

**The London School of Economics  
and Political Science**

*Institutionalisation of technology-supported organisational  
processes: a structural perspective on  
IT Service Management support technology*

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of the London School of Economics for the degree of  
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## **Declaration**

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## **Abstract**

Increasing emphasis on strategic and operational IT-business alignment and best-practice frameworks (e.g. ITIL) has promoted the deployment of cross-functional process-based IT Service Management (ITSM) technologies within a wide range of organisations. Such technologies underpin core IT support processes such as Incident, Problem, and Change Management within a Service Management framework, promoting greater visibility and evaluation of IT contribution to the business. However, strategic and operational improvement of cross-functional ITSM processes requires effective embedding of process-supporting software in the organisation's ITSM process infrastructure.

This research is based on an in-depth interpretive case-study of the use made of an ITSM software package in an IT Services department of a major UK university. In particular, this thesis examines the roles of organisational context, specific software functionality and design features, and organisational process infrastructure to develop an understanding of how particular ways of working with the software are embedded in various organisational routines. This research identifies a number of prevalent IT support working practices as organisational routines, and analyses the interrelationship between the working practices, organisational processes, the ITSM software artefact, and the immediate and wider organisational context. This thesis makes a number of contributions, including developing a theoretical framework for studying the role of technological artefact and organisational context and processes from the perspective of organisational routines and structuration theory.

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<b>Index of Figures:</b> .....	<b>9</b>
<b>Index of Tables:</b> .....	<b>11</b>
<b>CHAPTER ONE – INTRODUCTION</b> .....	<b>12</b>
1.1. Introduction.....	12
1.2. Research Objectives.....	14
1.3. Organisation of the thesis.....	21
<b>CHAPTER TWO – LITERATURE REVIEW</b> .....	<b>24</b>
2.2. Chapter Introduction .....	24
2.3. Business-IT alignment .....	24
2.4. IT Governance .....	25
2.5. Information Technology Infrastructure Library (ITIL) .....	27
2.5.1. Incident, Problem, Change and Configuration Management.....	29
2.5.2. Service Level Management.....	31
2.5.3. IT Help Desk and IT Service Desk .....	32
2.6. IT Service Management (ITSM) Process Maturity .....	33
2.7. IT Support .....	34
2.7.1. Problem-solving.....	35
2.7.2. Organising problem-solving .....	36
2.7.3. Interpreting problem-solving .....	37
2.7.4. Documentation of problem-solving and knowledge reuse .....	39
2.8. Related Industries and Technologies .....	41
2.8.1. Service Quality Management.....	41
2.8.2. Customer Relationship Management (CRM) .....	43
2.8.3. Call Centres.....	45
2.8.4. Knowledge Management .....	48
2.9. Practical and Conceptual points of departure .....	50
2.9.1. Role of ITSM technology .....	50
2.9.2. Conceptual point of departure.....	51
2.9.3. Practical point of departure.....	53
2.10. Chapter Summary .....	55
<b>CHAPTER THREE - THEORY REVIEW</b> .....	<b>57</b>
3.1. Chapter Introduction .....	57
3.2. Organisational routines .....	57
3.2.1. Routineness in technical support work .....	57
3.2.2. Patterns and recurrence .....	59
3.2.3. Mindlessness vs. effortful accomplishment.....	61
3.2.4. Collective and processual nature of routines .....	63
3.2.5. Context and path dependence .....	65
3.2.6. Deconstructing organisational routines.....	66
3.2.6.a. Grammatical model of routines .....	67
3.2.6.b. Performative and ostensive aspect of routines.....	68
3.2.7. Effects of routines within organisations .....	71
3.3. Structuration theory .....	73
3.3.1. Introduction.....	73
3.3.2. Overview.....	73

3.3.3.	The Duality of Structure and Agency .....	74
3.3.4.	The emergent nature of structuration .....	77
3.3.5.	Structuration theory and organisational routines .....	79
3.3.6.	Structuration Theory Critique .....	80
3.4.	Structuration Theory and Information Systems .....	82
3.4.1.	Adaptive Structuration Theory .....	83
3.4.2.	Structurational Model of Technology .....	85
3.4.3.	Practice Lens Model of Technology .....	87
3.5.	Enriching Practice Lens model of technology .....	91
3.5.1.	Grammatical Composition .....	91
3.5.2.	Performative and Ostensive Aspects .....	94
3.5.3.	Synthesised theoretical framework .....	96
3.6.	Chapter Summary .....	99
<b>CHAPTER FOUR – RESEARCH DESIGN .....</b>		<b>101</b>
4.1.	Chapter introduction .....	101
4.2.	Reflexivity.....	101
4.3.	Philosophical foundation .....	103
4.3.1.	Paradigm overview .....	104
4.3.1.a.	Positivist.....	104
4.3.1.b.	Interpretivist.....	105
4.3.1.c.	Critical.....	107
4.3.2.	Philosophical underpinning of this thesis .....	108
4.4.	Research methodology.....	111
4.4.1.	Guiding Principles .....	113
4.4.2.	Case study parameters.....	115
4.4.3.	Research site selection .....	117
4.5.	Data collection and analysis.....	118
4.5.1.	Transaction log analysis.....	118
4.5.2.	Task analysis.....	119
4.5.3.	Verbal protocol analysis .....	120
4.5.4.	Interviews.....	123
4.5.5.	Hermeneutic analysis and triangulation.....	126
4.5.6.	Major data types and summary of empirical data .....	128
4.6.	Chapter summary .....	131
<b>CHAPTER FIVE – TP HELPDESK SOFTWARE ARTEFACT.....</b>		<b>133</b>
5.1.	Chapter introduction .....	133
5.1.1.	Software Architecture .....	133
5.1.2.	Elements and Workflow .....	134
5.1.3.	Graphical User Interface (GUI) Layout.....	135
5.1.4.	Service Level Management.....	136
5.2.	Help Desk Software Customisation Options .....	137
5.2.1.	Customising workflow.....	138
5.2.2.	Customising entities, data elements and GUI.....	140
5.2.3.	Customising call-logging with Hot Topics .....	143
5.2.4.	Customising Teams and Roles.....	143
5.2.5.	Customising Service Level Management Reports.....	144
5.2.6.	Customising links with other systems and databases .....	145
5.3.	Chapter summary .....	146



**CHAPTER SIX – PRELIMINARY FINDINGS.....147**

6.1. Chapter introduction .....147

6.2. XYZ University .....147

6.2.1. IT Help Desk team.....150

6.2.2. Cluster Support Teams (Staff & 2<sup>nd</sup>-line Support) .....153

6.2.3. Systems and Network Teams (2<sup>nd</sup>-line Support) .....155

6.2.4. Intra-departmental Support Policy and Referrals .....156

6.3. Configuration of TP Help Desk Software at XYZ University.....157

6.3.1. Customised Workflow .....158

6.3.2. Customised entities, data elements and GUI .....159

6.3.2.a. Call Details Window.....159

6.3.2.a.1. IT Help Desk Team.....159

6.3.2.a.2. Cluster Support Teams and other teams .....161

6.3.3. Shared entities, data elements and GUI .....163

6.3.3.a. Common Data Elements .....164

6.3.3.b. Call Closure Window.....164

6.3.4. Customised Hot Topics.....165

6.3.4.a. IT Help Desk Team.....166

6.3.4.b. Cluster Support Teams (staff support).....168

6.3.5. Customised links with other systems and databases.....168

6.3.6. Customised Service Level Management Reports .....169

6.3.7. Unsupported Customisations: AutoEmail module.....171

6.4. Triangulation and overlapping nature of empirical evidence .....173

6.5. Analytical point of departure .....176

6.6. Contextuality.....178

6.7. Chapter summary.....178

**CHAPTER SEVEN – CASE STUDY ANALYSIS .....180**

7.1. Chapter introduction .....180

7.2. General Procedures and Training.....180

7.3. Role of TP HelpDesk software in daily work.....182

7.4. Call logging technologies-in-practice .....184

7.4.1. Performative Aspect – Transaction Log Analysis .....185

7.4.2. Ostensive Aspect – Operational Procedures .....187

7.4.3. Performative Aspect – Task Analysis.....188

7.4.4. Fire-and-Forget Call Logging .....190

7.4.4.a. Facilities, Norms and Interpretive Schemes .....190

7.4.4.b. Moves, Subroutines, and Performances.....196

7.4.4.c. Fire-and-Forget Call Logging – Summary .....198

7.4.5. Limited-use call logging .....201

7.4.5.a. Facilities, Norms and Interpretive Schemes .....202

7.4.5.b. Moves, Subroutines, Performances.....205

7.4.5.c. Limited-Use Call Logging – Summary.....206

7.5. Collaborative Working technologies-in-practice .....208

7.5.1. Performative Aspect – Transaction Log Analysis .....209

7.5.2. Ostensive Aspect – Operational Procedures .....213

7.5.3. Performative Aspect – Task Analysis.....215

7.5.4. Ostensive Aspect – Persistent Call Ownership.....221

7.5.5. Fire-and-Forget Call Escalation.....224

7.5.5.a. Facilities, Norms and Interpretive Schemes .....226

7.5.5.b. Moves, Subroutines and Performances .....	228
7.5.5.c. Fire-and-Forget Call Escalation – Summary .....	229
7.5.6. Limited-use collaborative working .....	232
7.5.6.a. Facilities, Norms and Interpretive Schemes .....	238
7.5.6.b. Moves, Subroutines and Performances .....	238
7.5.6.c. Limited-Use Collaborative Working – Summary .....	239
7.6. Chapter Summary .....	241
<b>CHAPTER EIGHT – DISCUSSION AND CONCLUSIONS .....</b>	<b>246</b>
8.1. Chapter Introduction .....	246
8.2. Discussion of findings.....	246
8.2.1. Review of identified organisational routines .....	247
8.2.2. Service Level Management Reports .....	248
8.2.3. SLDs and technologies-in-practice .....	252
8.3. Research contributions.....	260
8.3.1. Position with respect to established research.....	260
8.3.2. Theoretical Contributions .....	263
8.3.3. Methodological contributions .....	269
8.3.4. Practical contributions .....	270
8.4. Limitations of this study and recommendations for future research.....	272
8.5. Conclusion .....	278
<b>APPENDIX 1: ALTERNATIVE ILLUSTRATION .....</b>	<b>280</b>
A1-1. Fire-and-Forget Call Logging First-Person Narrative .....	280
A1-2. Chain of Evidence.....	283
<b>BIBLIOGRAPHY .....</b>	<b>286</b>

## Index of Figures:

Figure 1: IT Infrastructure Library (ITIL) overview .....	29
Figure 2: IT Process Maturity Model (Gartner 2005).....	34
Figure 3: Structurational Model of Technology (Orlikowski 1992).....	86
Figure 4: Practice Lens Model of Technology (Orlikowski 2000).....	89
Figure 5: Practice Lens and Grammatical Model of Organisational Routines .....	94
Figure 6: Practice Lens and Duality of Organisational Routines .....	96
Figure 7: Synthesised Theoretical Framework .....	98
Figure 8: TP HelpDesk software architecture.....	134
Figure 10: TP HelpDesk Software GUI layout.....	136
Figure 11: TP HelpDesk Software GUI - Workload List .....	137
Figure 12: TP HelpDesk Software: Customising Workflow .....	139
Figure 14: Preliminary Transaction Log Analysis.....	150
Figure 16: IT Help Desk Team Organisational Chart.....	151
Figure 18: Cluster Support Teams Organisational Chart.....	154
Figure 19: TP HelpDesk Software - IT Help Desk Team Main Call Window .....	160
Figure 20: TP HelpDesk Software: Other Teams Main Call Window .....	162
Figure 21: TP HelpDesk Software - Shared Call Closure Window.....	165
Figure 22: TP HelpDesk Software - IT Help Desk Team Hot Topics.....	167
Figure 24: Call Logging Transaction Log Analysis - Use of Hot Topics.....	185
Figure 25: Call Logging Transaction Log Analysis - Typology of Hot Topics .....	186
Figure 26: Call Logging Transaction Log Analysis - Prevalent Hot Topic.....	186
Figure 27: IT Help Desk Team "Catch-All" Hot Topic Operational Procedure.....	188
Figure 28: IT Help Desk Team Type A Hot Topic Operational Procedure.....	189
Figure 29: TP HelpDesk Software Common Call Closure Confirmation Screen .....	189
Figure 30: Synthesised Theoretical Framework - Fire-and-Forget Call Logging .....	199
Figure 31: Synthesised Theoretical Framework - Limited Use Call Logging.....	207
Figure 32: Collaboration Transaction Log Analysis - Call Ownership .....	210
Figure 33: Collaboration Transaction Log Analysis - Call Assignment.....	211
Figure 35: Collaboration Transaction Log Analysis - Receiving Assignments .....	212
Figure 36: Role of TP HelpDesk Software in Support Services Structure .....	214
Figure 37: Collaborative Work Practices - Documentation of Call Progress.....	216
Figure 38: Synthesised Theoretical Framework - Fire-and-Forget Call Escalation ..	230

Figure 39: Synthesised Theoretical Framework - Limited Use Call Assignment .....	240
Figure 40: Relating "macro" and "micro" - Research Contribution .....	253
Figure 41: Theoretical Contribution - Synthesised Theoretical Framework .....	265

## Index of Tables:

Table 1: Defining IT Service Management (ITSM) .....	28
Table 2: ITIL – Defining Incident, Problem and Change Management .....	30
Table 3: ITIL - Defining Service Level Management .....	32
Table 5: Giving the problem away (Pentland, 1992).....	37
Table 6: Structuration Theory – key concepts .....	75
Table 8: Structural Model of Technology (Orlikowski 1992).....	86
Table 9: Guiding principles for conducting interpretive research .....	114
Table 10: Major empirical data types .....	128
Table 11: Interviewee Summary .....	131
Table 12: Empirical Data Sources Summary.....	131
Table 13: IT Services support structure .....	156
Table 14: IT Services Support Policy .....	157
Table 15: TP HelpDesk Software - Task Analysis of Hot Topic Design Typology..	168
Table 16: TP HelpDesk Software - Service Level Management Report Design.....	171
Table 17: Fire-and-Forget Call Logging Routine Composition .....	200
Table 18: Transaction Log Analysis – Call Logging Inconsistencies .....	201
Table 19: Limited Use Call Logging Routine Composition.....	208
Table 20: Collaborative Working – Call Logging Procedures .....	215
Table 21: Collaborative Work Practices - Task Analysis Summary .....	220
Table 22: Collaborative Working Practices - Task Analysis of Type C Hot Topics.	221
Table 23: Fire-and-Forget Call Escalation Routine Composition .....	232
Table 24: Service Level Definition and Calculation.....	251
Table 25: Appendix - Fire-and-forget Call Logging First Person Account.....	282
Table 26: Appendix - Call Logging Technologies-in-Practice Chain of Evidence...	285
Table 27: Appendix - Collaborative Working Technologies-in-Practice Chain of Evidence.....	285

# CHAPTER ONE – INTRODUCTION

## **1.1. Introduction**

In 2004, 2005 and 2006 surveys of IT executives, Business-IT alignment was consistently cited as one of the top key management concerns (c.f: Luftman and McLean 2004; Luftman 2005; Luftman, Kempaiah et al. 2006). The concept of Business-IT alignment is underpinned by the notion of strategic partnership between the “business” and “IT” within an organisation, whereby investment in IT and delivery of IT services, whether sourced internally or externally, should reflect business priorities, and business priorities should in turn be based on an understanding of IT capabilities and limitations (Ward-Dutton and Macehiter 2005). There is a growing recognition that Business-IT alignment is a complex fusion of the business and IT functions along organisational strategy, structure, and culture dimensions (McKeen and Smith 2003), and that Business-IT alignment requires a governance framework underpinned by a range of IT Service Management (ITSM) processes operationalising IT infrastructure and services (Ribbers 2002; Patel 2004).

