Corporate wise Linux is much more stronger, protected security-wise, so we feel comfortable.” <u>(negative - sanctioned)</u> <u>(positive - non-sanctioned)</u></p> <p><u>Previous Use (Past Experience)</u></p> <p>“You see when management says we want the solution...very quickly, so immediately, <u>to my experience</u></p>	<p>market.” <u>(management)</u> <u>(technical user)</u></p> <p>“Yes, yes, definitely it will have effect. Because these top guys are usually not very technical.” <u>(management)</u></p> <p>“But these corporate...they don't give us any confidence. We feel much more confidence by the information provided by them in the community. These guys don't help us at all.” <u>(management)</u></p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Depending on the size of the project or depending on the nature of the project. If it is a very visible project or it's very small invisible (sic) project, OK? I can give you example of what we have: <business application name>, it's a small thing, which is internal, right? We take care of our activities, you see. So, for that, any technology we can use, it doesn't matter. But if the project, if the nature is <jurisdiction name> wide, <organization name> wide, then I think the corporate policy is important. And maybe the manager will not accept. Other than the policy.”</p> <p><u>Awareness</u></p> <p>“Interviewee: The only reason was that I have seen the success in the market. You see, I did not based on what the corporate is asking. At that time I was new. I</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>which tool can give you the result right away.”</p> <p>“I did not consider anything else. I said, because I have seen this...myself, I said no, take this approach.” (<u>past non-sanctioned use</u>)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“See, I look...I don't look at the buzz words, I see the...what's happening in the market which has successful rates.”</p> <p><u>Other Factors</u></p> <p>“Interviewer: Are there any penalties with not complying with an organizational policy or standards? Interviewee: I don't think so.” (<u>governance and controllership</u>)</p>	<p>did not know there was a corporate policy. Now I know the corporate policy more. That we have to go into these lines of business...(corrects himself) those line of products. Infrastructure .NET or JAVA. At that time I didn't know that much.</p> <p>Interviewer: If you knew, would you have acted differently? Interviewee: No.</p> <p>Interviewer: OK. Why is that? Interviewee: Success. 100 percent success. I was sure that we will succeed, if we go this line of action.” (<u>awareness – non-sanctioned</u>) (<u>low awareness - sanctions</u>)</p> <p>“This resource which you have. If I am a manager, and if I know my resources are very well in this tool I'll tell them let's use them more.” (<u>awareness - non-sanctioned</u>)</p> <p>“The corporates, you know, they are not aware of the technology. They don't know. They don't know what is happening in the market. The technical people knows what's happening in the market.” (<u>low awareness - non-sanctioned</u>) (<u>awareness - non-sanctioned</u>)</p> <p>“I think when you see something out there, you try yourself. And, see yes it does work. Nowadays, you can get all the information on the Internet, right?” (<u>awareness – non-sanctioned</u>)</p> <p>“Mostly, it will be the forums, blogs and these information, like</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
		<p>for example, Oracle has it's own forum where you can go, log as anybody and start asking questions.”</p> <p><u>Help and Support Availability</u></p> <p>“If I am a manager, and if I know my resources are very well in this tool I'll tell them let's use them more.”</p> <p>“But nowadays that friend can be Google too. You know Google is, has enhanced our pace of work to a very higher level. Before we used to look for books, this and that, now in seconds we find the answers.”</p> <p>“I think when you see something out there, you try yourself. And, see yes it does work. Nowadays, you can get all the information on the Internet, right?”</p> <p>“Mostly, it will be the forums, blogs and these information, like for example, Oracle has it's own forum where you can go, log as anybody and start asking questions. And the people will give you the answer.”</p>
Technical User (Interviewee 04)		
<p><u>Hidden Adoption</u></p> <p>“So, Agile development and Scrum methodology were the two in terms of methodology-wise. In terms of the tools, there are a lot of open source tools. Like PLONE, Python, Git, SVN, those things and Linux is one</p>	<p><u>Technical Factors</u></p> <p>“I think a lot of times even in general day-to-day life, somethings, if something makes sense, I guess, a good conscience would generally lean towards it and say, you know, this is a very good alternative, it</p>	<p><u>Technical Knowledge</u></p> <p>“Interviewer: What would the really upper management, the ones who put those rules in place about the use of certain software packages etc. would think if they know that, in places in the</p>

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<p>of the biggest ones which I have seen being adopted in the last year-and-a half. And it's been adopted pretty well. We are running about twenty servers on Linux now.”</p> <p>“For me it was from my project manager. I think where the initiation started and then he got approval at the senior management. That's how far as, as far as I know how it started and propagated.” <u>(shared adoption)</u></p> <p>“I don't think they would be thrilled to hear about it. Because, again, even those known names would sound funny to them, like, what are you using? This is not the standard.”</p> <p>“I would still do a prototype and show it to them. See how well it works, how little it costs, how much it's or how the resources are readily available in the market for this thing and build some ground on that. And try to move forward with that.” <u>(shared adoption)</u></p>	<p>costs a lot less, it's as good as, for example take the example of Solaris, Linux would be as good as, or as stable as Solaris, it's pretty much based on the fundamentals of Solaris, not from the cost point of view or licensing, but stability wise, or functionality wise it's as comparable to AIX or Solaris, so, I think, generally, if it makes sense, and definitely save some money, it just seems like a good fit.” <u>(positive - non-sanctioned)</u></p> <p>“But it's going pretty well. The functionality and the working, the developers are comfortable.” <u>(positive - non-sanctioned)</u></p> <p>“And you'd be surprised to see how much open source things are being taught or the languages or students are inclined on their own to learn those things that, you know, whatever JAVA could do in twenty pages Python may be able to do it in two.” <u>(positive - non-sanctioned)</u></p> <p><u>Previous Use (Past Experience)</u></p> <p>“Sometimes we keep doing things because we don't know a better alternative. So, we just keep doing it and we get comfortable with it.”</p> <p>“I think, it's the...again the fear of unknown and the fear of change. Nobody likes to take the pain to change the policies and take responsibility for it. So, although they know or they might know that this is an industry standard, everybody is using it, there is support available for it, but just because this is something new, and</p>	<p>organization, such software solutions as Python or Linux or Git and so on is being used? Interviewee: I don't think they would be thrilled to hear about it. Because, again, even those known names would sound funny to them, like, what are you using? This is not the standard. But, it will take a little bit of time to change the mentality and develop that perception that no it's not a bad thing to do.” <u>(management)</u></p> <p>“They think those old policies are there for some reasons which don't exist any more.” <u>(management)</u></p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“I think it would vary from the tool or the software itself. Linux being a very vital one, I would be very inclined to fight my way through and if I found that OK it's a tedious and lengthy process but eventually I'll get to it I will do it because it just makes a lot of sense. If it's a very <u>trivial thing</u>, I probably wouldn't bother going through that lengthy procedure. I would focus on the <u>bigger one</u> because once you get the bigger one approved and it is an open source, then you kind of opened the door to the small ones.”</p> <p>“For small things...Aaaaahhh...I guess I will have to test the waters. If my senior manager says yes, sure put the request in, I would like to try that.”</p>

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Category & Process	Antecedents	Moderators and Mediators
	<p>they would think...OK, Windows is working fine, why do you want to go for Linux?" (<u>past sanctioned use</u>)</p> <p>"They were very comfortable with Microsoft. They were very comfortable with Solaris or AIX or people working there were all up for these two or three big giants. Everybody was happy and comfortable with that they wrote the policies saying OK this is the standard this is tested through them." (<u>past sanctioned use</u>)</p> <p>"I think they...(hesitates)...they just went forward with it. It was probably there were some applications which were developed in that and then they just continued to practice without looking at what else is available so, it is just a continuation of what is working." (<u>past sanctioned use</u>)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>"And those tools if I look in the market now, to the job requirements, let's say Python is pretty prevalent. Every resume, the new ones, I mean, this is the tool of choice nowadays, so organizations are looking for developers who know these advanced tools."</p> <p><u>Other Factors</u></p> <p>"It is a good fit, because if you are getting x amount of features or x number of features and the functionality and the stability for x amount of dollars compared to y amount of dollars then the less is better in that case. Or if you have to</p>	<p><u>Awareness</u></p> <p>"Well, I mean, I know some of the standards but not thoroughly informed on, you know...I was never informed like exactly of this is the standard and this is what you cannot deviate from. So, I've never received those strict guidelines." (<u>low awareness - sanctions</u>)</p> <p>"In terms of any straight development guidelines or database guidelines I was never given anything like that." (<u>low awareness - sanctions</u>)</p> <p>"It's good at sometimes. But it cannot be a rule of thumb because sometime we keep doing things because we don't know a better alternative. So, we just keep doing it and we get comfortable with it." (<u>awareness – sanctioned</u>) (<u>low awareness - non-sanctioned</u>)</p> <p>"Uhhmmm. I don't know what is the exact approval of open source, for example I'll take the example of open source here, so, we are in our unit using some open source tools. Python and all that. I don't know how far the approval has gone for that." (<u>low awareness – sanctions</u>)</p> <p>"If it's a policy I cannot use Linux in production in the government I would certainly just not do it." (<u>low awareness - sanctions</u>)</p> <p>"Yeah, vendors could play a role in this...(smiles) I think they need to cause some more awareness.</p>

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	<p>pay \$10 compared to \$10,000 it's definitely a good fit. Why would you pay tens of thousands of dollars where you can pay ten dollars?" <u>(budget related)</u></p> <p>"Interviewer: Are you aware of any penalties for not complying with organizational policies and standards? Interviewee: I am not aware of that." <u>(governance and accountability)</u></p>	<p>How they do it is up to them. But how they have done it previously I am not sure. But of course the vendors have to shine a little extra especially vendors who are trying to make growth so, and they can use examples of places which have already adopted. So, let's say Red Hat could take our example and say hey this branch is running fine. Leverage our use of Linux. Portray it to the centre." <u>(awareness - non-sanctioned)</u></p> <p>"I think if...and that drive thing would come down to as awareness. Maybe people are more aware of things now and they don't agree with those policies so, not, not saying that are rebellion but sometimes you just don't agree with the policy, and you just don't take that because it is a policy. So, some people have a tendency to question that OK, why is it that policy doesn't make sense in current day and time." <u>(awareness - non-sanctioned)</u></p> <p>"I follow articles, I follow the webcasts, magazines...Or anything of my interest. I see something on Linux, an Oracle side or the new development and innovation, I read up on it. I don't say that I particularly follow that but if something catches my eye I read it. If you have an open eye you can't miss it nowadays. You can't be unaware." <u>(awareness - non-sanctioned)</u></p> <p><u>Help and Support Availability</u></p>

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		<p>“...if I know I have a solution then if I don't have expertise on that I may have to hire somebody. That would open another gate of approvals...”</p> <p>“I think, it's the...again the fear of unknown and the fear of change. Nobody likes to take the pain to change the policies and take responsibility for it. So, although they know or they might know that this is an industry standard, everybody is using it, there is <u>support available for it</u>, but just because this is something new, and they would think...OK, Windows is working fine, why do you want to go for Linux?”</p>
Technical User (Interviewee 05)		
<p><u>Hidden Adoption</u></p> <p>“Yeah, Subversion. And we used Git for...And Git, I liked Git the most.” “Agile was great experience for medium-size maybe project, medium-to-small size. Agile, in terms of, you know, methodologies.”</p> <p>“Also, say utility, open source utilities, uhm...I've used certain libraries that maybe wasn't...I didn't...Let me put it this way, I sensed that it can't be part of the product but however I included them for convenience, ease of use and...So, open source libraries from Apache and so on and so forth.” <u>(silent adoption)</u></p> <p>“Interviewer: When you used those complementary tools that have not</p>	<p><u>Technical Factors</u></p> <p>“So, to the tools I use Eclipse, I wanted to make that point because RAD couldn't do some functionality. Basically with Crystal Reports it couldn't support plug-ins with the version I am using. So, I used open source tool to get the job done and went back to, you know, RAD to finish it off. (Laughs) That's a point I wanted to mention.” <u>(negative - sanctioned) (positive - non-sanctioned)</u></p> <p>“Yeah, Subversion. And we used Git for...And Git, I liked Git the most. Interviewer: And why is that? Interviewee: It's very flexible, you can work in isolation without having to have that connection to the server. With ClearCase you could do the</p>	<p><u>Technical Knowledge</u></p> <p>“I have the theoretical knowledge, I know of, I have a good understanding...not full but of architectures, of design patterns, of design, you know, the architecture” <u>(technical user)</u></p> <p>“They <u>weren't technical enough</u> to give IT direction and so on. So, it was more of a project manager or a manager role versus actual technical lead. So, there was an absence of that role, therefore I had to do what I had to do. To, you know, to, basically I innovate, I played another hat, you know, wearing a different hat.” <u>(management) (technical user)</u></p>

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<p>been officially sanctioned or approved, do upper management know about them? Interviewee: No, because there is a disconnect from...Unfortunately in our team there is no such a role as team lead.” (<u>silent adoption</u>)</p> <p>“Interviewer: So, if there was a technical intermediary, like a technical lead, then those people would probably know, is that what you are saying? Interviewee: Yeah, I would probably, you know, ask them for a direction, you know, and they would understand what I am actually trying to accomplish. And the technical difficulty of, you know, doing something, you know, using those tools versus the official tools.”</p> <p>“So, what we did, what we decided, we'll have an internal SVN (laughs) server sitting on a regular computer. Regular computer not a server. We did our daily work on that...” (<u>shared adoption</u>)</p> <p>“Interviewer: OK. But would you be more willing to use them if those roadblocks didn't exist... Interviewee: Oh, of course, yeah. I would be much more...I would be much more, I would be more relaxed using them. Given that I have approvals and, they are, you know, certified or, you know they are the OK tools to use. Now, I do use them kind of secretly.” (<u>silent adoption</u>)</p> <p>“These machines can take up to, I don't know 16-gigs of RAM. They put 4 gigs of RAM and it only reads 3 point something gig. So, (laughs) I</p>	<p>same. ClearCase is also a good tool...It has it's bads but, you know, it's a very good tool. Uhm...Git is much simpler for development and you don't need to follow certain steps, you do but it's a lighter process than ClearCase. Uhm...And it's the latest and greatest, faster much faster. There is other advantages too.” (<u>negative - sanctioned</u>) (<u>positive - non-sanctioned</u>)</p> <p>“Right now I would use JBOSS. Yeah. For it's easier for developers, you know, just drop something and it deploys it and even JBOSS 7 application server, it's so fast and it uses multiple threading properly, it uses dual core so, it's a much faster start-up and shut down. And it has newer technologies, you know, EE6.” (<u>positive - non-sanctioned</u>)</p> <p>“I've used certain libraries that maybe wasn't...I didn't...Let me put it this way, I sensed that it can't be part of the product but however I included them for convenience, ease of use and...So, open source libraries from Apache and so on and so forth.” (<u>positive - non-sanctioned</u>)</p> <p>“I am assuming they don't want to bother re-factoring those to portal solution. And now they are doing the mistake of developing things temporarily and then re-developing things in the portal environment. So, I would say the management, the senior management like <manager's name> or the centre are pushing the portal but we are not...I don't know how it is going to fit...that question.” (<u>negative - sanctioned</u>)</p>	<p>“There is a lack of knowledge of the centre...of the official...uhm...processes if you will from the central agency down to me, the developer level. So, it could be miscommunication from that these things exist, hey, you know, you should , again from a technical lead or, you know, an architect, or, you know... You know, I would assume they need to know these things and they need to let us, hey guys we need to follow this kind of thing, so there isn't such a role (laughs).” (<u>management</u>)</p> <p>“So, I would say the management, the senior management like <manager's name> or the centre are pushing the portal but we are not...I don't know how it is going to fit...” (<u>management</u>)</p> <p>“Because if whoever is making this policy says well, OK, this is a proven thing in the States and they have been using it for years, then it must be OK to adopt this. Not really based on what's going to help you on a daily basis or what's really good for thousand developers on a lower level. So, it's in a way, I think some, you know, just covering their behinds.” (<u>management</u>)</p> <p>“But I am saying maybe the centre, or whoever pushes those, put those IT standards, think that, you know, more mature product is safer, you know, more secure. So, you know, there is a disconnect again of what really...They go</p>

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<p>shouldn't be saying that but I brought my own 64-bit Windows 7 copy, partitioned the disk and put my own 64-bit OS, you know, to utilize at least the 4 gigs there and the speed and...So that, there is a roadblock, they enforced it and I did, I still took the risk, although I know I'll be in shit if...</p> <p>Interviewer: If they found out. Interviewee: If they found out. Uhm..." (silent adoption)</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>"Everybody went to training at the time, you know, the Rational initiative, putting everybody into training. People didn't take it seriously here. I don't think, honestly maybe myself, I don't want to exaggerate, maybe two people took it seriously. But the rest, you know, the older, with the people that had been in this branch for longer, I don't want to say age group but people that are accustomed to what's happening here or in the <organization name> how things run before, they didn't take it seriously. I don't blame the actual tools. Maybe it's just...It was a transformation that was rejected in a way...Let's call it this way."</p> <p><u>Dual Adoption (non-genuine use)</u></p> <p>"So, to the tools I use Eclipse, I wanted to make that point because RAD couldn't do some functionality. Basically with Crystal Reports it couldn't support plug-ins with the version I am using. So, I used open source tool to get the job done and</p>	<p>"Yeah, I, you know, like, ease of use for development, uhm, up-to-date technologies, you know, being able...the tools should support up-to-date technologies you know, you want to use frameworks and libraries and things that...open source which, the whole industry are pouring effort into developing like, just yesterday I was reading about JBOSS identity...federated identity, it's really a new thing, uhm, and it's in the open source community now." (positive - non-sanctioned)</p> <p>"Up-to-date tools allow us use those innovative, brand new, bleeding...maybe not bleeding edge...I wouldn't push it to the bleeding edge because we're going to bleed (laughs), uhm, so, ease of use for development, uh, you know, up-to-date, being able to use technology and at the end of the day, uhm, rapid and fast development. So, it shouldn't slow me as a developer." (positive - non-sanctioned)</p> <p>"Yeah, yeah, in our case, again going back to <business application name> example, you know, it met the needs of the development, you know, what we want to accomplish, uhm, we wanted to do certain functionality on, in terms of screen design, using AJAX, using newer, fancier things in terms of screen design which those tools allow us to use. It was faster, easier, uhm, much lighter process" (positive - non-sanctioned)</p> <p>"To give you a real example that it happened with <organization</p>	<p>with the more, you know, with the more defacto, because it is bigger probably, it's more secure probably, you know (laughs). It's more, they don't know that it's more effort to do the same job. Instead of writing thousand lines of code here you can accomplish the same thing with 500 lines of code, you know." (management) (technical user)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>"Agile was great experience for medium-size maybe project, medium-to-small size. Agile, in terms of, you know, methodologies."</p> <p>"The question is if I am, under the two scenarios, would I be willing...yeah, I would be willing for...uhm...for applications that are <u>under the radar</u>, let's say. You know, uhm...you know, <u>internal</u> applications maybe."</p> <p>"Interviewer: So, would you be more willing to use it on a larger project or a smaller project or would it matter? Interviewee: To me it wouldn't matter. But I am saying maybe the centre, or whoever pushes those, put those IT standards, think that, you know, more mature product is safer, you know, more secure."</p> <p><u>Awareness</u></p> <p>"Because if whoever is making this policy says well, OK, this is a</p>

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<p>went back to, you know, RAD to finish it off. (Laughs) That's a point I wanted to mention.”</p> <p>“In the current environment no, it's more like these are the tools. And, I used Eclipse and other plug-ins to, you know, work, like a kind of to...uhm...complement let's say...complement the official tools (laughs) that, you know, I am using.”</p> <p>“So, what we did, what we decided, we'll have an internal SVN (laughs) server sitting on a regular computer. Regular computer not a server. We did our daily work on that and once a week, at the end of the week <individual name>, you know, he uploaded everything to ClearCase. So, he merged to, on a weekly basis. Daily basis we used SVN and at the end of the week we just packed kind of a backup.”</p> <p><u>Adoption Process</u></p> <p>“In the current environment no, it's more like these are the tools. And, I used Eclipse and other plug-ins to, you know, work, like a kind of to...uhm...complement let's say...complement the official tools (laughs) that, you know, I am using.” <u>(top-down vs. user-driven)</u></p> <p>“So, I would say the management, the senior management like <manager's name> or the centre are pushing the portal but we are not...I don't know how it is going to fit...” <u>(top-down adoption)</u></p>	<p>name>, we were using ClearCase server that was located in <city name> or something like that and the merging of code was a nightmare, and it took a long time. It took literally, you know, for a simple change, few files maybe fifteen minutes half an hour, it was a nightmare.” <u>(negative - sanctioned)</u></p> <p>“So, to give, to put it in a different way...Git is, I could administer Git myself, versus having this tool that it's not really administered, there is no...(laughs)...you know what I mean?” <u>(positive - non-sanctioned)</u></p> <p>“Even like putting a ticket to IBM now I have to ask <person name> or <person name> or you know and it's harder to get the support. The support is there but it's harder for me to get that support.” <u>(negative - sanctioned)</u></p> <p>“So, new things, new technologies, makes delivering a product easier, you know, instead of say, you know, doing huge effort in coding, you know, there are things that, frameworks and tools that make it, you know, make the effort much less, much, in terms of coding, in terms of development, it makes it more enjoyable too. I don't think I mentioned that too. Uhm. So, less effort, enjoyable, uhm, if the, if those, if those standards were more up-to-date, you know.” <u>(negative - sanctioned) (positive - non-sanctioned)</u></p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“Yeah, Subversion. And we used Git</p>	<p>proven thing in the states and they have been using it for years, then it must be OK to adopt this. Not really based on what's going to help you on a daily basis or what's really good for thousand developers on a lower level. So, it's in a way, I think some, you know, just covering their behinds.” <u>(low awareness - non-sanctioned)</u></p> <p>“Uhm...No maybe because forces from the industry like IBM has been there for a...since the fifties and they push their products so, it's a defacto versus, uhm, let be the best...In fact, it's not the best tool. But because they are the biggest and the largest, they pushed on the community before other, newer, innovative alternatives came to market. So they had the majority of the market but at the time maybe there wasn't an alternative.” <u>(awareness - sanctioned)</u></p> <p>“Being a typical developer, you know, yeah whatever, another policy. It probably does have some penalties. I don't know to what extent. (laughs)” <u>(low awareness – sanctions)</u></p> <p><u>Help and Support Availability</u></p> <p>“Another thing with maybe ClearCase, it could be the tool, it could be the <u>support to the tool</u> too. Because, right now, in our branch there is no expert, let's say, uhm, that, uhm, like an admin person. I'll give you an example, I might be converting <business</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>for...And Git, I liked Git the most. Interviewer: And why is that? Interviewee: It's very flexible, you can work in isolation without having to have that connection to the server. With ClearCase you could do the same. ClearCase is also a good tool...It has it's bads but, you know, it's a very good tool. Uhm...Git is much simpler for development and you don't need to follow certain steps, you do but it's a lighter process than ClearCase. Uhm...And <u>it's the latest and greatest</u>, faster much faster. There is other advantages too.”</p> <p>“Right now I would use JBOSS. Yeah. For it's easier for developers, you know, just drop something and it deploys it and even JBOSS 7 application server, it's so fast and it uses multiple threading properly, it uses dual core so, it's a much faster start-up and shut down. And <u>it has newer technologies</u>, you know, EE6.”</p> <p>“Yeah, I, you know, like, ease of use for development, uhm, <u>up-to-date technologies</u>, you know, being able...the tools should support <u>up-to-date technologies</u> you know, you want to use frameworks and libraries and things that...”</p> <p>“<u>Up-to-date tools</u> allow us use those <u>innovative, brand new</u>, bleeding...maybe not bleeding edge...I wouldn't push it to the bleeding edge because we're going to bleed (laughs), uhm, so, ease of use for development, uh, you know, <u>up-to-date</u>, being able to use technology and at the end of the day, uhm, rapid</p>	<p><i>application version</i>> to a newer version. So, I need to create a new component or whoever the ClearCase admin needs to create a new component on the server to start a new, the new development and the source code under that component. I'm not sure if there is (laughs) like <colleague name> knew how to do that so now...So, like a I guess, it prevents me, it's concerning for me. I'd rather...So, to give, to put it in a different way...Git is, I could administer Git myself, versus having this tool that it's not really administered, there is no... (laughs)...you know what I mean?”</p> <p>“Interviewer: Let's say you are not really familiar with innovative IT solution, like Git, and I was going to ask you whether the existence of a person who is knowledgeable nearby would have an effect? So, access to an expert...”</p> <p>Interviewee: Yeah, yeah, definitely. Uh, because it makes my job as a developer...At the end of the day tools should help me as a developer, help me and make it faster and easier. Not being a burden. Some of these tools are burden on the process and on the developers.”</p> <p>“Interviewer: Would you be more willing to use it if there was a community of interest? Interviewee: Yeah, definitely, yeah. I would be more, knowing, you know, there is <u>support</u>, there is people you can...they can help</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>and fast development. So, it shouldn't slow me as a developer.”</p> <p>“...we wanted to do certain functionality on, in terms of screen design, using AJAX, using <u>newer, fancier things</u> in terms of screen design which those tools allow us to use.”</p> <p>“Get the job done and it's also you feel good when you're doing <u>something new</u>. You know, <u>something new, innovative</u>, uhm, unfortunately a bigger, the bigger picture here, uhm, it's like blocking people's ambitions or, you know, people <u>want to innovate</u>, they want to come to work and have an exciting job, you know, <u>using newer things</u>, easier, you know, and with this structure it just kind of uhm pushes you down...I don't know what the right word but...So, so, yeah I would do it because I want to do the(laughs) <u>latest and greatest</u>, you know that kind of thing.”</p> <p>“But again, you know, <u>innovative, new things</u>, you know, knowing, I am involved right now with like, I try, want to...Android and Google, you know, all that so, all <u>new stuff</u>, to keep my, to keep one, to keep me interested. Because these things unfortunately, you know, so, <u>new things, new technologies</u>, you makes delivering a product easier, you know, instead of say, you know, doing huge effort in coding, you know, there are things that, frameworks and tools that make it, you know, make the effort much less, much, in terms of coding, in terms of development, it makes it</p>	<p>you, you know. I believe everything has been done before. So, you can always <u>ask someone else's</u> or, you know, for getting...how did you do it? what happened? what were the...what's to avoid? what were the harder parts, you know...So, I do. So, it would be a <u>support</u> and more comfortable and confident, uhm, layer or, you know, <u>a group to rely on</u>.”</p> <p>“It might be fear of taking the risk of trying something new, in other words, you know, covering your behind. Uhm, there might also be <u>reason of support</u>, you know, so, that might be their argument but it's not the reality, because the newer tools, Eclipse whatever all the open source tools, you could have, you could buy an open, you know, licence, support license, that's right.”</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>more enjoyable too. I don't think I mentioned that too. Uhm. So, less effort, enjoyable, uhm, if the, if those, if those standards were more up-to-date, you know..."</p> <p>"It's the <u>newest thing</u>. It's you know <u>more innovative</u>, you know, it's easier, not just easier, it's just that being on, you know, being there, being <u>where the technology is going</u>, you know, <u>where it's happening</u>, you know. Not five years...Like if you go with the main tools or what's pushed that's like or I don't know the number of years but it's being behind (laughs). I don't want to be...So, it has that sense of, you know, <u>being right there</u> you know. "</p> <p><u>Other Factors</u></p> <p>"Like <Manager's Name> is pushing portal solution, portal solution, portal solution, right, and you know, with <System Name> or even with the <System Name>, you know, the case management component that those guys 10-15 of them worked on 7-8 months which is being thrown away. I am assuming they don't want to bother re-factoring those to portal solution. And now they are doing the mistake of developing things temporarily and then re-developing things in the portal environment. So, I would say the management, the senior management like <manager's name> or the centre are pushing the portal but we are not...I don't know how it is going to fit...that question." <u>(fit with existing systems)</u></p>	
Technical User (Interviewee 06)		