The current management literature acknowledges that the state of IT infrastructure and services in many companies represents a “somewhat messy collage, as a result of deals, improvisations, and layers of sedimentation” – seen as something to be abandoned in favour of a more integrated and controlled approach turning the infrastructure from a “thrown-together institutional backbone” to a value-generating, integrated set of technologies, applications and processes (Ciborra and Hanseth 2000, p.3). The activities of controlling and managing IT services and infrastructure in organisations are often supported by best-practice frameworks such as IT Infrastructure Library (ITIL), whereby Business-IT alignment relies on measurement of operational performance of the IT Services against service levels stipulating the quality and value of the service. In fact, the service culture, emerging from the Help Desk function in the mid-1980s, is now spreading throughout the increasingly mature and business-aware IT organisation, and the traditional Help Desk itself is evolving from a reactive crisis-centre to being an IT ‘service nexus’ (Marcela and Middleton 1996).

The growing complexity of an organisation's IT infrastructure (Stinton 1996) and the need for operational reporting have led the market for software tools to help IT organisations deliver business-oriented IT Service Management (ITSM) to growth expectations of \$9.7 billion in 2010 (Gartner 2006). It is conventional wisdom in the ITSM industry that purchasing a software tool to provide, rather than reflect the ITSM processes is largely doomed to failure (Bruton 2004). However, the current understanding in the management literature tends to suggest that achieving a suitable "fit" between the organisational structure, culture, processes and configuration of the software artefact designed to reflect and facilitate the ITSM processes, although by no means easy, is nevertheless possible and even relatively unproblematic (c.f. McKeen and Smith 2003; Bruton 2004).

This research was largely motivated by the researcher's own experience of IT Service Management industry, including several years of managing a busy IT Service Desk in a public sector organisation, configuring the Help Desk software for use throughout a number of technical support teams, defining operational service levels, and designing operational performance reports for those teams. Through in-depth engagement with the technical support staff in the different teams, the author came to appreciate that the task of achieving the "fit" between organisational structure, culture and processes on the one hand, and the configuration of the Help Desk software to facilitate and reflect the management of the IT support function on the other, was surprisingly complex. In fact, the author was often left with a distinct impression that the "fit" was a careful balancing act, subject to a multitude of push and pull factors. For example, ascertaining what operational data was available, how it was captured on a day-to-day basis, and how it could be appropriately interpreted to provide a picture of the operational performance was a never-ending challenge of integrating the definitions of the service levels, the organisational processes that the service levels were supposed to represent, and the Help Desk software tool supposed to support those processes into a coherent holistic concept.

The author left full-time employment in the IT Services Management industry in order to conduct the research presented in this thesis. The research presented in this thesis is therefore not based on the author's personal experiences and is not autobiographic, in that it does not attempt to provide "a solo narrative ... reveal[ing] a

discovery and retell[ing] an epiphany in a character's life" (Saldana 2003, p.224-225). This thesis presents and analyses the findings of a detailed interpretive case-study (Walsham 1995) incorporating a wide variety of data collection methods, including transaction log analysis (Peters 1993), in-depth semi-structured interviews (Fontana and Frey 2000), verbal protocol analysis (Kuusela and Paul 2000), task analysis (Annett and Duncan 1967), as well as analysis of large amounts of documentary evidence. More detail about the design of this research is presented in Chapter 4.

The initial research direction was broadly defined as analysing the relationship between the organisational processes, the software designed to support those processes and the service level definitions and measurements reflecting those processes. This direction was gradually refined into a number of research questions, as outlined in the following section of this chapter.

## **1.2. Research Objectives**

Our research addresses the IT Service Management aspect of Business-IT alignment as concerned with effective supply of IT services and products and the management of IT operations in an organisation. Although the research presented in this thesis is not auto-biographic, the author nevertheless accepts the argument that "I am an instrument of my enquiry: and the enquiry is inseparable from who I am" (Louis 1991, p.365). Therefore, the close proximity and degree of practical experience of the researcher with the subject matter warrant some reflexivity (Alvesson and Sköldberg 2000; Ellis and Bochner 2000) in outlining the motivation for this research in some detail in order to illustrate the formation of the research objectives more fully.

In working with the various technical support teams to achieve the "fit" between the organisational processes, the Help Desk software supporting those processes, and the service level definitions and metrics reflecting those processes the author was struck by how much inertia was present in established ways of working, perceptions of what should be done, and how things could or could not get done. Inertia in this case was not felt to be political resistance (Markus 1983) in the sense of deviant and negative misbehaviour harmful to the organisational objectives (Franz and Robey 1984; Lyytinen and Hirscheim 1987). On the contrary, facilitating working practices with a suitably configured software tool which would allow a clear demonstration of just



how busy the technical support teams were (and perhaps get additional resources as a result) was generally indicated by IT support staff as perceived to be a very worthy goal. Inertia observed by the author in this case was felt to have more to do with recalcitrance brought about by the complexity of mutual interaction between the numerous IT Support activities, the numerous flexible software configuration options, and the multitude of judgments as to what constituted meaningful and measurable service targets. Anecdotal evidence of the sort: “that’s not how things work, this will never fit in” suggested that these mutual interactions almost took on a life of their own, with an existence as distinct and superseding the individual conceptions of the working processes, the software and the Service Level Definitions.

The author felt that a holistic understanding of the system as an interrelation of a number of factors, including the nature of IT support activities, Help Desk software configuration options, service definitions and targets, and the immediate and wider organisational context. The industry standard best-practice frameworks such as ITIL can only recommend what has to be done to, for example, align the Incident Management with Service Level Management process (discussed in some detail in Chapter 2), but the idiosyncrasies of particular implementations necessarily preclude such frameworks from being prescriptive and describing in detail how to achieve such alignment (CCTA 2000; Cater-Steel, Toleman et al. 2006). The idiosyncrasies of local implementations concern the particular context of that organisation, including the “macro” organisational factors such as strategy, structure and culture dimensions (McKeen and Smith 2003) mentioned above, but also including the “micro” situational factors such as the immediate circumstances in which technical support analysts work, their expertise and training, office layout, and the multitude of perceptions on what was going on around them. Anecdotal evidence of the sort: “I heard about this being done in another place but it will never work here” suggested that the mutual interactions between the working practices, software configuration options, and the service level targets not only took on a life of their own, but were highly contextual in nature.

The purpose of this brief illustration of the author’s background is to carefully guide the reader and set out the author’s preconceptions and personal experiences from the start, as relevant to the formulation of the research objectives (discussed in this

section of this thesis), and the conduct of empirical work and analysis (discussed in the following sections of this thesis). As researchers we bear a great responsibility to engage with ourselves through reflecting on our own thinking and evaluating the researcher and the “objects” of research (Alvesson and Sköldbberg 2000) in order to scrutinise the (often unacknowledged) pre-understanding influencing research (Weick 1999). The goal of this reflexive narrative in outlining the evolution of our research objectives is not to elicit an “emotional identification and understanding” (Denzin 1989, p.124), but rather to enhance the “contextual richness” (Miles and Huberman 1994, p.83) of the account presented further in this thesis. As outlined in greater detail in Chapter 4, this research follows an interpretive perspective and aims to attain a culturally derived and historically situated (Crotty 1998) “understanding of the *context* of the information system, and the *process* whereby the information system influences and is influenced by the context” (Walsham 1993, p.4-5). The author feels that appropriate reference to “[one’s] own life story does not reduce the reader’s trust, it enhances it. It does not distort the responsibility of the researcher and the authenticity of the work, it gives them clarity” (Lawrence-Lightfoot and Hoffman Davis 1997), and further helps to dispel any notion of the researcher as an independent, objective observer (Stacey 1996).

Our literature review which is presented in Chapter 2, notes that the service culture, emerging from the Help Desk function in the mid-1980s, is now spreading throughout the increasingly mature and business-aware IT organisation. A greater emphasis is being placed on the Service Level Agreements and IT Services performance metrics as one of the vehicles for promoting mutual understanding between the business and IT and a supporting basis for the IT governance and management frameworks such as ITIL. As illustrated in Chapter 2, the management of an organisation’s IT Service function relies on accurateness and extent of data being collected as part of normal operation of that function on a day-to-day basis. However, collecting such performance metrics data “on the ground” is often assumed to be relatively unproblematic whereby reliable data is readily available from the organisation’s ITSM software artefact.

The research presented in this thesis highlights the process of collection of IT Services performance metrics data as far from unproblematic, even in the more

traditionally service-oriented function such as Technical (IT) Support. In doing so, this research aims to fill this gap currently found in the literature. The research presented in this thesis aims to develop an in-depth micro-level understanding of how IT Service level performance metrics data is collected in practice with reference to the macro context of IT governance and management frameworks. More specifically, as shown in our literature review, the accuracy of operational performance data relating to a particular IT Service process depends on the consistent recording of that data over time and/or throughout the organisation. This relatively straightforward conceptual point of departure is the starting point for answering the following research questions:

- (RQ-1) What is the nature of the organisational process by which operational performance metrics data is collected in an organisation's IT Support function? What are the characteristics of specific working practices pertaining to collection of operational performance metrics data?
  
- (RQ-2) How does the process of collecting IT Support operational performance metrics data relate to the implementation of IT governance and management frameworks such as ITIL in an organisation?

The research questions presented above exhibit a deliberately strong "micro" level analytical focus, and emphasise both the nature of the process of collecting operational performance data and its contextuality as the problem areas addressed in this thesis. In doing so, they call for identification and analysis of the prevalent IT Support working practices within an organisation; the interrelationship between the technical support organisational processes, the ITSM software artefact involved in those processes; and the service level definitions and measurements reflecting operational performance of those processes.

The first research question (RQ-1) is deliberately framed in terms of calling for an analysis of the nature of the process of collecting operational performance data. The research presented in this thesis suggests that consistent recording of operational performance data using an ITSM software artefact can be expressed as process of engagement with the ITSM software artefact becoming a part of normal ("routine")

daily work practices. Therefore, this thesis develops an in-depth theoretical treatment of the process of collecting operational performance data from the perspective of organisational routines. It is tempting to define the concept of organisational routines as something more than regularised patterns of action at this point – however, as illustrated in Chapter 3 the very nature of organisational routines and their effects on organisations are subject to extensive theoretical debate. The theoretical focus of this research on organisational routines allows for analysis and theoretical and empirical contribution not only in terms of patterns and recurrence of the working practices in question, but also for a discussion of these practices in terms of their nature: whether they are mindless or effortful; whether they are collective or individual; what they are constituted of; the extent of their contextuality and path dependence; and finally their effects within the organisation.

The second research question (RQ-2) deliberately relates the micro level of analysis of a process to the wider context in which that process takes place. As highlighted above, the research presented in this thesis aims to attain a culturally derived and historically situated understanding of the information system, its organisational context, and the interrelationship between the two. This thesis is based on a theoretical grounding afforded by Structuration theory (Giddens 1976; Giddens 1979; Giddens 1984) which is discussed in detail in Chapter 3. However, alternative theoretical perspectives, including Institutional theory (e.g. Selznick 1948; DiMaggio and Powell 1983; Zucker 1987) and Actor-Network theory (Callon 1986; Latour 1987) were also considered and the choice is briefly reviewed here.

According to Institutional theory, "...institutions consist of cognitive, normative and regulative structures and activities that provide stability and meaning to social behaviour", transported by various carriers – cultures, structures and routines, and operating at multiple levels of jurisdiction (Scott 1995, p.33). The institutional environment thus supports and produces normative pressures on an organisation to perform in a legitimate fashion (Zucker 1987; Suchman 1995) conforming to institutional models and resisting attempts at reform to achieve and sustain that legitimacy (Meyer and Rowan 1977). The implication for the IS researcher is to "treat institutions as powerful sources of influence and regulation that are somewhat more stable than the entities they influence, but that over time, evolve in response to

changing conditions and thus change their focus and methods of influence and regulation” (King, Gurbaxani et al. 1994, p.160). The use of information systems has been highlighted to conform to institutional influences - e.g. political, technical, and organisational infrastructures (Laudon 1985). Furthermore, information systems themselves may take on institutional characteristics – becoming traditional entities that resist attempts at modification despite clear technical advantages of upgrades, conversions, and enhancements (Kling and Iacono 1989). Institutional theory suggests that we cannot explain what is happening in organizations by considering only the “rational” actions of managers and technology experts: through institutionalization, an innovation is adopted and maintained because of its acquired legitimacy, irrespective of whether or not it produces its promised technical value, and without having to rely continuously on powerful personalities (Avgerou 2000, p.236).

Actor-Network theory (ANT) is a development of one strand of the social construction of technology school of thought (Bijker, Hughes et al. 1987) and concerned with the creation and maintenance of coextensive networks of human and non-human elements. Actor-Network theory treats the social and the technical as inseparable and analyses people and artefacts with the same conceptual apparatus – examining the motivations and actions of groups of actors which form elements, linked by associations, of heterogeneous networks of aligned interests (Walsham 1997). ANT is both a theory and a methodology, in that it suggests tracing and explaining the creation and maintenance of relatively stable networks of aligned interests (or lack of such networks), and examining the software artefact as frozen organisational discourse – immutable network elements which resist change and exhibit properties of irreversibility mobile across time and space. Actor-Network theory has been used in IS research (Bloomfield, Coombs et al. 1992; Boland and Shultze 1996; Latour 1996; Monteiro and Hanseth 1996; Monteiro 2000) and offers concepts and ideas for understanding of the social-technical nature of information systems. However, Actor-Network theory has been criticised for its limited analysis of social structures in addressing the local and contingent but paying little attention to the broader social structures influencing the local (Reed 1995) and its generalised symmetry of people and things (Pels 1995).

Both Institutional theory and Actor-Network theory would offer interesting and valuable insights into the problem domain as outlined above, and in as much as any theory is "... our chronically inadequate attempt to come to terms with the infinite complexity of the real world ... there is not and never will be a best theory" (Walsham 1997, p.478). However, Structuration theory is more appropriate for the research questions as outlined above due to its key tenet of the duality and recursive influence of social structure and social agency. In particular, as outlined further in this thesis, structuration theory suggests that individuals acquire ontological security through engagement in predictable routines and encounters which are in turn constitutive of the social institutions thus enabling the continuity of social life (Giddens 1984; Jones 1999). The research presented in this thesis develops a rich theoretical framework illuminating the process of use of ITSM artefact to collect operational performance data as human action existing in a multi-level nested system of social structures yet implicated in sustaining and changing those structures through its enactment. Structuration theory itself has been criticised for offering little methodological guidance and being more of a meta-theory – perhaps best combined with other approaches including Actor-Network theory (Walsham 1997). However, this research follows a different route: following a thorough review of the current application of structuration theory to the field of Information Systems research, this thesis makes a clear and significant theoretical and methodological contribution by enriching the Practice Lens (Orlikowski 2000) structural view of technology through incorporating explicit empirical and theoretical treatment of organisational routines – thus allowing future researchers to better identify, and analyse forms of recurrent engagement with technological artefact.

Additionally, this research aims to make the following theoretical contributions: a review of current literature on IT Service Management (ITSM), related technologies and management and governance frameworks; a review of theoretical perspectives on organisational routines as well as structuration theory and its application to the field of IS; construction of a synthesised theoretical framework based on Practice Lens model (Orlikowski 2000) incorporating elements of grammatical model of organisational routines (Pentland 1995) and ostensive/performative aspects of organisational routines (Pentland and Feldman 2005); thorough application of triangulation of empirical evidence from transaction log analysis, task analysis,

documentary analysis and interviews with verbal protocol and hermeneutic analysis as triangulation mechanisms. This research also contributes to the current academic debate on organisational routines by providing additional empirical grounding that organisational routines are effortful accomplishments, and should be conceptualised as collective contextual phenomena which cannot provide organisational stability in and of themselves and demonstrates the complexity of interaction of the duality of structure and agency through the modalities of facilities, norms and interpretive schemes. In practical terms, this research offers a much deeper understanding of the micro-level processes (e.g. operational performance data collection) supporting macro-level management frameworks (e.g. ITIL). Micro-level processes are demonstrated to be determined not only by training and operational procedures, but rather as enactments of social structures reconstituted in recurrent engagement with ITSM technology and mediated by the prevailing facilities, norms, and interpretive schemes. Finally, this thesis aims to bridge the gap in the current academic literature concerning elements of the ITIL framework which is now the de-facto international standard for IT Service Management

### **1.3. Organisation of the thesis**

Chapter 1 outlines the introduction to our research, identifies its motivation, defines the research objectives and outlines the organisation of the rest of the thesis.

Chapter 2 reviews the current academic and industry literature on Business-IT alignment, IT governance, IT Service Management (ITSM), IT Infrastructure Library (ITIL) including Incident, Problem, Change, Service Level and Configuration Management. Following that, Chapter 2 reviews the current academic and industry literature on IT Support, including problem-solving; coordination of problem-solving in the context of distributed competencies and functional specialisation; interpretation of problem-solving in the context of asymmetry of information, equivocality, noise, and lack of reciprocity of perspectives between the technical support analyst and end-user; and documentation of problem-solving and knowledge-reuse. Chapter 2 then reviews the position of this research with reference to related industries and technologies, including Service Quality Management, Customer Relationship

Management, Call Centres, and Knowledge Management. Finally, Chapter 2 outlines the practical and conceptual points of departure for our research.

Chapter 3 presents the theoretical basis for the research presented in this thesis. The conceptual and practical points of departure introduced in Chapter 2 are elaborated on using theoretical perspectives on including organisational routines, structuration theory, and the role of technological artefact in organisational processes. Following a review of theoretical perspectives informing the research presented in this thesis, Chapter 3 develops a synthesised theoretical framework based on the grammatical model of organisational routines, performative/ostensive dimensions of organisational routines, and the practice lens model of technology.

Chapter 4 presents the ontological, epistemological and methodological foundation of the research presented in this thesis. A number of ontological and epistemological perspectives are reviewed and the interpretivist approach undertaken by this thesis is thoroughly outlined and justified. Following that, Chapter 4 discusses the selection of the research site, and operationalises the synthesised theoretical framework developed in Chapter 3 by grounding it in specific data collection methods. The general principles for conducting interpretive case-studies are reviewed, and the triangulating analysis of transaction logs, verbal protocol, task organisation, in-depth semi-structured interviews, and documentary empirical data as undertaken by this research presented in this thesis is thoroughly reviewed.

Chapter 5 presents a description of the architecture and functionality of the Help Desk software artefact analysed in this thesis. Particular attention is paid to the customisability options built-in by the designers of the software which allow the software artefact to be adapted to particularities of local contexts of implementation.

Chapter 6 presents preliminary findings of the research presented in this thesis. Firstly, the organisational context of the research site is reviewed with specific reference to the strategic and operational objectives, organisational structures, service level definitions, orientation of support processes, physical location context and other aspects. Overview of transaction log analysis is introduced as a basis for identification of the primary empirical focus of this research – one of the technical support teams of



the IT Services department of the research site. Following a review of organisational context, Chapter 6 presents the findings of our research as pertains to the particular configuration of the Help Desk software at the research site, with specific references to the instantiation of organisational processes as workflows in the software package, data capture configuration, User Interface (UI) configuration and customisation for different teams. Chapter 6 relates the preliminary findings to literature review and conceptual and practical points of departure developed in Chapter 2, the synthesised theoretical framework developed in Chapter 3, the data collection and analysis methodology developed in Chapter 4. Chapter 6 concludes by presenting preliminary findings of the case-study in discussion of the triangulation and overlapping nature of empirical evidence collected at the research site, and development of a synthesised analytical point of departure, including early empirical evidence of contextuality of the role of HelpDesk software artefact in the technical support organisational routines.

Chapter 7 presents the “micro” level analysis of how performance metrics on the delivery of IT support service to the business are collected as a by-product of normal daily operations of technical support team chosen as the primary empirical point of research in Chapter 6. A number of distinct patterns of engagement with the Help Desk software artefact by technical support analysts are identified, and their context of operation analysed as technologies-in-practice based on the synthesised theoretical framework developed in Chapter 3 using the data analysis methods presented in Chapter 4.

Chapter 8 presents a discussion of the findings of the research presented in this thesis with specific reference to the service level management reports and technologies-in-practice identified and analysed in Chapter 7. Following that, the theoretical, methodological and practical contributions of this research are discussed, as well as the limitations of this study and recommendations for future research. Chapter 8 ends with the conclusion of the thesis.

## **CHAPTER TWO – LITERATURE REVIEW**

### **2.2. Chapter Introduction**

This chapter presents an overview of the literature relevant to the research objectives identified and defined in section 1.2. This chapter is organised as follows: firstly the “macro” level concepts of Business-IT alignment, IT governance, IT Service Management (ITSM), IT Infrastructure Library (ITIL) and other best-practice frameworks, key ITSM Service Delivery and Service Support processes of Incident, Problem, Change, Service Level and Configuration Management are introduced in order to delineate the context of this research. Secondly, the current industry and academic literature on IT support is reviewed, including emphasis on problem-solving; coordination of problem-solving in the context of distributed competencies and functional specialisation; interpretation of problem-solving in the context asymmetry of information, equivocality, noise, and lack of reciprocity of perspectives between the technical support analyst and end-user; and documentation of problem-solving and knowledge-reuse. Thirdly, the position of this research in the ITSM industry and Information Systems academic field is identified with reference to related industries and technologies, including Service Quality Management, Customer Relationship Management, Call Centres, and Knowledge Management. Finally, the practical and conceptual points of departure for the research presented in this thesis are identified as a basis for the discussion of the theoretical perspective developed in Chapter 3.

### **2.3. Business-IT alignment**

As we have stated in the introduction to this thesis, in 2004, 2005 and 2006 surveys of IT executives, Business-IT alignment is consistently cited as one of the top key management concerns (c.f. Luftman and McLean 2004; Luftman 2005; Luftman, Kempaiah et al. 2006). The concept of Business-IT alignment is underpinned by the notion of strategic partnership between the “business” and “IT” within an organisation, whereby investment in IT and delivery of IT services, whether sourced internally or externally, should reflect business priorities, and business priorities should be based on an understanding of IT capabilities and limitations (Ward-Dutton and Macehiter 2005).

Although many IT departments today are still ‘protected’ as monopoly suppliers of IT services and products to the business by virtue of policy or effectual arrangements (even in cases where transfer charging or outsourcing are present), there is nevertheless a shift of focus from ‘supply-side’ delivery of IT products and services to ‘demand-side’ IT for value delivery, manifested in aligning IT and business functions by emphasising a focus on business objectives and targets before seeking technology solutions (Aitken 2003). For example, a system providing requested functionality and delivered to budget and on schedule (i.e. supply-side) can only be considered successful if the deliverables add the promised value to the business (i.e. demand-side) in realising commercial advantage, business case or predicted benefits.

However, coordinated planning alone is now understood to be insufficient to develop a viable fit between an organisation’s strategies and its IT resources, as recent research has highlighted such alignment as a fusion of the business and IT functions along organisational strategy, structure, and culture dimensions (McKeen and Smith 2003). Furthermore, it has been suggested that such Business-IT alignment needs to go beyond aligning IT strategy into corporate business strategy but requires defining them in parallel (Baets 1992), with specific organisational focus on IT governance.

#### **2.4. IT Governance**

IT governance is the organizational capacity exercised by the Board, executive management and IT management to control the formulation and implementation of IT strategy and in this way ensure the fusion of business and IT (Van Grembergen 2002). IT governance is part of corporate governance and has to provide mechanisms for IT councils, business alignment and implementation processes (Broadbent 1998).

A coherent governance framework for leadership and management of IT is often identified as the first and the most critical step in dealing with IT development, deployment, operation and strategic risks (c.f. Jordan and Silcock 2005) and such framework espouses a considerable measure of control over IT function’s processes. Indeed historically, IT governance has been strongly associated with the organisational structure and configuration of the IT function, identifying the locus of

responsibility for making IT management decisions as centralised, decentralised, or federal with respect to business units.

However, a recent survey suggests that “there is no single ‘best’ IT organizational structure or governance arrangement because IT needs to respond to the unique environments within which it exists” (Agarwal and Sambamurthy 2002). In fact, one recent approach has been to emphasise the organising logic for the IT function – “the managerial rationale for designing and evolving specific organizational arrangements in response to an enterprise’s environmental and strategic imperatives”, and to define governance as “an organization’s IT-related authority pattern” including the activities that are governed within the IT administrative structures (Sambamurthy and Zmud 2000). More recently, IT governance is being acknowledged as having moved beyond ‘organisational structure’ to embrace a more dynamic and social existence as ‘relationships architecture’ – examining whether a particular governance arrangement encourages the IT employees to understand the business, typically through daily interaction, or if they are shielded from the business units (Schwartz and Hirscheim 2003).

IT governance, as a system of measurement and control of management, accountability, and supervision of the IT function, includes the following essential components (Bloem, van Doorn et al. 2006): legislation and regulation – such as the Sarbanes-Oxley Financial Accounting and Disclosure Act; and frameworks and tools – such as the Control Objectives for Information and Related Technology – COBIT, Information Technology Infrastructure Library – ITIL, Capability Maturity Model for Software – CMM, Capability Maturity Model Integration – CMMI, and Total Quality Management – TQM. These elements constitute the guiding principles for IT Service Management – ITSM, in terms of compliance with legislative and regulatory requirements and best practice frameworks and methods of organising and delivering IT operational activities.

The two-way strategic Business-IT alignment supported by an implementation of an appropriate IT governance framework has been suggested to not only support existing business strategies, but enable new superior ones in many different ways. For example, it has been suggested that IT can assist transforming business operations

functions within an organisation for mass customisation – achieved through lowering unit costs and greater customer specificity (see for example Pine, Victor et al. 1993). However, it has been successfully argued that IT is not just another resource and that careful consideration must be given to the distinctive and idiosyncratic nature of IT. This argument has been put forward in the face of increasing propagation of the vision of IT as a cost burden to be minimised and/or outsourced, which was brought about by the 1990s shift in business strategy away from diversification as means of mitigating risk into a focus on core competencies, coupled with the failure of IT to deliver competitive advantage promised in the 1980s (Feeny and Ives 1997).

More specifically, it has been argued that: a). IT is not a homogenous function but comprises a wide variety of activities; b). predicting IT needs past a three-year horizon is wrought with uncertainty due to its rapid evolution; c). there is no simple basis for gauging the economics of IT activity; d). economic efficiency has more to do with IT practices than inherent economies of scale; and e). IT sourcing decisions are associated with very large switching costs (Lacity and Willcocks 2001). Similarly, instead of focusing on IT as a whole as core or non-core, the debate should really focus on which IS capabilities are core to the business's future capacity to exploit IT successfully (Feeny and Willcocks 1998) through effective management of the IT Services function within the organisation.

## **2.5. Information Technology Infrastructure Library (ITIL)**

Where governance and alignment are more broad concepts, IT Service Management (ITSM) is the domain focused on effective management of the IT operations (Peterson 2003). The management, accountability and supervision of the IT function includes compliance with legislation and regulation [e.g. Sarbanes-Oxley], standards [e.g. BS15000/ISO20000] and best-practice frameworks and tools [e.g. COBIT, ITIL] (Bloem, van Doorn et al. 2006). BS15000 standard is based heavily upon the ITIL (IT Infrastructure Library) framework which is rapidly becoming the *de facto* standard for IT Service Management and the basis of accepted terminology in the ITSM industry.

IT Service Management as a research domain makes use of many similar and overlapping concepts, and it is important to establish a consistent terminology for use

throughout this research. Furthermore, the following clarification of concepts through a consistent and industry-accepted scheme of definitions will serve to delineate the empirical base of this research and highlight the foundation for theoretical direction undertaken in research design and analysis of findings. The United Kingdom Office of Government Commerce (OGC 2006) provides the following definitions:

Concept	Definition
IT Service Management (ITSM)	<i>“The implementation and management of Quality IT Services that meet the needs of the Business. IT Service Management is performed by IT Service Providers through an appropriate mix of People, Process and Information Technology”.</i>
IT Services	<i>“The use of technology for the storage, communication or processing of information. [...] used to support Business Processes through IT Services. A specific IT service is made up from a combination of People, Processes and Technology and should be defined in a Service Level Agreement”.</i>
Link between Business Processes and IT Services through Quality	IT Services are oriented to support business processes which <i>“... contribute to the delivery of a product or Service to a Business Customer. For example, a retailer may have a purchasing Process which helps to deliver Services to their Business Customers”</i> and are linked through the notion of quality - <i>“The ability of a product, Service, or Process to provide the intended value [...] also requires an ability to monitor Effectiveness and Efficiency [...]”</i>

**Table 1: Defining IT Service Management (ITSM)**

The ITIL concept emerged in the 1980s, when the British government determined that the level of IT service quality provided to them was not sufficient, and the Central Computer and Telecommunications Agency (CCTA), now called the Office of Government Commerce (OGC), was tasked with developing a framework for efficient and financially responsible use of IT resources within the British government and the private sector. The value of ITIL as a best practice framework is provided by broad service delivery and support recommendations, as well as by common definitions and terminology. However, while ITIL describes what best practices should be pursued, it does not define how to implement detailed processes and work-level procedures that

enable those recommendations as these will vary according to local implementation context (CCTA 2000; Cater-Steel, Toleman et al. 2006).

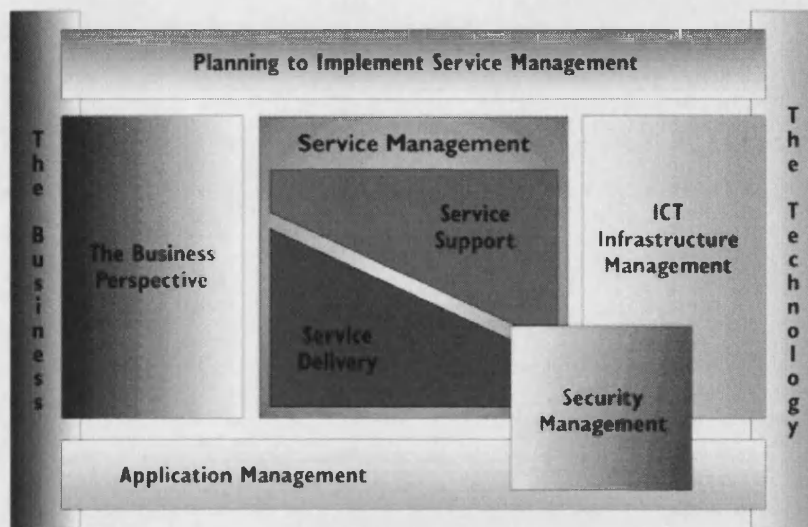


Figure 1: IT Infrastructure Library (ITIL) overview

ITIL is a truly voluminous publication: the hard copy books fill a bookshelf over a meter wide! The interrelationship between the seven ITIL modules is shown on the diagram above, however the two most commonly used sets are Service Support and Service Delivery, which together form the heart of the IT Service Management framework. Service Delivery is the management of the IT services themselves, and involves a number of management practices to ensure that IT services are provided as agreed between the Service Provider and the Customer. Service Delivery consists of 5 ‘disciplines’: Service Level Management; Capacity Management; Contingency Planning; Availability Management; and Cost Management for IT Services. Service Support is the practice of those disciplines that enable IT Services to be provided. Without these ‘disciplines’, it would be almost impossible to provide these IT Services, or at best in a very unmanaged and haphazard way. The 5 Service Support ‘disciplines’ are: Configuration Management; Problem Management; Change Management; Incident Management; and Software Control and Distribution.

### 2.5.1. Incident, Problem, Change and Configuration Management

The broad service delivery and support recommendations provided by the IT Infrastructure Library (ITIL) are reported to bring benefits of institutionalisation and

standardisation of proactive processes, particularly where they are supported by comprehensive IT support technology tools that automate such processes, and objective, transparent, comparable and monitored criteria expressed as Key Performance Indicators and Service Level Agreements for delivery of services are introduced (Hochstein, Tamm et al. 2005). Recent research of IT managers in nineteen \$1 billion-plus companies that have gone through full ITIL implementation ranked Incident, Service Level and Configuration Management processes as the most important and of most value to the overall IT Service delivery (Forrester 2005).