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
<p><u>Hidden Adoption</u></p> <p>“And then I switched to Eclipse, Eclipse J2EE package, so basically Eclipse and all the plug-ins in it, like the JBOSS tools plug-in, the Maven plug-in, Git plug-in in Eclipse. Uhm, for the Python related is the Aptana Studio like for Python Editor and the framework we are using for the projects are the Pyramid...those stuff.”</p> <p>“For version control, uhm, we always use Git for our projects. And they also suggest to use SVN because of the vendors.”</p> <p>“I think I would, like, if I do need to submit some process to go through formally I would submit that then I'll start to use this (laughs) quietly waiting for that to come back (laughs).”</p>	<p><u>Technical Factors</u></p> <p>“It's easy to use, convenient like you don't have to make very complicated steps to make one simple thing happen, right. It's very easy to install, easy to set-up, easy to be adopted in the different environment no matter if you are familiar with Windows or Linux whatever. But it's very easy to use. Uhm, the other thing is, uhm, the developers like, the...how to say that...like the developers even if they are not familiar with the tool at the beginning it's very easy for them to get in, to know the basic stuff and the tutorials or the documentation is online and very easy to read. So that they won't have an excuse I don't know how to use it. Things like that.” <u>(positive - non-sanctioned)</u></p> <p>“When I first joined I do used RSA for one of the project but uhm sometimes I found that it's a little bit complicated and because those products whenever not in here in the company, in the university I did not get a chance to use them, right, Websphere or stuff. So, uhm, that's why when I first came in I had to come down and use to learn to know how to use those complicated ClearCase I never used it before.” <u>(negative - sanctioned)</u></p> <p>“Uhm, personally I still like, prefer the easiest Like Eclipse. The important thing is there are a lot of solutions out there. Like if you have come up with a problem, just Google on line, there's a lot of developers out there, they have similar issues</p>	<p><u>Project Size, Visibility and Criticality</u></p> <p>“For version control, uhm, we always use Git for our projects. And they also suggest to use SVN because of the vendors. So, we currently we have two but for all the Python projects or the projects like <i><business application name></i> we developed we always use Git. For bigger <i><business application name></i> we use SVN.”</p> <p>“Uhm, I think the manager level also need to kind of pressure like this is the standard or something like that. I think that's how we introduced Git. Right now, we officially use Git for those smaller projects.”</p> <p>“For deployment, like especially the big, big projects I probably would think OK because this goes to production, very very big project like <i><business application name></i>, uhm, but if it's just internal application I would still go with JBOSS. I used them both in the last year when I am debugging or deploying things on Websphere there are a lot of things set up how different, it's very complicated, hidden behind even there is these exceptions you need to go deep to figure out how to solve this problem maybe just configuration problem, maybe it's something in your code, it's so complicated. And also it's very heavy like stuff but JBOSS is like lightweighted and logings are more clear, the setup is much</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>with you, they are using Eclipse like free, they are not using RSA.” <u>(positive - non-sanctioned)</u></p> <p>“Or if you say I want to solve this particular problem in RSA there is very little answers out there. You probably need to contact IBM, call different phone calls to get your answer. Maybe not get it at all. But just the way you solve your problem is much harder than when you use those Eclipse and stuff.” <u>(negative - sanctioned)</u></p> <p>“It's just you Google and you get answers (laughs).” <u>(positive - non-sanctioned)</u></p> <p>“All those like the tools we have mentioned is almost open source or free out there then that means although we don't have a big company to support but we have a big community to support. Like all the developers out there, they are very smart persons because they always find the solution and even though the problem is not theirs if you post something, they are very happy to help you out. Thing like that, so, it's easier for the developer to use those free stuff.” <u>(positive - non-sanctioned)</u></p> <p>“When I am debugging or deploying things on Websphere there are a lot of things set up how different, it's very complicated, hidden behind even there is these exceptions you need to go deep to figure out how to solve this problem maybe just configuration problem, maybe it's something in your code, it's so complicated.” <u>(negative -</u></p>	<p>easier, so I'd say if it's not a very critical, big project like <i><business application name></i>, I would still would choose JBOSS.”</p> <p><u>Awareness</u></p> <p>“Interviewer: (Referring to corporate IT standards) Do you think everybody follows those standards? Interviewee: I don't think so, at least I am not following them. I don't even know the details of all the rules.” <u>(low awareness - sanctions)</u></p> <p>“Interviewer: When you have adopted Git or Eclipse if you knew that there was a corporate standard saying that you shouldn't be using anything but ClearCase or Rational Application Developer, uhm, how would that affect your decision? Would you be more likely or less likely to go ahead with Git? Interviewee: I would still go ahead with Git (laughs). Interviewer: You would still go ahead? Interviewee: Yeah. It just makes your daily life easier, right. And then, it would help get your job done faster. It's the...the two are the...serve you for the same purpose, why not take the easier way to do that?” <u>(awareness - sanctions) (awareness - non-sanctioned)</u></p> <p>“Interviewer: Uhm... Do you know if there are any penalties for not complying the corporate</p>

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	<p><u>sanctioned</u></p> <p>“JBOSS is like lightweighted and logings are more clear, the setup is much easier” (<u>positive - non-sanctioned</u>)</p> <p>“Another factor often is, as technical people like developers you always want to keep with the new technologies right, you don't want to say I keep using the old things for years and years. Then if something new comes out and very very popular in the community that means it's really helpful like Maven, like before we don't even know what's Maven right, and now Maven has come out then I would say I would go with Maven not some other comparable tools. Personally I want to keep my technology up-to-date with the whole community. And almost all the cases if this is popular means this is the best or this is almost make your life much much easier, not going backwards. And the thing you developed, it's easier to be supported or it's easier to be compiled with other environment, it's not too old.” (<u>positive - non-sanctioned</u>)</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Because, first of all when something new introduced, not all the people would like to take new things, they are going to use what they're familiar with or they already know”</p> <p>“Actually, uhm, there are two projects moving away from Git, one because of the vendor, uhm, the</p>	<p>policies? Interviewee: (gesture indicating no) Interviewer: No? Interviewee: No, I don't know anything (laughs).” (<u>low awareness - sanctions</u>)</p> <p><u>Help and Support Availability</u></p> <p>“Yeah, because the deadline is so close. Like just the end of month they need to do it fast. That's why they...But if there are some <u>people who really knows how to do it who can help them out when they have the problems</u> I think we can we can still keep that so I am saying basic training is very important to keep those new software.”</p> <p>“The important thing is there are a lot of solutions out there. Like if you have come up with a problem, just Google on line, <u>there's a lot of developers out there, they have similar issues with you</u>, they are using Eclipse like free, they are not using RSA.”</p> <p>“Or if you say I want to solve this particular problem in RSA there is very little answers out there. You probably need to contact IBM, call different phone calls to get your answer. Maybe not get it at all. But just the way you solve your problem is much harder than when you use those Eclipse and stuff.”</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>vendor is, <vendor name>, they use SVN and they moved away from Git. Another is the the new developed <business application name>, after I set up the framework and everything and then I leaved the project because the remaining team members they are not familiar with checking in and checking out so they are still like copying code like they didn't use, they build their own and then they copied the code to each other."</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>"Another factor often is, as technical people like developers you always want to <u>keep with the new technologies</u> right, you don't want to say I keep using the old things for years and years. Then if <u>something new comes out</u> and very <u>very popular in the community</u> that means it's really helpful like Maven, like before we don't even know what's Maven right, and now Maven has come out then I would say I would go with Maven not some other comparable tools. Personally I want to <u>keep my technology up-to-date with the whole community</u>. And almost all the cases if this is <u>popular</u> means this is the best or this is almost make your life much much easier, not going backwards. And the thing you developed, it's easier to be supported or it's easier to be compiled with other environment, it's not too old."</p> <p><u>Other Factors</u></p> <p>"Interviewer: Uhm... Do you know</p>	<p>"Interviewer: On those occasions when you need help on those big vendor tools, like IBM's tools, when you call the company or when you log in a ticket how quickly do you get a response? Interviewee: Uhm, it depends...It depends how urgent the problem is. One of my experiences is, for example, when I used the e-form, uhm, they got back to me very quickly not the solution just to say somebody is contacting you, like knowing that you are using the ticket, very general high-level answer is like yes, we are now supporting this feature or this. This is quick but whenever you want say how to solve it, to get some particular expert to help that takes forever. Even now I don't even get that solution. Always suggestions, suggestions from e-mails or phone calls."</p> <p>"Actually, uhm, there are two projects moving away from Git, one because of the vendor, uhm, the vendor is, <vendor name>, they use SVN and they moved away from Git. Another is the the new developed <business application name>, after I set up the framework and everything and then I leaved the project because the remaining team members they are not familiar with checking in and checking out so they are still like copying code like they didn't use, they build their own and then they copied the code to each other."</p>

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Category & Process	Antecedents	Moderators and Mediators
	<p>if there are any penalties for not complying the corporate policies? Interviewee: (gesture indicating no) Interviewer: No? Interviewee: No, I don't know anything (laughs).” (<u>governance and accountability</u>)</p>	
Technical User (Interviewee 07)		
<p><u>Hidden Adoption</u></p> <p>“I prefer Eclipse.”</p> <p>“Uhm, findbugs is one. Which is like static analysis tool. Then Selenium.”</p> <p>“My personal preference is TDD (test driven development) and Agile.”</p> <p>“So, you use Firefox to do that. Sometimes like, uh, the industry standards are not <organization name> standards.”</p> <p>“Interviewer: Does your immediate management know? Interviewee: Yes. Interviewer: How about the high level, corporate management, like the guys in centre, do they know? Interviewee: Probably not.” (<u>shared adoption</u>)</p> <p>“It depends upon the problem. If I can't solve my problem using the standard tools, then I would be more inclined to use a product which can solve my problem.”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“...for instance like now, you are</p>	<p><u>Technical Factors</u></p> <p>“For instance like now, you are trying to, you know, debug a JAVA script application. And standard says that you must use Internet Explorer. And Internet Explorer does come with it's own debugger but it's not really smart enough. So, then, what would you do? Interviewer: What do you do? Interviewee: So, you use Firefox to do that. Sometimes like, uh, the industry standards are not <Organization Name> standards.” (<u>negative - sanctioned</u>)</p> <p>“Uhm, they are (industry) standards because they are easy-to-use and they have been widely adopted, there is a vibrant community supporting the application and it's open source so anybody can join. You know, like, if you want to improve on IE you have to tell Microsoft and Microsoft can simply say shut up, I don't need your advice. So, basically it comes down to that.” (<u>positive - non-sanctioned</u>)</p> <p>“I am trying to develop four or five different versions of the same right, instead of doing them sequentially, I do them all together by breaking</p>	<p><u>Technical Knowledge</u></p> <p>“I think one reason is that in the <organization name> because if not the people are not exposed to the current R&D and the what's in and what's out in the industry. So, people will not know.” (<u>management</u>)</p> <p>“And so, if you have more experience in something so you are also more inclined to use it, you know, whether it's standard or not.” (<u>technical user</u>)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Interviewer: About those innovative tools that you use, uhm, does it matter how big or small the project is? Would you feel more comfortable using those unapproved tools for smaller projects as opposed to big ones? Does it matter? Interviewee: I don't think so. No. As long as I am able to be more productive and do more work I would keep on using those tools.”</p> <p><u>Awareness</u></p>

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<p>trying to, you know, debug a JAVA script application. And standard says that you must use Internet Explorer. And Internet Explorer does come with it's own debugger but it's not really smart enough. So, then, what would you do? Interviewer: What do you do? Interviewee: So, you use Firefox to do that. Sometimes like, uh, the industry standards are not <organization name> standards.”</p> <p><u>Adoption Process</u></p> <p>“Probably it was <manager's name> who decided. interviewer: OK, so, it's the senior manager? Interviewee: The senior manager.” <u>(top-down adoption)</u></p>	<p>down into you know various iterations and I can give that to say five teams, right. Then I need to have these five different branches. And ClearCase is...well, you can create branches but it's not that smart because what happens is if I want to have full control on my merges ClearCase does not give me an opportunity where it figures out that OK, there is no conflict there would just merge, and then for me there is no way to figure out what was merged from where to where.” <u>(negative - sanctioned)</u></p> <p>“Well, IE as far as end user is concerned, yes, you would get the same experience as an end user but from developers' perspective it does not, to have a full control, right, so you can't debug, you can't do automated testing with it so all those extra tools and add-ons which Firefox has like say for instance, uhm, you are just a graphic designer and you just want to know how much real estate you have. So, how you measure it using IE, there is no way to do that. But there is a plug-in available for Firefox with which you can, you know, how your graphics look like, how your icons are and colours etc. so you can just click and it would tell you what the html colour is so, you know, it save you a lot of time. So, of course you can do that manually if you are using IE you'll be spending like, you know, hours just to do simple things which you can do in less than a minute. So, if there is a practical gain using Firefox so why not use something with which, you know, everybody gets benefit?” <u>(negative - sanctioned)</u></p>	<p>“And for instance, Apache webserver, you know, it's like the mother of all web servers. So whatever web server you use, apart from IIS, so internally it might be based on Apache. So, if corporate standard says no you can't use Apache IIS is the only server you are supposed to use, then you have to use that.” <u>(awareness – non-sanctioned)</u> <u>(low awareness - sanctions)</u></p> <p>“Interviewer: Do you know if there are any penalties for not complying with <Organization Name> I&IT standards or policies? Interviewee: I haven't heard of anything.” <u>(low awareness - sanctions)</u></p> <p>“...in past I have worked with CBS, PBCS, ClearCase, Subversion and in most of the places, you know, they got rid of the ClearCase and moved to Subversion.” <u>(awareness - non-sanctioned)</u></p> <p><u>Help and Support Availability</u></p> <p>“it's because if you have access to the source code, and if they did something which is really, you know, tying you down, you can go down and you can fix problem yourself instead of, you know, like say for instance working with the IBM. Now,like I was telling you earlier that there is one small issue it's almost now two months I am working with IBM and still they don't know, you know, how to fix it. So, if a commercial tool</p>

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	<p><u>(positive - non-sanctioned)</u></p> <p>“Ah, well, even though RAD or all those Rational tools are based on Eclipse but sometimes there is restriction you cannot add some plug-ins or you need to know exactly what is the based Eclipse version is being used for that particular RAD and then only you can do that and sometimes, you know, you cannot live with it because many times there are some well I shouldn't say bleeding edge but like the more latest tools with which, you know, make your life easier. They are not supported by RAD. So, if Eclipse is more extensible, so that's the reason you know people don't want to get tied to something with which they can't do their job.” <u>(negative - sanctioned) (positive - non-sanctioned)</u></p> <p>“Yes, it is and sometimes, you know, it's because if you have access to the source code, and if they did something which is really, you know, tying you down, you can go down and you can fix problem yourself instead of, you know, like say for instance working with the IBM. Now,like I was telling you earlier that there is one small issue it's almost now two months I am working with IBM and still they don't know, you know, how to fix it. So, if a commercial tool cannot solve the problem and the vendor does not know how to fix it, so what good is that tool even though, you know, I am paying them for support and have purchased that.” <u>(negative - sanctioned) (positive - non-sanctioned)</u></p>	<p>cannot solve the problem and the vendor does not know how to fix it, so what good is that tool even though, you know, I am paying them for support and have purchased that.”</p> <p>“Interviewer: So, in comparison, would you be able to find support on like Eclipse easier? Interviewee: Yes. If...Because it's open source right so there are so many public forums and most likely, the issue you are experiencing somebody else has already experienced. And if not, you can always post a question and sooner or later you would get an answer.”</p> <p>“Like for instance, in banks, banks would use all these like Websphere, Weblogic application servers, they will not use Tomcat but things have started changing now because earlier the issue was that they needed somebody to indemnify because of that nobody would use open source, so things have changed now so commercial support is available for Tomcat, Apache, for all these defacto industry standards.”</p>

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	<p>“Interviewer: So, in comparison, would you be able to find support on like Eclipse easier? Interviewee: Yes. If...Because it's open source right so there are so many public forums and most likely, the issue you are experiencing somebody else has already experienced. And if not, you can always post a question and sooner or later you would get an answer.” <u>(positive - non-sanctioned)</u></p> <p>“So here what we are trying to achieve is to solve the problem and if the problem can be solved effectively using using, what do you call, substandard, by substandard means then so be it. Because that...idea is not to break the rules, the idea is to solve the problem, you know, how effectively the problem can be solved and by what means. So, that's the idea.” <u>(negative - sanctioned)</u></p> <p>“If I am using a framework for instance, uhm, I was this problem now we have <business application name> right, so the IMS database is not relational, so something closer to it is Cassandra. Now this Cassandra would run on a specific JVM, which, Websphere will not support. Because Websphere JVM is always two levels behind the current JVM, so, and if, and this is Cassandra by the way is the industry standard, and if my solution uses Cassandra , and that's the only thing I can use, and which WebSphere will not support, so then what my options are?” <u>(negative - sanctioned)</u> <u>(positive - non-sanctioned)</u></p>	

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Category & Process	Antecedents	Moderators and Mediators
	<p><u>Previous Use (Past Experience)</u></p> <p>“...mostly it's a Tomcat you know like the one...Tomcat, uhm, I prefer using because of the, you know, more experience I have on it and extensibility...” (<u>past non-sanctioned use</u>)</p> <p>“(referring to proclivity to re-use previously used solutions)Yeah, obviously, more likely. And it also, depends upon, you know, your past experience, so, uhm, in past I have worked with CBS, PBCS, ClearCase, Subversion and in most of the places, you know, they got rid of the ClearCase and moved to Subversion. So, naturally nobody questioned, you know, like why they stopped using ClearCase and moved to Subversion. And so, if you have more experience in something so you are also more inclined to use it, you know, whether it's standard or not.” (<u>past non-sanctioned use</u>)</p> <p><u>Other Factors</u></p> <p>“Interviewer: Do you know if there are any penalties for not complying with <Organization Name> I&IT standards or policies? Interviewee: I haven't heard of anything.” (<u>governance and accountability</u>)</p>	
Technical User (Interviewee 08)		
<p><u>Hidden Adoption</u></p> <p>“Version control. Most if the time I use Subversion.”</p>	<p><u>Technical Factors</u></p> <p>“Depending on, I mean, if someone have more experience with the tools</p>	<p><u>Technical Knowledge</u></p> <p>“Uhm, actually it's depend on, it's not...from actually depend on the</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
<p>“Testing tool. Just Junit.”</p> <p>“But no, when I work on the <organization name> they don't use the Rational tools. They use Eclipse.”</p> <p>“Interviewer: Let's say you are considering again an innovative solution like JBOSS, knowing that there is a standard in place and the standard mandates the use of a particular product, would you still go ahead with an innovative solution like JBOSS as long as you immediate management is in agreement? Interviewee: Yes (laughs).” (<u>shared adoption</u>)</p> <p><u>Adoption Process</u></p> <p>“Interviewer: OK. Are there any occasions when a team member like you, a developer, can propose a tool? interviewee: Of course, yes. Depending on, I mean, if someone have more experience with the tools and get more result, faster, efficient work, yeah, we adopt it and we use it.” (<u>user-driven adoption</u>)</p>	<p>and get more result, faster, efficient work, yeah, we adopt it and we use it.” (<u>positive - non-sanctioned</u>)</p> <p>“The features, more feature making the developer more easier to make it faster work. And I think the developer would likely to use it.” (<u>positive - non-sanctioned</u>)</p> <p>“Depend on the project, if the project wanted to be delivered fast, probably I would pick up the Eclipse.” (<u>positive – non-sanctioned</u>)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“Interviewer: For example, you mentioned Eclipse, Eclipse is a very very... Interviewee: <u>popular</u> Interviewer: ...widely accepted, popular tool but according to the standard, it says if you are going to use an integrated development environment in a JAVA shop it is either Rational Application Developer or Rational Software Architect which incidentally they're based on Eclipse. Interviewee: Yes, it is.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Uhm, actually it's depend on, it's not...from actually depend on the developer experience. If they just prefer using open source like Eclipse, Eclipse and IT tools they are more familiar with that because then they have lots of experience to do I mean adding the plug-in and more future for Eclipse, for the developer who have a very strong I mean</p>	<p>developer experience. If they just prefer using open source like Eclipse, Eclipse and IT tools they are more familiar with that because then they have lots of experience to do I mean adding the plug-in and more future for Eclipse, for the developer who have a very strong I mean background of science they'll probably like using Eclipse.” (<u>technical user</u>)</p> <p><u>Awareness</u></p> <p>“Interviewer: When you went ahead with Subversion or Eclipse, did you know that there was a standard in place saying that you should be using RAD or ClearCase? Interviewee: No, I haven't checked it out. Or even I don't know. Nobody told me. No, nobody.” (<u>low awareness - sanctions</u>)</p> <p>“Interviewer: Do you know if there are any penalties for not complying with corporate policies? Interviewee: No. interviewer: You don't know or there are no penalties? interviewee: Probably they do have penalties but I don't know for the details.” (<u>low awareness – sanctions</u>)</p> <p>“Interviewer: When you say the tool help you do your work how...what are some of the other criteria that you think about? So, you are looking at a tool and you are saying this tool help me do</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>background of science they'll probably like using Eclipse. Because if they want if for specific if they want this feature and they can download it and get it.” (<u>past non-sanctioned use</u>)</p> <p>“Interviewer: Are there any occasions when a team member like you, a developer, can propose a tool? Interviewee: Of course, yes. Depending on, I mean, if someone have more experience with the tools and get more result, faster, efficient work, yeah, we adopt it and we use it.”</p> <p>“Well, I think it depends on developers' experience. For example, they do have been working on a tool, for example Eclipse tool a couple of years, they feel more comfortable and they are going to work more fast. This is I think is the major thing to impact why we use not following the <i><central unit name></i>, I mean <i><organization name></i> policy. This is my main point.” (<u>past non-sanctioned use</u>)</p> <p><u>Other Factors</u></p> <p>“For example, I, high level from the, high level from the project manager they found the <i><organization name></i> standard tools is such and such and such and use the Rational tools but the problem in each <i><business area></i> they do have different <u>budget</u>. To buy and maintain license is <u>very expensive</u>. Depend on the <u>budget</u> of <i><business area></i>.” (<u>budget related</u>)</p> <p>“Uhm...For the tool of course it is</p>	<p>my work better. What are those things that it would help you do better?</p> <p>interviewee: Sometimes you do it better you said you are already familiar with the tool. And compare the <u>new tools</u> and look into features what can do what cannot do and which one you like to do.”</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 1)**

Category & Process	Antecedents	Moderators and Mediators
	<p>free, I mean, for the developer if it's open source then of course that will be very good choice because you <u>don't need to pay</u> the money right?" <u>(budget related)</u></p> <p>"Interviewer: Do you know if there are any penalties for not complying with corporate policies? Interviewee: No. Interviewer: You don't know or there are no penalties? Interviewee: Probably they do have penalties but I don't know for the details. Interviewer: OK. Have you heard of anybody who was punished because that person used an unapproved tool? Interviewee: No, I haven't. At least I haven't heard any. Did you hear that? I don't know (laughs)." <u>(governance and accountability)</u></p>	