In order to put the ITIL recommendations in perspective with regard to what is perhaps the most visible part of IT Services to the end-user we shall begin by outlining the Incident, Problem and Change Management concepts, drawing on ITIL definitions given below:

<b>Concept</b>	<b>Definition</b>
Incident	<i>“Any event which is not part of the standard operation of a system that causes, or may cause, an interruption to, or a reduction in, the quality of service”</i>
Problem	<i>“An unknown underlying cause of one or more Incidents”</i>
Change	<i>“Addition, modification or removal of approved, supported or baseline hardware, network, software, application, environment, system, desktop build or associated documentation”</i>

**Table 2: ITIL – Defining Incident, Problem and Change Management**

While the focus of Incident Management as restoring normal service is primarily reactive, Problem Management aims to minimise the impact of adverse errors within IT infrastructure and includes both reactive (quickly solving problems in response to one or more incidents) and proactive (reduce the overall number of incidents) emphases. Change management is primarily proactive, by focusing on provision of information, control and audit with respect to changes to the organisation’s IT infrastructure.



Following ITIL definitions (OGC 2006), at the heart of ITIL specification is Configuration Management, “*accounting for and verifying the configuration records of all the components of the IT infrastructure, as well as providing accurate information to support all other support processes, including Incident Management, Problem Management, Change Management, and Release Management.*” (CCTA, 2000, p.226). Configuration management therefore is the nexus of ITIL processes, for instance linking together Incidents, Problems, and Changes and relating them to particular items of IT infrastructure such as hardware, software, and personnel.

### 2.5.2. Service Level Management

As IT departments are increasingly transforming their ongoing operations orientation from being technology providers into product/service providers (Zarnekow and Brenner 2003), the quality of IT products and services provided to the business is defined and evaluated on the basis of transparent operational metrics. Such metrics set out the relationship between the IT service provider and their customers and are specified as Service Level Agreements – SLAs and Key Performance Indicators – KPIs, as defined in ITIL below:

Concept	Definition
Service Level Management	<i>The Process responsible for negotiating Service Level Agreements, and ensuring that these are met. SLM is responsible for ensuring that all IT Service Management Processes, Operational Level Agreements, and Underpinning Contracts, are appropriate for the agreed Service Level Targets. SLM monitors and reports on Service Levels, and holds regular Customer reviews.</i>
Service Level Target	<i>A commitment that is documented in a Service Level Agreement. Service Level Targets are based on Service Level Requirements, and are needed to ensure that the IT Service design is Fit for Purpose. Service Level Targets should be measurable, and are usually based on KPIs [Key Performance Indicators]</i>
Key Performance Indicator	<i>A Metric that is used to help manage a Process, IT Service or Activity. Many Metrics may be measured, but only the most important of these are defined as KPIs and used to actively manage and report on the Process, IT Service or Activity.</i>

Concept	Definition
Process	<i>A structured set of Activities [set of actions to accomplish specific result] designed to accomplish a specific Objective; [...] may include any of the Roles, responsibilities, tools and management controls required to reliably deliver the outputs.</i>

**Table 3: ITIL - Defining Service Level Management**

The definitions given above illustrate the current orientation of industry-based conceptualisation of IT Services provision, and the particular emphasis made on not only an appropriate orientation of IT Services to Business Processes – using the notion of alignment, but also on the operational organisation of such alignment based on specific Service Level Agreements. Some KPI metrics and corresponding SLAs, for example as relating to network availability and network performance can be monitored automatically (Muller 1999), however Service Level Targets are no longer confined to such strictly technical processes. In addition to customer service oriented SLAs such as end-user satisfaction, or staff on-site availability, the most recent focus of Key Performance Indicators is on the areas of good governance; growth and value; cost management; risk; and communication and service; where appropriate metrics include emphasis on issues of prioritisation, investment and use of IT against cost; effective asset utilisation; re-use and sharing of services, infrastructure and architecture; asset status and tracking; availability, continuity, accessibility and protection of information; awareness and knowledge of customer requirements (TouchPaper 2006). It is outside the scope of this study to discuss the difference between Service Level Definitions and Agreements in detail – Chapter 8 suggests several promising avenues for research with respect to the process of SLA negotiation.

### **2.5.3. IT Help Desk and IT Service Desk**

The service culture, emerging from the Help Desk function in the mid-1980s, is now spreading throughout the increasingly mature and business-aware IT organisation, and the traditional Help Desk itself is evolving from a reactive crisis-centre to being an IT ‘service nexus’ (Marcela and Middleton 1996).

ITIL defines the primary purpose of the Help Desk as “...to manage, coordinate and resolve Incidents as quickly as possible and to ensure that no request is lost, forgotten or ignored.”, although the Help Desk function has in many cases developed beyond the limited role traditionally associated with Technical Support. In an effort to provide greater consistency, higher levels of service, and single point of contact for incoming enquiries, organisations are transforming the traditional Help Desk into a Service Desk, with a much greater range of functions.

Following ITIL definition, Service Desk “... extends the range of services and offers a more global-focused approach, allowing business processes to be integrated into the Service Management infrastructure. It not only handles Incidents, Problems and questions, but also provides an interface for other activities such as customer Change requests, maintenance contracts, software licences, Service Level Management, Configuration Management, Availability Management, Financial Management for IT Services, and IT Service Continuity Management”.

## **2.6. IT Service Management (ITSM) Process Maturity**

Just as the Help Desk can be more than a reactive crisis centre coping with the problems, the entire IT Services organisational orientation can reach one of several levels of ‘maturity’ of management processes and activities in terms of Business-IT alignment, as illustrated below using the Gartner (Gartner 2005) process maturity model. Whilst this model may not exhaustively describe and categorise the entire range of IT Services operational processes and activities, and the level of ‘maturity’ of ITSM processes may not be uniform across functional areas within a single IT Services organisation, it is nevertheless a useful indicator of the general orientation within a given functional area (e.g. network services, application services, support, training). Furthermore, the model presented below serves to illustrate the evolution of the IT Services infrastructure from reactive to proactive and from chaos to control, as espoused by the notions of IT Service Management, IT Governance, and IT-business alignment discussed in the earlier sections of this chapter.

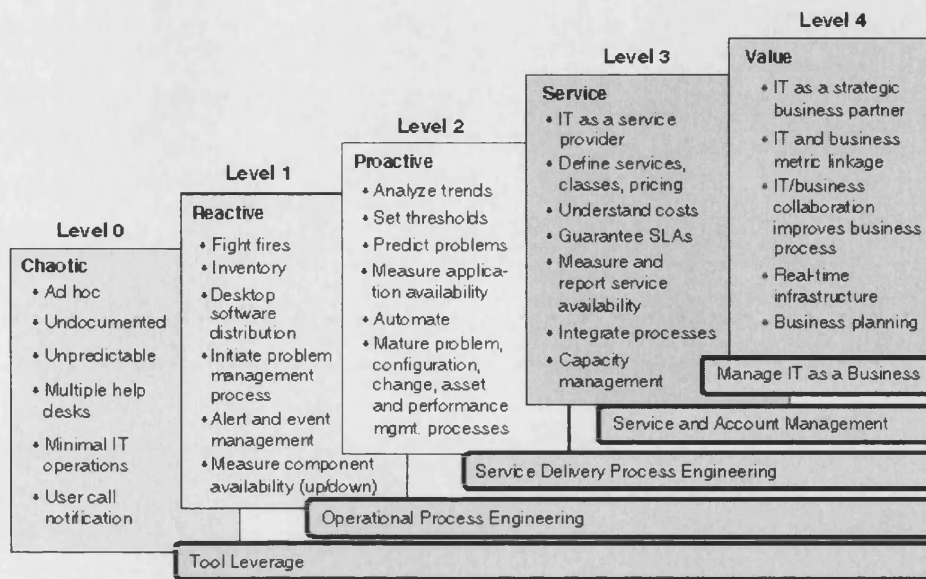


Figure 2: IT Process Maturity Model (Gartner 2005)

## 2.7. IT Support

Vast majority organisations purchase and customise enterprise-wide applications, such as ERP rather than building them from scratch (Soh, Kien et al. 2000). For many years software operations support has become a critical element of the information systems function, with as much as 90% of the software lifecycle effort and cost in many organisations being spent in the operations support phase after the application has been developed (or purchased) and installed (Bennett 1991; Gorla 1991).

A complete theory of technical support services is not currently available, however a number of existing literature sources contain insights explaining how technical problems arise, how they are formulated into concrete work tasks and how they are solved (overview in Das 2003). For example, one perspective which explains why technological artefacts experience shortfalls in performance (relative to the expectation of specific users) is that of technology as a script for the interaction of users with artefacts (Suchman 1987; Woolgar 1991; Latour 1992). In this view, designers of technological artefacts configure the artefact so as to anticipate and suitably respond to user's actions. Problems arise therefore when functionality is missing, for example where the context of use and user demands are different to what the designers anticipated (Hewitt 1986; Woolgar 1991). Similarly, even when the designer can pre-configure the artefact's responses to all possible user actions, the

practicalities of the design process are such that correctly implementing all design specification is difficult, resulting in erroneous operation (Dahlbom and Mathiassen 1993). The following sections of this chapter outline a number of theoretical perspectives on the technical support work processes in terms of the utilisation of cognitive resources and dealing with organisational and other contextual constraints.

### **2.7.1. Problem-solving**

Drawing on information processing theory (Newell and Simon 1972) we can conceptualise the nature of technical support work as structured problem solving aimed at reducing the difference between the desired and realised performance of technology relative to expectations of specific end-users. Based on the empirical analysis of questions posed by users while using software (Pilkington 1992) and taxonomy of generic tasks in artificial intelligence (Chandrasekaran 1983; Chandrasekaran 1986; Chandrasekaran, Johnson et al. 1992) accomplishment of knowledgeable performances by technical support personnel can be envisaged as a series of generic problem-solving tasks (Das 2003).

These tasks include: a) information retrieval – requests for factual information such as ‘what/where/when...?’; b) plan synthesis – requests for procedures to accomplish tasks or goals such as ‘how do I...?’; c) state abstraction – questions concerning consequences of contemplated actions, such as ‘what would happen if...?’; and d) abductive diagnosis – requests for diagnostic explanations such as ‘why does ... happen?’. Such categorisations provide an analytical separation between the solution (“knowledge level”) requirements of tasks from the methods (“algorithms”) by which problem-solving activities are carried out (Newell and Simon 1972; Marr 1982; Anderson 1993).

The specific behaviours on part of technical support analysts to achieve knowledgeable performances include: a) looking up organisational databases; b) finding past precedents of the reported problem in the call archives; c) finding canonical procedures from various manuals to achieve the user’s goals; d) finding the principles of operation for particular software modules; e) comparing the user’s actions against a canonical procedure to check if departures from recommended procedure are responsible for unexpected behaviour of the software; f) modifying the

user's procedure to test whether such modifications avert the problem; and g) tracing the user's code and the error messages generated by the program execution (Das 2003, p.419). In general, these behaviours can be classified as 'locate', 'adapt' or 'generate' knowledge, depending on the similarity of the problem to previously anticipated/encountered problem-solution records (Das 2003).

### 2.7.2. Organising problem-solving

Technical support work typically takes place in a context of distribution of competencies, functional specialisation and division of labour within the technical support team(s), therefore if a technical support analyst is unable to provide a resolution him/herself, they accomplish collective knowledgeable performances by being able to retain ownership of the incoming enquiry and 'get help', or 'give the enquiry away' to solicit assistance from other support analysts. Conceptualised in this way, technical support work exhibits a distinctively organisational nature of collective performance, where individual behaviour is contingent on contextual structures, such as what is socially acceptable and physically possible. Pentland (1992, p.536) puts it succinctly: *"I call these organizing moves because they are intimately connected to the formal structure of the vendor organization, reflecting and enacting its division of labour, hierarchy, and boundary"*, and the following illustrates examples of the various organising behaviours he found during his study:

Get help	Quick question
	"How many records can you put in a file?"
Give away	Take a look
	"Can you take a look at this output? I can't figure out what's going on."
	Assign
	"There's a call in the queue for you."
	Refer
	"Sorry, but that sounds like a hardware problem. Do you want their phone number?"
Give away	Transfer
	"That's not really my area, so let me transfer you to our network specialist."
	Political escalation
	"I realize you are upset, but I can't give you your money back. You'll have to talk to my supervisor."
Give away	Technical escalation
	"It looks like that may be a bug. I'll have to give it to someone in engineering."

Table 4: Organising IT Support (Pentland 1992)

Specifically, ‘getting help’ is actualised as a shorter ‘quick question’ or longer ‘take a look’ set of behaviours, contingent on both physical constraints such as office layout and communication channels, and ritual constraints, such as competence of the help-seeker and proper justification given to the help-giver. (Pentland 1992) reports the following quote from one of the participants of his research: “*An incompetent person could ask anything, as long as it was quick. But if one was asking for an investment of time and effort, one needed to justify the request*”. Similarly, (Pentland 1992) finds that behaviours actualising ‘giving the enquiry away’ draw on organisational aspects of the workplace, as illustrated in Table 5 below:

<b>Organising Behaviour</b>	<b>Description</b>	<b>Organisational Aspect of the Workplace</b>
Assigning	Initial direction of the enquiry to appropriate support function area/team based on description received from customer	Reinforcing specialisation of teams
Referring	Redirecting non-support enquiries to another department (e.g. sales)	Enacting the boundary of software support function
Transferring	Reassigning enquiries ‘horizontally’ – redirecting enquiries (or parts of enquiries) within support function to appropriate teams/analysts	Reinforcing existing competence structure
Escalating	Reassigning enquiries ‘vertically’ – redirecting enquiries (or parts of enquiries) within support function based on need for greater technical skills or greater managerial authority	Invoking hierarchical aspects of organisational structure, and technical/managerial-political authority

**Table 5: Giving the problem away (Pentland, 1992)**

### **2.7.3. Interpreting problem-solving**

Technical support work rarely takes place in an idealised world of information processing theory (Newell and Simon 1972) with well-structured problems, well-defined problem space, clear goals, sufficient operators to achieve the goal and all facts known to the problem-solver. Drawing on situated action perspective (Suchman

1987), the context in which technical support work takes place is not a passive aspect of the problem space, but is actively constituted by the actions and understandings of the problem solver, and much of what the individuals are able to accomplish is a product of their interactions with their context (Greeno and Moore 1993).

The technical support process often exhibits a fundamental asymmetry – to create a knowledgeable response to an enquiry the support analyst must obtain the details of the situation from the end-user, and interpret both the reported problem and the end-user's model of the problem (Pentland 1995). To interpret the enquiry, technical support analysts must overcome equivocality (message with more than one meaning) and noise (e.g. message altered in transit) in problem descriptions, pervasive use of indexical expressions (where meaning is apparent only in context of reference) and a lack of reciprocity of perspectives (e.g. charitable interpretation of incorrect use of jargon) between the caller and technical support personnel. To deal with these impediments, technical support analysts employ a variety of interrogative behaviours, broadly categorised as 'tell me', 'read me' and 'send me'.

For example, 'tell me' is an unspecified request for information soliciting a problem description/interpretation from the end-user by the support analyst. The ritual constraints on 'tell me' are quite loose, in the sense that a support person seems to be able to ask almost anything about a problem at any time (Pentland 1995, p.67). However, 'read me' (e.g. an error message off the screen) is a special case of 'tell me' and imposes a stronger ritual constraint in that this move only works for fairly brief textual material. Furthermore, 'send me' (e.g. forwarding a troublesome file to support team) eliminates equivocality and noise but introduces a variety of physical constraints (e.g. attachment format); as well as ritual constraints (e.g. the problem has to be important enough). These behaviours serve to progressively bracket off the caller's interpretation of the problem and reduce equivocality and noise under increasing structural (physical, ritual/cultural, and competence/problem-knowledge) constraints.