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
Immediate Manager (Interviewee 15)		
<p><u>Hidden Adoption</u></p> <p>"So, sometimes there is no quick solution but if things aren't on the mandatory VOR you find a way to get them in, uhm, the other way, uhm, I don't know if that's a...</p>	<p><u>Technical Factors</u></p> <p>"(ease-of-use, lack of support) Because the tool, uhm...the tool was difficult, wasn't communicated appropriately, uhm, it's actually a pretty good tool. Uhm, but I think</p>	<p><u>Technical Knowledge</u></p> <p>"I want to start getting, you know, people to start thinking differently from the architecture group right. Their mandate it seems is to slow down my business and stop me</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
<p>(laugh)...there are other ways but, uhm...you know...something probably worth not putting it here.”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“(referring to rejection of a sanctioned solution in many clusters) right now we have Clarity, I don't know if you know Clarity, only three Clusters adopted Clarity.”</p> <p>“...so they weren't brought on board, they weren't, they were told versus...being, uhm, you know, asked about the tool. So, they were told, oh, you need to use this tool and ignored (the recommendation).”</p> <p>“(rejection of mandated processes) Interviewer: There are a lot of uhm, rules saying that on certain occasions you are mandated to do the TRA (threat risk assessment) and the PIA (privacy impact assessment) etc. do people always follow those rules? Interviewee: No. So, again I don't think you can mandate a TRA or a PIA, right. Uhm, at the end of the day the business owner can accept the risk, uhm, and say, I accept the risk, of not doing a TRA or not doing a PIA because there's, all that is is legal implications from a PIA perspective, uhm, I can breach privacy, it doesn't mean I can't do it, I can do it and just have legal implications of it, right.”</p>	<p>the marketing was off, the communications were off, uh, some clusters had preferences and they just, the change management piece wasn't there...” <u>(negative - sanctioned)</u></p> <p>“(process issues) But the way it's set up there is one instance, they all have to agree to, uhm, let's say they want to do a report change, they all have to agree to that, they all have to say yes, this is what we agree to. That's what I want to move away from in the new tool.” <u>(negative – sanctioned)</u></p> <p><u>Other Factors</u></p> <p>“Because there is no authority, right. So, there is no authority at the corporate governance levels, there is no teeth, right. So, you can go to architecture review and they can say, oh, you will need to do this and...so what? Of course, you can't force it, right. Uhm, or at least there is the perception.” <u>(governance and controllership)</u></p> <p>“I can't go and police everybody. It should say mandated. Actually, now the directive does say, uhm, any tool must be approved by the Corporate CIO. So <i><Corporate CIO's Name></i>, if someone wants to come in with a tool that's different from whatever we bring in, they need to get that approval from the Corporate CIO.” <u>(governance and controllership)</u></p> <p>“It all comes down to not having sufficient policies or guidelines or just standards in place. So, if the policy or whatever we are putting the</p>	<p>from going forward.” <u>(management)</u></p> <p>“A lot of architects out there are just like the, you know, provide comments for the sake of providing comments.” <u>(management)</u></p> <p>“So, when I look at the corporate architecture, you know, our chief architect should be a person that knows the whole landscape of the <i><Organization Name></i> architecture. Everything that's coming through, but yet we do the same old architecture over and over and over.” <u>(management)</u></p> <p>“Take the architects, you could probably get rid of 50 architects in the <i><Organization Name></i> and streamline like the service of the <i><Organization Name></i>...much better. All you need is a few key architects that can help you.” <u>(management)</u></p> <p>“You know what for one artifact they have decided to get rid of, the system architecture document, the SAD, was probably the best artifact that showed the full picture of what your logical, what your system should look like. And they got rid of that artifact.” <u>(management)</u></p> <p>“I mean, yeah, if you have the right skill set, you are going to get the right things done. I think people are sometimes in the wrong positions in the <i><Organization Name></i> and it's</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
	<p>directive or standard did say that this is a mandated tool, well if <Cluster Name> went and implemented Microsoft-Project Server, then that could have had repercussions.” (<u>governance and controllership</u>)</p>	<p>probably to do with, uh, <Organization Name> mentality and just staying in the same job for their whole life and people, you know, becoming, complacent and the whole union aspect of bumping and here because of seniority not because that skill doing something...” (<u>technical user</u>)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Interviewer: Does the project size make a difference? Interviewee: I think it makes a difference, uhm, because you can scrap a \$39,000 tool, uhm, easily. Versus putting hundreds of thousands of dollars into the governance and then realizing oh well that's not the tool wanted to use.”</p> <p><u>Awareness</u></p> <p>“The directive may say something but what are you going to do if I break the directive? What are the implications of that? Are you going to come down and get rid of my tool? Are you going to come and, uhm, you know, someone is going to get fired?” (<u>low awareness – sanctions</u>)</p> <p>“And then we have our system development folks, this was from my <Cluster Name> days, they are going through all FDDs, TDDs, DDDs, you know, the detailed design documents, technical design documents, functional design, they are doing</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
		<p>all this work, and then they have to go to architecture. So, they have done all this work in their own templates, and then architecture says well, we can't accept any of that so, you need to do in all these artifact templates. So, then they have to reverse engineer all that crap, put into architecture documents, it's nuts. If my systems folks are doing all these documents anyways, just hand that to the architects and let them figure out how they should re-edition and write it in a service to their client. They shouldn't be saying well, here is our standard template, go fill it out. It's stupid." (low awareness - sanctions)</p> <p>“Interviewer: So, if somebody is using agile in the <Organization Name>, they are just breaking the mandate, they are not doing it the... Interviewee: Are they? Or because it's out of scope, there is no mandate for it, so they are able to do it. Interviewer: Is that your interpretation? Interviewee: That's my interpretation. It doesn't say that you are not to do agile. It just says we don't have the standard on agile. It's out of scope for this document.” (low awareness – sanctions)</p> <p><u>Help and Support Availability</u></p> <p>“I don't have a solutions branch, I don't have people to support my solution so my mandate, if</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
		<p>anyone wants a service or a tool, it's coming in as a software as a service.”</p> <p>“(Referring to provision of help and support by internal or external communities or individuals) OK, uhm, I don't know. It depends on how good that centre of excellence is at doing agile or .NET or, because the .NET centre of excellence to me is a joke right now. Uh, because of their track record, even <Branch Name> tried to use them to create our solution for our integrated business tool and they failed miserably. You have Sharepoint service out of <Cluster Name> and we brought them into trying to do some stuff with Sharepoint, they even brought in Microsoft experts and they couldn't do it. We had an intern an he did it. And it was noting for him.”</p> <p>“Interviewer: Do you think having a knowledgeable individual has an effect that you can tap into as a resource? Interviewee: Definitely. I mean, yeah, if you have the right skill set, you are going to get the right things done.”</p>
Senior Manager (Interviewee 19)		
<p><u>Hidden Adoption</u></p> <p>“So the pattern I see again and again you know, there is a rebellion against how long it takes the centre, in this case the cluster, to provide to the</p>	<p><u>Technical Factors</u></p> <p>“Part of it is...the centre, uhm, establishing the standards without knowing what's happening at the coalface so to speak.” <u>(negative –</u></p>	<p><u>Project Size, Visibility and Criticality</u></p> <p>“Uhm, and it seems to me that there is (sighs)...lots of exceptions but two big classes here. One of,</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
<p>branches and divisions of the ministry what they need so they go rogue and do their own thing. Then later on there has to be another project to dismantle it or take it over, or bring it in replace it, so you end up doing it twice.” (<u>shared adoption</u>)</p> <p>“And I see that again and again and again. On smaller ones...there are examples of projects where the branch or the division went outside, got frustrated with how long it was going to take the cluster to do something went out and got their own solution, just went out put an RFP (request for proposal), got a vendor to build something.” (<u>shared adoption</u>)</p> <p>“I know of cases where businesses contrived to get IT solutions...uhm, implemented without going through the process. So, if they are small, if they are Class C then the rules kind of allow them to be, you know, just cluster governed” (<u>shared adoption</u>)</p> <p>“You now have groups in the cluster doing support work, enhancement work even development work for systems that are you know a completely mixed bag, well you know, I mean it's every possible technology you can imagine, you can find in that mix somewhere. Uhm...so there is two pieces to this, one is...uhm...that the process is, the development and support part, the methodologies used, the de-facto methodologies what they are actually doing on the ground, is different in every little pocket. Uhm...because my own conclusion, so this is just my own...belief that it's because these</p>	<p><u>sanctioned</u>)</p> <p><u>Previous Use (Past Experience)</u></p> <p>“You now have groups in the cluster doing support work, enhancement work even development work for systems that are you know a completely mixed bag, well you know, I mean it's every possible technology you can imagine, you can find in that mix somewhere. Uhm...so there is two pieces to this, one is...uhm...that the process is, the development and support part, the methodologies used, the <u>de-facto methodologies what they are actually doing on the ground</u>, is different in every little pocket. Uhm...because my own conclusion, so this is just my own...belief that it's because these groups weren't constructed out of the standards and approaches out of the centre or even the ones the clusters created uhm, <u>these are the little IT departments that every program area used to have.</u>”</p> <p>“Because it takes so long and costs so much to come to the cluster. Sometimes it's because <u>they know how and they are familiar</u> I mean, you know as I do, <u>if you are familiar with something</u>, like Access and it meets your needs you can often in a day or two have something put together that does the job.”</p> <p><u>Other Factors</u></p> <p>“Uhm, and it seems to me that there is (sighs)...lots of exceptions but two big classes here. One of, uhm environments where they've had large systems for a long time and</p>	<p>uhm environments where they've had large systems for a long time and others where there hasn't been major IT funding and <u>the flavour of the system is smaller, more recent, newer, newer technology but smaller and more recent is a major major factor.</u>”</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
<p>groups weren't constructed out of the standards and approaches out of the centre or even the ones the clusters created uhm, these are the little IT departments that every program area used to have.”</p> <p>“(recognition of hidden adoption) Interviewee: So by adopted do you mean how they get selected and chosen or how they actually find their way into the active use? interviewer: It's bang on. So both. Who initiates the process... Interviewee: Because it's a different...”</p> <p>“(referring to rationale behind adoption of non-sanctioned solutions) Because it takes so long and costs so much to come to the cluster. Sometimes it's because they know how and they are familiar I mean, you know as I do, if you are familiar with something, like Access and it meets your needs you can often in a day or two have something put together that does the job.”</p> <p><u>Adoption Process</u></p> <p>“Part of it is...the centre, uhm, establishing the standards without knowing what's happening at the coalface so to speak.” (<u>top-down adoption</u>)</p> <p>“(Referring to a consultation process directed by the centre) So when the group first met, to start to have a workshop, to start discussing this, uhm, the person from the centre handed out the uhm, discussion document which looks suspiciously like the finished product that they</p>	<p>others where <u>there hasn't been major IT funding</u> and the the flavour of the system is smaller, more recent, newer, newer technology but smaller and more recent is a major major factor.” (<u>budget related</u>)</p> <p>“Uhm, I've gone to the architects in couple of different clusters on different occasions and said to them we are going to put this RFP (request for proposals) out, I need you to tell me what the architecture restrictions are. If there are certain platforms, certain environments, uhm, that are acceptable, certain ones that aren't, especially if there are certain ones that aren't, you need to tell me that because we'll specify in the RFP that the solution has to fit these parameters. Uhm, and the answer that comes back is, oh well no we don't have, you know we don't have any actual rules that say you can't do this or that. Uhm, so it tends to be done by putting up barriers afterwards. Very very inefficient.” (<u>governance and accountability</u>)</p> <p>“No, no, they did it deliberately to circumvent those rules because the perception was if we knuckle under to, if we conform to all those rules and all that governance, this will fail. But the governance will cause the project to fail. Because it will be too costly. But more than that and so <u>often it comes down to the time</u> more than the money.” (<u>performance related concerns</u>)</p> <p>“And I see that again and again and again. On smaller ones...there are examples of projects where the branch or the division went outside,</p>	

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Category & Process	Antecedents	Moderators and Mediators
<p>want to hand off (throws the document on the table) (laughs). So, uhm, you know, they've, they've got, they want to have a discussion around what the priorities they're proposing and that's OK, I mean, I have no objection to, you know, putting a straw dog as a discussion point, uhm, but looking at the schedule, the number of people involved, the complexity of these consultations, and the expectation that we are going to end up with the finished product in three meetings, we are pretending to consult here. It's not real." (<u>top-down adoption</u>)</p> <p>"Uhm, so you know we pushed back a fair but the juggernaut was on its rails (laughs) that the product is going to come out. I don't think that they particularly got it wrong, but to tell us well <Senior Management Committee> is taking a look at that so you know those overarching uhm, strategic priorities may change. So, why are we putting a strategy together if the priorities may be about to change? Uhm...that's all I say about that (laughs)." (<u>top-down adoption</u>)</p>	<p><u>got frustrated with how long it was going to take the cluster to do something</u> went out and got their own solution, just went out put an RFP (request for proposal), got a vendor to build something." (<u>performance related concerns</u>)</p> <p>"So the pattern I see again and again you know, there is a <u>rebellion against how long it takes the centre, in this case the cluster</u>, to provide to the branches and divisions of the ministry what they need so they go rogue and do their own thing. Then later on there has to be another project to dismantle it or take it over, or bring it in replace it, so you end up doing it twice." (<u>performance related concerns</u>)</p> <p>"Because it <u>takes so long and costs so much</u> to come to the cluster. Sometimes it's because they know how and they are familiar I mean, you know as I do, if you are familiar with something, like Access and it meets your needs you can often in a day or two have something put together that does the job." (<u>budget related</u>) (<u>performance related concerns</u>)</p> <p>We've become slaves to the process. Because it's the process it means you know we have to do it and can't be questioned or challenged, sometimes. Or we act that way. Couple of examples. Uhm...when we go through the Enterprise Architecture checkpoints with a design with a solution, and get that approved, why is it necessary the next time we are coming through when we got a new solution but</p>	

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
	<p>much of it is the same as the last one that all that part that went through and got approved last time has to go through and get approved again...You know, why is it not acceptable to establish that this part of it matches the previous one so we are only going to really examine the delta. (<u>governance and accountability</u>)</p> <p>“Uhm, here it's a you know body after the side that reviews things, criticizes things, demands changes in the end blesses it uhm, and then it's after the side and really has no control even no knowledge of what physically happens in production.” (<u>governance and accountability</u>)</p>	
Corporate Staff (Interviewee 18)		
<p><u>Hidden Adoption</u></p> <p>“So, for example, if a development environment tool was needed and what's provided as standard does not meet the requirements of the project someone might download something and try using it.” (<u>silent adoption</u>)</p> <p>“In the communications area, things like free, uhm, graphics programs like, I am not sure if you are familiar with Gimp, but that's free and it does a lot more than say, uhm, your basic paint, or if what's needed to do the work is not available and uhm...in design or that set of suite is too expensive, then the folks working with that would just download it and use them.” (<u>silent adoption</u>)</p> <p>“Interviewer: So, on those occasions</p>	<p><u>Technical Factors</u></p> <p>“(Referring to technical requirements) If the tools that are offered as standard don't uhm...<u>don't meet the requirements</u>, then the, then usually it's the people who are working with the tools that will introduce things to try different things. So, and generally speaking, it will usually be free. Because that way they don't have to go through so many levels of approvals needed to get.” (<u>negative – sanctioned</u>)</p> <p>“If there are, if they are <u>easier to use</u>, if they <u>add additional functionality</u>...uhm beyond the standard set, something that <u>makes things easier to do</u> so, an example might be what you would consider a search and replace. So if you are</p>	<p><u>Technical Knowledge</u></p> <p>“Interviewer: OK. Does it depend on the technical skill level of the person? Interviewee: ... Yes, I would say so. Uhm, I think people tend to use, my experience, <u>I think people tend to use what's available to them, what they've been told, uhm if their skill level a little lower. As their skill level elevates they are kind of a little bit more uh willing to explore different options.</u> Because they are more comfortable with it and with I guess accepting the risk of trying something different. To a point, once they become a manager I think their stance would change (laughs)” (<u>technical user</u>)</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

Category & Process	Antecedents	Moderators and Mediators
<p>when, uhm, technical users disregard the existing standards and use something on the basis of its easier to use, it has more functionality, it helps them get their job done, uhm, who do they tell about it? Do they... Interviewee: They generally don't. Interviewer: They generally don't? OK. And why do you think so? Interviewee: Uh, because I think it would be...probably their first thought is that well it's not such a big deal. Because it's free, because it doesn't require perhaps installation because it's portable, uhm, their perception is that they are only going to use it and then no-one really needs to know." (<u>silent adoption</u>)</p> <p>"If the tools that are offered as standard don't uhm...don't meet the requirements, then the, then usually it's the people who are working with the tools that will introduce things to try different things. So, and generally speaking, it will usually be free. Because that way they don't have to go through so many levels of approvals needed to get."</p> <p>"Interviewer: Are they usually aware of the standards? Interviewee: Yes. Interviewer: Yes? So even though they know they still...(ignore the standard and use non-sanctioned solutions) Interviewee: I would say so."</p> <p>"I think that the reluctance to...to let anyone know who doesn't need to know is more bureaucratic red tape or limiting their ability to use it in the future if the risk of manager saying no you shouldn't be using it. Because</p>	<p>working with code that does search and replace, that you need to take out a variable name or something like that, uhm...another tool might provide you more ability to customize that search and replace to narrow down what you are going to do with that functionality so that you can be more specific. Uhm, and that functionality might not exist in the standard toolset. Uhm...I think one of the examples I might bring up is uhm, if you are working with straight code and uh, a text editor is very useful. But there are lots of different text editors out there. So, there are particular types of text editors that actually do much more. You can search in hex or you can search in binary search different code-sets or and sort of take that apart...It's, this functionality is available out there in the tools that are free uhm, but the standard toolset might not have that." (<u>positive – non-sanctioned</u>) (<u>negative – sanctioned</u>)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>"I would probably want to mention that there is an element of that's not, not would not quantify, could not be quantified as, uhm, technical value. There is...I would say <u>aesthetic or emotional appeal of some tools</u>. Uh...<u>tools that just look better</u> for example. Yeah, if you had two tools that provide the exact same functionality but one looked better or you can even argue easier to use because you know it was more intuitive, they might pick that. Because it...(unclear)...uhm...we tend</p>	<p><u>Project Size, Visibility and Criticality</u></p> <p>"Interviewer: <Organizational Standard Number>, it's a standard, the platform standards document and if you go and look at that document it specifies let's say if you are a JAVA shop these are the tools you use it says. Uhm, knowing that do you they would be more or less likely to try something else? Interviewee: <u>It depends on...uhm...the project. The size of the project, the visibility of the project and whether using something else would significantly impact the project itself</u>. Or whether it would just be in to supplement the project. <u>So if it was something that was much more visible, uhm...my sense is that they would definitely, uh, defer to the standard</u>. Because questions will be asked if otherwise and it will be more likely that they'll need to justify not using it versus using it. Uhm, and if they feel strongly that tool is, that would definitely benefit them then they would go through the whole process but they understand how much of an administrative overhead burden that might involve if they were to go that route trying to get an exemption."</p> <p>"I think that they uhm, I think that their inclination would be to the quickest sort of route. And <u>depending on how visible it is uh, the project I mean, the benefits</u></p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 2)**

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<p>if they don't ask then they haven't been denied. I think that's the thinking.” (<u>silent adoption</u>)</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“If the <u>tools that are offered as standard don't uhm...don't meet the requirements</u>, then the, then usually it's the people who are working with the tools that will introduce things to try different things. So, and generally speaking, it will usually be free. Because that way they don't have to go through so many levels of approvals needed to get.”</p> <p>“So, for example, if a development environment tool was needed and <u>what's provided as standard does not meet the requirements of the project</u> someone might download something and try using it.”</p> <p><u>Adoption Process</u></p> <p>“But in terms of, in relative terms some clusters have access to more, uhm, tools, uhm, more development tools, more access to more innovation, uhm, options. Uhm, they have, they put it to...well, before all of the server consolidation, some clusters and areas had, uhm, their own data centres and their own areas where they could, uhm, try things out before actually, uhm, investing and creating, uhm, projects around them. And that ability is significantly diminished since.” (<u>top-down adoption</u>)</p>	<p>to in the < <i>Organization Name</i> > to look to strip away those kind of things and evaluate tools purely on their technical, uhm, merits. And when you do the evaluation, all of the things that come up are, on paper they look great. But people don't like to use them, uhm, <u>iPads for example</u>, uh, it's another thing they're, you got your Blackberry, you got your iPads, on paper the Blackberry Playbooks are great, phenomenal, uhm, technically superior, they are more secure but the iPads just look better or they are easier to use. So you feel good about using them. <u>You look cooler when you are using them</u> or whatever it is the non-quantifiable technical value that we as consumers able to choose, it doesn't appear in the organization. It doesn't factor in. That it's such an important influence in people's decisions to use something, that we seem to ignore it. And we question why people choose to ignore our decision to go with the technically superior.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“So, tool-wise, uh, it's generally those who are working with the tools that, uhm, introduce them. They had either <u>worked with them in the past or have had experience with them in personal life or previous life</u>. And they bring that knowledge and experience to a new project.”</p> <p>“(Referring to non-sanctioned solutions) Or use what they know work because they have had experience with it, uhm, and it's free” (<u>past experience – unsanctioned</u>)</p>	<p><u>would have to be pretty significant for them to go through the rigour</u> and it does seem that (unclear) amount of rigour that's needed, so, uh, I would not say that they would completely rule it out but the benefits need to be pretty significant.”</p> <p><u>Awareness</u></p> <p>“If the tools that are offered as standard don't uhm...don't meet the requirements, then the, then usually it's the people who are working with the tools that will introduce things to try different things. So, and generally speaking, it will usually be free. Because that way they don't have to go through so many levels of approvals needed to get.” (<u>awareness – non-sanctioned</u>) (<u>low awareness - sanctions</u>)</p> <p>“They are not really thinking in terms of uh, the security implications, or if they are opening up the network to a vulnerability. They are also probably not think too much about licensing or the impacts of using this tool or whatever.” (<u>low awareness – sanctions</u>)</p> <p><u>Help and Support Availability</u></p> <p>“So, again searching the Internet, the biggest source of information is usually forums. Uhm, and it's usually starts with a questions and then following with a bunch of answers that may or may be not conflict with each other. And you try to sort of figure out what the</p>

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<p>“Uhm, managers generally don't suggest things. Uh, from what I've experienced, my experience has been that the managers get caught up in more providing direction than in actual providing that level of guidance around what should be used or what should not be used. Uhm, a lot of that is also...uh...<u>a lot of that has also been uhm...determined by what is standard, what is available in the <Organization Name> to for acquisition, purchase of what not</u>” (top-down adoption)</p> <p>“If the tools that are offered as standard don't uhm...don't meet the requirements, then the, then usually <u>it's the people who are working with the tools that will introduce things to try different things.</u> So, and generally speaking, it will usually be free. Because that way they don't have to go through so many levels of approvals needed to get. (user-driven adoption)</p> <p>“On, in terms of higher level direction, it usually comes from the top, so executive sponsors, I wouldn't even say...like director level perhaps, it usually comes from like the CIO or director that provides that high level champion of the new technology. Without that nothing usually moves.” (top-down adoption)</p> <p>“Interviewee: So, you are asking me what in my opinion influences CIOs decisions? Interviewer: Yes. Interviewee: Uhm, so, part of my experience in <Cluster Name> was actually to work as the EA (executive</p>	<p>“Interviewee: (When asked about influences on adoption decisions by decision makers) Definitely their peer group. So, other CIOs, uhm, vendors, their senior management team...uhm, and their own <u>experiences.</u>”</p> <p>“Interviewee: (When asked about influence of past decisions) Uhm, I don't think that any CIO that I am aware of would base a decision purely on their past experience. Uhm, but it would, it may influence them as you said.”</p> <p><u>Other Factors</u></p> <p>“I think that uh...the use of these tools is genuinely because that <u>they feel that it helps.</u> And if they think that it will help others then they will share it.” (performance related concerns)</p> <p>“They choose to or take upon themselves to adopt it themselves because <u>they see the value.</u> Not because of any kind of peer pressure.” (performance related concerns)</p> <p>“Uhm, secondary to that would be that they think that it is probably <u>too much work to try to get approval or try to even introduce the idea that they are trying to use this.</u> And it is they see probably it is uhm, as a roadblock to let anyone else know what it's, what they are doing, what they need to do.” (performance related concerns)</p> <p>“Interviewer: OK. Uhm, do you</p>	<p>best solution is or the trend is. Uh, similarly with who else is doing it, at the time I had a very large circle of friends and colleagues not all working in the <Organization Name>. But, who I knew were in technical areas. And I would ask them what they would be doing or how they would do it.”</p>

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<p>assistant) to CIO. So, I think I have a bit of a insight into that perspective. Interviewer: It's great (laughs). Interviewee: (Laughs) Definitely their peer group. So, other CIOs, uhm, vendors, their senior management team...uhm, and their own experiences.” (<u>top-down adoption</u>)</p>	<p>know if there are any penalties for not complying with an <Organization Name> I&IT policy or standard? Interviewee: Penalty of not getting your project approved. And not getting a formal endorsement on it. Uhm... ..I think there are uh, I think there are s... what you would call I guess uh... unintended penalties, such as uhm, the necessity to redo what you had to do. Because you didn't have approval for it. To go back to drawing board. That's a bit of a penalty (laughs).” (<u>governance and accountability</u>)</p>	

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Technical User (Interviewee 17)		
<p><u>Hidden Adoption</u> “(Referring to the selection of a non-sanctioned tool) It was basically on my recommendation because, uhm, the particular group of staff we had when we introduced it, uhm, there was some HR problems and couldn't trust them to actually use, uhm, say Subversion or something. There had to be a GUI tool and this one was a lot more robust than what the Microsoft one shipped with. So, it was about that.”</p>	<p><u>Technical Factors</u> “Uhm, so, it's been several re-orgs but back when that was an issue we were using Microsoft SQL server because, we were low enough volume but <u>it was mostly fire and forget</u>. We had a sort of general system admin, couple of them right, so among other things they took care of the database servers. But we didn't need a dedicated DBA.” (<u>positive – non-sanctioned</u>)</p>	<p><u>Technical Knowledge</u> “Interviewer: So, what differentiates those managers that say go ahead implement that solution I trust you versus the other ones who want to strictly follow the standards? Have you noticed any differences between those people? interviewee: Yes, the managers who tended to ignore the standards, the bad standards especially, have tended to have</p>

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<p>“So yeah, cost would be another factor. Cost also plays into, uhm, approval processes. <u>If you can get something for no cost then you don't even necessarily have to ask anyone.</u> And depending on the cost, the approval process can be anywhere from annoying to...basically impossible.” (<u>silent adoption</u>)</p> <p>“(Use of a non-sanctioned solution) Uhm, so, it's been several re-orgs but back when that was an issue we were using Microsoft SQL server because, we were low enough volume but it was mostly fire and forget. We had a sort of general system admin, couple of them right, so among other things they took care of the database servers. But we didn't need a dedicated DBA.”</p> <p>“Personally my view is if the standard is obviously not designed for my scenario and adhering to the standard would either cost my clients far too much or it just outright kill the project if the clients couldn't afford it <u>then ignore the standard.</u>”</p> <p>“Because again, you know, we are a small group we are doing all sorts of small projects we weren't part of that say 5 percent, you know, for which the standards were created so, you know, <u>if we were to adhere to the standards we would never do anything.</u> Like sometimes, that was literally that way.”</p> <p>“(Referring to use of non-sanctioned solutions) So web people across the <Organization Name> they have local admin rights <u>they can install it</u></p>	<p>“(Referring to Python and Perl, the interviewee's preferred scripting solutions)...It's a very nice interactive environment, it's good for sort of data managing, it's a bit more regular than Perl.” (<u>positive – non-sanctioned</u>)</p> <p>“(Referring to use of non-sanctioned solutions) In some cases it's just because it's <u>whole a lot less painful to use that rather than the mandated standard, that pain can be administrative pain, it could be, uhm, scheduling pain, or it could just be lousy technology just painful to have to use right.</u> That's a big factor as well. Because <u>a lot of the enterprise software, anything that falls directly out of the basic procurement process is a...it tends to do all the features in a paper evaluation but it just tends to be horribly designed and horribly implemented and extremely painful to actually configure and make it do what the vendor said it would do right.</u> There is no job satisfaction in using it.” (<u>positive – non-sanctioned</u>) (<u>negative - sanctioned</u>)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“(Talking about various influences on solution selection) And then there is you want to learn something.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“So with Perl, that was around before the, those standards being around so, we are using that for years. (Referring to permissions) No not really, because we already had</p>	<p><u>strong technical backgrounds</u> themselves. And they were a little more focused on solution delivery than on processes and politics.” (<u>management</u>)</p> <p>“So, there is a huge disconnect between the folks in the centre and the folks who are actually trying to do work. And the governance processes tend to be capricious and arbitrary even within the Cluster like enterprise change management, it's a nice idea but the way it is actually implemented is a huge screw-up.” (<u>management</u>)</p> <p>“Interviewer: Did you want to use Subversion? interviewee: Yeah, I would have wanted to at that time because it has functionality that this lacks but this one is a lot safer, we configured into a safer mode at the time.” (<u>technical user</u>)</p> <p>“(Referring to people who use non-sanctioned solutions) The ones who successfully break the rules repeatedly, they definitely tend to be <u>technically more competent.</u> Because if you break the rules and you trip and fall on your face then (laughs)...you have to have a judgement of what rules you can break and what rules you can bend and where you have to stay away from something.” (<u>technical user</u>)</p> <p>“There is a huge amount interesting stuff that will just never fly because, it's not just technical standards, there is also</p>

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<p><u>themselves</u>, if they don't and they're technically savvy then they get the portable apps versions, uhm, cause you need it to do your job. That's it.” (silent adoption)</p> <p>“They are actively prevented by the way our policies are, all our policies are towards creating these unmodifiable, monolithic mega systems. And everyone has to use the same thing nobody can actually customize for the work that they are actually doing. And you are not allowed to automate anything of your daily tasks. <u>Unless you go around and outside the system.</u>”</p> <p>“Interviewer: OK, I am going to go back to again something that you said earlier, because you said, I use Perl and I use Python. Uhm, why do you use Python? Interviewee: ...It's a very nice interactive environment, it's good for sort of data managing, it's a bit more regular than Perl. Interviewer: Is Python a standard? Interviewee: I doubt it.” (silent adoption)</p> <p>“Uhm, I actually got the first Linux computer and introduced there. Uhm, essentially a co-worker had been trying to do it through official channels and get approval. <u>And in my case I just installed it on a spare machine and asked the networking guys.</u> Before the centralization they were on the same floor, I just walked over and asked them to set me up on the network and I had a sort of work justification for it, they just did it and it worked.”</p>	<p>code bases established for that and had it deployed on various servers. There can be huge roadblocks if you are trying to do anything with ITS (Central IT service group) especially around Zone 1. Uhm, doing anything with ITS is a road block in itself.”</p> <p><u>Other Factors</u></p> <p>“So yeah, cost would be another factor. Cost also plays into, uhm, approval processes. If you can get something for no cost then you don't even necessarily have to ask anyone. And depending on the cost, the approval process can be anywhere from annoying to...basically impossible.” (budget related)</p> <p>“Right, so we've got like five, we have like five developers at the time, two of whom couldn't be relied on to tie their own shoelaces and then, you know, now we are going to have to get a dedicated server and keep something like TFS (Team Foundation Server)? So, one huge problem historically with <i><Organization Name></i> standards is that the standards were...uhm, developed with like the biggest five percent of the projects across the <i><Organization Name></i> in mind and with complete and outright disregard for literally everyone else. Same thing for the database standards for a long time. ORACLE or DB2 only. Oh gee great, do you want to fund licensing and the extra staff person we are going to need to keep it running? (laughs) Our org chart doesn't support adding an ORACLE DBA to keep it from crashing itself.” (budget related)</p>	<p>the HR realities because there is not a lot of technical staff in the <i><Organization Name></i>.” (technical user)</p> <p>“<i><Organization Name></i> standard images regularly run with horribly insecure software for weeks or months at a time before they get patched. That's something I feel uncomfortable with so I patch them myself.” (technical user)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Because again, you know, we are a small group we are doing all sorts of small projects we weren't part of that say 5 percent, you know, for which the standards were created so, you know, if we were to adhere to the standards we would never do anything. Like sometimes, that was literally that way.”</p> <p>“(Referring to the link between preference of non-sanctioned solutions and project size) It depends on the nature of the project. Well, for smaller projects it's definitely easier to do. Because the larger the project, the more eyes are looking at it. But also the larger the project the better the funding and the more sort of ancillary, uhm, project management and other staff there are to fight the battles and to sort of shepherd it through.”</p> <p>“(Justifying use of a non-sanctioned solution in a smaller</p>