#### **2.7.4. Documentation of problem-solving and knowledge reuse**

The nature of technical support work has been augmented from a primary focus on ‘problem-solving’ to ‘problem-solving and documentation’ following introduction of groupware technology. At its simplest, call-tracking functionality is deliberately designed to produce documentation of the work process as a by-product of daily operations, allowing for utilisation of operational knowledge through establishment of well documented and searchable incident histories and a full audit trail of work tasks, enabling greater accountability and process and performance monitoring. Similarly, dynamic workload balancing among support analysts augmented the daily operational activities in terms of distribution of work, forms of collaboration, interaction and co-ordination among team members (Orlikowski 1995). Technical support analysts also typically have access to knowledge management functionality – to improve the transfer of product- or service-related knowledge between technical support analysts (Bose and Sugumaran 2003); CRM functionality – to capture knowledge about end-users in order to provide each with superior individualized service (c.f.: Day 2000).

In a synthesis of literature focusing on reuse of knowledge in the form of documented information (as opposed to numerical records), (Markus 2001) examines the conditions under which successful knowledge reuse or transfer can occur and identifies four types of knowledge reuse situations involving different knowledge reusers: shared work producers, shared work practitioners, expertise-seeking novices, and secondary knowledge miners; differentiated by the “knowledge distance” between those who have the knowledge and those who do not. Shared work producers working together in homogenous or cross-functional teams produce knowledge for later own reuse (e.g. IT technical support personnel accessing user’s call history information) whilst shared work practitioners who do similar work in different settings produce knowledge for each other’s reuse (e.g. IT technical support personnel in different organisations). Both shared work producers and shared work practitioners require contextualised knowledge, although the former can use raw declarative (what was done), procedural (how it was done), rationale (why it was done), and analytic (how it can be done better) information more effectively, and the latter require sanitised and quality checked knowledge. In contrast, expertise-seeking novices with an occasional need for expert knowledge they do not acquire or possess themselves

who have knowledge of their local context but lack relevant general knowledge typically require transfer of decontextualised and sanitised knowledge (e.g. Frequently Asked Questions) packaged in a way allowing for easy recognition (e.g. translated terminology/jargon) and recontextualisation into local context. Lastly, secondary knowledge miners extracting knowledge collected by others for different purposes must be well aware of the structures and limitations of the source data set (documents).

Shared work producers' main difficulty is in capturing and searching knowledge, whilst shared work practitioners' main difficulty is in location and selection of relevant knowledge. However, expertise-seeking novices will potentially have difficulties at all stages of the knowledge reuse process. In general, the more dissimilar the reusers are from knowledge producers the more difficulty they will have in defining the search question, locating and selecting expertise and reusing even carefully packaged knowledge. (Markus 2001) reports that people are most likely to produce documentation when it is intended to benefit themselves rather than others, when the benefit is immediate rather than delayed, and when the effort required is minimal as when the documentation is produced as a by-product of work itself (Grudin 1988; Grudin 1996).

Organisational memory systems, which seek to preserve experiential knowledge of the employees (Walsh and Ungson 1991; Stein and Zwass 1995), require upstream costs when the downstream payoffs are unclear (Grudin 1988; Ackerman 1994), and even when those conditions are met, the effort required to produce (capture, classify, index, and avoid free-riding on high-quality contributions (Markus and Connolly 1990)) and use good documentation can be prohibitive. Markus (2001) argues that the purpose and content of records in repositories often differ depending on whether knowledge producers knowingly document for different kinds of knowledge reusers and the former often lack the resources and motivation for the considerable work of repurposing knowledge for the requirements of the latter. She concludes that one way to overcome the difficulties is to provide appropriate organisational incentives and back them up with appropriate organisational norms, although the knowledge distance between the producers and reusers, and the lack of understanding about when, why

and how to document successfully, may require instituting the role of knowledge intermediaries (Culnan 1983; Brown and Duguid 1998).

## **2.8. Related Industries and Technologies**

It is necessary to position the research presented in this thesis within the wider area of current research on related industries and technologies, such as Service Quality Measurement, Customer Relationship Management, Call Centres, and Knowledge Management. IT Service Management industry shares a number of areas of commonality with these related industries and technologies, therefore the following sections of this thesis briefly outline the current thinking and major debates in these related research areas.

### **2.8.1. Service Quality Management**

Some aspects of IT Service Management (ITSM) organisational strategy and software tools incorporate elements and features of Service Quality Measurement approach, most notably through the use of Key Performance Indicators (KPI) and Service Level Agreements/Definitions (SLA/SLD) performance metrics to measure IT Service Management performance. A major difference between the Service Quality Measurement approach and IT Service Management SLA/SLD-based performance measurement is that the former is concerned principally with capturing the gap between consumer expectations and perceived delivery (i.e. from the customer's perspective), whereas the latter is more concerned with service performance data captured as a by-product of service operation (i.e. from the service provider's perspective). Nevertheless it is necessary to review the current literature and state of research in the Service Quality Measurement area in order to better illuminate the performance-focus of ITSM industry.

Service quality in general is widely regarded as an important driver of corporate marketing and financial performance through its apparent relationship to costs (Crosby 1979), profitability (Rust and Zahorik 1993), customer satisfaction (Bolton and Drew 1991) and customer retention (Reichheld and Sasser 1990). The SERVQUAL instrument was originally developed by marketing researchers in 1985 to assess service quality in general using a 22-item 5-dimension scorecard reflecting customer evaluation of service quality regardless of the type of customer service

(Parasuraman, Zeithaml et al. 1985). The dimensions include: (1) Tangibles: the appearance of physical facilities, equipment, and personnel; (2) Reliability: the ability to perform the promised service dependably and accurately; (3) Responsiveness: the willingness to help customers and provide prompt service; (4) Assurance: the knowledge and courtesy of employees and their ability to inspire trust and confidence; and (5) Empathy: providing caring and individualized attention to customers. The SERVQUAL instrument is a customer questionnaire administered twice in different forms – first to measure service expectations, then to measure service perceptions. Service quality is thus evaluated on the basis of the gap between prior expectations and perceptions of (received) service. Published studies using SERVQUAL have touched on a very diverse range of industries and settings, including tyre retailing (Carman 1990), hotels (Saleh and Ryan 1992), banking (Kwon and Lee 1994), and hospitals (Babacus and Mangold 1992).

SERVQUAL has been subjected to a number of theoretical and operational criticisms (Buttle 1996). For example, SERVQUAL is based on a “disconfirmation” customer satisfaction model widely adopted in customer satisfaction literature whereby satisfaction is operationalised as a relationship between expectations and outcomes. However, the relatedness of service quality and customer satisfaction concepts, and the use of the latter to evaluate the former has been called into question (review in Iacobucci, Grayson et al. 1994). Furthermore, it has been suggested that perceived quality is best conceptualised as an attitude (Cronin and Taylor 1992) and that the adequacy-importance model should be adopted for service quality research. The “expectation-outcome gap” approach at the core of SERVQUAL approach has also been criticised as being “intuitively appealing” but not providing “any additional information beyond that already contained in the perceptions component of the SERVQUAL scale” (Babakus and Boller 1992). Furthermore, SERVQUAL fails to capture the dynamics of changing expectations (Gronroos 1993) to evaluate how expectations are formed and changed over time (Wortuba and Tyagi 1991).

The usability of SERVQUAL (modified or unmodified) instrument to assess information systems service quality has been advocated and criticised by different studies. For example, in two longitudinal case studies (Pitt, Watson et al. 1995) service quality was initially measured, then IS management took steps to improve the

service, and significant improvements in service quality were detected in a follow-up measurement 12 months later. Similarly, a modified SERVQUAL instrument has been used to assess the quality of the services supplied by an information services provider (Kettinger and Lee 1995) by combining elements of the original SERVQUAL questionnaire (Parasuraman, Zeithaml et al. 1985) and User Information Satisfaction (UIS) instrument (Ives, Olson et al. 1983). However, a similar study (Van Dyke, Prybutok et al. 1999) found the revised UIS-SERVQUAL instrument “neither a valid nor reliable measure of perceived service quality in IS” (Van Dyke, Prybutok et al. 1999, p.888), questioning the use of subtraction (expectations – perceptions) as a simulation of psychological processes, and suggesting that predictive validity is better achieved by performance (perceptions-only) measures of service quality (Cronin and Taylor 1992). The use of SERVQUAL and suitable modifications has been defended point-by-point (Pitt, Watson et al. 1997) and extended through the use of a number of further modifications to SERVQUAL (Kettinger and Lee 1997).

### **2.8.2. Customer Relationship Management (CRM)**

Some aspects of IT Service Management (ITSM) organisational strategy and software tools incorporate elements and features of Customer Relationship Management (CRM) approach and tools, most notably through the construction of an end-user database and the use of various operational data, such as Incident records, to identify trends with respect to current operational priorities and end-user needs (such as training). A major difference between CRM and ITSM lies in the difference in focus of the two areas: the former is more concerned with marketing, profitability and customer retention, whereas the latter is more focused on effectiveness of internal IT Services processes, including end-user IT support. Nevertheless it is necessary to review the current literature and state of research in the CRM area in order to better illuminate the customer-focus of ITSM industry.

Recognition that small customer retention rates have a large impact on profitability (Reichheld and Sasser 1990) and the increasing profitability of customers the longer the relationship lasts (Reichheld 1996) have promoted the concept of “relationship marketing” (Berry 1983) as a more balanced emphasis on continuing relationships with customers, rather than individual transactions with them (Peck, Payne et al.

1999). The term Customer Relationship Management (CRM) has more recently evolved from a synonym for relationship marketing to “using information technology (IT) in implementing relationship marketing strategies” (Ryals and Payne 2001, p.3).

It costs as much as five times more to obtain a new customer than it does to keep an existing one (c.f. Christopher, Payne et al. 1991) and customers have been shown to become increasingly profitable the longer the relationship lasts highlighting the importance of lifetime customer value rather than single-period profitability (Reichheld 1996). In general terms, CRM is an application of one-to-one marketing and relationship marketing concepts – responding to an individual customer based on what the customer tells you and what else you know about that customer (Peppers, Rogers et al. 1999). Customer retention strategies cannot be effective without the support of a suitable data infrastructure (Pearce 1997). More specifically, IT-enabled CRM strategy relies on information-intensive strategies (Glazer 1997) supported by data-warehousing (Kelly 1997) which allows the company to see the relationship with a customer as a whole regardless of the channel of communication (Ryals and Payne 2001).

“Information-based continuous relationship marketing” (Adolf, Grant-Thompson et al. 1997) relies on data warehousing (or smaller data marts) and data mining strategies. A data warehouse is an integrated store of data collected from a variety of sources inside and outside the organisation, such as call centres, sales, market and customer surveys, electronic point of sale systems, geodemographic data and competitive information (Ryals and Payne 2001). A data warehouse is a regularly refreshed (therefore non-volatile) data store which can be queried without slowing down transaction processing operational systems and in which data can be cleansed, de-duplicated and integrated. A CRM data warehouse facilitates data exploitation through reporting (e.g. alpha numeric data on quality control, profitability analysis, management reports and campaign analysis) and data visualisation (e.g. charts and tables on segmentation, trend analysis and customer analysis). Data mining is the process of exploring data for patterns, correlations and irregularities based on a number of techniques such as: clustering – identifying groups of similar profiles; conjoint analysis – identifying preferences; regression analysis – identifying patterns of relationships between variables; and neural network analysis – identifying complex

relationships between and within combinations of variables. In other words, “data warehousing provides the enterprise with a memory ... data mining provides the enterprise with intelligence” (Berry and Linoff 1997).

Customer Relationship Management strategies and associated technologies are concerned primarily with the identification of desirable (and undesirable) customer segments based on profitability, and improved targeting of marketing so as to increase customer retention and profitability (Kutner and Cripps 1997). A number of CRM success factors have been identified (c.f. Wilson, Daniel et al. 2002), including alignment of the organisation around the customer is reliant on organisational structure (McDonald 1996) such as cross-functional teams (Wilson and McDonald 1996), as well as convergence of customer-facing systems so as to give a single view of the customer or competitors (Ryals, Knox et al. 2000). Similarly, some of the barriers to successful implementation of CRM have been identified as: implementing CRM (tool) before creating customer strategy, rolling out CRM (tool) before changing your organisation to match, assuming that more CRM technology is better, stalking, not wooing customers (Rigby, Reichheld et al. 2002).

### **2.8.3. Call Centres**

Some aspects of IT Service Management (ITSM) organisational strategy and organisational structure closely resemble elements and features of Call Centres, most notably through the establishment of Help/Service Desks which provide support to end-users by telephone and email. A major difference between the two areas is the nature of the product being supported, whereby a mature IT support environment poses a greater variety of challenges due to the age of systems, number of different types of systems, and the complexity of having these systems interact – requiring very strong software skills on the specific systems being maintained. (Nelson, Nadkarni et al. 2000). Nevertheless, it is necessary to review the current literature and state of research in the area of Call Centres in order to better illuminate the customer-support focus of ITSM industry.

The telephone call centre industry has grown considerably over the last decade on regional – e.g. in the North East of England (Richardson and Marshall 1996), pan-European – e.g. in Dublin (Breathnach 2000), and global – e.g. in India (Taylor and

Bain 2004) scale. In general, the call centre industry growth can be viewed in the wider context of the relatively recent rapid tendency of spatial separation of front- and back-office activities driven by the desire to achieve significant cost-savings by moving what tend to be a firm's most labour-intensive and therefore space-using office activities out of high-cost central city locations, where most firms locate their head offices (Castells 1989). The spatial separation of front- and back-office activities has been facilitated by a broad variety of factors, such as wage costs differential, availability of a modern telecommunications infrastructure, cultural and language similarity, availability of skilled labour, and time zone difference (Apte and Mason 1995). Back-office activities, such as payroll, accounting, subscriptions, billing, claim processing, and IT support typically require little face-to-face contact with other personnel either within or without the firm, and tend to be highly routine, labour intensive, and already automated or a viable prospect for automation (Breathnach 2000). Correspondingly, call centres provide a variety of functions, such as customer service, help desk, emergency response, telemarketing, and order taking, and the latest telecommunications and information technology allows a call centre to be the "virtual embodiment of a few or many geographically dispersed operations" (Gans, Koole et al. 2003, p.82).

Call centres are fascinating socio-technical systems in which the behaviour of customers and employees is closely intertwined with physical performance measures (Gans, Koole et al. 2003), and have been the subject of much academic attention since the mid-1990s. Significant early contributions focussed on branchless retail banking (Marshall and Richardson 1996), the spatial and regional aspects of growth (Richardson and Marshall 1996), and the growing importance of considerations of quality (Frenkel and Donoghue 1996). However, it has been the area of employee relations in the call centre that has attracted a great deal of passionate debate. In particular, a paper entitled "(Not) hanging on the telephone: Payment systems in the new sweatshops." (Ferne and Metcalf 1998) attracted considerable controversy, particularly over the authors' note that call centre technology, such as call centre agents' schedule and activity monitoring "provides management with the ultimate opportunity for control" and subsequent assertion that call centres are "the archetypal organization to represent (Foucault 1977) application of Bentham's Panopticon to the workplace" (Ferne and Metcalf 1998, p.8).



For example, a typical call centre operational management report can provide half-hourly statistics not only concerning the numbers of incoming, queuing, resolved, and abandoned calls, but also the global (across the service) and individual records on the state of customer service representatives as active (handling a call), available (idle but ready to take a call), and unavailable (not handling a call but not idle), their availability vis-à-vis scheduled staff allocation, as well as their average speed of answer – and all this data is subsequently analysed with a great deal of statistical sophistication and used for forecasting and planning (Gans, Koole et al. 2003). The notion of electronic Panopticon has been questioned by other studies, most notably – “Entrapped by the 'electronic Panopticon'? Worker resistance in the call centre” (Bain and Taylor 2000), which argues that evidence suggests that such technology in fact promotes emerging collective resistance and trade unionisation. In particular, the authors state that although “mechanisms of electronic surveillance are extensively employed but, rather than leading to the nullification of resistance and the creation of obedient, passive subjects” (Bain and Taylor 2000, p.3) the actual management of the employment relationship is far more problematic than the simplistic ‘total control’, and that the real-world design and operation of the electronic ‘Panopticon’ call centre technology allows for numerous surveillance avoidance and control resistance practices on part of call centre agents.