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<p>“Interviewer: (Asking when the interviewee share the occasion of non-sanctioned solution use with his manager) Would you raise the bell and ask for permission or would you just use it? Interviewee: Depending on the context, uh, <u>if I were building some custom systems that was relatively small I would just use it.</u> Uhm, especially if it was going into Zone 2 as opposed to a Zone 1 system, if it didn't have extreme governance sort of inspection.” (<u>silent adoption</u>)</p> <p>“And well, getting a sort of real full-blown commercial meta-data repository is a very lengthy and expensive process and there is a whole lot of sole searching through and (unclear) analysis that used to be done across the Cluster and with the clients right to actually do something. We need to be off of it by September so, and I actually dig up an open source system and uh...because it actually has to be deployed on to someone's server room and so on, we actually had to go through the, oh we positioned it as a developer tool you know. Technically it is not but that allowed us to into the least onerous sort of open source approval process, just CIO approval and forget it right, don't tell anybody else. So, that's what we did.” (<u>shared adoption</u>)</p> <p>“If I had to do it over again, the thing here with the library, no I would not even mention it to them to my manager. I would've sort of taken the thing that my co-workers already used and just put it on my project and be done weeks earlier.” (<u>silent</u></p>	<p>“Uhm, so, it's been several re-orgs but back when that was an issue we were using Microsoft SQL server because, we were low enough volume but it was mostly fire and forget. We had a sort of general system admin, couple of them right, so among other things they took care of the database servers. But we didn't need a dedicated DBA.” (<u>budget related</u>)</p> <p>“(Referring to the use of a sanctioned solution) If you are a small shop you need to avoid that at all costs. Because you can't afford the maintenance bit.” (<u>budget related</u>)</p> <p>“Personally my view is if the standard is obviously not designed for my scenario and adhering to the standard would either cost my clients far too much or it just outright kill the project if the clients couldn't afford it then ignore the standard.” (<u>budget related</u>)</p> <p>“And well, getting a sort of real full-blown commercial meta-data repository is a very lengthy and expensive process and there is a whole lot of sole searching through and (unclear) analysis that used to be done across the Cluster and with the clients right to actually do something. We need to be off of it by September so, and I actually dig up an open source system and uh...because it actually has to be deployed on to someone's server room and so on, we actually had to go through the, oh we positioned it as a developer tool you know.</p>	<p>project) They are basically doing like surveying to gather some statistics, like there is nothing really important, it's not like there is personal information, you should not be held to the same sort of ridiculous set of hoops that something that is actually important should be held to.”</p> <p>“Interviewer: Would you raise the bell and ask for permission or would you just use it? Interviewee: Depending on the context, uh, if I were building some custom systems that was relatively small I would just use it. Uhm, especially if it was going into Zone 2 as opposed to a Zone 1 system, if it didn't have extreme governance sort of inspection.”</p> <p><u>Awareness</u></p> <p>“When I did look at the standards for virtualization they seemed to be oriented for the data centre and not to the developer work station.” (<u>awareness-sanctions</u>)</p> <p>“Interviewer: OK, I am going to go back to again something that you said earlier, because you said, I use Perl and I use Python. Uhm, why do you use Python? Interviewee: ...It's a very nice interactive environment, it's good for sort of data managing, it's a bit more regular than Perl. Interviewer: Is Python a standard? Interviewee: I doubt it.” (<u>low awareness-sanctions</u>)</p> <p><u>Help and Support Availability</u></p>

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<p><u>adoption</u>)</p> <p>“Uhm, when it comes to real security, like I would personally, I know some people who've actually broken the group policy desktops and actually replaced McAfee with other stuff. I would never go that far.”</p> <p>“<Organization Name> standard images regularly run with horribly insecure software for weeks or months at a time before they get patched. That's something I feel uncomfortable with so I patch them myself.” (<u>silent adoption</u>)</p> <p>Adoption Process</p> <p>“...partly sort of management and standards, partly our input and then a lot of sort of the ancillary tools as <u>whatever we decide to pick up and use</u>. Some, you know, for the version control system what we used was Sourcegear's Vault.” (<u>user-driven adoption</u>)</p> <p>“(Referring to top-down imposition of solutions) It's that they handed on them like Moses with the tablets and then they just walk away.” (<u>top-down adoption</u>)</p>	<p>Technically it is not but that allowed us to into the least onerous sort of open source approval process, just CIO approval and forget it right, don't tell anybody else. So, that's what we did.” (<u>budget related</u>)</p> <p>“(Referring to the rationale behind the use of non-sanctioned solutions) Uhm, in some cases...it's because...it's cheaper and faster and we are constantly under pressure to do something cheaper and faster.” (<u>budget related</u>)</p> <p>“And we see that with a lot of governance processes as well, where the governance processes no matter what is documented, if anything is documented, they are basically, ultimately they are arbitrary and capricious sort of and this is...one in particular the quote from running this governance process just this week was, you know, if you have any questions call us. Oh yeah, great so we are supposed to consult with you on everything? What's the process there? Doesn't really matter what process you tell us if we have to consult with you on everything (laughs).” (<u>governance and accountability</u>)</p> <p>“So, there is a huge disconnect between the folks in the centre and the folks who are actually trying to do work. And the governance processes tend to be capricious and arbitrary even within the Cluster like enterprise change management, it's a nice idea but the way it is actually implemented is a huge screw-up.” (<u>governance and accountability</u>)</p>	<p>“I think that's really going to, I think, given the <Organization Name> and my own experience in the <Organization Name> I think it's not going to be so much around technical platform, <u>it's going to be around what kind of staffing support and what kind of support model can I expect to have</u> for those servers and the applications deployed on them over the next 5 or 10 years and then pick a technology accordingly.”</p>

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	<p>“...when you go off to the centre and (laughs) one problem with process is is that anytime a process is established there is never any sort of quality control, there is never any follow up.” (<u>governance and accountability</u>)</p> <p>“...but the problem, the big problem is, there is zero follow-up, there is zero consequence.” (<u>governance and accountability</u>)</p> <p>“If you are starting a start-up or something then you'd surely have flexibility because you have no legacy right. But an organization like the <Organization Name>, you have to consider the legacy of what you already have running.” (<u>fit with existing systems</u>)</p> <p>“Performance was a disaster. And had been for a long time. There was, and there was one thing, we were trying to get a wiki going on top of that there were uhm, problems around actually deleting files and restricting permissions around that and the show stopper there was if you accidentally deleted something and wanted to restore it it took something like two weeks to get it backed up from the tape back-up, they had to call in their private vendor support to do it and uhm, and then there were a lot of things which they promised the system can do but they just couldn't do it. I don't remember the details but I remember that we really tried hard twice before we have given up on it.” (<u>performance related concerns</u>)</p> <p>“Interviewer: On occasions when</p>	

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 3)**

Category & Process	Antecedents	Moderators and Mediators
	<p>technical users disregard company policies, procedures, standards and use something else instead, an innovative solution, why do you think they do that?</p> <p>Interviewee: There is a number of reasons. Uhm, in some cases...it's because...it's <u>cheaper and faster</u> and we are constantly under pressure to do something cheaper and faster...In some cases it's just because it's <u>whole a lot less painful to use that rather than the mandated standard</u>, that pain can be administrative pain, it could be, uhm, scheduling pain, or it could just be <u>lousy technology</u> just painful to have to use right. That's a big factor as well. Because a lot of the enterprise software, anything that falls directly out of the basic procurement process is a...it tends to do all the features in a paper evaluation but it just tends to be horribly designed and horribly implemented and extremely painful to actually configure and make it do what the vendor said it would do right. There is no job satisfaction in using it.” (performance related concerns) (budget related)</p>	
Immediate Manager (Interviewee 14)		
<p><u>Hidden Adoption</u></p> <p>“Interviewer: (Referring to a non-sanctioned solution) Because I know for sure that Adobe Life Cycle Forms is not (a corporate standard). Interviewee: Yeah, they are, uhm, well, corporate forms group is working with Adobe right now, but we got an exemption, like we had a SDLC approval, architect approval to</p>	<p><u>Technical Factors</u></p> <p>“So, as part of what you call, the Siebel, you know, what you call, the toolset, life cycle, in terms of deploying the solutions in Siebel, Siebel has its own, uhm, methodology, what to suggest, so, (unclear) it's a waterfall method. (unclear) in our kind of environment, you know, in our kind of</p>	<p><u>Technical Knowledge</u></p> <p>“(technical knowledge moderating decision to adopt a non-sanctioned solution)...just give an example of like, you know, library call as node.js, right, uhm, the implementation of network protocol in it for two way communication, push-based communication is so simple, so</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 3)**

Category & Process	Antecedents	Moderators and Mediators
<p>get Adobe Life Cycle as a corporate solution.” (<u>shared adoption</u>)</p> <p>“So, as part of what you call, the Siebel, you know, what you call, the toolset, life cycle, in terms of deploying the solutions in Siebel, Siebel has its own, uhm, methodology, what to suggest, so, (unclear) it's a waterfall method. (unclear) in our kind of environment, you know, in our kind of environment in <Organization Name> waterfall we not always follow right so, we need to be agile when we are doing business requirements. Because, you know, most of the time we'll find that, you know, after you have done your functional design, you know, scope starts creeping in. So what we did was as part of the projects I am doing right now for projects, you know, it was agile methodology in terms of capturing the business requirements.” (<u>shared adoption</u>)</p> <p>“Our, uhm, one of the things that...as part of business requirement capturing, in terms of Agile methodology, right, the way we are doing it, in fact it was one of the business analysts who came and suggested that why don't we do screen prototypes, wireframes right with the business.” (<u>shared adoption</u>)</p> <p>“And, there have been suggestions, even like, you know, across the whole development, deployment cycles of the project where how certain things help us speed things you know and fine tune things. So, I have ensured that those inputs are taken and incorporated, right,</p>	<p>environment in <Organization Name> waterfall we not always follow right so, we need to be agile when we are doing business requirements. Because, you know, most of the time we'll find that, you know, after you have done your functional design, you know, scope starts creeping in. So what we did was as part of the projects I am doing right now for projects, you know, it was agile methodology in terms of capturing the business requirements.” (<u>positive – non-sanctioned</u>) (<u>negative - sanctioned</u>)</p> <p>“I think if you tell them that hey you should not be using, you know, open source IDE, probably they understand but if it's a library, hey it's just a library right? <u>It's ease of use, functionality is there right</u>, I don't have to re-write, and it's a library, the whole world is using it, why not us? Right?” (<u>positive – non-sanctioned</u>)</p> <p>“Uhm, road blocks in terms of, unable...not being able to use open source, to me that is a big road block because, you know, <u>the innovation is happening in that community not with your regular vendor community.</u>” (<u>positive – non-sanctioned</u>)</p> <p>“But again, you know, for me someone has to start. Even if it's me, you know, it's fine with me, right, I would not have any, what you call (doubts) about it in the sense that hey you know what it would be rejected or whatever on that it's not a standard, you know, tool or technology in the <Organization</p>	<p>simple, within few lines of code you can have your two-way communication enabled. That is like, you know, blow away your mind. Rather than sitting in figuring out how to do it in .NET right, hundreds of lines and then scalability issues, memory leaks and things like that.”</p> <p>“I've seen centre to be more focused on theoretical, you know, ITIL processes or security processes, like it's more about process than practicality. And for a developer it's more about practicality than theoretical approach.”</p> <p>“(Referring to technical users' thought process evaluating a non-sanctioned solution) They'll say, hey you know what the source code is available, I can do my own compiling, make it a library”</p> <p>“If you look at people who make those policies and processes and you know things like that, those are not the people who have been through or managed projects. Who haven't been through the practical experiences in terms of managing projects, delivering solutions.” (<u>perception of corporate staff / decision makers</u>)</p> <p>“Probably they would have people who have all these, you know, different certifications like CRISC, CISAs and you know what not, right. They are more of from a, they come from a theoretical perspective, right, so they are trying to look at things</p>

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<p>because again, I am not good at everything.” (<u>shared adoption</u>)</p> <p>“(Getting an exemption for a non-sanctioned solution) So, I have my business case to the CIO, what is my risk? I am not looking at any personal information, this information is all public. So, if you are saying that I need to apply high level of application between my different layers, right, web server and application server and database server, that means <Organization Intranet> is not really secure. I'm having some encryption it's not that I am having zero encryption. I am having 66 bit encryption” (<u>shared adoption</u>)</p> <p>“Interviewer: Do you go to them on every single occasion that something doesn't fit the standards? Interviewee: Uhm, not really, see again when this is standards, I really challenge them to say that is it a recommendation or is it a must. Many time if it is a recommendation, the business is ready to accept the risk, they are fine with it right. If it's a must, then we have to go through the exemption route, right.”</p> <p>“interviewer: Do you think there may be occasions when developers do things and won't even tell you? Interviewee: Oh yeah, yeah. There are, there are, there are occasions especially if you look at, you know, the whole thing about using open source and you know things like that. I can tell you there are many many production systems in the <Organization Name> whether you want to call them mission critical</p>	<p><i>Name</i>> right. Someone has to start, <u>get to show what you have done, show the ease of use, show what the tool would do to the business, at the end of the day if it's bringing some sort of benefits to the business”</u> (<u>positive – non-sanctioned</u>)</p> <p><u>Previous Use (Past Experience)</u></p> <p>“..that definitely helped, the Agile process. But it's more of the managers who decide, again <u>based on experience</u>, based on you know (unclear) that was my experience with the client that they are very (unclear) their expectations in terms of their requirements. The scope keeps on expanding after the project is completed.” (<u>past experience non-sanctioned</u>)</p> <p>“One of the thing here is that if you box them into using specific tools and technologies, right, I have found that with a lot of ORACLE Forms developers, right. Uhm, it was a very good toolset, technology you know, (unclear) a lot of good developers, now the small group in <Cluster Name>, I have been trying to encourage them to come out of that, right, but they're so focused into that toolset that they can't come out of it. They don't want to come out of it. For them that's the best tool in the world to their development.” (<u>past experience non-sanctioned</u>)</p> <p><u>Other Factors</u></p> <p>“(Referring to high cost of sanctioned solutions) We explained them basically what the system is, it's a medium risk, it's not high risk.</p>	<p>more from a process perspective, from what the PMBOK says or what COBIT says what Val IT says, they are looking at theoretical material to define those processes. They are not looking at any kind of practical what you call implementations, because they haven't come from those areas, right.” (<u>perception of corporate staff / decision makers</u>)</p> <p>“If you look at architecture, how many of the architects have gone through a complete life cycle doing the real architecture work, right? You look at frameworks, you look at but...how have you actually implemented that framework in a real life cycle project?” (<u>perception of corporate staff / decision makers</u>)</p> <p>“(Referring to corporate staff) You have taken ITIL, industry best practices you have taken PMBOK for project management, you have taken COBIT from an IT assurance and you know audit and things like that but you haven't seen in your environment how does it practically, you know, what is the impact from from a practical perspective? Does it meets your, you know, uhm, day to day requirements of solution development?” (<u>perception of corporate staff / decision makers</u>)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Interviewer: So, do you think the size of the project or task makes a difference?</p>

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<p>whatever, you know, category you want to put them, they are using a lot of source software, pieces of open source software which, as far, you know, as the policy or whatever should not be going in unless you have CIO's or Corporate CIO's approval." (<u>silent adoption</u>)</p> <p>"I think if you tell them that hey you should not be using, you know, open source IDE (integrated development environment), probably they understand but if it's a library, hey it's just a library right? It's ease of use, functionality is there right, I don't have to re-write, and it's a library, the whole world is using it, why not us? Right?" (<u>silent adoption</u>)</p> <p>"And they know if we have to go and approve, get approval for each and every of those smaller components, you know, probably we won't be doing any development just, you know, getting the approvals and nothing else..." (<u>silent adoption</u>)</p> <p>"(Referring to the use of non-sanctioned solutions) I myself have used a lot of those components"</p> <p>"(Explaining why one would use non-sanctioned components) Why re-invent the wheel? Most of the time that's what we say hey, if something is there we'll use it rather than re-inventing it, right? And, as a developer, if my need can be made by writing a few lines of code, I would do that rather than, you know, using you know rather than write thousand lines of code which I don't know will work at the end of the day or not."</p>	<p>And the second thing is that, you know, what would it cost putting that kind of security, right." (<u>budget related</u>)</p> <p>"...and cost is another factor, because I see when I, my heart really bleeds when I see small business areas paying hundreds of thousands of dollars every year to have software support, right." (<u>budget related</u>)</p> <p>"Interviewer: So cost is a factor? Interviewee: Cost is something that impacts." (<u>budget related</u>)</p> <p>"So at the Cluster level you don't have any controllership, right. There is no governance in terms of ensuring you know, those processes are, those mandates are being taken care of or not, you know. You have your gate checkpoints, you have your gating from a project management, you have checkpoints from an architectural perspective, you have roads going in, but what about from standards, what about from assurance, you know, one of the things I am trying to put now is that security should be part of each and every phase of the project." (<u>governance and accountability</u>)</p> <p>"In terms of not complying open source again, there is no written directive saying that if you don't comply with this, you know, that the only penalty I always hear that, you know what, it won't go live. We won't sign off. Those are the penalties I hear in terms of not meeting the standards or the project not going ahead or things like that." (<u>governance and accountability</u>)</p>	<p>Interviewee: That makes a big difference. Because, as I said, right, if they were using, they know that they can't use open source IDE (integrated development environment) even though, you know, it may give them better and faster results but when it comes to using, you know, sort of libraries, that help them let's say for encryption or things like that right, just giving an example right, they may look at those kind of components."</p> <p><u>Awareness</u></p> <p>"If they say it's a process, or it's a standard, show me where, if it is written. If it's not written it doesn't exist. That's my theory always. So, they say, you know, is it, like, it's a best practice but you follow or not, but it doesn't say I have to follow it to the teeth right?"</p> <p>"Interviewer: Is Siebel a corporate standard? Interviewee: Yes. It is part of the Case Management Standards. Siebel and Curam are two, uhm, products that are certified as case management standard." (<u>awareness – sanctioned</u>)</p> <p>"(Referring to exposure following use of a non-sanctioned solution) So, the, again, there was nothing that we could do to get that and I said we went through the whole review, the executive person was evaluating the solution at each phase, why are you telling me when, you know, I am, you know,</p>

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<p>“(Referring to developers who download and use open source solutions) They'll say, hey you know what the source code is available, I can do my own compiling, make it a library”</p> <p>“(Referring to use of non-sanctioned solutions) But again, you know, for me someone has to start. Even if it's me, you know, it's fine with me, right, I would not have any, what you call (doubts) about it in the sense that hey you know what it would be rejected or whatever on that it's not a standard, you know, tool or technology in the <Organization Name> right. Someone has to start, get to show what you have done, show the ease of use, show what the tool would do to the business, at the end of the day if it's bringing some sort of benefits to the business”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“(Rejection of waterfall methodology and adoption of agile) So, as part of what you call, the Siebel, you know, what you call, the toolset, life cycle, in terms of deploying the solutions in Siebel, Siebel has its own, uhm, methodology, what to suggest, so, (unclear) it's a waterfall method. (unclear) in our kind of environment, you know, in our kind of environment in <Organization Name> waterfall we not always follow right so, we need to be agile when we are doing business requirements. Because, you know, most of the time we'll find that, you know, after you have done your</p>	<p>“They say hey remove it or else we are not signing it off, right. Do it or it doesn't go live. So, that's the only penalty I have heard. But I haven't heard anything that say that it is going to have an impact on say your career progression or your job or, you know, any of that kind of thing.” (governance and accountability)</p> <p>“People are focused on very specific things. And when you are looking at large enterprise integrated systems you need to have, you know, what you call, you know, awareness in terms of if I do here how it is going to impact my other components.” (fit with existing systems)</p> <p>“Our, uhm, one of the things that...as part of business requirement capturing, in terms of Agile methodology, right, the way we are doing it, in fact it was one of the business analysts who came and suggested that why don't we do screen prototypes, wireframes right with the business. Rather than me sitting in isolation or my team sitting in isolation doing it, do it with the business, right? And, that helped a lot, right, we did not had to worry about, you know, having different labels and the business, you know, a lot of times the terminology is different than when we think what it should be called case number, (unclear) file number, right so, you know, it helped me in those kind of terminologies and things like that, right. We may have, when you lay these prints down, you may put some information in different place but from a logical perspective business</p>	<p>20 days from going live? Or 20 days, or whatever number of days from (unclear) you should, you should have had that right in the beginning.” (low awareness – sanctions)</p> <p>“My interpretation was that's a recommendation, not a standard. On our servers there are batch jobs, you cannot ask someone to go on to production server and change those passwords every time because we don't even have access to it.” (low awareness – sanctions)</p> <p>“...just give an example of like, you know, library call as node.js, right, uhm, the implementation of network protocol in it for two way communication, push-based communication is so simple, so simple, within few lines of code you can have your two-way communication enabled. That is like, you know, blow away your mind. Rather than sitting in figuring out how to do it in .NET right, hundreds of lines and then scalability issues, memory leaks and things like that.” (awareness - non-sanctioned)</p> <p>“If there is a clear, I would say, if there is a clear, what do you call, policy or process that says hey you can't use even a library or you know whatever it is, right, maybe you know, you put it in front of their desk saying that, maybe that would, you know, make them aware on a day-to-day basis because, this process as I said, is theoretical so you say that</p>

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<p>functional design, you know, scope starts creeping in. So what we did was as part of the projects I am doing right now for projects, you know, it was agile methodology in terms of capturing the business requirements.”</p> <p><u>Adoption Process</u></p> <p>“Our, uhm, one of the things that...as part of business requirement capturing, in terms of Agile methodology, right, the way we are doing it, in fact it was one of the business analysts who came and suggested that why don't we do screen prototypes, wireframes right with the business.” (<u>user-driven adoption</u>)</p> <p>“And, there have been suggestions, even like, you know, across the whole development, deployment cycles of the project where how certain things help us speed things you know and fine tune things. So, I have ensured that those inputs are taken and incorporated, right, because again, I am not good at everything.” (<u>user-driven adoption</u>)</p>	<p>may think that it has to be done at different place. So, those are the kind of things that, you know, doing with the business helped in terms of understanding, you know, where they are coming from if we had certain suggestions are...help the business tool, you know, re-validate what their thinking was, right. Uhm, that's just one instance, right. And, there have been suggestions, even like, you know, across the whole development, deployment cycles of the project where how certain things help us speed things you know and fine tune things. So, I have ensured that those inputs are taken and incorporated, right.” (<u>performance related concerns</u>)</p> <p>“Because, as I said, right, if they were using, they know that they can't use open source IDE even though, you know, it may give them better and faster results but when it comes to using, you know, sort of libraries, that help them let's say for encryption or things like that right, just giving an example right, they may look at those kind of components” (<u>performance related concerns</u>)</p> <p>“So in the <Cluster 4> I found business have a big big hand in making the IT decisions, whereas in <Cluster 3> and <Cluster 1> it is, you know, the technology people who make IT decisions. In the <Cluster 4> the business person is saying, you know, I would use Adobe or, you know, Siebel e-services or what not, so that was a shocking thing for me.”</p>	<p>once, you say that twice you know, after that it's gone.” (<u>low awareness - sanctions</u>)</p> <p>“If you look at it, I don't know, where on <Organization Name> Intranet to find about, you know, that I should not be using open source libraries. If I go on my Cluster Net, I don't see it anywhere there. If I go on the default Intranet page like <Intranet Page> I don't see anywhere there. I have to dig deeper into whatever those ITS (Information Technology Standards), <Company IT Standards> standards are, or, you know, somewhere on the corporate site to find out, find that information, right. So, as a developer I am not looking at that every day-in day out. I am probably looking at some forums or, you know, I would have modified my home page to Google.com” (<u>low awareness - sanctions</u>)</p> <p>“We could have done it in .NET, we could have done it in J2EE, my developer said, <Immediate Manager's Name> should I try HTML 5? And that guy is a .NET developer. So, you haven't seen it, it's not just me but even I said try whatever you want to, whatever works here, like whatever is good, is going to work on all the devices.” (<u>awareness - non-sanctioned</u>)</p> <p><u>Help and Support Availability</u></p> <p>“(Talking about evaluation</p>

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		<p>process of a non-sanctioned solution) I called friends I knew in Corporate Security, hey guys can you help me with this? This is information I've got actually what do you think?"</p> <p>"So having, you know, a knowledgeable source right, let's say I want to use an open source library, I can, you know, say hey, you know what, ABC in corporate whatever innovation or standards, do you think, is this product have any security issues, security holes? Have you guys looked at it? They may say yeah, we have looked at it you know we have been in the process of certifying it, you know, go ahead and use it in your dev and test, by the time we'll have it in you know..."</p> <p>"(Talking about evaluation process of a non-sanctioned solution) The other thing is that what kind of user support it has. Because there are a lot of tools and technologies, you know, uhm, it may be good one but it may not be any support, right."</p> <p>"One of the things that goes against open source is the support for the product or the tool, right. So, you know, I have my own reason saying that, you know, hey you know what, I've looked at it, I understand you have issues with support but there is a huge community out there who are supporting this."</p>
Immediate Manager (Interviewee 16)		