Call centres have been described as a modern IT based organizational form, that is at the forefront of a current trend of technological intensification of service activity (Taylor and Bain 2000). However, they have received limited attention in IS research (Corea 2006). A number of IS studies have made quantitative assessment of IT on their work environment, showing that staff are seen to on one hand experience greater performance in service tasks (e.g. Subramanyam and Krishnan 2001) and on the other higher mental stress, diminished quality of staff relationship and lower job satisfaction (e.g. Knights and McCabe 1998).

However, although only a few of IS studies focusing on call centres or IT support Help Desks have been qualitative, they have highlighted the emergent nature of technology-mediated work practices. For example, a study of the use of Lotus Notes in an IT Help Desk (Orlikowski 1995) highlighted emergent changes in work

practices in the areas of problem-solving collaboration, co-ordination and quality of knowledge. Cross-organizational IT projects such as implementing a new call centre have been shown to be a continual process, in which the outcomes continue to evolve from the often unanticipated pattern of interactions between users, IT tools, and institutional contexts, and the understanding that call centres must be fully integrated with the rest of the firm and not treated as self-sufficient/standalone units (Boddy 2000). A more recent study has sought to extend the notion of emergent and interdependent nature of organisational contexts and IT-based activities by demonstrating the value of explicitly analysing rhetorical formulations of a call centre's performance aims as a means of analysing key procedural and technological structural tensions and incompatibilities in the call centre's operations (Corea 2006).

#### **2.8.4. Knowledge Management**

Some aspects of IT Service Management (ITSM) organisational strategy and software tools incorporate elements and features of Knowledge Management (KM) approach and tools, most notably through the construction of a database to hold various items of information pertaining to IT issues and their resolution. A major difference between KM and ITSM lies in the difference in focus of the two areas: the former is more concerned with creation, storage, dissemination and reuse of information within organisations, whereas the latter is more focused on effectiveness of internal IT Services processes, including end-user IT support. Our literature review has already highlighted a number of aspects of knowledge management in the technical support processes. Nevertheless it is necessary to review the current literature and state of research in the KM area in order to better illuminate the knowledge-management aspect of ITSM industry.

Knowledge has been defined as a justified belief that increases an entity's capacity for effective action (Huber 1991), and thus distinguished from data – raw numbers and facts, and information – authenticated data (c.f. Machlup 1980; Dretske 1983). The variety of conceptualisations of knowledge has important implications for organisational strategy and the role of IT systems in knowledge management (review in Alavi and Leidner 2001). If knowledge is conceptualised as an object, then knowledge management strategy should be concerned with building and managing knowledge stocks. If knowledge is a process, then knowledge management should

correspondingly be concerned with the flow, creation, sharing and distribution of knowledge. Finally, if knowledge is a capability, then knowledge management should be concerned with core competencies, strategic advantage of know-how, and intellectual capital.

While information technology can be considered as a value-adding technological infrastructure, knowledge management can be viewed as a socio-technical system of tacit and explicit business policies and practices enabled by the strategic integration of information technology tools, business processes and intellectual, social and human capital (Carayannis 2005). Most knowledge management projects in organisations have one of three aims: (1) to make knowledge visible and show the role of knowledge in an organization, mainly through maps, yellow pages, and hypertext tools; (2) to develop a knowledge-intensive culture by encouraging and aggregating behaviours such as knowledge sharing (as opposed to hoarding) and proactively seeking and offering knowledge; and (3) to build a knowledge infrastructure – not only a technical system, but a web of connections among people given space, time, tools, and encouragement to interact and collaborate (Davenport and Prusak 1998). Knowledge management thus involves distinct but interdependent processes of knowledge creation, knowledge storage and retrieval, knowledge transfer, and knowledge application (Alavi and Leidner 2001).

The knowledge management academic literature is expanding rapidly from the first references in 1987 to more than 2500 scholarly papers published since 1995 in the leading IS journals (Peachey and Hall 2005). Conceptual literature has focused on the following three most prominent areas of research: the differences between data, information and knowledge and the implications of such differences; the expression and subsequent interpretation of personalised knowledge in order to be useful to others; and knowledge as processing of information through the processes of reflection, enlightenment and learning (Alavi and Leidner 2001). The sociotechnical dimensions of such concepts are further explored through the difference between tacit knowledge – actions, experience and involvement in a specific context as comprised of cognitive and technical elements; and explicit knowledge – articulated, codified and communicated in symbolic form and/or natural language (Polyani 1962; Polyani 1967; Nonaka 1994). The technical aspects of storing, indexing and retrieving

information have focused on the use of knowledge repositories such as data warehouses. Many kinds of repositories are involved in knowledge management, with perhaps the most basic distinction being made between repositories of documents and data (Blair 1984). Other distinctions include repositories which store external knowledge such as demographic data, competitive intelligence; structured internal knowledge such as organisational data or documents); and informal information such as transcripts of group discussions via electronic messaging systems (Davenport, De Long et al. 1998). Other distinctions include one between general knowledge, such as explicit scientific knowledge and specific knowledge, such as knowledge including local context (Zack 1999). Finally, the processual aspects of knowledge management have focused on the issues of knowledge creation and reuse, as outlined in more detail in section 2.7.4 of this thesis.

## **2.9. *Practical and Conceptual points of departure***

Following a review of the current literature on the “macro” level concepts of Business-IT alignment, IT governance, IT Service Management including IT Infrastructure Library (ITIL), and IT support, we are now in a position to develop the conceptual and practical points of departure for the research presented in this thesis. The conceptual point of departure provides a base for conceptual grounding of this research by relating the “macro” level concepts to a specific organisational process or series of processes thus focusing the analytical approach of this research. The practical point of departure provides a basis for an empirical grounding of this research by relating the conceptual point of departure to a specific “micro” empirical issue or series of issues thus focusing the data collection approach of this research. The conceptual and practical points of departure for this thesis are discussed in the following sections.

### **2.9.1. Role of ITSM technology**

IT Support technology tools are not found only in the Help/Service Desks. As it becomes increasingly difficult for any member of staff to have even an overview knowledge of the entire range of IT equipment and applications (Stinton 1996), the market for software tools to help IT organisations deliver business-oriented IT Service Management is expected to grow to \$9.7 billion in 2010 (Gartner 2006). Similarly, although from the mid 1990s vendors started to offer add-on modules to handle

inventory management and hardware asset network auto-discovery, service/change requests and knowledge management functionality, even now, many organisations use a plethora of disparate tools, and where these tools are integrated, it is usually little more than different systems with similar interfaces or branding (Bruton 2004).

Despite significant market growth during 1995-2000, only the basic functionality of the early generation of Help Desk software, such as call tracking, user history, workload management, remained implemented. However, by 2004 over 50% of enterprise-level Consolidated Service Desk requests for purchase specified inclusion of functionality to support the ITIL Change Management process (Gartner 2005). The new generation of Service Desk technologies is based on Configuration Management Database [CMDB] – accounting for and verifying the configuration records of all the components of the IT infrastructure, including hardware, software, people, skills in an underlying database, and providing a unified basis to support all other support processes, including Incident, Problem, and Change Management (CCTA 2000, p.226).

### **2.9.2. Conceptual point of departure**

Help Desk software is used to manage the day-to-day technical support processes within a Help/Service Desk. As we have outlined above, such practical day-to-day use typically includes the following basic functionality: call logging – recording and updating information on particular enquiries and collaborative working – progressing enquiries between analysts. Help Desk software is designed to capture considerable amount of data as a by-product of routine daily operations, both automatically – as date/time stamps and audit trails, and manually – as input by technical support analysts. Such data is then used in management reporting – querying the raw data stored in the Help Desk software to evaluate service performance against a variety of Key Performance Indicators.

Organisations often judge the effectiveness of their Help/Service Desks on cost and service criteria defined as quantitative operational metrics defined as Service Level Definitions/Agreements (SLD/A) and Key Performance Indicators (KPI). For example, a typical SLD may be defined as: “all enquiries to be resolved within 8 working hours”. It is widely recognised in the ITSM industry that management

reporting for such metrics based on the data stored in the Help Desk software is only as reliable as the day-to-day process of data capture implemented in the Help Desk software and the technical support process. Moreover, the day-to-day process of data capture is inextricably linked to the role of the Help Desk software in the technical support process in a particular organisation.

For example, the SLD as stated above assumes that all enquiries are logged with enquiry status “open” as soon as they are received by technical support analyst from the end-user, and are updated with the status “resolved” as soon as the particular enquiry is resolved. The management report based on this SLD then evaluates the number of business hours elapsed between date/time stamp “open” and date/time stamp “resolved” to obtain a measure of performance against the stated performance target. However, even a relatively straightforward SLD such as this requires considerable effort to translate a qualitative service-related objective (prompt enquiry resolution) into a quantitative service-related target (8 working hours) and a statistical measure of performance (% of calls meeting the target).

The conceptual point of departure for this thesis therefore focuses on the need for consistent/regularised use of HelpDesk software to record and progress incidents as a basis for accurate IT Support performance metrics, Service Level Management and its role in Business-IT alignment. It is recognised that unless the process of data capture and the role of Help Desk software in the support process is clearly and consistently defined both across the technical support teams/analysts as well as over time, management reporting based on data obtained from the Help Desk software is unlikely to be a reliable indicator of the technical support process. For example, differences in the definition of “resolved” may lead to some analysts updating a particular call as “resolved” upon communicating the resolution details to the end-user, whilst other analysts may only update that call as “resolved” upon receiving confirmation from the end-user that the resolution details were sufficient to fix the problem. Such differences of definition, and subsequently of the way the technical support process is organised and reflected in the day-to-day use of Help Desk software are instructive and allow the researcher a glimpse into organisational process patterns.

### 2.9.3. Practical point of departure

In general, the practical day-to-day use of Help Desk software in technical support has been described by the following dilemma, which has attained something of a conventional wisdom status in the ITSM industry (Remedy 2006):

*The more data you attempt to collect, the more useful the information, but the less likely that you will capture all of the data because entering the information takes too long. On the other hand, the less data that you attempt to collect, the less useful analysis will be, but the more likely that you will capture all of this data.*

This statement neatly captures the intricate relationship between the software artefact and the process of its daily use, e.g. how long it takes to log calls, and its wider (managerial) context of use, e.g. what information the organisation wants to collect. However, this statement alone is insufficiently rigorously defined to serve more than an indication of our research direction and the primary research question needs further elaboration.

The technical support work exhibits a distinctly organisational nature, with work patterns being contingent on contextual factors (Pentland 1992; Pentland 1995). Similarly, it has been argued that that it is not possible to use a generic Help Desk software tool without customisation – products designed to appeal to maximum number of potential customers (so to everybody, and therefore by extraction, to nobody in particular) cannot anticipate the idiosyncrasies of any one particular implementation (Bruton 2004). Therefore, ITSM vendors advertise a high degree of customisability and adaptability of their product to local circumstances, work processes and activities, whilst still claiming to support the underlying ITIL and other beset-practice principles (Bruton 2004). Drawing on the statement of dilemma presented above, one particular purpose of customising the software artefact is to promote a better fit between the functionality and the look-and-feel of the software and the business processes which the software artefact is meant to support.

It would seem that the better the “fit” between the software artefact’s functionality and interface and the underlying business processes which it supports, the more effective the implementation of that artefact will be in terms of delivering on

organisational objectives. As one of such objectives is the accurate capture of data as a by-product of normal daily IT Support operations, customisations are meant to promote and make easier the capture of relevant data by technical support analysts in the course of daily work, embedding the use of the software as part of the normal work processes. In fact, it is the very notion of consistent use of the software artefact on a daily basis by various individuals that would allow the organisations to aggregate and meaningfully analyse statistical information obtained as a by-product of daily operations, such as Key Performance Indicators used to evaluate the organisation's performance against its Service Level Agreements.

At first glance, consistency of use of the software artefact presupposes regularised pattern(s) of engagement with the software artefact's facilities by multiple individuals and/or groups across multiple contexts in ways prescribed by organisational procedures. However, the statement of data capture and use dilemma presented above is instructive in its invocation of "*likely*" turn of phrase to refer to the relationship between organisational objectives (i.e. data to be obtained), the prescribed process of fulfilling those objectives (i.e. procedures governing software use), and the actual process of fulfilling those objectives (i.e. daily use of the software in a variety of local context). In fact, this conventional wisdom indicates that the relationship between the objectives, procedures, and actual implementation of the ITSM software is by no means straightforward, and that achieving organisational objectives such as KPIs and SLAs (which may be fairly generic across organisations) is a careful balancing act requiring careful attention to be paid to the local context of implementation.

Our general research direction can therefore be narrowed down to two particular dimensions. Firstly, our conceptual point of departure is a central theme of our analysis because of how it can place the software artefact and the daily operations in the context of organisational need for ITIL-based IT Services delivery model. Secondly, our research must address the contextual aspect of the consistency of use of ITSM software as part of daily process. The issue of context-dependence is also a central theme of our analysis because organisation's of how it can illuminate both the immediate circumstances surrounding a particular instance of ITSM software use (e.g. logging a particular Incident) and the wider perspective on organisations as complex social systems and the interrelation between human agency (e.g. the action of logging



an Incident) and social structure (e.g. organisational hierarchy/strategy/procedures, training, available information, and other “wider” contextual factors). The practical point of departure for the research presented in this thesis focuses on the “micro” level issues including the context of use of HelpDesk software as part of daily work processes and its implications for the collection of operational data. Let us illustrate these two aspects of our research direction with an example.

Firstly, if ITSM software artefact is not used consistently in Incident, Problem, and Change Management aspects of an organisation’s IT Services operations, the information gathered as a by-product of daily operations and provided as part of Service Level Management will be inaccurate. Such information will be inaccurate because without consistency of use of the technological artefact to generate operational data, aggregation of such operational data for performance evaluation purposes will be difficult, if not impossible. In other words – unless Incidents, Problems and Changes are logged consistently on a daily basis, one will have difficulties calculating even simple statistics such as the total number of particular kinds of Incidents in a given time period. Following on, if the Service Level Management information is inaccurate it distorts the basis for management decisions addressing the performance of the organisation’s IT Services function with respect to the issue of Business-IT alignment and associated business strategising.

Secondly, in order to ensure consistency of management information the organisation may prescribe certain ways of using ITSM software in a variety of circumstances as determined by the organisation’s need for operational performance data. In other words, if information on certain types of Incidents is required (e.g. perhaps pertaining to a particular service or client) a procedure may be set up whereby all such Incidents must be logged in a particular way. However, a procedure is only one part of the complex social system in which daily activity takes place and the notional organisation of work described by the procedural map may not correspond to the actual organisation of work “on the ground”.

## **2.10. Chapter Summary**

This chapter presented an overview of the current literature on the “macro” level concepts of Business-IT alignment, IT governance, and IT Service Management

(ITSM) in order to delineate the context of this research, and explored the key principles of the IT Infrastructure Library (ITIL) – a de-facto standard for IT Service Management – Service Delivery and Service Support disciplines, highlighting the role of the organisation’s HelpDesk as a coordination point for Incident, Problem, Change, Service Level and Configuration Management as an appropriate starting point for our enquiry.

The current industry and academic literature on IT support activities has been reviewed with particular reference to: problem-solving (Das 2003) drawing on information processing theory (Newell and Simon 1972); organising problem-solving in the context of distribution of competencies and functional specialisation (Pentland 1992); interpreting problem-solving in the context of asymmetry of information, equivocality, noise, and lack of reciprocity of perspectives between the technical support analyst and the end-user (Pentland 1995); and documenting problem-solving, and knowledge-reuse (Markus 2001).

Following locating this thesis in the literature on related industries and technologies, this chapter developed the conceptual and practical points of departure for our research. The conceptual point of departure focuses on the need for consistent/regularised use of HelpDesk software to record and progress incidents as a basis for accurate IT Support performance metrics, Service Level Management and its role in Business-IT alignment. The practical point of departure for the research presented in this thesis focuses on the “micro” level issues including the context of use of HelpDesk software as part of daily work processes and its implications for the collection of operational data. The following chapter presents the theoretical basis for the research presented in this thesis.