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<p><u>Hidden Adoption</u></p> <p>“Interviewee: So, if you have a project and you are looking down there are much better...tools, there are much more light-weight source code repositories. Interviewer: So what did you use instead? Interviewee: We used SVN, which is open source, very easy to update. Any developer can just pick it up read the manual and get it going.”</p> <p>“Interviewer: Uhm, did you get any approvals for SVN at that point? Interviewee: Uhm... Interviewer: Did you even try? interviewee: ...I don't think we tried. I think we just did it. Put it in place.” <u>(silent adoption)</u></p> <p>“Interviewer: Uhm, at that point you obviously knew that ClearCase was a standard but you've sort of decided not to go ahead... Interviewee: Yes, because it wouldn't have been feasible. There was no feasibility.”</p> <p>“(Referring to the use of a non-sanctioned solution) So, they wouldn't ring the bell if it was internal and if they knew they could get away with it. So, if they knew for example, that no-one was really paying that much attention to that sort of level of detail and I have been in places where you have that, where you have managers were just project managers and don't really understand technologies all, because they come from a business area, so, they are just</p>	<p><u>Technical Factors</u></p> <p>“(When asked about the replacement of a sanctioned solution with a non-sanctioned alternative) So, I can stop you right there on ClearCase. I was the project manager on <Project Name> for years. And this is a good example, so ClearCase. I have used ClearCase in the past. In order to properly implement it you need an expert. Someone who is extremely technical, who really knows how to run it because that repository in itself, maintaining that repository in itself is a project. And places I have been where we have used effectively, we have like a \$1,000 a day consultant running it...” <u>(negative - sanctioned)</u></p> <p>“Interviewee: So, if you are a project and you are looking down there are much better...tools, there are <u>much more light-weight</u> source code repositories. Interviewer: So what did you use instead? Interviewee: We used SVN, which is open source, <u>very easy to update. Any developer can just pick it up read the manual and get it going.</u>” <u>(positive - non-sanctioned)</u></p> <p>“(Justifying the adoption of a non-sanctioned solution) Because <u>it is very light-weight</u>, it was very, we <u>could set it up on a server that we had</u>, and we had the ability to do it, and <u>anybody could maintain it</u> on the team. So we could find, I could easily find a developer who had that skill set and say OK, you are responsible for maintaining this</p>	<p><u>Technical Knowledge</u></p> <p>“Interviewee: (Talking about technical users' keeping a low profile on non-sanctioned solution use) So, they wouldn't ring the bell if it was internal and if they knew they could get away with it. So, if they knew for example, that no-one was really paying that much attention to that sort of level of detail and I have been in places where you have that, where <u>you have managers were just project managers and don't really understand technologies all, because they come from a business area</u>, so, they are just sort of saying OK, it meets the requirements we'll put it in. Interviewer: So, the difference between technical skills of the staff and the management... Interviewee: Yeah, yes. Interviewer: ... that probably has a factor. Interviewee: Yeah, that has a huge factor.” <u>(perception of managers)</u></p> <p>“I think #1 is that the centre comes up with policies <u>without doing the whole scan of what's going on in the clusters</u>. So, for example, if you, if there was true engagement, at the, because, it may get for example at the director level but it never goes below that. Because <u>we never hear senior managers or managers or technical staff being consulted</u> when these, uh, policies get renewed or when these policies</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 3)**

Category & Process	Antecedents	Moderators and Mediators
<p>sort of saying OK, it meets the requirements we'll put it in.” (<u>silent adoption</u>)</p> <p><u>Adoption Process</u></p> <p>“Several years ago a bunch of different managers across the <Organization Name> met and decided what made the most sense from the BI (business intelligence) perspective for people who, because this was still a nascent industry, just sort of what the industry stack was at that point in time and it turned out that IBM was at the forefront, their DB2 and COGNOS stacks and Informatica. That's really where that sort of came from.” (<u>top-down adoption</u>)</p> <p>“I think #1 is that the centre comes up with policies without doing the whole scan of what's going on in the clusters. So, for example, if you, if there was true engagement, at the, because, it may get for example at the director level but it never goes below that. Because we never hear senior managers or managers or technical staff being consulted when these, uh, policies get renewed or when these policies get refreshed or incremented. So, you end up with these, uh, directives that are written without really consulting what's going on on the ground. So, you end up, so what happens is, so for example if you have to deliver a solution in six months, you are going to find the fastest way of doing that. So for example, if you are looking at a certain kind of technology stack, you are going to look and say what is the easiest solution for me to</p>	<p>piece whereas finding a Rational ClearCase developer, I remember that was like several years ago, there is no way. We can't do it.” (positive – <u>non-sanctioned</u>) (<u>negative - sanctioned</u>)</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Interviewer: Did you, or had you at that point used SVN before? Interviewee: I had personally yes. Interviewer: OK. How about the other team members? interviewee: I think everybody had used it. Interviewer: Do you think that may have had an effect? Something that you used before, you are familiar with it? Interviewee: I think familiarity does work.” (<u>past experience non-sanctioned</u>)</p> <p>“Interviewer: So, if I am understanding you correctly, you are saying that the fact that somebody else is using that tool elsewhere helps. Interviewee: Yes, definitely. Interviewer: The fact that you have used that tool elsewhere earlier so that experience with that helps. Interviewee: Yes, yes.” (<u>past experience non-sanctioned</u>)</p> <p>“Interviewer: What about what other organizations are doing? Interviewee: Uhm, yeah, I think that that also has an impact as well. So, if you do a scan, so for example, we are getting people out from outside, <u>if they are coming in with a certain level of experience and expertise for a certain product or features.</u>” (<u>past</u></p>	<p>get refreshed or incremented. So, you end up with these, uh, directives that are written <u>without really consulting what's going on on the ground.</u>” (perception of corporate staff)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Interviewer: Do you think project size may have an effect because sometimes people, when the project is smaller, they have, uhm, they are more willing to experiment with the tools, they are more willing to break the rules. Interviewee: I think, I don't think it has anything to do with size, with the size of the project, like <Project Name> was a large project. But I think it had to do with...feasibility like, I mean, if you look at OK, <Organization> client is paying for something. They don't care where you store your software. But in part of the procurement rules we have to be transparent what we are hiring people to do. So if I hired a consultant to come in and support a software repository, then we would have to go out and procure because the Cluster doesn't own, like I don't think, if you look at this Cluster I don't think we have any licenses for Rational ClearCase for ClearCase. So (laughs). Interviewer: Were you sure that the SVN would work? Interviewee: Yes. We were certain that SVN would work.”</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 3)**

Category & Process	Antecedents	Moderators and Mediators
<p>implement to meet the requirements of my ministry. Because they are footing the bill. And you are judged on your ability to deliver not on your ability to follow corporate standards.” (<u>top-down adoption</u>)</p>	<p><u>experience non-sanctioned</u>)</p> <p>Other Factors</p> <p>(budget related) (governance and accountability) (performance related concerns) (fit with existing systems)</p> <p>“(Referring to adoption of a non-sanctioned solution) Interviewer: Uhm, and what made you go ahead without any approvals? Interviewee: Well, I think our senior manager at the time just wanted something done. That had a...that was low cost.” (<u>budget related</u>) (<u>performance related concerns</u>)</p> <p>“OK, so, if <Cluster 1> is using it and I have a very, I'd have to have a very good reason for this, so, let's say for example, there was a piece of technology that my client wanted, my client is footing the bill and someone else was using it already and implemented it successfully then I would leverage whatever mechanism they used to bring that in. But only if it met the criteria that the client is paying for it, and the standard technology didn't meet the requirements.” (<u>budget related</u>) (<u>performance related concerns</u>)</p> <p>“...So, you end up, so what happens is, so for example if you have to deliver a solution in six months, you are going to find the fastest way of doing that. So for example, if you are looking at a certain kind of technology stack, you are going to look and say what is the easiest solution for me to implement to meet the requirements of my ministry.</p>	<p>“(effect of visibility) Well, I mean, theoretically you could be stopped by one of the corporate gating authorities if they asked you. But they don't ask those questions. I mean they will look at your architecture documents in terms of what technologies you are using and make you justify things but they don't, I've never been asked what source code repository I am using.”</p> <p>“(effect of visibility) Like here is a good example, if i went forward with the JBOSS server that's open source, I know I would get stopped right there. If I went through and said OK I'm implementing this.”</p> <p>“(visibility) So, they wouldn't ring the bell <u>if it was internal and if they knew they could get away with it</u>. So, if they knew for example, that no-one was really paying that much attention to that sort of level of detail and I have been in places where you have that, where you have managers were just project managers and don't really understand technologies all, because they come from a business area, so, they are just sort of saying OK, it meets the requirements we'll put it in.”</p> <p>Awareness</p> <p>“I've reading that there has been some people in the industry who has been using it to automate tests. So, I am looking to see how we could best go about doing</p>

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	<p>Because they are footing the bill. And you are judged on your ability to deliver not on your ability to follow corporate standards.” (<u>budget related</u>) (<u>performance related concerns</u>)</p> <p>“Well, I mean, theoretically you could be stopped by one of the corporate gating authorities if they asked you. But they don't ask those questions. I mean they will look at your architecture documents in terms of what technologies you are using and make you justify things but they don't, I've never been asked what source code repository I am using.” (<u>governance and accountability</u>)</p> <p>“...So you have to balance between the end users' requirements, so are we able to meet their requirements? Can we maintain the solution? So, do we have the skills, knowledge, expertise in house to actually implement and maintain that solution? <u>Does it fit with our existing technology stack?</u> And then are there any security concerns or privacy impacts, things that can happen from choosing that techno, that solution.” (<u>fit with existing systems</u>)</p> <p>“Interviewer: You came here about a year ago. And there was already a technology stack in place. Interviewee: Yes. Interviewer: Does that stop you from considering other things that you personally would think be a better solution but because they don't fit well with the existing stack you kind of discard them? interviewee: Yes. I would say right</p>	<p>that.” (<u>awareness - non-sanctioned</u>)</p> <p>“(Talking about a standard that actually exists) So, my understanding is there is no corporate standard. So, I am actually working on developing a corporate standard.” (<u>low awareness - sanctions</u>)</p> <p>“(Talking about a non-sanctioned solution that was selected) It was extremely technically suitable. And it was, and we were all set it up in about three hours. We were able to set our source code repository. Whereas, ClearCase you are looking at months of, OK how does this VOB (version object base) get together and things like that.” (<u>awareness - non-sanctioned</u>)</p> <p>“ So, you end up, so what happens is, so for example if you have to deliver a solution in six months, you are going to find the fastest way of doing that. So for example, if you are looking at a certain kind of technology stack, you are going to look and say what is the easiest solution for me to implement to meet the requirements of my ministry. Because they are footing the bill. And you are judged on your ability to deliver not on your ability to follow corporate standards.” (<u>awareness - non-sanctioned</u>)</p> <p><u>Help and Support Availability</u></p> <p>“(Talking about a non-sanctioned</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 3)**

Category & Process	Antecedents	Moderators and Mediators
	<p>now, yes, because of the cost involved. So if you have to integrate another piece of technology that can get very costly, that can be very, so, unless you have a very large project it wouldn't be feasible to do something like that.” (budget related) (fit with existing systems)</p>	<p>solution that was selected) ...because it is very light-weight, it was very, we could set it up on a server that we had, and <u>we had the ability to do it, and anybody could maintain it on the team</u>. So <u>we could find, I could easily find a developer who had that skill set and say OK, you are responsible for maintaining this piece</u> whereas finding a Rational ClearCase developer, I remember that was like several years ago, there is no way. We can't do it.”</p> <p>“(Talking about a non-sanctioned solution that was selected) I think that made it a bit easier too because someone else was already using it. <u>So we already knew OK, it's supported</u> so we can just...”</p> <p>“Interviewer: OK. So, uhm, why do you think that they (ones setting the corporate standard) picked ClearCase in the first place? Interviewee: That I have, because, I'll be honest with you, I think I know the reason why is because it's IBM. And because it has a vendor and <u>because they can get probably a support agreement for that</u>. Whereas SVN is open source <u>they couldn't get support agreement for that</u>. Here we use Visual Source Safe which is by Microsoft. <u>We do have a support agreement in place for it.</u>”</p> <p>“...So you have to balance between the end users' requirements, so are we able to</p>

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Category & Process	Antecedents	Moderators and Mediators
		meet their requirements? <u>Can we maintain the solution?</u> So, do we have the skills, knowledge, expertise in house to actually implement and maintain that solution?..."
Senior Manager (Interviewee 20)		
<p><u>Hidden Adoption</u></p> <p>“Interviewer: Even when, let's assume for a second that they know that there is an offering, at the technical level, do you think they will always follow the rules and the standards? Interviewee: ...No, I don't think that they would. Uhm...for a number of reasons. Big one being cost...Uhm...and so this is the scenario where people know there is a standard and there is an approach they are supposed to follow...”</p> <p><u>Adoption Process</u></p> <p>“So, what's happening in this Cluster is that <u>we made some clear technology adoption decisions and these are the only environments we are running.</u> You come and you want to...I am making this up, uhm...run a charity uhm, auction. We are going to put that damn charity auction on one of those four platforms and there won't be anything else that it could possibly be done on.” (<u>top-down adoption</u>)</p> <p>“So, when you say when those standards were written, our model has been for a long while and still is</p>	<p><u>Technical Factors</u></p> <p>“.....Because the standards are aged and they don't keep up with the capabilities of today. Whether it is a corporate VOR (vendor of record agreement) or standard both could end up making them mandatory.Because the standard doesn't match their needs or they...literally or they just feel it doesn't match their needs because they weren't consulted when it was adopted.” (<u>negative - sanctioned</u>)</p> <p><u>Previous Use (Past Experience)</u></p> <p>“So the business is jumping, <Organizations> are jumping up and down saying no I want SAS or I want you know...I want that. Uhm, because <u>they already have an application in house that will do the same thing that they could leverage.</u> ... Because of speed, to, you know, time to market. What to get something off of a slow moving corporate approach which is probably more for a service than just a straight-out application because you can probably just go buy that.” (<u>past experience non-sanctioned</u>)</p> <p>“Open text is there. It's supposed to be the corporate VOR. People <u>are</u></p>	<p><u>Awareness</u></p> <p>“I am going to say function or service that we need to deliver, how do you use it or not use it? Do you have to use it? Uhm, do you have to check the VORs? Or do you have to check and see if open source is available which you do under the new policy anyway. Well, you will when it gets approved.” (<u>low awareness - sanctions</u>)</p> <p>“So lack of awareness and lack of a weight to declare a service or an offering. There is no way to declare an offering that is outlined and easy to find.” (<u>low awareness - sanctions</u>)</p>

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<p>today <u>centrally we decide we need a standard and then we'll say oh, Joe in <Cluster 1> will write that standard.</u> So Joe in <Cluster 1> has never consulted with another cluster in his life but is a member of <Directors' Council> and now in charge of writing a standard. So any logs Joe had about what all these standards were you know, what all these consultations were they are on Joe's desktop. You know, how much advice Joe gets from the central area so the whole consultation process is uhm a little fuzzy at the moment in the <Organization Name>.” (<u>top-down adoption</u>)</p> <p>“But basically, you, if a corporate VOR (vendor of record agreement) exists, you must use it period. All it has to do is exist.” (<u>top-down adoption</u>)</p>	<p><u>using SharePoint, they like it.</u> They want to use it. Or there is another thing called PowerPlay. It might be that can also store documents...<u>They are using PowerPlay.</u> It's not the corporate VOR. Or, uhm...no I don't have a specific example but I am sure there are examples where someone is using...you know case and grants management and they they want to keep using it for one more thing as opposed to going to, you know, corporate licensing option.” (<u>past experience non-sanctioned</u>)</p> <p>“Interviewee: Would a senior technical manager or head...use a non-open source product that they are familiar with and happy with instead of something else. Yeah absolutely.” (<u>past experience non-sanctioned</u>)</p> <p><u>Other Factors</u></p> <p>“Interviewer: Even when, let's assume for a second that they know that there is an offering, at the technical level, do you think they will always follow the rules and the standards? Interviewee: ...No, I don't think that they would. Uhm...for a number of reasons. Big one being cost...Uhm...and so this is the scenario where people know there is a standard and there is an approach they are supposed to follow...” (<u>budget related</u>)</p> <p>“Interviewee: (When asked about who would be concerned about cost implications of adoption) I think senior technical managers start being</p>	

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Category & Process	Antecedents	Moderators and Mediators
	<p>concerned about cost. So, your <technical user upper level>s your <immediate manager>s probably less concerned if concerned at all, maybe a little concerned if they are actually doing the solutioning business case to figure out what you know if they are actually doing the solutioning, but based on my personal experience in the cluster a lot of the solutioning decisions are made without a lot of costing or requirement that known.” (<u>budget related</u>)</p> <p>“(Referring to the unclear governance processes/structures around adoption) I am going to say function or service that we need to deliver, how do you use it or not use it? Do you have to use it? Uhm, do you have to check the VORs? Or do you have to check and see if open source is available which you do under the new policy anyway. Well, you will when it gets approved.” (<u>governance and accountability</u>)</p> <p>“So lack of awareness and lack of a weight to declare a service or an offering. There is no way to declare an offering that is outlined and easy to find.” (<u>governance and accountability</u>)</p> <p>“So when you say when those standards were written our model has been for a long while and still is today centrally we decide we need a standard and then we'll say oh, Joe in justice will write that standard. So Joe in justice has never consulted with another cluster in his life but is a member of <Directors' Council> and now in charge of writing a</p>	

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	<p>standard. So any logs Joe had about what all these standards were you know, what all these consultations were they are on Joe's desktop. You know, how much advice Joe gets from the central area so the whole consultation process is uhm a little fuzzy at the moment in the <Organization Name>.” (<u>governance and accountability</u>)</p> <p>“Regardless of what standards say or if there is a standard (banging hand on the table) you must use the corporate VOR and if your cluster did a VOR and you are in another ministry in the cluster (banging hand on the table) you must use the cluster VOR period. So, the VORs override everything according to the procurement directive.” (<u>governance and accountability</u>)</p> <p>“(Referring to corporate centre) They're creating a matrix of impenetrable processes that don't allow us to get best value for money.” (<u>governance and accountability</u>)</p> <p>“Uhm, was uhm, when you look at the roles, every policy is usually written with some you know roles in the back, uhm because that enforcement is the local responsibility. And not many policies are written with any type of intention to measure compliance or report on compliance or re-write.” (<u>governance and accountability</u>)</p> <p>“I would say the unwritten rule is nobody has time to enforce. Just put it out there and expect people to comply and if you find out they are</p>	

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	<p>not then maybe you can take some action or you might not.” (<u>governance and accountability</u>)</p> <p>“Interviewer: Are there any penalties for not complying with the...(policies, standards...) Interviewee: No, absolutely not.” (<u>governance and accountability</u>)</p> <p>“I'm not aware of anyone suffering any real consequence for not having followed the policy.” (<u>governance and accountability</u>)</p> <p>“...because they already have an application in house that will do the same thing that they could leverage. ... <u>Because of speed, to, you know, time to market.</u>” (<u>performance related concerns</u>)</p>	

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
Technical User (Interviewee 25)		
<p><u>Hidden Adoption</u></p> <p>“(Referring to adoption of a non-sanctioned solution) We used to use SVN. Actually I was one of the persons who set up the SVN repository.”</p> <p>“(Referring to adoption of non-</p>	<p><u>Technical Factors</u></p> <p>“Uhm, the <i><technical standard number></i> has a whole lot of stuff in it which is...some of them are relevant, some of them are <u>outdated</u>. I think it was updated like 4 years or 5 years ago, uhm, and a lot of things are <u>not even updated</u> like some of the integration things like it doesn't</p>	<p><u>Technical Knowledge</u></p> <p>“Interviewer: OK, so, did you look at, initially, did you look at any other tools before you picked SVN? Or how did you pick SVN? Interviewee: We did a, I think <u>CVS was another product out there</u>. Uhm, so <u>we looked at</u></p>

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<p>sanctioned solutions) Testing tools, uhm...like I've used tools which is JAVA specific like JUnit and those kind of stuff, uhm, but I, uhm, I haven't used any of the automated test tools which the QA, there is a department, QA department they are there mainly to testing the actual like at the system integration testing, right. Uhm, but in terms of just doing the unit test as a developer, I used JUnit and soapUI (open source functional tester) to do the web services test..."</p> <p>"And uhm, if it's something which is...you know, which is...you kind of use like, if you look at the frameworks like Struts even those are open source like products right. So, if somebody comes and says OK I need to do like Apache like some, you know, like (unclear) whatever like if you have a some product out there which is which you can do install rather than coding, the designer would say yes, sure, like you can use that or not use it based on the pros and cons and then...but he does have to go to the manager and take his approval." (<u>shared adoption</u>)</p> <p>"Yes, yes. And if it is really something that the designer cannot make a decision on then yeah it goes to the manager and then uhm, but yeah, that's pretty much all there is." (<u>shared adoption</u>)</p> <p>"Uhm, I think it's a...see lot of things that what you may want to really right to code to do it, there may be a product out there which may already be doing it, right. Uhm...so if you look at open source, now everything</p>	<p>even talk about the real integration that is happening now." (<u>negative - sanctioned</u>)</p> <p>"Interviewer: (Asking about adoption of a non-sanctioned solution) OK, so, did you look at, initially, did you look at any other tools before you picked SVN? Or how did you pick SVN? Interviewee: We did a, I think CVS was another product out there. Uhm, so we looked at couple of them and then this was <u>most easy one to adopt</u>, uhm, and also there was a person in house who has the skillset, so that's how, uh, we picked the tool." (<u>positive - non-sanctioned</u>)</p> <p>"(Talking about a non-sanction solution that got adopted) So we, another product we picked was Drools, the Drools engine, uhm, <u>we did the performance test</u> and all the you know like what are the other competitive products out there, so, it's always good to have that so that when, these things keep coming like if somebody install new product, some project comes on board why did you pick this product, there is other like, every developer comes with his own kind of things you know like, like we should have used this why are we using this and this document has helped to say we picked this at this point in time this is what we thought it was, so, we have done it for a couple of big open source products out there." (<u>positive - non-sanctioned</u>)</p> <p><u>Previous Use (Past Experience)</u></p> <p>"Interviewer: OK, so, did you look</p>	<p><u>couple of them</u> and then this was most easy one to adopt, uhm, and also there was a person in house who has the skillset, so that's how, uh, we picked the tool." (<u>technical user</u>)</p> <p>"Interviewer: You also said you had the skillset available. Was that, who was that? Interviewee: There was an <u>internal developer who knew how to install and he had worked on SVN before</u>, so we leveraged that and said OK, why don't we...uhm...you know, get this started because it was just becoming messy." (<u>technical user</u>)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>"Interviewer: (Enquiring about the possible effects of project size and visibility on adoption of non-sanctioned solutions in a hidden manner) Do you think project size may have an effect? like size and visibility? If you are doing a project that is very visible... Interviewee: I think so, yeah. Because if you have to go through checkpoints and those kind of stuff then you would have to, uhm, you would have to show that as part of your physical design document, right. Uhm, then yeah, you will be. I've hear people talking OK, don't do this because in checkpoint you are going to be, like they are going to flag this. Uhm, but in a smaller project...I don't think you should be recording this but I think</p>

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Category & Process	Antecedents	Moderators and Mediators
<p>is open source, even the presentation frameworks, everything is open source, uhm, would you rather do it the way with putting JSPs and those tags and everything or just download Struts or JSF or whatever it is and then just...you know, just follow the instructions and then that's so much more easier like everything becomes like a packaged thing, right.”</p> <p>“(Referring to adoption of a non-sanctioned solution) So we, another product we picked was Drools, the Drools engine, uhm, we did the performance test and all the you know like what are the other competitive products out there, so, it's always good to have that so that when, these things keep coming like if somebody install new product, some project comes on board why did you pick this product, there is other like, every developer comes with his own kind of things you know like, like we should have used this why are we using this and this document has helped to say we picked this at this point in time this is what we thought it was, so, we have done it for a couple of big open source products out there.” (<u>shared adoption</u>)</p> <p>“Uhm...even in the...big ones, I think people...would be, like if you have to go through a checkpoint process, <u>I would think people don't even want to put something like that out there.</u> Because, mainly because yeah, you will be asked so many questions around why are you using this. It depends on, again it depends on what is it, like if it's a, open source could be anything right. It could be using</p>	<p>at, initially, did you look at any other tools before you picked SVN? Or how did you pick SVN? Interviewee: We did a, I think CVS was another product out there. Uhm, so we looked at couple of them and then this was most easy one to adopt, uhm, and also <u>there was a person in house who has the skillset</u>, so that's how, uh, we picked the tool.” (<u>past experience - non-sanctioned</u>)</p> <p>“Interviewer: You also said you had the skillset available. Was that, who was that? Interviewee: <u>There was an internal developer who knew how to install and he had worked on SVN before</u>, so we leveraged that and said OK, why don't we...uhm...you know, get this started because it was just becoming messy.” (<u>past experience - non-sanctioned</u>)</p> <p>“So, we, actually it's pretty good because we have all our, uhm, uhm, source code and everything and <u>we also had a like a person who was working with us who was an expert in the ClearCase thing so we got everything.</u>” (<u>past experience - sanctioned</u>)</p> <p>“(Talking about various effects on the adoption process) When it comes to that I may look at somebody already using it like if another developer using it, oh it's easy for me to learn because I can just sit with him for a day and then he is going o tell me how to use this or <u>if it's something I have used in previous projects...</u>”</p> <p><u>Other Factors</u></p>	<p>people do use it (laughs).”</p> <p>“Interviewer: Are there any penalties for not complying with the standards and policies? Interviewee: <u>If it is a small project, no.</u> Honestly. Like, who even notices that, right. It's an internal thing.”</p> <p>“Yeah, you can just go download it. Uhm, I am yeah, if...uhm, you don't have to tell them, you can use this within a project. I mean if <u>it's a project less than a million dollars you don't even tell anybody.</u>”</p> <p>“... if I have to build this particular component it's going to take me like two months to do it and the I have the timeline for like two months I need to finish this in a month uhm, and he like if he proposes let's say a component that he is going to use within this project and it says <u>very small project</u>, uhm, we would say yeah, go ahead use it...”</p> <p><u>Awareness</u></p> <p>“Uhm, I think it's a...see lot of things that what you may want to really right to code to do it, there may be a product out there which may already be doing it, right. Uhm...so if you look at open source, now everything is open source, even the presentation frameworks, everything is open source, uhm, would you rather do it the way with putting JSPs and those tags and everything or just</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
<p>from a framework or particular component itself, it could be like a solution itself, uhm, if you're saying that as part of my physical design I am going to show this big component and I am going to get through the checkpoint process I don't think people would do that." (<u>silent adoption</u>)</p> <p>"Yeah, you can just go download it. Uhm, I am yeah, if...uhm, you don't have to tell them, you can use this within a project. I mean if it's a project less than a million dollars you don't even tell anybody." (<u>silent adoption</u>)</p> <p>"If there is a small project and then if it requires that you need to do an open source thing uhm, one of the things that we have done just for our own thing because vendors can be because in our case it's not like uh we have our own internal people you know putting these open source thing right, we need to get the vendors using like they need to tell us what they are using, so we have an application inventory list kind of a thing where you identify because just for our own" (<u>shared adoption</u>)</p> <p>"If I have to build this particular component it's going to take me like two months to do it and the I have the timeline for like two months I need to finish this in a month uhm, and he like if he proposes let's say a component that he is going to use within this project and it says very small project, uhm, we would say yeah, go ahead use it and then he needs to say what is that and then we have an application inventory list</p>	<p>"(Talking about decision to adopt a sanctioned solution) I think it was a management decision. I don't know how that came down. Uhm, but I, I think that was part of a project, uhm, <u>they got funding to procure the</u> (ClearCase), that's my understanding, I mean, you know..." (<u>budget related</u>)</p> <p>"Uhm, so when we did the checkpoint process too we were like yeah, these guys, what they are asking it makes sense because it means that you have thought through the whole process for even going and presenting something. But they are kind of like...reviews and all those small nitty gritty things that you keep coming back it kind of like makes you feel that, really, do you really have to go through this right. So, that's where I think there has to be some kind of a balance and...I don't know, I am getting myself into trouble (laughs)." (<u>governance and accountability</u>)</p> <p>"Uhm, knowing that there is a standard there uh, it all depends on whether that, OK, let me put it this way, <u>it all depends on whether the project has the budget to go and procure that product</u>, would that be something that I can use in this application which is open source and then I can, it's free, and...is it something I have to use in the project to say that <u>I need to meet my deadline</u>." (<u>budget related</u>) (<u>performance related concerns</u>)</p> <p>"...if I have to build this particular component it's going to take me like</p>	<p>download Struts or JSF or whatever it is and then just...you know, just follow the instructions and then that's so much more easier like everything becomes like a packaged thing, right." (<u>awareness - non-sanctioned</u>)</p> <p>"Interviewer: Are developers familiar with the existing standards and policies and procedures in the <Organization Name>?" Interviewee: Uhm...(sighs)...if you are looking at would they know <Technical Standard Number>, is that? Interviewer: Yeah, would they know it? Would they know, since you are a JAVA shop, would they know what applies to the JAVA column? Interviewee: Uhm...I would say no. Uhm, mainly because the developers over here are consultants. So, that's when a designer would have to know what is there and then guide them." (<u>low awareness - sanctions</u>)</p> <p><u>Help and Support Availability</u></p> <p>"Interviewer: Do you think technical users would pick an open source solution purely based on ideological grounds, just because it's open source? Interviewee: Uh.....uh, I don't think so. Just because it's open source, no. If there is a product out there which is licensed, I think they do prefer because you have like you can go with <u>maintenance and support</u> and</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

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<p>which we maintain so that we track what are the things which are out like there.” (shared adoption)</p> <p><u>Dual Adoption (non-genuine use)</u></p> <p>“Interviewee: Uhm...mainly...the...I think in the <Organization Name> everybody follows waterfall, right. Uhm.....some of the projects over here has been like...like an agile kind of a thing where we have like, uhm, iterative but it's not like...it's not a preferred way when we go to the clients. They want to give use all the requirements and then just go and finish the requirements, go to develop you know that kind of a thing. But some of the project demanded us in certain way that we had to go to an iterative like, give us the first batch, let's build on something and then I've used both of them and I prefer iterative... Interviewer: So, do you internally do you do like an agile kind of process and externally when you work with clients...they give you all the requirements in a waterfall manner, is that what you are saying? Interviewee: Yes, they do prefer to give us in a waterfall manner because that way they can just give us all the requirements once and then you just go and you know, start working on those, uhm...but (in) one of the most recent project that I worked on, it was, we were basically saying that give us a small piece of it and then we can start building around it. Uhm, and that's how we worked on one of the most current projects.”</p> <p><u>Adoption Process</u></p>	<p>two months to do it and the <u>I have the timeline for like two months I need to finish this in a month</u> uhm, and he like if he proposes let's say a component that he is going to use within this project and it says very small project, uhm, we would say <u>yeah, go ahead use it</u> and then he needs to say what is that and then we have an application inventory list which we maintain so that we track what are the things which are out like there.” (performance related concerns)</p> <p>“And when it comes to timeline you would go on look for something that you want to use uhm, which is not there and then go and procure that product would take <u>a)time b)money</u>, right. Uhm, so, those are with the factors for you to go and say OK I can't afford this because this is going to cost me licensing cost and yada yada yada that stuff even though it's there as part of the product that I have to buy, uhm, I would go and buy this and if I buy this product it's much easier, I can use it and buying this product like there may be 10 other products, open source products out there.”(performance related concerns)</p> <p>“And regardless of what's underneath uhm, and I think they, <u>another cluster's already produced something and they had it tightly coupled with the infrastructure itself</u>, and we were forced to use that and I am like...you can't use this because they have portal and we don't have portal and I'm like how am I going to put this in my physical diagram now right, so that's where like you kind of</p>	<p>everything else.”</p> <p>“When it comes to that I may <u>look at somebody already using it like if another developer using it</u>, oh it's easy for me to learn because <u>I can just sit with him for a day and then he is going o tell me how to use this</u> or if it's something I have used in previous projects...”</p>

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Category & Process	Antecedents	Moderators and Mediators
<p>“(Explaining adoption process of a sanctioned solution) I think it was a management decision. I don't know how that came down. Uhm, but I, I think that was part of a project, uhm, they got funding to procure the (ClearCase), that's my understanding, I mean, you know...” (<u>top-down adoption</u>)</p> <p>“And regardless of what's underneath uhm, and I think they, <u>another cluster's already produced something and they had it tightly coupled with the infrastructure itself, and we were forced to use that</u> and I am like...you can't use this because they have portal and we don't have portal and I'm like how am I going to put this in my physical diagram now right, so that's where like you kind of think that the architects are there and they have some thing that...it's like...when somebody is like...so hands on and so working...like at the code level and...it just doesn't like...you just don't see eye-to-eye right. So...and it's not just me like a lot of the folks over here that's the...there was somewhere there was like a gap between the real architects and the people who were on the floor...” (<u>top-down adoption</u>)</p>	<p>think that the architects are there and they have some thing that...it's like...when somebody is like...so hands on and so working...like at the code level and...it just doesn't like...you just don't see eye-to-eye right.” (<u>fit with existing systems</u>)</p>	
Technical User (Interviewee 26)		
<p><u>Hidden Adoption</u></p> <p>“People use Eclipse, people use Eclipse, I am not sure about SVN but they do use Eclipse. And some people have preference of that. And uh...because if you want to write your code, which is independent of</p>	<p><u>Technical Factors</u></p> <p>“Interviewer: Why did you like SVN? Interviewee: <u>It is really simple. Really, really simple. If I compare it with ClearCase, that's complex and SVN was really simple.</u></p>	<p><u>Technical Knowledge</u></p> <p>“Interviewer: Do you think that developer would be more willing to approach the manager and tell the manager that he or she is using the open source if the manager is really technically</p>

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<p>application server which should run on any application server, that you are better of using Eclipse right. Then you can easily switch between ORACLE and WebSphere. But if you are writing your code on RAD, and if you are using some of the RAD features then it ties you with the application server, so there are people, there's still some people out there, in <Organization Name> also, which thinks they should write a code which is independent of an application server, so, I think they want to use Eclipse.”</p> <p>“But most of the time we mandate some of the tools like, these are the toolset every people come to get it, has to use it. But, but, (unclear) that developer <u>behind the scenes</u> we'll find oh well, we go and see or something, they use something else” (silent adoption)</p> <p>“Interviewer: When do you think the developer will tell his or her immediate manager about this? Interviewee: Sometimes, they tell. Sometimes they express that, you know, I want to use this but uh...but whatever let's say is on approved open source list you know it doesn't work, because it's so dated like you know...and...and our open source policy is really really slow. Right now, in market there are so many open sources, nice products out there but our policy is really really slow. And you have to go through that process, it's a very lengthy process to get something approved right. So, sometimes they will tell us. And sometimes they won't tell us.” (silent adoption) (shared adoption)</p>	<p><u>straightforward</u> and...everything (unclear) as a like, if you are using, typically a developer uses a Windows machine to do all their development, deployment is on UNIX or other environment but for development they use typically Windows machine right so, <u>then you can see like in the tree structure all your codes and everything and you can check out check in clearly and it resolves conflicts and it was very lightweight, very fast.</u>” (positive - non-sanctioned) (negative - sanctioned)</p> <p>“People use Eclipse, people use Eclipse, I am not sure about SVN but they do use Eclipse. And some people have preference of that. And uh...because if you want to write your code, which is <u>independent of application server which should run on any application server</u>, that you are better of using Eclipse right. Then you <u>can easily switch between ORACLE and WebSphere</u>. But if you are writing your code on RAD, and if you are using some of the RAD features then it ties you with the application server, so there are people, there's still some people out there, in <Organization Name> also, which thinks they should write a code which is independent of an application server, so, I think they want to use Eclipse.” (positive - non-sanctioned) (negative - sanctioned)</p> <p>“I don't think project size has so much effect in my opinion that you know, if they want to use that tool they will continue using that tool for uh...just because they think that tool is better than more of the standard</p>	<p>capable as opposed to somebody who is very light on the technical side and doesn't understand the technical challenges. Interviewee: I would say on the contrary if your manager is more technical then they will be more afraid.....It just depends, like on the manager. If your manager is more technical then he really understand it and then he will say yeah, I see, let's say if you want to use Spring, it's still not approved but you know it makes so much sense to cut down development and the maintenance costs down the line...But then, uh, but if the manager is little rigid on saying you know no we don't have (unclear) yet...but uhm, then he can queue him alternately, yes, you can use this, this, this, because the manager is technical enough to tell him you cannot use this but this is the alternate one and it will still keep us within the standards. <u>But if he is less technical manager than you know he just ask you (unclear) answer right, is it in standard, yes, is it not in standard no, if you say no, then the developer knows if I am going to him if he is going to ask me that one question is it the standard yes or no, then he is always going to say don't use it. He is not going to you know reason with me why I cannot use it. And so, he will not tell the manager who is less technical, you just..</u> <u>AA: Use it and keep quiet?</u> <u>RW: Yeah.</u>” (management)</p> <p>Project Size, Visibility and</p>

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<p>“I would say...if you really probe them like how you are doing this, how you are doing that, how you are doing this...and if it's a critical piece of component then you really would, at that time they would tell you. At that time, in the discussion it'd really come out. And even though we well them upfront you know, that they cannot use any open source from, that they just cannot download and start using any open source, so but we do find instances that they do use it because they have been using in past.” (<u>silent adoption</u>)</p> <p>“Interviewer: Do you think that developer would be more willing to approach the manager and tell the manager that he or she is using the open source if the manager is really technically capable as opposed to somebody who is very light on the technical side and doesn't understand the technical challenges. Interviewee: I would say on the contrary if your manager is more technical then they will be more afraid.....It just depends, like on the manager. If your manager is more technical then he really understand it and then he will say yeah, I see, let's say if you want to use Spring, it's still not approved but you know it makes so much sense to cut down development and the maintenance costs down the line...But then, uh, but if the manager is little rigid on saying you know no we don't have (unclear) yet...but uhm, then he can queue him alternately, yes, you can use this, this, this, because the manager is technical enough to tell him you cannot use</p>	<p><u>thing.” (positive - non-sanctioned)</u></p> <p>“(Talking about non-sanctioned open source solutions) Uh, <u>ease of development</u>. That's the main component. Ease of development and uhm, because a lot of this open source products are...they are <u>the utility</u>, ...if you see Apache commands, there are <u>so many utility products</u>, small, small, small things in it, just for example, for logging, if you stick with the...<u>the standard JAVA thing it will take forever</u>, just to log it will be so painful but now if you use open source, log4j is approved but before log4j was approved and it was so painful to do logging right so these are the small, small things, small, small open source uh, product out there you know, they really help you, <u>they speed your development effort</u>. That's the only reason.” (<u>positive - non-sanctioned</u>)</p> <p>“(When asked about why non-sanctioned solutions are preferred by technical users) Uh, same thing like past experience and the <u>ease of development</u> in their mind and I think primarily...if they think the <u>standards are a little outdated</u> then...then, uhm, I think the onus should be on the standard side also that you know they should keep it as current as possible with industry.” (<u>positive - non-sanctioned</u>)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“(Perception of open source being leading edge) A, I think, first it's open source right. So, you know, like</p>	<p><u>Criticality</u></p> <p>“I don't think project size has so much effect in my opinion that you know, if they want to use that tool they will continue using that tool for uh...just because they think that tool is better than more of the standard thing.”</p> <p>“If the project is going through the checkpoint process or the gating process, <u>if it's about 1 million dollar, then uhm, the rules around that are pretty tight, on the standards and the open source and everything that you are using. So, I've seen the developers who are working in those kind of project they are really cautious and they are aware of all those things. But if it's (an) under 1 million dollar project then.....somethings get..</u>”</p> <p>“(Referring to how large, more visible or critical projects are evaluated) So, that's where you now are going to one level up right, now beyond <Cluster 4> you are going to the corporate world right. And then there are more sets of eyes who are looking at you, so, you are more cautious, and you are more like you know, you know, you don't want to get flagged so...<u>So, that's where the developer community, the architect, the designers, everybody act more cautious when they are working on those projects.</u>”</p> <p><u>Help and Support Availability</u></p> <p>“interviewer: Do they look at</p>

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<p>this but this is the alternate one and it will still keep us within the standards. But if he is less technical manager than you know he just ask you (unclear) answer right, is it in standard, yes, is it not in standard no, if you say no, then the developer knows if I am going to him if he is going to ask me that one question is it the standard yes or no, then he is always going to say don't use it. He is not going to you know reason with me why I cannot use it. <u>And so, he will not tell the manager who is less technical, you just...</u> Interviewer: Use it and keep quiet? Interviewee: Yeah.” (silent adoption) (shared adoption)</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“People use Eclipse, people use Eclipse, I am not sure about SVN but they do use Eclipse. And some people have preference of that. And uh...because if you want to write your code, which is independent of application server which should run on any application server, that you are better of using Eclipse right. Then you can easily switch between ORACLE and WebSphere. But if you are writing your code on RAD, and <u>if you are using some of the RAD features then it ties you with the application server, so there are people, there's still some people out there, in <Organization Name> also, which thinks they should write a code which is independent of an application server, so, I think they want to use Eclipse.</u>”</p>	<p>anybody can and being open source that's why it's more popular with the developers also right, you know.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Interviewee: (Referring to technical user preference for non-sanctioned solutions) Do you think there may be other reasons why they have a preference for those tools? Interviewer: (sighs).....uhm.....it's just because <u>they have used in past, in number of places they are coming from.</u> And we have seen that. Like people would come very strongly and told, <u>because they have been just using it for, for the last five years so they want to continue using that.</u> So, that's another reason I can think of.” (past experience - non-sanctioned)</p> <p>“If you study the outside industry you find out of 10, 8 people are using, before they come to <u><Organization Name>, they were already using that tool, right, before they come to <Organization Name>.</u> So, when they come to <u><Organization Name></u>, naturally they want to use that tool, because they have more comfort level, <u>their use in past</u> and if you have tight project deadlines, then you know, you want to go with the fastest way you can.” (past experience - non-sanctioned)</p> <p>“They...they don't want, every new tool, <u>if they are not used to that tool, then there is a learning curve</u> and you know, they may not...do it, if they don't have time, then they don't have time then, they just move on.”</p>	<p>other, knowledgeable individuals or groups within their surrounding areas? Interviewee: <u>Yeah, yes, yes.</u> Interviewer: They do? Interviewee: Yes, they do. So (unclear) developer, <u>most of the time the new developer will not come to us at least but he will go to other developer.</u>”</p> <p>“Interviewer: (Asking about availability of help and support) How would you get your questions answered? Where do you go? Interviewee: Yeah, so, uh...forums, user forums, right. Interviewer: User forums? Interviewee: Yeah, yeah, user forums are, if you (unclear) and then if they don't find answer and if you are really stuck then they just throw away then just move onto another tool, (laughs) you know.”</p>

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<p>“(Referring to technical users' rejection of mandated solutions)They...they don't want, every new tool, if they are not used to that tool, then there is a learning curve and you know, they may not...do it, if they don't have time, then they don't have time then, they just move on.”</p> <p><u>Adoption Process</u></p> <p>“(Talking about the approach of a Centre of Excellence – a centrally created community) But most of the time <u>we mandate some of the tools like, these are the toolset every people come to get it, has to use it.</u> But, but, (unclear) that developer behind the scenes we'll find oh well, we go and see or something, they use something else.” (<u>top-down adoption</u>)</p>	<p>“But, but most of the time we find that they have used, but it just a question of difference like, like they have both used both the tool but they sometime <u>they want to use what they have used in past.</u>” (<u>past experience - non-sanctioned</u>)</p> <p>“I would say...if you really probe them like how you are doing this, how you are doing that, how you are doing this...and if it's a critical piece of component then you really would, at that time they would tell you. At that time, in the discussion it'd really come out. And even though we well them upfront you know, that they cannot use any open source from, that they just cannot download and start using any open source, so but <u>we do find instances that they do use it because they have been using in past.</u>” (<u>past experience - non-sanctioned</u>)</p> <p>“(Referring to effects on solution preferences) Uh, same thing like <u>past experience</u> and the ease of development in their mind and I think primarily...if they think the standards are a little outdated then...then, uhm, I think the onus should be on the standard side also that you know they should keep it as current as possible with industry.”</p> <p><u>Other Factors</u></p> <p>“Interviewer: OK.... Uhm, do you know if there are any penalties for not complying with these standards or policies in the <Organization Name>?”</p> <p>Interviewee:In my limited experience like in 3 years I am not</p>	

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	<p>sure if there are...</p> <p>Interviewer: Have you seen any examples of people getting penalized because they did not use standard?</p> <p>Interviewee: No, in 3 years I have not seen any example of that.” <u>(governance and accountability)</u></p> <p>“Interviewer: (Referring to adoption of a non-sanctioned solution) Why did you like SVN?</p> <p>Interviewee: It is really simple. Really, really simple. If I compare it with ClearCase, that's complex and <u>SVN was really simple, straightforward</u> and...everything (unclear) as a like, if you are using, typically a developer uses a Windows machine to do all their development, deployment is on UNIX or other environment but for development they use typically Windows machine right so, then you can see like in the tree structure all your codes and everything and you can check out check in clearly and it resolves conflicts and <u>it was very lightweight, very fast.</u>” (performance related concerns)</p> <p>“If you study the outside industry you find out of 10, 8 people are using, before they come to <i><Organization Name></i>, they were already using that tool, right, before they come to <i><Organization Name></i>. So, when they come to <i><Organization Name></i>, naturally they want to use that tool, because they have more comfort level, their use in past and <u>if you have tight project deadlines, then you know, you want to go with the fastest way you can.</u>” (performance related concerns)</p>	

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	<p>“They...they don't want, every new tool, if they are not used to that tool, then there is a learning curve and you know, they may not...do it, if they don't have time, then they don't have time then, they just move on.” (<u>performance related concerns</u>)</p> <p>“Uh, <u>ease of development</u>. That's the main component. <u>Ease of development</u> and uhm, because a lot of this open source products are...they are the utility, ...if you see Apache commands, there are <u>so many utility products</u>, small, small, small things in it, just for example, for logging, if you stick with the...the standard JAVA thing it will take forever, just to log it will be so painful but now if you use open source, log4j is approved but before log4j was approved and it was so painful to do logging right so these are the small, small things, small, small open source uh, product out there you know, <u>they really help you, they speed your development effort</u>. That's the only reason.” (<u>performance related concerns</u>)</p> <p>“Oh...Uhm...So, here is this thing, like, when I came I started using plain Eclipse, like, you know, <u>it was much faster coming up and everything else</u> right. But, uh, but then I later found like, that uh, even the development goes faster with Eclipse little bit, but then I found that RAD comes with <u>much more better interfacing with the actual application server</u>. So, it has its own custom plug-ins and everything. So, so, so I found that RAD is much better because it is built for even</p>	

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	<p>though it has this little bit overhead in it so, then I stopped using Eclipse. I started using RAD.” (<u>performance related concerns</u>) (<u>fit with existing systems</u>)</p> <p>“...in WebSphere I found it was very very easy but then what it does also at the same time, it will bind you with WebSphere like with everything. Because behind the scenes it starts putting the IBM code. The plug-in that it comes with, it will do that.” (<u>fit with existing systems</u>)</p>	
Technical User (Interviewee 28)		
<p><u>Hidden Adoption</u></p> <p>“(Talking about non-sanctioned solutions he currently uses) ...text editor I use Vim, I am not sure if you are familiar with that, also Eclipse...uhm, and then as far as kind of the supporting pieces I use SQL Developer, you know, to help with the database stuff”</p> <p>“Interviewer: Do you use any version control software? Interviewee: Uh, yeah, I use Subversion. That’s my favourite.”</p> <p>“I would say, as far as kind of high-level, I prefer the kind of more Agile approach.”</p> <p>“Interviewer: When you do your development work, are there any occasions when.....you, knowingly, even though when you know that there is a standard in place, you choose to ignore the standard and do use something else for various</p>	<p><u>Technical Factors</u></p> <p>“Interviewer: How do you pick those tools that you use? What do you do, how do you decide what to use? For example, you said, for version control you like Subversion... Interviewee: Yep. Interviewer: ...that’s your favourite. How did you pick that? Interviewee: Uhm...yeah, I mean, historically, I worked with it before, or at least with its predecessor, CVS, right. Uhm.....uh...yeah, I don’t know, I guess mostly personal history, uhm, also <u>ease of implementation</u>, right. So, we started using, at least I started using Subversion in the <Organization Name> just because <u>it was easy to get set up and going</u> and it’s there right, instead of you know maybe something a bit more, you know, involved. And that sort of thing.” (<u>positive - non-sanctioned</u>)</p>	<p><u>Technical Knowledge</u></p> <p>“Uhm, in my case I would probably be more kind of, you know, <u>I don’t want to say in his face</u> but I would be more...you know vocal about, you know what, we should use this tool or, if I said, I would like to use this tool and he said no to me, I would say, you know, I would try to make a case to let him use that.” (<u>perceived technical knowledge of management</u>)</p> <p>“So, I would say, you know, as far as software development goes, you know, <Manager’s Name> probably isn’t very knowledgeable, uhm, you know, maybe in the past he was, but he is certainly...been kind of...” (<u>perceived technical knowledge of management</u>)</p> <p>“I mean <u>my background is software development</u> so, I have</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
<p>reasons? Interviewee: Uhm.....I would say yes (laughs). Do you want a specific example? I mean...uhm...you know, as far as development tools, I think, you know, I use Vim, which probably no-one else uses, uhm, just because I like it, for certain types of development, especially the web stuff.” (<u>shared adoption</u>)</p> <p>“Interviewer: When would you approach your manager and when you would not bother approaching him? Interviewee: ...Well, I mean, if it's something that costs money, presumably, you would have to approach the manager to get that expensed appropriately, unless you bought it personally. Uhm.....most of I would say the non-standard stuff that gets used is either free or trial-ware or something like that, so, it wouldn't fall into that category of needing expensing. And, uhm, as developers we have administrative rights to our computer so, we just install what we want so, there is not too many barriers to using what we want.” (<u>silent adoption</u>) (<u>shared adoption</u>)</p> <p>“(Referring to immediate manager's attitude towards adoption of non-sanctioned solutions) You know, he is OK with us doing you know as long as we are getting the work done, we can do it using what tools we want, right. I mean...” (<u>shared adoption</u>)</p> <p>“So, yeah, if I had to coordinate with (corporate) people I'd be more...you know, likely to use the corporate tools.”</p>	<p>“(Talking about sanctioned solutions) And I don't know what the history of ClearCase is, either if it has a deserved reputation for I mean that is my case for Visual Source Safe, it's you know, really in the past <u>it wasn't the greatest...</u>” (<u>negative - sanctioned</u>)</p> <p>“Interviewer: And what makes it, what makes a version control system great? Interviewee: Uhm...well I mean, particular features, if you make it good at that, uhm...obviously you want, well, uh, you know, <u>ease-of-use</u> sort of....I think that's probably a big one so you can have some uptake and get going, uhm...”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Interviewer: How do you pick those tools that you use? What do you do, how do you decide what to use? For example, you said, for version control you like Subversion... Interviewee: Yep. Interviewer: ...that's your favourite. How did you pick that? Interviewee: Uhm...yeah, I mean, <u>historically, I worked with it before</u>, or at least with its predecessor, CVS, right. Uhm.....uh...yeah, I don't know, I guess mostly personal history, uhm, also ease of implementation, right. So, we started using, at least I started using Subversion in the <Organization Name> just because it was ease to get set up and going and it's there right, instead of you know maybe something a bit more, you know, involved. And that sort of thing.”</p>	<p>certainly seen <u>a lot of the stuff that I developed being taken on by other people</u> and, you know, copying my stuff and that sort of stuff. And, you know, I've seen their maturity kind of increase a bit, just because they've been working with, you know, a different, you know, they see it and so they experience it and work with it and uh, so...we are sort of that...that...you know, on the job learning going on.” (<u>technical user</u>)</p> <p>“Uh, well, uh.....just, uh, well picking on source control, right, you know, some people wouldn't even do it right. So, in that sense there is not that uhm.....a lot of the people come from the <Particular Technology> background to the software development you know, uh, side of things, so they don't kind of have maybe those experiences to tell them, you know, that source control is a good idea, uhm, what other things might be like...you know how you build things properly in the sense of modularization, testing and, uh, put all the various pieces uh, and aside each person is different but uh...” (<u>technical user</u>)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“(Referring to the effect of project visibility) So, yeah, if I had to coordinate with people I'd be more...you know, likely to use the corporate tools.”</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
<p>“Yeah, uhm, yeah, and that's sort of maybe another distinction of the CoE (Centre of Excellence) is...a lot of our projects are sort of single or uhm...you know, maybe two developers on it, so, it's very much, you know, here is your project, in a sense you can do it how you want right. Uhm...so, there is not a whole lot of collaboration going on in the development sense where you know, I might be working on this component and they got to get together and that sort of stuff.”</p> <p>“(Talking about adoption of non-sanctioned solutions) Uhm... (sighs)...Yeah...trying to think, I was definitely...done that sort of stuff in the past, uhm.....again a lot of the projects are small development-wise and kind of business-wise as well, so, I think in that sense, the justification is, you know, I'll use this library, you know, if it doesn't work then it just comes back to us anyways and we want to figure something out right. Uhm.....I think as far... certainly... uhm... you know currently I would say... the libraries that are out there... or, the libraries that are kind of available are sufficient for this kind of stuff we are doing, uhm, so, I don't think uhm, in that sense, there is a whole lot of, oh you know, should we use this or not, you know, a lot of decisions like that.”</p> <p><u>Adoption Process</u></p> <p>“Interviewer: One of the things you said was, you said, for those toolsets, uhm, there is going to be a move to IBM Rational.</p>	<p>(<u>past experience - non-sanctioned</u>)</p> <p><u>Other Factors</u></p> <p>“Uhm...uh, yeah...I guess...part of it was you know, <u>you just want to get something going now and make sure that it's there.</u> Uhm, and then the other part would be uhm, <u>the cost involved with doing that.</u> So, both the service centre and the CoE uhm, (are) cost recovery right so, to take on, you know, to buy us extra software right would be <u>an extra cost.</u>” (<u>budget related</u>) (<u>performance related concerns</u>)</p> <p>“Interviewer: When would you approach your manager and when you would not bother approaching him? Interviewee: ...Well, I mean, <u>if it's something that costs money.</u> presumably, you would have to approach the manager to get that expensed appropriately, unless you bought it personally. Uhm.....most of I would say the non-standard stuff that gets used is either free or trialware or something like that, so, it wouldn't fall into that category of needing expensing. And, uhm, as developers we have administrative rights to our computer so, we just install what we want so, there is not too many barriers to using what we want.” (<u>budget related</u>)</p> <p>“Interviewer: would a typical developer care about cost? . Interviewee: Uh...no, probably not. And, yeah, certainly in our group I would say is definitely developers that don't care about cost.” (<u>budget related</u>)</p>	<p>“(Referring to the effect of project visibility, smaller projects appear to offer more developer flexibility) ...a lot of our projects are sort of single or uhm...you know, maybe two developers on it, so, it's very much, you know, here is your project, in a sense you can do it how you want right. Uhm...so, there is not a whole lot of collaboration going on in the development sense where you know, I might be working on this component and they got to get together and that sort of stuff.”</p> <p>“...again a lot of the projects are small development-wise and kind of business-wise as well, so, I think in that sense, the justification is, you know, I'll use this library, you know, if it doesn't work then it just comes back to us anyways and we want to figure something out right. Uhm.....I think as far...certainly...uhm...you know currently I would say...the libraries that are out there...or, the libraries that are kind of available are sufficient for this kind of stuff we are doing, uhm, so, I don't think uhm, in that sense, there is a whole lot of, oh you know, should we use this or not, you know, a lot of decisions like that.”</p> <p><u>Awareness</u></p> <p>“Interviewer: Are you familiar with <Organization Name> IT Standards? Interviewer: Uh, some of them, like <IT Standard Number>. Uhm... Interviewer: Are you familiar</p>