## **CHAPTER THREE - THEORY REVIEW**

### **3.1. Chapter Introduction**

This chapter presents the theoretical basis for the research presented in this thesis. The conceptual and practice points of departure for this study as outlined in Chapter 2 are subject to further elaboration and theoretical grounding using perspectives afforded by the current conceptualisation of organisational routines and role of the technological artefact in organisational processes. The underlying theoretical framework of structuration theory is introduced and a synthesised theoretical framework is developed as a basis for this study.

### **3.2. Organisational routines**

We can begin developing the underlying theoretical framework with an explicit consideration of the first research direction – What constitutes “consistent use” of the ITSM software artefact by IT Services personnel on a daily basis? The notion of “consistent use” can be helpfully expressed as the process of engagement with the ITSM software artefact becoming a part of normal daily work processes. However, what distinguishes a ‘normal’ daily work process from an exception, and how do particular forms of engagement with the ITSM software artefact become part of ‘normal’ daily work processes?

#### **3.2.1. Routineness in technical support work**

Technical support work exhibits both routine and non-routine elements, which can be analysed in terms of the number of exceptions and task analysability (Perrow 1967), and the extent of deliberation and search involved in providing a knowledgeable response to the enquiry. For example, although many technical support desks experience a high number of similar or even identical enquiries from different end-users, the extensive scope of support service provided by an Help Desk in an organisation can present the technical support analysts with potentially a high number of exceptions, by proxy of low numbers of similar calls and high frequency of new calls, particularly where publicising FAQ information to end-users is successful. Similarly, although many organisations deploy standard desktop configurations to employees, the complexity and the variety of possible interactions of software

components may lead to low task analysability, whereby a particular problem encountered by the end-user cannot be reproduced by technical support analysts and it is impossible to obtain enough information to isolate the exact symptoms of a problem, much less explore its causes. Additionally, where symptoms and causes are identified there is an additional phase of search for a solution and deliberation on which of the possible solutions is most appropriate – sometimes a fix can be found, and at other times the end-user may have to ‘work around’ the problem (Pentland and Rueter 1994).

Technical support work is a very interesting organisational phenomenon, where “one man’s routine of work is made up of the emergencies of other people” (Hughes 1971, p.316). The mix of routine and non-routine aspects of technical support work, and its contingency on a wide variety of contextual factors, one of which is the very technology employed to augment the work processes, calls for a situated action (Suchman 1987) analysis of the technical support work pattern with particular reference to the ongoing interaction of technical support analysts with the technical support software artefact. More fundamentally, the increasing prevalence of both the generality of best-practice models and specificity of local circumstances of implementation guiding the processes of technical support work, call for an examination of the nature of technical support work and artefact in terms of the ontological status of the social reality in which such work takes place.

A rigorous examination of work processes, and their constituent tasks, followed by juxtaposition of these processes with formulation of organisational objectives codified in operational procedures is insufficient to understand the complexity of organisational life. What we need is an analytical tool which will help us examine specific work processes from the perspectives of both actual observable interactions and tacit knowledge held by individuals, so that we can apply this analytical tool to the work processes relating to the use of the ITSM software artefact. More specifically, our analytical tool needs to enable us to trace the contextual nature of organisational processes, by examining how patterns of behaviour involving the ITSM software artefact are embedded in other patterns of behaviour. A useful way of conceptualising a ‘normal’ daily work process is to identify it as an organisational routine. Therefore the emphasis on ‘consistency of use’ placed by our research

question suggests that understanding and characterising patterns of social interaction in an organisational context from the perspective of organisational routines should be the first building block of our theoretical foundation.

Despite (or because of) the increasing popularity of the concept of routines, many ambiguities and inconsistencies in the literature that deals with routines prevail still today (Becker 2004), and it doesn't help to clear matters that the word "routine" is used as a noun, a verb, and an adjective. As a noun "routine" is used to identify a fixed pattern of individual behaviour in response to a fixed stimuli (March and Simon 1986), and objectify a collective capacity to perform recognisable patterns of action (Nelson and Winter 1982). The difference between the noun and the verb is similar to the distinction between organization and organizing (Weick 1979); the noun form encourages us to see the phenomenon as a static thing. while the verb form encourages us to see the phenomenon as a dynamic process (Pentland and Rueter 1994, p.486). As an adjective, it indicates a judgement about a variable property of a pattern of action, such as repetitiveness (Gersick and Hackman 1990), analyzability (Perrow 1967), variety (Daft and Macintosh 1981), or even 'mindlessness' (Ashford and Fried 1988), or to the contrary – 'effortful accomplishments' (Pentland and Rueter 1994, p.488). The very concept of routines is fraught with several sources of ambiguity: "(i) the distinction of individual and collective recurring activity patterns; (ii) the fact that for some authors, the term 'routines' refers to cognitive regularities (rules) and for others, to behavioural patterns (recurrent interaction patterns); and (iii) the neglect of agency in the executing of behaviour patterns, or in the process of expressing rules in action" (Becker 2004, p.663). The sheer depth and variety of uses of the concept of routines necessitates that we outline the definition and characteristics of routines as well as their role in organisational life before proceeding to use organisational routines as a building block of our theoretical framework.

### **3.2.2. Patterns and recurrence**

The concept of organisational routines as recurring patterns of behaviour was proposed over 60 years ago (Stene 1940). Subsequently, in 1964 Sydney Winter defined a routine as "pattern of behaviour that is followed repeatedly, but is subject to change if conditions change" (Winter 1964, p.263), and in 1967 philosopher Arthur Koestler defined routines as "flexible patterns offering a variety of choices" (Koestler

1967). The concept of routine is very prominent in the literature on organisational and economic evolution (Ioannides and Nielsen 2007) following the publication of “An Evolutionary Theory of Economic Change” (Nelson and Winter 1982), who put the concept of routines centre-stage in their development of an evolutionary perspective on organisational and economic change. Routines are not only a central feature of human organisations but as a concept also forms the basis of the explanatory mechanism in many of our most widely accepted theories (Pentland and Feldman 2005).

Recurrence is a key characteristic of routines and has been highlighted both in theoretical developments (c.f. Winter 1964; Cohen, Burkhart et al. 1996) and empirical studies (c.f. Pentland 1992; Pentland and Rueter 1994; Knott and McKelvey 1999). As we have outlined above routines are recurrent behavioural or cognitive patterns, however conceptualisation of the content of these patterns is not uniform in the literature on organisational routines (overview in Becker 2004). For example, routines have been conceptualised as built up of *action* (c.f. Cohen, Burkhart et al. 1996), *activity* (c.f. Dosi, Nelson et al. 2000, p.4), *behaviour* (c.f. Nelson and Winter 1982, p.14), and *interaction* (c.f. Dosi, Teece et al. 1992, p.191-192). While activity and action are usually used as synonyms, *behaviour* is distinguished from *action* in that it is observable and is understood to be a response to a stimulus, whereas *interaction* is a subset of *action* and establishes a distinction between the individual and the collective level by referring to such *action* as involves multiple actors (Becker 2004, p.645). Furthermore, the concept of routines builds on an older and overlapping family of concepts, such as ‘customs’, and ‘habits’. All the concepts of this family share the notion of a predisposition to a certain ‘tendency’ in an individual’s behaviour; however routines and customs are social in nature, as opposed to the individual nature of habits. Routines involve habits shared within an organisation (or by organisations across organisational boundaries), whereas customs can involve shared habits by individuals that do not have to be members of organisations (Ioannides and Nielsen 2007, p.234).

### 3.2.3. Mindlessness vs. effortful accomplishment

Routines have also been conceptualised as cognitive patterns or regularities (Simon 1947; March and Simon 1958). For example, one way of conceptualising cognitive routines is using a computational metaphor –

*“most behaviour and particularly mass behaviour in organisations is governed by performance programs ... we will regard a set of activities as routinised, then, to the degree that choice has been simplified by the development of a fixed response to a defined stimuli. If search has been eliminated, but a choice remains in the form of a clearly defined and systematic computing routine, we will still say that the activities are routinised” (March and Simon 1958, p.142).*

Routines in this case would be understood as a kind of “if-then” cognitive rules. Similarly, event schemas or scripts (Schank and Abelson 1977) have been used to support the argument that routines are sustained by the cognitive structures of individual organisation members. Scripted behaviour can occur in the following circumstances: (i) the presence of an event schema; (ii) categorisable stimulus cues; (iii) the presence of action rules; (iv) minimal required effort; (v) the absence of unstructured subroutines; and (vi) the absence of interruptions and unmet expectations (Ashford and Fried 1988), and similar criteria (Weiss and Ilgen 1985).

Cognitive resources are limited (Simon 1947; Simon 1955) and by implication neither all alternatives, nor all consequences of any one alternative can be known (March and Simon 1958). Thus as a cognitive device, routines economise on the scarce or bounded information processing and decision-making capacity of agents (Simon 1947; March and Olsen 1976). In situations of uncertainty, particularly pervasive uncertainty, routines make an important contribution to actors’ ability to pick a course of action (Weiss and Ilgen 1985). Uncertainty refers to ill-structured problems where neither the outcomes, nor their probabilities are known, despite the increases in available information. Organisational routines can fix certain parameters of action, whereby “... greater uncertainty will cause rule-governed behaviour to exhibit increasingly predictable regularities, so that uncertainty becomes the basic source of predictable behaviour” (Heiner 1983, p.570).

By economising on scarce cognitive resources, routines increase the potential for selectively focused attention (Simon 1947) and in order to better use limited cognitive capacity, attention is usually focused on non-routine events whereas recurring events are dealt with semi-consciously (Postrel and Rumelt 1992). Thus routines as attention focussing mechanisms allow the agents to “free-up higher degrees of awareness, mental deliberation and decision making for the more complex decision” (Hodgson 1997, p.667), and routines guide search by experience and reduce the space of behavioural options that agents should scan (Winter 1985). Routines as cognitive resource economising mechanisms rely on event schemas or scripts (Schank and Abelson 1977) as outlined above, and organisational routines are thus characterised by ‘mindlessness’ (e.g. Ashford and Fried 1988).

However, opinions are sharply divided (c.f. Becker 2004) as to whether routines are characterised by ‘mindlessness’ as described above, or whether routines are, in fact, ‘effortful accomplishments’ (e.g. Pentland and Rueter 1994). Many studies call into question the concept of routines as fixed or mindless/automatic. For example, even some of the most routinised kinds of encounters, such as fast food service (Leidner 1993) and buying stamps (Ventola 1987) exhibit a considerable amount of variety and require effort on the part of the participants to accomplish successfully. Organisational routines are “complex interactional products and usually require the participation of multiple individuals; they are unlikely to unfold the same way every time” (Pentland and Rueter 1994, p.488) because “an organisational routine is not a single pattern but, rather, a set of possible patterns – enabled and constrained by a variety of organizational, social, physical and cognitive structures – from which organizational members enact particular performances” (Pentland and Rueter 1994, p.491). Similarly, “mechanistic decision making does not necessarily diminish the opportunities for genuine, deliberate choice” (Winter 1985, p.109). Furthermore, routines can be triggered (Weiss and Ilgen 1985) by external cues (e.g. sequential links between routines) and by actor-related triggers, such as aspiration levels where the aspiration level establishes a limit for adequate performance above which actors follow satisficing, rather than maximising behaviour (Levinthal and March 1981). Thus, the argument that routines are ‘effortful accomplishments’ is based largely on the conceptualisation of routines as collective and context-dependent phenomena,



which in turn has significant implication for analysing routines from the perspective of organisational stability and endogenous/exogenous change.

#### **3.2.4. Collective and processual nature of routines**

There is general agreement that “routines” are complex patterns of social action, and “routineness” is a variable property of such patterns (Pentland and Rueter 1994). Routines are recognised to be collective phenomena (Nelson and Winter 1982, p.73). Routines involve multiple actors (Feldman and Pentland 2003), and an organisational routine can be distributed across space or across the organisational units (Cohen, Burkhart et al. 1996; Zollo and Winter 2002). The collective nature of routines has been described in many empirical studies (e.g. Weick 1990; Pentland and Rueter 1994) which detail our understanding of the relationship between individual actors and the collective routines they participate in. For example, routines can be disrupted when participants in a routine start ‘acting in a manner that is more individual than collective’ (Weick 1990, p.579). In fact, although routines are linked by interaction, the overlap and dispersal of knowledge held by the actors involved in carrying out a particular routine is also vital to consider when analysing the relationship between the individual actor and the collective routine. Where actors hold very specialised knowledge that the overlap with the knowledge of others is small, the knowledge is said to be dispersed (von Hayek 1945; Minkler 1993). Subsequently, “the dispersedness of knowledge is a driver of uncertainty: actors do not have the overview of all possible alternatives, and of the factors that influence the probabilities with which these alternatives lead to certain outcomes” (Becker 2004, p.647). Thus, routines guarantee the regularity and predictability of individual behaviour necessary for collective action (Amin and Cohendet 2004, p.27).

We have already highlighted one source of ambiguity with regard to the linguistic usage of the term routine as a noun, a verb and an adjective. A further source of ambiguity stems from the notion that routine is a process, despite the conceptual complication that a recurrent *pattern* of interaction is a somewhat stable *sequence* of interactions (Becker 2004, p.649). For example, the following dimensions (Becker 2004) describing the processual nature of organisational routines can be found in the literature: the speed of decay of the routines (Giddens 1984, p.86; Cohen 1991, p.139); the speed of executing the routines, of changing their contents, and of

switching between them (Cohen 1991, p.136); reaction speed, time lags and delays (March 1994); frequency of repetition and point of time and impact (Ginsberg and Baum 1994); frequency and fashion of shifting from one routine or set of routines (Hannan and Freeman 1989, p.76); age (duration) of an activity, speed of environmental change, quality of information with regard to the activity, amount of managerial and employee turnover, and volatility of the decision environment which all can act to intensify or dispel the influence of routines (Hirshleifer and Welch 1998); and tensions arising from different speeds of different but interacting routines (Winter 1975, p.109).

Routines are context-dependent as ‘the context of the information possessed by an individual is established by the information possessed by all other members’ (Nelson and Winter 1982, p.105). Therefore, execution of a routine can only be conceived in a given context that provides the natural locus of attention for collective action, and for the individual member, knowing what routines to perform “entails the ability to receive and interpret a stream of incoming messages from other members and the environment” (Nelson and Winter 1982, p.100). Routines can be conceptualised as an embodiment of organisational memory by expressing both the cognitive and coordination dimensions of a routine - “routines embody the successful solution to problems solved by the organization in the past. They are retrieved and executed whenever the organization faces a problem resembling one already solved” (Paoli and Prencipe 2001, p.12). Routines can be adopted, however, they can fall apart if the collective sense-making process is disturbed (Weick 1993). For example, conditions such as (extreme) time pressure can obstruct the collective sense-making (by restricting communication), thus making it more likely that adopted routines fall apart. In particular, more recent routines which have been practised less often are even more vulnerable and “can be expected to unravel sooner than those acquired earlier under time pressure” (Weick 1990).

Routines store organisational knowledge – “routinisation of activity in an organisation constitutes the most important form of storage of the organisation’s specific operational knowledge” (Nelson and Winter 1982, p.99). Whilst it is difficult to get an overview of the “whole” knowledge held in an organisation (c.f. Cohen, Burkhart et al. 1996; Zollo and Winter 2002), to the extent that “memories of an organization

stored in routines carry much of the knowledge (both tacit and that which can be articulated) needed to perform activities based on repertoires of knowledge” (Amin and Cohendet 2004, p.27) one can usefully conceptualise the knowledge- and interaction-based generative nature of the context of routines by locating it not at the levels of the individual or the organisation, but at the intermediate level of communities. Multiple actors involved in the routines can be part of different kinds of communities, for example, ‘hierarchical’ communities, such as those which share a disciplinary specialisation, and are typically homogenous; and ‘autonomous’ communities, such as communities of practice defined horizontally either by production of new knowledge or a common interest in a given practice (Cohendet and Llerena 2003). Different communities provide a different local context in which routines emerge and learning takes place, leading to routines that strongly differ in terms of power of replication, degree of inertia and search potential (Cohendet and Llerena 2003, p.273).