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Category & Process	Antecedents	Moderators and Mediators
<p>Interviewee: Yep. interviewer: Who initiated that move? Where did that come from? Interviewee: Uhm, that was, it was...I don't know how they split it up, but it's sort of, like a...sub-project of the BSS transformation... Interviewer: OK. Interviewee: ...to kind of consolidate those tools, you know, make sure everyone is using the same tools. Uhm, so... Interviewer: So, were the developers consulted? Or did it come top-down? Interviewee: Uhm, it was more of a <u>top-down</u>. A lot of, at least from our perspective, that I would say a lot of the BSS transformation steps have been top-down.” (<u>top-down adoption</u>)</p> <p>“I mean, for instance, if...you know you have the suite of, you know, half a dozen products and <u>one manager really likes the one product in that suite and makes a, you know, strong case for that</u>, then, you know, the other products, even though they may not fulfil what, you know, the other groups want then they have to come fall in line...” (<u>top-down adoption</u>)</p> <p>“I guess...one other thing is maybe just around the whole policy idea, you know, on the ground it seems a lot of time it <u>is coming from the top down</u>. Uhm...and I am not sure how...top down it is coming from right. Because I mean, obviously they need to have input into their decision you know how far down are they going down for that input, and sometimes <u>it doesn't seem like they are going down far enough.</u>” (<u>top-down adoption</u>)</p>	<p>“(Referring to the effect of funding) There in the sense of, you know, what you would either been producing, or even in the sense that if we told the client that it is going to cost this much they are not even going to do the project. So you are not even going to get that project or get that money. <u>So, certainly I think funding plays a big part of it.</u>” (<u>budget related</u>)</p> <p>“Interviewer: Do you know if there are any penalties for not following the standards? Interviewee: Uh.....I don't know. Interviewer: Have you heard anybody who got penalized because they didn't follow the standards? Interviewee: Uh, no, no.” (<u>governance and accountability</u>)</p> <p>“(Referring to the attitude of immediate manager regarding adoption of non-sanctioned solutions) You know, he is OK with us doing you know <u>as long as we are getting the work done</u>, we can do it using what tools we want, right. I mean...” (<u>performance related concerns</u>)</p> <p>“Sure, well, I mean, I think one of the things would be definitely, you know the <u>tie-ins (with) the products, right</u>. You are not going to go off and buy RAD (Rational Application Developer) and not necessarily get, you know, RTC (Rational Team Concert) right. Uhm...makes sense to get the suite even though perhaps there is some features that you wanted to see, you know, in one of the particular products and they</p>	<p>with <IT Standard Number>? Platform Standards. Interviewee: <IT Standard Number>, yeah, the different platforms right.” (<u>awareness – sanctioned</u>)</p>

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Category & Process	Antecedents	Moderators and Mediators
<p>“Interviewer: Do you think your input is being asked or not? Interviewee: Well, that's the...like, so for instance, with the... <Policy/ Standard Number> they kind of just came out with the draft and asked for our input and <u>it seemed like it was way too late in the process.</u> Uhm...although at the same time I don't even know if we had the input if it would have affected it. Uhm...so..yeah I don't want to say that (laughs) but yeah, it.....I am not sure if it's just sort of, you know, an expedience thing that you know they just want to do it quickly and you know talking to some policy people it just seems like...you know, having the policy is the be all and end all instead of having the effects of the policy. And you know as a developer that kind of grates you the wrong way, right. Because you want to make good products and you know, as far as I am concerned, sure policies are good and you know I am always trying to use best practices from wherever but you know if <u>they are just pushing to get the policy out so that they can say we have a policy</u> you know and then...well, is it actually going to produce the results that you are looking for?” (<u>top-down adoption</u>)</p>	<p>aren't there, you would still go with that product to get the suite and to get the, you know, the interoperability that's...uhm, you know, the productivity that should be there if you are getting the whole suite.” (<u>fit with existing systems</u>)</p>	
Technical User (Interviewee 29)		
<p><u>Hidden Adoption</u> “We've got uh...two or three versions of Visual Source Safe going (unclear), one version of Subversion going, and we should be moving over</p>	<p><u>Previous Use (Past Experience)</u> “Interviewer: (Asking about what impacts solution preferences) Are there anything else that may affect on their decision?”</p>	<p><u>Project Size, Visibility and Criticality</u> “Interviewer: (Referring to technical user willingness to use non-sanctioned solutions on</p>

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Category & Process	Antecedents	Moderators and Mediators
<p>to RTC (Rational Team Concert) soon (laughs).”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“Interviewer: So one of the things I am exploring in this research is whether IT folks, technical folks, knowingly or unknowingly, disregard the IT standards, policies, procedures, guidelines and so on... Interviewee: Yes. Interviewer: ...have you seen any examples of that happening in your 13 years? Interviewee: Yes..... We have <u>always struggled with the accessibility rules</u>. Uhm...and...for so long...I don't know if officially or unofficially we got away with not being accessible. Because we claim our stuff is too technical or uh...too different.”</p> <p>“Interviewee: <u>So, we are just going to carry on...not following the rules</u>. Also, in terms of...in terms of...uh, forgot the number it got, <Standard Number> I think, which is the application... Interviewer: Application Development Standard. Interviewee: ...development standard. Uhm.....I would say we loosely follow that. I think every application development project is supposed to follow that. Uhm.....we <u>have built software requirement specifications that loosely follow that standard but we don't...we've made it work for us. And we haven't gone back and okayed that with anybody or verified...</u>”</p>	<p>Interviewee: Interviewer: Can you think of anything else? Interviewee:Really, the preference and <u>experience thing where they've had previous experience with it</u> or an actual preference with that tool.”</p> <p><u>Other Factors</u></p> <p>“Interviewer: Earlier on you have mentioned that it was imposed on a top down manner. How do you think they selected RTC (Rational Team Concert) in the first place? Interviewee:Should I figure out (unclear)...uhm...I know, <u>I think there was a lot of money available at a certain point in time in the year and a bunch of IBM investment was made...That was my, that's my impression.</u>” (budget related)</p> <p>“(Explaining why standards are ignored and non-sanctioned solutions are adopted) Uhm.....and there is also the.....I want to say <u>lack of enforcement of the standard.</u>” (governance and accountability)</p> <p>“Interviewer: Do you know if there are any penalties for not complying with standards? Interviewee: I don't know if there are any penalties for not complying with standards.” (governance and accountability)</p> <p>“Interviewer: ...why do you think such a discrepancy exists between a corporate policy and what everybody is using? Interviewee:Number 1, because people don't know...and</p>	<p>smaller, less visible, less critical projects) So, would they be more or less willing to play with those innovative ideas for smaller projects as opposed to bigger ones? Interviewee: ...I am just guessing but I would guess that it would be yes, they would be more up for that for smaller projects. But uh, typically, everything, everything I do and my team does is small from a <Organization> perspective. It's small IT project.”</p> <p><u>Awareness</u></p> <p>“Interviewer: Why would they know the standard and use something non-standard? Interviewee:Uhm, definitely, one situation would be a lack of knowledge that the standard exists.....” (low awareness - sanctions)</p> <p>“Interviewer: ...why do you think such a discrepancy exists between a corporate policy and what everybody is using? Interviewee:Number 1, because <u>people don't know...and number 2...because there is...because no-one, no-one is enforcing it</u>” (low awareness - sanctions)</p>

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Category & Process	Antecedents	Moderators and Mediators
<p><u>Adoption Process</u></p> <p>“Interviewer: And who decided to move to RTC (Rational Team Concert)? Interviewee: Uhm, <u>management</u>. Interviewer: Management. So, was it a top-down decision? Interviewee: <u>Top-down decision</u>. Interviewer: Have you been consulted? Interviewee:Me personally, no. Plus as a group, I don't think so.” (<u>top-down adoption</u>)</p> <p>“So, the transformation, yeah, a lot of the stuff was, a lot of the technologies that we are supposed to use in our new processes <u>has been dictated at us.</u>” (<u>top-down adoption</u>)</p>	<p>number 2...because there is...because no-one, no-one is enforcing it” (<u>governance and accountability</u>)</p>	
Immediate Manager (Interviewee 22)		
<p><u>Hidden Adoption</u></p> <p>“If there are no strict constraints around me, if I can meet the project timelines and stuff, I will do, I will try to get my project done. So, it's not that if there are strict constraints which I sign up to abide that, I might. But if not, if there is some flexibility I see there is in scope, if I can, If I see that the project can be done in time by the slight deviation, I might push as a project manager, but that's my prerogative. That's something different. It varies from individual to individual, to what <u>level of deviation</u> they will take it.”</p> <p>“Interviewer: And you said you are using Lean/Kanban method? Interviewee: Yeah. So, we use</p>	<p><u>Technical Factors</u></p> <p>“We still see it's in alignment with <u><IT Standard Number></u>...See, the people who write standards, which standards can change every four years, <u>things are changing, new things are coming, it cannot be as rigid as...because then there is no innovation, no development.</u> They should be guidelines, and there should be slight flexibility not to...but the flexibility should be viewed as some kind of an opportunity for innovation. And should move on.” (<u>negative - sanctioned</u>)</p> <p>“(Referring to outdated IT standards) As an IT industry we are at that stage so there are changes happening on a</p>	<p><u>Technical Knowledge</u></p> <p>“So, we understand it is a developer who is trying to use those libraries they should be able to figure it out themselves, mostly. Around the functions which they are using it. Uh, but whenever we update the product to the next version, we get those updated, because, they are taking care of the uh, the latest updates of those products. For example, if there is a library for version for example, JAVA 1.2, when JAVA 1.4 comes they are upgrading it to that version and releasing it. Apache Foundation. So, because of the trust we are saying we use that. <u>And...given the developer people available in the market</u></p>

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Category & Process	Antecedents	Moderators and Mediators
<p>whatever we do in changes in the fiscal work, PM could be updated on the...on this. So everyone can see it. When morning meetings can happen against these, so, because it is electronic, so we can take some metrics like which car is there, in which Phase and how long...and if there is a blocker, for how long the blocker is there.</p> <p>Interviewer: And where did you get the application, the tool?</p> <p>Interviewee: This is ehm, this particular one is, ehm, we, we bought it as software as a service. We paid for a user base, and it's hosted outside, uhm...</p> <p>Interviewer: Did you get any approvals for that?</p> <p>Interviewee: Mmmmmm, approvals is at Cluster level, senior level approval.” (shared adoption)</p> <p>“(Referring to the use of non-sanctioned libraries) They are...they are libraries, especially from Apache we use quite a bit.”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“If there are no strict constraints around me, if I can meet the project timelines and stuff, I will do, I will try to get my project done. So, it's not that if there are strict constraints which I sign up to abide that, I might. But if not, if there is some flexibility I see there is in scope, if I can, If I see that the project can be done in time by the slight deviation, <u>I might push as a project manager</u>, but that's my prerogative. That's something different. It varies from individual to individual, to what level of deviation</p>	<p>yearly basis, with innovations happening, <u>so standards which are like 4-5 years old, we can only interpret to a level how it can be, unless it is really obsolete. We got to update it.</u> But we got to still to (unclear) period of it...But it will be difficult for anyone on the planet to come up with a standard and hold everyone to that standard and just live like that where the world is moving so fast on the IT front.” (negative - sanctioned)</p> <p>“So it would be difficult when you (unclear) and if you want admission then you got to be on top of your standard, keep updating your standard. <u>Do you have that kind of uhm, capacity at the corporate to update your standard with changes every year?</u>” (negative - sanctioned)</p> <p>“Interviewee: And given that the maturity of Apache that our gang and the folks who are actually...uhm... interviewer: The Apache Foundation?</p> <p>Interviewee: Foundation. So, they...because of the trust they have we are allowing them to use the Apache products.” (positive – non-sanctioned)</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Interviewee: And given that the maturity of Apache that our gang and the folks who are actually...uhm... interviewer: The Apache Foundation?</p> <p>Interviewee: Foundation. So, they...because of the <u>trust</u> they have we are allowing them to use the Apache products.” (past experience</p>	<p><u>with that skillset it is not a huge risk to kind of use these products.”</u> (technical user)</p> <p>“What if it fails, OK, that again, if...we should not kill innovation in the name of standards. If if the situation, if you are for example, I am , we are saying you are following Struts and you use this particular library for this function. As a developer you find a new one...and before you implement it, yes you got to bring it to my attention to see how, how much, what the deviation is what to trying that out, uhm, do you want to do a POC instead of spending time for three weeks on it. We could POC it for a few hours and see if it's really worth it in those function. <u>You do it, you see, yeah it's coming out in fine colours...</u>then we should start changing the standard for our guidelines but for now you go ahead with this we will find the experience before we put in the standard you have to play it out. Do it.” (technical user)</p> <p><u>Awareness</u></p> <p>“Interviewer: Do, just because you mentioned standards and deviation earlier, are people aware of the standards to begin with?</p> <p>Interviewee: I think most of them, At least those at the manager level, architects level, at the senior developer's level, I think most of the employees also at least (unclear)” (<u>awareness –</u></p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
<p>they will take it.”</p> <p><u>Adoption Process</u></p> <p>“Who is responsible for the security of that data?...So a small application has to sync with, it might be seen as an overhauling (unclear) set of work but as a <Organization> there is some responsibilities for our <Clients>. So we got to, <u>we have to follow and hold on to that in centralizing stuff. When you view and try to implement centralization then you will have common tools, common stuff, it's easy to implement.</u>”(top-down adoption)</p> <p>“(referring to top-down procurement of solutions) For the tools we can overcome that by having the toolset ready to go out procured in house. Get your folks trained and keep them ready. So if there is any such budget things come up, they have everything, they can develop it.” (top-down adoption)</p>	<p>– non-sanctioned)</p> <p>“Mostly I think those folks who are putting together standards definitely they go for sure <u>with their experience</u>. And also they I believe with some of these standards they called in, uhm...colleague folks from outside. Uh, one or two consultants, experienced <u>consultants who have work experience in other industries</u>, and several industries. So that, I think they used that help in following the standards to an extent.” (past experience – sanctioned)</p> <p>“.....The other thing is their comfort level with that tool. So, to use any new tool...there is a learning curve, one. Second, there is a factor called change which, humans are not.....they don't like change right. So...<u>if they were using Eclipse all along, and suddenly, in an organization you want to bring RAD (Rational Application Developer), they may not be very receptive to that.</u>” (past experience – non-sanctioned)</p> <p><u>Other Factors</u></p> <p>“If...if the integration...depends upon...if there is an organizational need of integration, <u>integrating across multiple domains</u>, I might choose a different...uhm...and the tools. If there is a need for them then I would choose different one like Rational Suite, but if there is no such a need, if it is a <u>cost cutting thing</u>, uhm, do the basic code repository then I will go to CVS.” (budget related) (fit with existing systems)</p>	<p>sanctioned)</p> <p>“Interviewee: (Talks about his own interpretation of standards and sanctions) (laughs) The way they came out is...we said OK, waterfall and iterative and agile falls under the broader iterative methodology. Interviewer: OK. That's how you see it right? Interviewee: Yeah, so it's, it's interpretation again. So, OK...There are different ways of implementing iterative, for example, we have...we would like to visualize the work so we do a Kanban...” (low awareness - sanctions)</p> <p><u>Help and Support Availability</u></p> <p>“(Talking about importance of being able to get support on an IT solution)...So, we understand it is a developer who is trying to use those libraries they should be able to figure it out themselves, mostly. Around the functions which they are using it. Uh, but whenever we update the product to the next version, we get those updated, because, they are taking care of the uh, the latest updates of those products. For example, if there is a library for version for example, JAVA 1.2, when JAVA 1.4 comes they are upgrading it to that version and releasing it. Apache Foundation. So, because of the trust we are saying we use that. And...<u>given the developer people available in the market with that skillset it is not a huge risk to kind of use these products.</u></p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
	<p>“I totally agree there should be at the lowest level there should be some alignments but there are other factors which are influencing, because some of them we can put tools at the standards, but when the folks who put the tools in standards <u>how (do) they ensure that there is enough budget for the Clusters to buy those tools?</u>” (budget related)</p> <p>“OK I follow the standard can you get me the tool PM (Project manager)? PM goes through my budget uhm, no it was the budget approved by my client, my client said you got to just build it, get this but I do not consider that you needed this tool so I did not include in it. What do I do? OK, can I use this, or continue to use this open source? Yeah. Or do you stop the work or do you use open source and then we'll move it.” (budget related)</p> <p>“There are additional hurdles which one should help to define the results, <u>it's not about finding a one time money it's about ongoing, ongoing tools, maintenance, renewals and so on.</u>” (budget related)</p> <p>“You go and ask, uhm, to folks who are using Eclipse for example, in a small shop, they say yeah I have four licenses of RAD (Rational Application Developer) but this came today and I hired two new external consultants, I can't procure tools at my...I can't procure licenses, I got to go to approvals, that will take another one month, this project is two month project, I got a consultant for two months, I have to</p>	<p><u>But again, there might be other one-offs at some places if you download and use it and if that shop is closed or if that guy, these folks are gone, then we will be at bigger risks. So, in those situations, we better look, have someone who can provide support.</u>”</p> <p>“Interviewer: So, whenever they need, let's say, support, do they go and talk to each other? Interviewee: Oh, yeah. If a particular...in the morning, 9 o'clock (unclear) happens, if if a particular thing is holding an individual they will raise it, I am stuck at this point because of I don't know, I haven't used this particular uh PDF generator, this particular function I am stuck, that's why I got, I am getting delayed I spent (unclear) times today. OK, who else? You...spend an hour with <Name of a technical user>(?)”</p>

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	<p>deliver quickly, it's a small project so no budget for to buy additional tools, I have RAD, in my shop but my developers are using it.” (<u>budget related</u>)</p> <p>“(Referring to how managers' adoption decisions may be affected by performance concerns) Uhm, depending upon the constraints imposed on them, they might say, it's not fair on you folks to impose to push ten different constraints on me and still expect me to finish on this date. No, if I follow, if I adhere to these constraints manager, you change my date...Oh then maybe, we will kind of change...” (<u>performance related concerns</u>)</p> <p>“OK, what's important now? You want me to hold to your <Chief Executive's> announcement so that <Organization> gets not booted by papers or do you want me to deliver it on time? OK guys let's get it on time. That's the kind of situation where actually the deviations happen.” (<u>performance related concerns</u>)</p> <p>“...if you are put in a situation, as a developer, to say, to abide by, to abide by this date...you got to develop it and I can clearly understand you got to use Eclipse to quickly do it, because you cannot wait for the procurement of the tool for the next 6 weeks as the delivery date is in 2 months. Because for me to get you the tool I got to go...through because I got process around the standard right, procurement directive around the standard, I need to get approvals, I</p>	

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Category & Process	Antecedents	Moderators and Mediators
	<p>need to find a funds approvals first which at least takes me 6 weeks. What do you do?" (<u>performance related concerns</u>)</p> <p>“And performance. So, what happens is, if a particular tool uhm, I have a 2GB laptop for example, I am given that, now as a manager you are coming and asking me to use RAD. I say boss if I use RAD on 2GB it has, they come with so much overheads in that, it needs at least 4GB. If I use 2GB if I click the save it takes 3 minutes for me. So, I'd rather use Eclipse which works. Which has a minimum set of features. The minimum set of features may be sufficient for the work which you are giving me, I might quickly use it...until you give me the hardware which supports that software which you want me to use.” (<u>performance related concerns</u>)</p> <p>“Uhm, especially, in our case for example, if you are targeting, if our testing is for web applications, then I don't care which, whether it's QTP or Rational. But if want to target to...develop automated scripts for Lotus Notes applications, then I'd look for a totally different one, which actually we don't have one here. Uhm, but these tools that they can't do the job. So, it depends on the platform too.” (<u>fit with existing systems</u>)</p> <p>“Now when you came to the if a whole organization has to integrate across different domains, then we got to see the tools which can also integrate with a repository and work...seamlessly. Then that's where</p>	

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	<p>we are moving away from QTP to the Rational Functional Tester and the Performance Tester.” (<u>fit with existing systems</u>)</p> <p>“Who is responsible for the security of that data?...So a small application <u>has to sync with</u>, it might be seen as an overheading (unclear) set of work but as a <Organization> there is some responsibilities for our <Clients>. So we got to, we have to follow and hold on to that in centralizing stuff. When you view and try to <u>implement centralization</u> then you will have common tools, common stuff, it's easy to <u>implement.</u>” (<u>fit with existing systems</u>)</p> <p>“So, these are all, if you are looking for something to integrate across all this, they you got to...I don't think there is an open source which does all that, we have chosen the Rational Team Concert for that.” (<u>fit with existing systems</u>)</p>	
Immediate Manager (Interviewee 27)		
<p><u>Hidden Adoption</u></p> <p>“Interviewer: Have you seen occasions when people knowingly ignored a standard or policy for various reasons? Interviewee: Yeah (nodding).”</p> <p>“Interviewer: (Asking about adoption of non-sanctioned solutions) When does that happen? Interviewee: It happens because...business areas are looking for flexibility and sometimes the</p>	<p><u>Technical Factors</u></p> <p>“Interviewer: (Referring to technical user preference for non-sanctioned solutions) So, why do they prefer that alternative option rather than the corporately imposed one? interviewee: <u>Maybe it doesn't meet their needs. Or they weren't consulted.</u> And that's the thing, the biggest hurdle, I think it's just human nature you are not going to talk to me about something marginally accepted. Like if I am not engaged,</p>	<p><u>Technical Knowledge</u></p> <p>“I think in some cases you want to be leading edge, you want to maintain your skills, right. You want to make sure you are able to mark it yourself if the need arises that you have to move on.” (<u>technical user</u>)</p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“Interviewer: Do you have to go</p>

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<p>policy is either not flexible or it's so subjective that it's meaningless.”</p> <p>“(Referring to occasions when non-sanctioned solutions get adopted) If I have a client that has a business need, uhm, they could care less what the IT policy says. They just want the job done, right.”</p> <p>“(Referring to various non-sanctioned solutions that got adopted) We have adopted, you know, lean and agile and using Kanban and our cluster is probably leading in terms of Kanban adoption”</p> <p><u>User rejection (of sanctioned solutions)</u></p> <p>“It lists all government directives, whether it's financial, uhm, and they list them they say here's the Directive, here's the Policy, here's the Guideline, if it's a guideline, and uhm, it's great having all that stuff but if you don't follow it there is no consequence. <u>There is an IT Directive...and I see it (being) broken all the time. My own people break it.</u>”</p> <p>“If I have a client that has a business need, uhm, <u>they could care less what the IT policy says.</u> They just want the job done, right.”</p>	<p>and I think it is human behaviour, like fundamental human behaviour, I see it all the time, uhm...and so, I strive to engage my staff in the decision making process as much as possible.” (negative - sanctioned)</p> <p>“(Referring to outdated technical standards) Maybe you have to go back every few years and re-visit existing policies and that's, I think that's the point that I have found interesting. I don't know why you don't see it more often but...you'll see a study come out or you'll hear of a study coming out and I'm not sure if anybody has gone back and re-visited 5 year later to say well, is that really how it should have been, or is that how it turned out so, <u>you may have created a policy, a <Organizational IT Standard> standard 10 years ago, is it still relevant?</u> And you know this keeps growing, uhm, but I am not sure if they go back and re-visit and say let's fresh that it's no longer relevant” (negative - sanctioned)</p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“I think in some cases <u>you want to be leading edge</u>, you want to maintain your skills, right. You want to make sure you are able to mark it yourself if the need arises that you have to move on.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Interviewer: (Referring to adoption of non-sanctioned solutions) But, who initiated it, originally? Interviewee: Uh, that came, here is</p>	<p>through enterprise architecture approvals in your projects? Interviewee: Yes. Yes, for projects that have a certain limit, right. So, I can't, I can't remember if it's over a million or 10 million, I think it even over a million you have to go through all the gating processes, uhm, but I don't have to do that. That's another part of the Cluster that deals with that. Interviewer: How does that affect their, uhm, possibility of breaking the rules and going outside the standards? Interviewee: ...Uhm.....I'll give you an, I'll give you a personal example, uhm, and it's one that I am dealing with right now. I am trying get some changes made and that is...groups go to ARB (Architecture Review Board) and ACT (Architecture Core Team) with their solutions to get approval as part of the gating process, right. Uhm.....my world is <Particular Technology>, my world is <Particular Technology>...some of those things go through, with components...that are not aligned with what we are trying to drive, and we are trying to drive a common platform, uhm, what I am trying to do is get them to have, as they are going through their checkpoints, if there is something that involves <Particular Technology> or <Particular Technology>, there should be a dropdown-consult-return. Some kind of feedback. And that's not there now. Because, even when it goes through us, oh yeah we've</p>

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	<p>an interesting point, uhm.....that, in the Cluster we hired a new head...and that new head came in and <u>brought with him...this...new approach. That's what he had done in his previous job.</u> He came in and changed our organization tremendously...Uhm...we are still paying the price for it and he has left. He has moved on...and doing the same thing somewhere else now..." (past experience – non-sanctioned)</p> <p><u>Other Factors</u></p> <p>“Uhm, one of my colleagues, uhm, went through the <Organizational IT Standard> Standard...uhm...for (unclear), which is how to represent data on the earth, and it took him two years to get through the process of creating that <Organizational IT Standard> standard. He had time to do that. It's very rare to get, to spend that much time, has to have a resource so you could spend that much time, to make something a government-wide standard when in fact you can call it a local standard.” (governance and accountability)</p> <p>“It lists all government directives, whether it's financial, uhm, and they list them they say here's the Directive, here's the Policy, here's the Guideline, if it's a guideline, and uhm, it's great having all that stuff but if you don't follow it there is no consequence. There is an IT Directive...and I see it (being) broken all the time. My own people break it.” (governance and accountability)</p>	<p>consulted, where is the formal consultation? Yeah, there is an e-mail that say, yeah we are trying to, we are thinking of doing this, and you never hear about it hear from them again. So, some of those processes need to be better formalized. Uhm.....but how many projects fit in that...1 million plus...Like, it's interesting because few years ago there's multiple studies, and a lot of the enterprise architecture and all of the project management standards and so forth, you know, they are driven by these big corporate reports that are kind of odd(?), uhm, like project management in particular. If you go back to the original study that was released back (unclear) they dealt with projects that were 100 million dollar projects. And they had a number of recommendations for 100 million dollar projects. Somebody has come along and said, looked at those recommendations and said, let's apply it to everything. They haven't scaled it, right. And that scalability is often a challenge. So, maybe there is a corporate standard that...again.....needs to be...scaled to the situation.”</p> <p><u>Awareness</u></p> <p>“Interviewee: (Drilling down on why non-sanctioned solutions are preferred in place of sanctioned standard solutions) I am trying to figure out why they are preferring the outside as opposed to inside? interviewee: ...Uhm.....I mean why I do it is, it's because there is</p>

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	<p>“Interviewer: (Referring to occasions where non-sanctioned solutions get adopted) When does that happen? Interviewee: It happens because...business areas are looking for flexibility and sometimes the <u>policy is either not flexible or it's so subjective that it's meaningless.</u>” (governance and accountability)</p> <p>“If you create a policy, if there is no repercussion if you don't follow it, you are not to be held accountable for it. That's an issue. But if the policy itself isn't clear and concise, it's really got to be concise that affects adoption as well.” (governance and accountability)</p> <p>“(Referring to the dysfunctional consultation process) Some kind of feedback. And that's not there now. Because, even when it goes through us, oh yeah we've consulted, where is the formal consultation? Yeah, there is an e-mail that say, yeah we are trying to, we are thinking of doing this, and you never hear about it hear from them again. So, some of those processes need to be better formalized.” (governance and accountability)</p> <p>“And, uhm, I couldn't tell you right now I couldn't tell you what the process is for getting that standard in government. I could not tell you that. I know there is a standards council, and I know we have a rep in the Cluster who sits, probably on some sub-committee, uhm, but to be honest I am not sure (unclear), like...uhm.....if you can't make it simple to understand and easy to get</p>	<p>a wealth of information out there that...uhm.....would you rather go to the corner store...a corner store, a mom-and-pop corner store for...uhm.....a plumbing fixture, or would you rather go to home depot? You get a lot more variety at home depot.” (<u>awareness – non-sanctioned</u>)</p>

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	<p>to the end goal, I know they'll (be) hesitant to open that Pandora's Box.” (<u>governance and accountability</u>)</p> <p>“Interviewer: Do you know if there are any penalties for not complying with standards or policies in the <Organization Name>?”</p> <p>Interviewee: ...I don't know anybody who has been fired for not following the policy. Except maybe procurement.” (<u>governance and accountability</u>)</p> <p>“If I have a client that has a business need, uhm, they could care less what the IT policy says. <u>They just want the job done, right.</u>” (<u>performance related concerns</u>)</p>	
Immediate Manager (Interviewee 30)		
<p><u>Hidden Adoption</u></p> <p>“Interviewer: OK. And, do you think, on those occasions when a team member uses something non-standard, uhm...would they approach you and tell you about that solution all the time? Or are there any occasions you would think that they would just use it and won't tell you?”</p> <p>Interviewee:I mean that's certainly, that's certainly possible. I am not going to come, go and check everybody's desktops in terms of what they are doing.” (<u>silent adoption</u>)</p> <p><u>Adoption Process</u></p> <p>“ (Referring to strict control over solutions) Uhm, probably the biggest difference would be the level of</p>	<p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“We all, uhm, attempt to keep up-to-date with technological trends.”</p> <p>“And there is a natural tendency that we want to build it. And the technology people want to build it. And that isn't always the right solution in one word.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“I mean, you know, if the standard was to change, you know, I mean, well I would probably suggest it shouldn't because <u>we have invested a huge amount in COGNOS.</u>” (<u>past experience – sanctioned</u>)</p> <p>“But now I think, you know, it's</p>	<p><u>Project Size, Visibility and Criticality</u></p> <p>“Uhm, out of sight out of mind, I mean, I am.....very, I am engaged with what happens in <Location Name>, uhm, to a great extent but not as much as I am here. You know, it's like that. As I said, that's much more around the <Particular Technology> side which is much more established, and has acquired much quite of maturity than what we are doing here with COGNOS and then BI (Business Intelligence). Uhm, so, there is still a tendency for, you know, homegrown solutions to pop-out from <Organization Name> that they want to move into production, they want to do this and in that instance, it's.....it</p>

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<p>control the <Organization>, uhm, Cluster retained over it's toolset, and this is actually one of the things that prompted for me to leave” (<u>top-down adoption</u>)</p>	<p>ironic actually, with the exception of the database we are pretty much, you know, an IBM shop, I mean here. We have WebSphere as our, uhm, application server, we, uhm, obviously do our BPM (Business Process Modelling) modelling around that, I am looking towards ways of getting that integrated more with COGNOS. I want to see how that can work with things like one source and one key so that we can actually get a true integration one from the security perspective, you know, I think there is a lot of synergy to be had there. <u>That's why you get everybody the big stack, you buy cross product synergy but you lose the flexibility where being able to, you know, if you move off that stack it becomes quite expensive to do so.</u>” (past experience – sanctioned)</p> <p>“You have a stack that was built up predominantly because the development environments were free on almost exclusively ORACLE, uhm, platform, so, you are talking about not BI but ORACLE Reports, ORACLE Forms, ORACLE Portal, Application Server, ORACLE Database, the whole lot and in terms of switching that to a COGNOS, ORACLE, Informatica, JAVA front-end, <u>we are talking probably multiple years, multiple probably millions of dollars if someone tries to switch that.</u>” (past experience – sanctioned)</p> <p>“I say to my folks is that if, uhm, if you need a database and you want to do something that is free, you got free offerings from IBM, from ORACLE in terms of that stack. And</p>	<p>creates an interesting political scenario I should say...”</p> <p><u>Help and Support Availability</u></p> <p>“I also recognize there has to be sustainability and the ability to sustain systems as well.”</p> <p>“What happened in many instances if you look at some of this happening in a unit or in a branch is that they will have somebody who, out of (unclear) centralized, we have back-ups, we have repositories, we have, we have followed an SDLC (software development life-cycle) model...we know what is happening in the uh, uhm, in a lot of the branches of course we find it somebody is building something, uhm, and put it into production or in production on a service on whether it is being used than of course they leave and the whole thing just falls apart”</p> <p>“I say to my folks is that if, uhm, if you need a database and you want to do something that is free, you got free offerings from IBM, from ORACLE in terms of that stack. And then you can gradually upgrade it. <u>To me it is about sustainability, that's the key, how do we actually sustain and promote IT systems.</u>”</p> <p>“I think that is kind of the way it would look to me from an organizational perspective it makes sense, <u>once again</u></p>

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	<p>then you can gradually upgrade it. To me it is about sustainability, that's the key, how do we actually <u>sustain and promote IT systems</u>" (<u>past experience – sanctioned</u>)</p> <p>"I mean I really can't think of you know, I mean, to the example of ColdFusion, what ColdFusion does is sorry is exactly what JAVA does, I mean you are not getting any optimal business benefit and it just happens that <u>the developer they brought in without involving us knew ColdFusion.</u>" (<u>past experience – non-sanctioned</u>)</p> <p>"I think if you then kind of go down...as you go down into your mid-career you have usually gone down a track that says, you know, database, data management, BI or front-end application development or, you know, I mean, whatever...and you are within that ballpark, you want to stick with it."</p> <p><u>Other Factors</u></p> <p>"And, you know, in many instances, uhm, because people want to do things on a...very small budget, usually at the Branch level, sometimes even below that, uhm, there is a tendency to try and cobble together things as much as trying to cobble together solutions as much as possible." (<u>budget related</u>)</p> <p>"Uhm.....I think...if I listen to, if I listen to my folks, if I listen to the people I manage, it usually comes down to that question that they feel that the solution that they are choosing is the only one that would</p>	<p><u>sustainability being the key</u>, it makes sense to have standards around the toolsets, you know, it means you got transferable skills, and that's the other thing actually, people know they got transferable skills across the <i><Organization Name></i>. If somebody is going down in a particular rabbit hole then the chances are they are not going to have that this, and if they want to stay on that technology track they are not going to have something that is readily transferable to another cluster, say, if they want to expand their business experience or that technology experience."</p>

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	<p>meet the business...issues that they are facing or the business problems that they are facing. And we'll do it in a way that is, uhm.....cheap and effective as well, for the lowest cost” <u>(budget related)</u></p> <p>“I think it comes down to the ability to.....respond, be responsive, uh, usually if you are embedded in a branch or a unit you are much closer to the business problem than you would be in IT. Uhm, <u>you are able to respond to that business problem in a more effective...way, at least in the short term</u>” <u>(performance related concerns)</u></p> <p>“You know it's a very very impressive piece of work, but <u>if somebody wants to come to me with a question that needs to be answered in the <Organizational Executive Meeting> this afternoon</u>, and the data exists in the database but for some reason hasn't been included in let's say in the COGNOS Metadata Model...<u>how can we get that exposed to business so that they can answer that question</u>. And the one thing we can't do is we can't engage with a project manager or a CRM, you know, we can't set up a two or three week process to do it, <u>it has to be something a lot more responsive</u>. And I think it is that piece that we need to sharpen. And that's why that's what the business can do it.” <u>(performance related concerns)</u></p> <p>“And I think, you know, if you look at a COTS (commercial off-the-shelf) solution within Siebel, then ORACLE Business Intelligence Enterprise Solution makes perfect</p>	

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
	<p>sense. And, you know, even though it isn't the form of BI (Business Intelligence) tool that is, you know, used within the <Organization Name> if it is embedded, as it was in this instance within a COTS solution, I don't see that as breaking that particular policy." (<u>fit with existing systems</u>)</p> <p>"So, you know, if you look at the big players uhm, you know, I mean, Business Objects under uhm...what was the...SAP, S-A-P, uhm, ORACLE obviously, Siebel Analytics which is now ORACLE Business Intelligence Enterprise Edition, IBM with COGNOS, uhm, if you look at those three big players and they obviously offer a wide, uhm, variety of uhm, of product and a wide offering." (<u>fit with existing systems</u>)</p> <p>"But now I think, you know, it's ironic actually, with the exception of the database we are pretty much, you know, an IBM shop, I mean here. We have WebSphere as our, uhm, application server, we, uhm, obviously do our BPM modelling around that, I am looking towards ways of getting that integrated more with COGNOS. I want to see how that can work with things like one source and one key so that we can actually get a true integration one from the security perspective, you know, I think there is a lot of synergy to be had there. That's why you get everybody the big stack, you buy cross product synergy but you lose the flexibility where being able to, you know, if you move off that stack it becomes quite expensive to do so."</p>	

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
	<p><u>(fit with existing systems)</u></p> <p>“You have a stack that was built up predominantly because the development environments were free on almost exclusively ORACLE, uhm, platform, so, you are talking about not BI but ORACLE Reports, ORACLE Forms, ORACLE Portal, Application Server, ORACLE Database, the whole lot and in terms of switching that to a COGNOS, ORACLE, Informatica, JAVA front-end, <u>we are talking probably multiple years, multiple probably millions of dollars if someone tries to switch that.</u>” <u>(fit with existing systems)</u></p>	
Senior Manager (Interviewee 24)		
<p><u>Hidden Adoption</u></p> <p>“(Talking about adoption of a non-sanctioned methodology) We are implementing tools such as Kanban Boards that help us visualize the work, look at the rate of flow of our work going through the system, to our system of work rather. Uhm, and then looking for, obviously calculating and collecting metrics around how well we are doing, how quickly the things flow through and then looking for efficiencies to eliminate some of the bottlenecks that are associated with our system of work and how things flow through.”</p> <p>“(Referring to adoption of non-sanctioned solutions) We use the Mercury product toolset which is now owned by HP, right, so your LoadRunner, your QuickTest we use</p>	<p><u>Technical Factors</u></p> <p>“(Referring to factors affecting adoption of non-sanctioned solutions) So, again, depending on what you are doing, yes, and again, it's <u>ease of use</u>, you know, you don't have to buy the application server it's free right. <u>Lot's of support</u> for it, it's the same thing with the development tools.” <u>(positive – non-sanctioned)</u></p> <p><u>Latest and Greatest (Coolness / Popularity)</u></p> <p>“They are very easy to use it because they are <u>very, they are very popular within developer community</u>. And there is generally a lot of support for them...Ok, so, if you are having problems you know integrating your IDE into you know, into one of these open source repositories, you can get</p>	<p><u>Technical Knowledge</u></p> <p>“And what happens is you get one or two individuals now who have that skill and then they become the single point of failure inside the organization providing support to those applications and technologies, right. So, that's a manager's dilemma.” <u>(technical user)</u></p> <p><u>Project Size, Visibility and Criticality</u></p> <p>“(Implying how application of stricter standards around larger or more visible projects affect whether sanctioned or non-sanctioned solutions would be used) So, if you've got well-established processes that expects certain tools to be used because</p>

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Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
<p>those and the developers would use things like JUnit but that's more for like unit testing...and there is a couple of other open source, uh, coding like static code analyzers that our folks are kind of experimenting with.”</p> <p>“Interviewer: (Referring to another non-sanctioned tool used in the Cluster) I've noticed that there is significant use of a tool called Subversion. Interviewee: Yes, we use that as well. Interviewer: OK. Uhm... Interviewee: And PMD (source code analyzer) as well.” (<u>shared adoption</u>)</p>	<p>help online right. I mean <u>there's millions of users out there that you know, through some kind of chat forums, wikis, whatever right</u>, I mean there is definitely a lot of support.”</p> <p><u>Previous Use (Past Experience)</u></p> <p>“Interviewee: ...we bought...the testing tools, the Mercury, LoadRunner and WinRunner when it was still Mercury. So, back in like 2000, 2001 those tools were bought. OK, going out through, you know, some kind of competitive process or you know bid and the tools were acquired for our internal team purposes. Interviewer: So, predates the establishment of the standards. interviewee: In some cases yes.” (<u>past experience – non-sanctioned</u>)</p> <p>“I think what we try to do is to make every effort to align with the standard as much as possible on a go forward basis OK, but without, you know, but <u>without it being detrimental to what we already have, with the investments that we've already made.</u>”</p> <p>“<u>Developers nowadays are equipped with a whole bunch of tools they can literally get for free right.</u> So, if you are looking at JAVA development you can get you can get an Eclipse-based tool uhm, literally for free of the Internet right, through the various communities of practice right that are out there. Uhm, in addition to that people develop supporting tools around those products.” (<u>past experience – non-</u></p>	<p>the tools are often hand-off points right, between parties, then they will be forced into using the tools that are predominantly prescribed by the Cluster right, or the organization.”</p> <p><u>Awareness</u></p> <p>“(Speaking about a solution set that are covered by an existing standard) I don't recall seeing or knowing about an explicit standard on testing tools. So one doesn't exist..” (<u>low awareness - sanctions</u>)</p> <p>“Interviewer: At the technical level are they familiar with the standards? Are they aware of the standards? Interviewee: I think it's variable. Uhm, I think some of our more senior folks, like they do some of the solutioning and the design work, uhm, they are more familiar with the standards because they bump into them more so than others. Uh, and the reason I use the term bump into is because these are the people that would have to provide like our solution designs and our approaches that sometimes for, depending on the size of the project, end up going through the you know, the checkpoints, the gating OK, so when they are in front of ACT (Architecture Core Team) and ARB (Architecure Review Board) you know, Checkpoint 0, 1, 2, 3, 4, they are going to get asked those questions, right. So, they have</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
	<p><u>sanctioned)</u></p> <p><u>Other Factors</u></p> <p>“I think what we try to do is to make every effort to align with the standard as much as possible on a go forward basis OK, but <u>without, you know, but without it being detrimental to what we already have, with the investments that we've already made.</u>” (budget related)</p> <p>“Interviewer: Uhm, and ClearCase is the current standard in the <i><IT Standard Number></i>. Interviewee: Also, very expensive. interviewer: OK, so, is cost the only answer to that usage issues? They use Subversion because it's cheap? interviewee: No, I, I think uhm...to be quite frank I think developers uhm, will use the tools that are free....” (budget related)</p> <p>“Interviewer: Do you know if there are any penalties for not complying with the standards or the policies? Interviewee: Not that I am aware of.” (governance and accountability)</p> <p>“When you talk about the governance problem, it happens at two levels. One is at the <i><Organization Name></i> level. So, who, where is the police at the <i><Organization Name></i> level that goes after the clusters?...All right? The second level on governance really, and this is where the governance really does happen or should be happening, is more at the Cluster level. So, part of I think the standards in the IT Directive is that Clusters are responsible for</p>	<p>more experience, uhm, in terms of understanding what some of the standards are how they actually influence what they do, right. Whereas your kind of lower-level you know, uhm, let's say <i><Lower Level></i> developer or <i><Lower Level></i> developer was doing, just coding, taking instructions, they don't necessarily have to worry about it as much.”</p> <p><u>Help and Support Availability</u></p> <p>“Developers nowadays are equipped with a whole bunch of tools they can literally get for free right. So, if you are looking at JAVA development you can get you can get an Eclipse-based tool uhm, literally for free of the Internet right, <u>through the various communities of practice right that are out there. Uhm, in addition to that people develop supporting tools around those products.</u>”</p> <p>“I think the <u>community of practice outside the <i><Organization Name></i> is much much bigger, it's much much more vast if you would, and the amount of expertise collectively is much much greater than what the <i><Organization Name></i> can ever provide.</u> So, when you're talking about millions of users that are contributing right, to you know, improving the use of JAVA or you know, telling you know, how to do certain things it's techniques, tips, tricks, whatever it is...<i><Organization Name></i> cannot compete with that, OK.</p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
	<p>enforcing the standards. There is no central body that enforces the standards.” (<u>governance and accountability</u>)</p> <p>“So checkpoints and gating you have that around the artifacts that are you know, developed, delivered but they don't ask which tool you used to develop the artifacts with. They don't ask that. They never ask that question. It's like did you deliver the artifacts...Knowing for well that yeah you can deliver the artifacts using 20, 30, 50 different tools.” (<u>governance and accountability</u>)</p> <p>“Not for these minor things, I...I call them minor right, like I mean, this is not, in my eyes, depending on how you look at it, this is not somebody uhm, blatantly going out they are trying to cause damage or trying to you know, be destructive right. It's more about, look I need tools in order to manage the work that I do. And if you are not going to provide me with the tools I got to find them because it's the right thing to do, right?” (<u>performance related concerns</u>)</p> <p>“(Referring to adoption of non-sanctioned solutions by technical users) So, they'll do that out of necessity...as opposed to going out and trying to be malicious.” (<u>performance related concerns</u>)</p> <p>“Interviewer: On those occasions when technical folks go outside the rules, either...they may either tell you or their manager or they may not tell you on the occasions like use of an open source library or a using a</p>	<p>And these would be you know, kind of generic problems around you know, how do I code something, I am getting this type of error when I am trying to do this right, and those are very specific you know, to perhaps to JAVA language itself, and you know, how to do certain things you know, while you are coding.”</p> <p>“(Talking about the rationale behind adoption of non-sanctioned solutions) They are very easy to use it because they are very, they are very popular within developer community. And <u>there is generally a lot of support for them...Ok, so, if you are having problems you know integrating your IDE into you know, into one of these open source repositories, you can get help online right. I mean there's millions of users out there that you know, through some kind of chat forums, wikis, whatever right, I mean there is definitely a lot of support.</u>”</p> <p>“(Talking about why non-sanctioned open source solutions get adopted) That's probably why they use a lot of the...popular open source tools, <u>because they can get the support from their peers and their colleagues in the broader community of practice.</u>”</p> <p>“(Talking about why non-sanctioned open source solutions get adopted) And what better way to do it than with open source <u>where you have a very large community base that can help you</u></p>

**Table 10 - Conceptually-Clustered Matrix:
Adoption Categories, Antecedents, Possible Moderators&Mediators (Cluster 4)**

Category & Process	Antecedents	Moderators and Mediators
	<p>compiler that's not official and so on, why do they do that? interviewee: ...I think it's uhm, from my experience, it's really to get the work done. That's what it is, right.” (<u>performance related concerns</u>)</p> <p>“RTC Rational Team Concert is our code repository for everything so it provides not only uh, source code like repository like check in, check out, but <u>what it does behind the scenes is it takes your requirements documents that you've created using the toolset as well</u>, creates a full audit trail, and an audit log of who created, when it was created and how <u>that particular artifact was then linked in to your test plans, your test strategy, your test cases complete with linkage back to the piece of code or object that's being put together by the developer</u> so, it is an integrated code repository from that perspective.” (<u>fit with existing systems</u>)</p> <p>“So, if you've got well-established processes that expects <u>certain tools to be used because the tools are often hand-off points</u> right, between parties, then they will be forced into using the tools that are predominantly prescribed by the Cluster right, or the organization.” (<u>fit with existing systems</u>)</p> <p>“For example, in the case of RTC, Rational Team Concert, we are implementing now, there is, I mean, <u>RTC is kind of like the base product, then you got all these other products around it.</u>” (<u>fit with existing systems</u>)</p>	<p><u>out if you are in a pinch.”</u></p> <p>“So, again, depending on what you are doing, yes, and again, it's ease of use, you know, you don't have to buy the application server it's free right. <u>Lot's of support for it, it's the same thing with the development tools.</u>”</p> <p>“<u>You know the user community out there that can provide the support.</u>”</p>

Appendix N: Sample Interim Matrix Displays

Internal and External Influences

Cluster	Interview	Compliance	Identification	Internalization	Coercive	Normative	Mimetic
1	01	Y	Y	Y	Y	Y	Y
1	02	Y	Y	N	Y	Y	Y
1	04	Y	Y	N	Y	Y	Y
1	05	Y	Y	Y	Y	Y	Y
1	06	Y, N	Y	N	Y	Y	Y
1	07	N	Y	N	Y	Y	Y
1	08	Y	Y	N	Y	Y	Blank
1	10	Y	Y	N	Y	Y	N

Cluster	Interview	Compliance	Identification	Internalization	Coercive	Normative	Mimetic
4	22	Y	Y	Blank	Y	Y	Blank
4	24	Y	Y	Blank	Y	Y	Blank
4	25	Y	Y	N	Blank	Blank	Blank
4	26	Blank	Y	N	Y	Y	Blank
4	27	Blank	Y	Blank	Y	Y	Y
4	28	Y	Y	Y	Y	Blank	Y
4	29	Blank	Y	Y	Blank	Blank	Y
4	30	Y	Y	N	N	Blank	Blank

Y Existence of this particular pressure confirmed in the interview.
 N Existence of this particular pressure denied in the interview.
 Blank The topic was not discussed or there was no clear indication of interviewee's position.

Adoption Categories and Process

Cluster	Interview	Top-down Adoption	User-driven Adoption	User rejection of Sanctioned Solutions	Silent Hidden and Surreptitious Adoption	Shared Hidden and Surreptitious Adoption	Dual Adoption and Non-Genuine Use
1	01	Y	Y	Y	Blank	Blank	Blank
1	02	Y	Y	Y	Blank	Y	Blank
1	04	Blank	Blank	Blank	Blank	Y	Blank
1	05	Y	Y	Y	Y	Y	Y
1	06	Blank	Blank	Blank	Blank	Y	Blank
1	07	Y	Blank	Y	Blank	Y	Blank
1	08	Blank	Y	Blank	Blank	Y	Blank
1	10	Y	Y	Y	Blank	Y, N	Blank

Cluster	Interview	Top-down Adoption	User-driven Adoption	User rejection of Sanctioned Solutions	Silent Hidden and Surreptitious Adoption	Shared Hidden and Surreptitious Adoption	Dual Adoption and Non-Genuine Use
4	22	Y	Blank	Y	Blank	Y	Blank
4	24	Blank	Blank	Blank	Blank	Y	Blank
4	25	Y	Blank	Blank	Y	Y	Y
4	26	Y	Blank	Y	Y	Y	Blank
4	27	Y	Blank	Y	Blank	Y	Blank
4	28	Y	Blank	Blank	Y	Y	Blank
4	29	Y	Blank	Y	Blank	Blank	Blank
4	30	Y	Blank	Blank	Blank	Blank	Blank

Y Existence of this particular category or process confirmed in the interview.
 N Existence of this particular category or process denied in the interview.
 Blank The topic was not discussed or there was no clear indication of interviewee's position.

Antecedents of Hidden and Surreptitious Adoption

Cluster	Interview	Sanctioned Solutions (Negative Aspects)	Non-Sanctioned Solutions (Positive Aspects)	Past Use of Sanctioned Solutions	Past Use of Non-Sanctioned Solutions	Popularity of Non-Sanctioned Solutions	Financial and Budgetary	Fit with Existing Solutions	Governance and Accountability	Performance Induced Awareness
1	01	Y	Y	Blank	Y	Blank	Blank	Blank	Blank	Y
1	02	Y	Y	Blank	Y	Y	Blank	Blank	Y	Y
1	04	Blank	Y	Y	Blank	Y	Y, N	Y	Y	Y
1	05	Y	Y	Y	Blank	Y	Blank	Y	Blank	Y
1	06	Y	Y	Y	Blank	Y	Blank	Blank	Y	Y
1	07	Y	Y	Blank	Y	Blank	Y	Blank	Y	Y
1	08	Blank	Y	Blank	Y	Blank	Y	Blank	Y	Y
1	10	Y	Y	Blank	Blank	Y	Y	Y	Y	Y

Cluster	Interview	Sanctioned Solutions (Negative Aspects)	Non-Sanctioned Solutions (Positive Aspects)	Past Use of Sanctioned Solutions	Past Use of Non-Sanctioned Solutions	Popularity of Non-Sanctioned Solutions	Financial and Budgetary	Fit with Existing Solutions	Governance and Accountability	Performance Induced Awareness
4	22	Y	Y	Y	Y	Blank	Y	Y	Blank	Y
4	24	Blank	Y	Y	Y	Y	Y	Y	Y	Y
4	25	Y	Y	Y	Y	Blank	Y	Y	Y	Y
4	26	Y	Y	Blank	Y	Y	Blank	Y	Y	Y
4	27	Y	Blank	Blank	Y	Y	Blank	Blank	Y	Y
4	28	Y	Y	Blank	Y	Blank	Y	Y	Y	Y
4	29	Blank	Blank	Blank	Y	Blank	N	Blank	Y	Blank
4	30	Blank	Blank	Y	Y	Y	Y	Y	Y	Y

- Y Existence of this particular antecedent confirmed in the interview.
- N Existence of this particular antecedent denied in the interview.
- Blank The topic was not discussed or there was no clear indication of interviewee's position.

Possible Moderators and Mediators

Cluster	Interview	TECHNICAL KNOWLEDGE & SKILL		PROJECT SIZE, VISIBILITY & CRITICALITY	AWARENESS		AVAILABILITY OF HELP & SUPPORT
		TECHNICAL USER (+)	MANAGER (-)		SANCTIONS (-)	NON-SANCTIONED (+)	
1	01	Y	Y	Y	Y	Blank	Blank
1	02	Y	Y	Y	Y	Y	Y
1	04	Y	Y	Y	Y	Y	Y
1	05	Y	Y	Y, N	Y	Y	Y
1	06	Y	Blank	Y	Y	Y	Y
1	07	Y	Y	N	Y	Y	Y
1	08	Y	Blank	Blank	Y	Y	Y
1	10	Y	Y	Y	Y	Y	Y

Cluster	Interview	TECHNICAL KNOWLEDGE & SKILL		PROJECT SIZE, VISIBILITY & CRITICALITY	AWARENESS		AVAILABILITY OF HELP & SUPPORT
		TECHNICAL USER (+)	MANAGER (-)		SANCTIONS (-)	NON-SANCTIONED (+)	
4	24	Y	Blank	Y	Y	Y	Y
4	25	Y	Blank	Y	Y	Y	Y
4	26	Blank	Y	Y, N	Blank	Y	Y
4	27	Y	Blank	Y	Blank	Y	Blank
4	28	Y	Y	Y	Y, N	Y	Blank
4	29	Blank	Blank	Y	Y	Blank	Blank
4	30	Blank	Blank	Y	Blank	Blank	Y

- Y Existence of this particular category or process confirmed in the interview.
- N Existence of this particular category or process denied in the interview.
- Blank The topic was not discussed or there was no clear indication of interviewee's position.