### **3.2.5. Context and path dependence**

The notion of ‘situated action’ (Suchman 1987) illustrates the complementarity between routines in their contexts whereby external structures, such as artefacts, help to control, prompt, and co-ordinate individual actions. As mentioned above, routines are embedded in an organisation and are specific to the context (Cohen, Burkhart et al. 1996), even to the extent that general rules have to be incompletely specified when transferred across contexts precisely because contexts are different (Becker 2004, p.651). Limits to the transfer of routines between contexts are an implication of routine *specificity*, such as historical (Hodgson 2001), local (Simon 1976), and relation (Dyer and Singh 1998) specificity. Problems with transfer of routines may arise because it may not be clear what is essential about the routines and what is peripheral (Szulanski and Winter 2002), and application of transferred routines is not straightforward as interpretation and judgement skills are required for completing general rules, for example to know what routines to perform when (Nelson and Winter 1982).

Routines are shaped by historical context-dependence (Nelson and Winter 1982) and are path-dependent to the extent that how they develop is a function of where they have started from (Dosi, Nelson et al. 2000). Where change to a routine occurs, it

does so incrementally based on their previous state (Cohen, Burkhart et al. 1996). Path-dependence is a function of feedback effects, such as competency trap: 'favourable performance with an inferior procedure leads an organisation to accumulate more experience with it, thus keeping experience with a superior procedure inadequate to make it rewarding to use' (Levitt and March 1988, p.322). Furthermore, retracing the origins of a routine and 'resetting' it to its state at an earlier point in time is a difficult, if not impossible proposition. The experiential development of a routine in a path-dependent fashion makes the "lessons of the history, but not the history" (Levitt and March 1988, p.320) available to the organisation, and without knowledge of the reasons as to why a certain path was taken in the past it is impossible to reconstruct that path and the problems to which the routine was the solution (Becker 2004, p.653).

### **3.2.6. Deconstructing organisational routines**

In organisation theory, a process is often the appropriate unit of analysis. This seems to be the intuition that Weick (1979) was building on when he suggested that organizations construct processes from a set of "cycles" or "double interacts" using a set of "assembly rules" (Pentland 1995, p.546), and organisational routines offer a useful analytical starting point. By far the most common approach to studying organisational routines is treating the routines as a black box – treating the inputs and outputs of the routine as a whole, without having to map or measure the internal structure of the routine (Pentland and Feldman 2005, p.801). Theories on the nature of organisational routines often illustrate the roles of routines in organisations by offering analogies, such as individual habits (Stene 1940; Simon 1947; Nelson and Winter 1982), computer programs (March and Simon 1958) and DNA (Nelson and Winter 1982). Such analogies have greatly helped us to understand the cognitive efficiency of routines, however as we have highlighted above the term routines has been used by many people to mean behavioural regularities as distinct from cognitive patterns. The black box approach is limited in helping us to understand how (i) cognitive regularities and behavioural regularities relate to each other; and (ii) identifying how agency influences the implementation and evolution of rules (Becker 2004). In this respect, the recent contributions on grammatical model of organisational routines (Pentland and Rueter 1994; Pentland 1995) and the analytical distinction between ostensive and performative aspects of organisational routines

(Feldman and Pentland 2003; Pentland and Feldman 2005) have been particularly instructive.

### 3.2.6.a. Grammatical model of routines

A behavioural entity can be conceptually deconstructed using the concepts of 'routine', 'performance', 'subroutine', and 'move', in the context of a 'grammatical model' – in the same way that linguists use grammar to describe a language, we can use grammar to describe certain aspects of a routine (Pentland 1995). A 'move' is the unitary act of the routine, and refers to 'any full stretch of talk or of its substitutes which has a distinctive unitary bearing on some set or other of the circumstances in which participants find themselves (some "game" or other in the peculiar sense employed by Wittgenstein)' (Goffman 1981, p.24). Individual moves cannot be isolated from the situational particulars of the context and the sequence of interaction in which they occur. For example in a game of chess, 'it is neither the motion of the piece nor the intentions of the player that define a move in chess. Rather, it is defined by the circumstances surrounding the action, its ratification by other players, and its role as part of an overall game' (Wittgenstein 1958, p.17). Structure provides constraints on the moves members can make; it defines the game within which the players choose their moves. At the same time, moves enact structure (Pentland 1992, p.531).

As a unitary act of the routine a *move* can be exemplified as 'greet customer', 'transfer customer' – similarly, as a unitary element of a language is a word, for example: 'dog', 'barking'. The situated quality of action in organisations extends beyond individual moves to include sequences of moves, often in chunks of behaviour which have themselves become largely routinised, but can nevertheless be nested together and recombined – largely like organisation theory's performance programs (March and Simon 1958). These chunks of behaviour form *subroutines* which are intermediate parts of the routine and act as a building block for the whole routine, for example: 'answering the phone'. The grammatical counterpart of the routine is the 'syntactic constituent' – the intermediate part of the sentence which act as a building block to the whole sentence, for example: noun phrase 'the dog', or verb phrase 'is barking'. A single, complete repetition of the routine is a *performance*, for example a

particular customer service encounter, and its grammatical equivalent is a sentence – a single complete expression in a language, for example: ‘the dog is barking’.

The whole organisational routine is the set of possible performances for a particular task, described in part by a grammar and made up of constituent parts, for example: ‘customer service’ routine is made up of ‘particular encounters’ performances, ‘answering the phone’ subroutines and ‘greet the customer’ moves. The grammatical equivalent of the organisational routine is language – the set of possible sentences in a particular language, described in part by a grammar, for example: ‘English language’ is made up of sentences, such as ‘the dog is barking’, made up of noun phrases, such as ‘the dog’, and verb phrases, such as ‘is barking’, and in turn made up of words, such as ‘dog’ and ‘barking’. In the same way that English grammar allows speakers to produce a variety of sentences, and an organisational routine allows members to produce a variety of performances, and what we actually observe empirically is never the whole routine, but rather specific instances of it. Similarly, an organisational routine is not a single pattern, but, rather a set of possible patterns – enabled and constrained by a variety of organisational, social, physical, and cognitive structures – from which organizational members enact particular performances (Pentland and Rueter 1994).

### **3.2.6.b. Performative and ostensive aspect of routines**

Furthermore, in analysing particular situated performances by organisational members we can further usefully employ a distinction between an ostensive (abstract pattern) and performative (specific actions) aspects of a routine (Feldman and Pentland 2003). An ostensive definition of a concept is one that exists in principle (Sevon 1996), and is created through the process of objectification as it is studied. A performative definition is created through practice – “society is not the referent of an ostensive definition discovered by social scientists despite the ignorance of their informants. Rather it is performed through everyone’s efforts to define it” (Latour 1986, p.273). Ostensive routines may be devoid of ‘active thinking’ (Cohen, Burkhart et al. 1996, p.695) but “routines enacted by people in organisations inevitable involve a range of actions, behaviours, thinking and feeling” (Feldman 2000, p.622).

The ostensive aspect of a routine shapes our perception of what a routine is, and may be (partly) codified in an operational procedure, or it may exist as a taken-for-granted norm involving a significant tacit component embedded in procedural knowledge (Cohen and Bagdayan 1994). The ostensive incorporates the subjective understandings of diverse participants, and – like any socially distributed stock of knowledge – the ostensive aspect of a routine is not a monolithic unified object, but is likely to be distributed unevenly (Schutz 1967) – each participant’s understanding of a routine depends on his or her role and point of view. The ostensive aspect of a routine cannot encompass specific performances because it is impossible to specify any routine in sufficient detail that it could actually be carried out (Feldman and Pentland 2003, p.101). The rules of a bureaucratic procedure (codification of organisational routine) “must be abstract in order to guide the different courses of action necessary for the accomplishment of an objective in diverse situations” (Blau 1955, p.23). There are always contextual details that remain (and must remain) open as no amount of rules is sufficient to specify a pattern of behaviour fully, because the interpretation of any rule, or part of a rule, requires yet more rules (Wittgenstein 1958).

Performances are the specific actions taken by specific people at specific times – effortful accomplishments by participants constructing routines from a repertoire of possibilities (Pentland and Rueter 1994). Particular practices are carried out against a backdrop of rules and expectations, but the particular courses of actions chosen are inherently improvisational (Bourdieu 1977; Bourdieu 1990). Whilst ‘mindless’, habitual action is certainly possible, even routines that have been engaged in by the same people many times need to be adjusted to changing contexts (Feldman and Pentland 2003, p.102). The concepts of the ostensive and performative have many analogies, such as in music. The improvisational nature of the performative aspect of routine involves “reworking precomposed material and designs in relation to unanticipated ideas conceived, shaped, and transformed under the special conditions of performance, thereby adding unique features to every creation” (Berliner 1994, p.241). Following the analogy of organisational routines in music, such as jazz (Weick 1998), in an organisational routine “the degree of divergence from the score may vary considerably, from minor adjustments to cadence and dynamics to near total re-invention” (Feldman and Pentland 2003, p.102).

People can use the ostensive aspect in relation to the performative aspect of the routine as *guiding, accounting, and referring* – to signify that some performances are part of a recognisable routine and to legitimate some performances as appropriate to that routine (Feldman and Pentland 2003, p.106). Firstly, the routine can be a “target” (Nelson and Winter 1982) whereby the ostensive aspect of a routine can serve as a template (script) or a normative goal guiding behaviour. Secondly, a routine can serve a retrospective sense-making function (Weick 1995), accounting for past behaviour and legitimising it if it is understood to be part of the routine and delegitimising it if it is not. Thirdly, people use the ostensive aspect of routines to refer to patterns of activity that would otherwise be incomprehensible, whereby labelling the activity helps us to pay attention to a comprehensible and manageable portion of it (Feldman and Pentland 2003, p.107). Similarly, the performative aspect of organisational routines is essential for the *creation, maintenance, and modification* of the ostensive aspect in much the same way that speaking creates, maintains and alters a language (Feldman and Pentland 2003, p.107). Firstly, organisational routines are repetitive patterns of action which are created through repetition and recognition, not simply through conferring a written procedure and the idea it signifies. Secondly, where a routine is no longer performed the capability to do so vanishes, as in the case of ancient music and languages where the ostensive definition exists, but can no longer be reproduced. Thirdly, although enacting a routine maintains its ostensive aspect, people may also choose to deviate from it whether in response to external changes or reflexive self-monitoring (Giddens 1984), which in turn may alter the potential repertoire of activities that creates and recreates the ostensive aspect of that routine (Feldman and Pentland 2003, p.108).

Making the distinction between ostensive and performative aspects of organisational routines and conceptualising an organisational routine as consisting of both the idea (ostensive) and the enactment (performative) allows us to explore the relationship between these two aspects without mistaking either one for each other or the whole. From the performative perspective, routines consist of many performances of patterns of actions. As those patterns of actions become more practiced and familiar, the routine becomes easier to do but harder to verbalise and explain, and the performative aspect of the routine becomes increasingly tacit – “devoid of active thinking” (Cohen,



Burkhart et al. 1996, p.695), but nevertheless “not diminishing the opportunities for genuine, deliberate choice” (Winter 1985, p.109)

### **3.2.7. Effects of routines within organisations**

Routines are considered the building blocks of organisational capabilities (Dosi, Nelson et al. 2000; Winter 2003), and have a number of significant effects within organisations. We have already discussed the role of organisational routines in economisation on cognitive resources (Simon 1947; Simon 1955), reducing uncertainty (Heiner 1983; Weiss and Ilgen 1985), and storing operational knowledge (Nelson and Winter 1982). However, routines have a number of other effects within organisations, namely coordination and control, governance, and stability.

Organisational routines possess coordinative power (Becker 2004, p.654). “Coordination of activities within an organization tends to vary directly with the degree to which essential and recurring functions have become part of the organization routine” (Stene 1940, p.1129), and it has been suggested that as coordinating devices routines can even be more efficient than contracts (Langlois and Robertson 1995). This coordinative power derives from a number of sources: routines’ capacity to support a higher level of simultaneity (Grant 1996); from giving regularity, unity and systematicity to practices of a group (Bordieu 1977); from making many simultaneous activities mutually consistent (March and Olsen 1989); from providing each of the actors with knowledge of the behaviour of others on which to base their own decisions (Simon 1947); from providing instructions in the form of scripts (Schank and Abelson 1977); and from establishing a truce (Nelson and Winter 1982).

Organisational performances have two different aspects: cognitive and governance (Nelson and Winter 1982, p.107). We have discussed the cognitive aspect of routines above, however the governance aspect is particularly interesting in that organisational members are rarely surprised by each other’s behaviour. Rule enforcement and lack of divergent interests go some way in explaining the smooth functioning of organisations, but their role is limited (Nelson and Winter 1982, p.109). Discretion in possible course of action awards some bargaining power to those who execute orders but bargaining is not usually employed for each and every order that is to be executed

(Becker 2004, p.655). In the 'zone of indifference' (Barnard 1938) orders are accepted without conscious questioning of the authority of those who give orders. In this way, organisational routines can be observed to play a role in (implicit) truce established between those giving and those executing orders – “the usual amount of work gets done, reprimands and compliments are delivered with the usual frequency, and no demands are presented for major modifications in the terms of the relationship” (Nelson and Winter 1982, p.110).

Organisational routines can provide stability (Becker 2004, p.659). As long as an existing routine gives satisfactory results, no conscious cognitive problem solving is triggered to find another way to achieve the task (March and Simon 1958), and no additional (cognitive or otherwise) cost is incurred by changing the mode of executing a particular task. Stability has an important effect within organisations as it provides a baseline for assessing changes and learning (Postrel and Rumelt 1992). Stability gives rise to predictability, which in turn aids co-ordination (Nelson and Winter 1982), and routines may even persist despite negative performance feedback (Heiner 1983). However, such inertia of organisational routines is by no means assured. As has been outlined above, ostensive and performative (Feldman 2000) aspects of the routine are recursive and may be divergent – helping to analyse and explain the role of endogenous incremental change in organisational routines and their role in contributing to both stability and change as has been outlined above.

Analysis of ostensive and performative aspects of organisational routines requires an analytical framework in order to conceptualise these two distinct aspects of a single entity as well as to identify and break down the performative aspect into its constituent parts. Grammatical model of organisational routines (Pentland 1995) offers a foundation to building such an analytical framework. However, the grammatical model of organisational routines offers an operational foundation, and it is also necessary to establish a conceptual foundation in order to fully illuminate the context-embeddedness of organisational routines from the point of view of structure and agency, as well as provide a solid analytical framework to analyse the role of the technological artefact in formulation, persistence and change of organisational routines.

### **3.3. Structuration theory**

#### **3.3.1. Introduction**

As we have stated in the introduction to this chapter, the following two broad themes stand out from our examination of prior literature on this subject: a). the emphasis on consistency of use of technological artefact as part of daily work processes; and b). the mutual interdependency of the use of the technological artefact and the particularities of immediate and wider organisational circumstances of implementation. It is worth re-iterating at this point that these two research themes call for an examination of both the nature of the engagement with the technological artefact (to address consistency of use), and the links between such engagement and the circumstances in which it takes place (to address interdependency with organisational context).

The previous sections of this chapter have laid the foundation for (broadly) one half of the theoretical basis for our research. Theoretical treatment of organisational routines is integral to our study of the nature of the engagement with the technological artefact, particularly in reference to the consistent use of the technological artefact in daily work. However, in order to build a coherent theoretical foundation which would allow us to develop a conceptual framework to guide our data collection and subsequent analysis we now need to address the organisational (social) context in which organisational routines take place.

#### **3.3.2. Overview**

A influential broad taxonomy of social science research suggests a division along the ontological assumptions dimension – social studies are either *objectivist*, which analyse social phenomena as “hard external objective reality” or *subjectivist*, which appreciate “the importance of the subjective experience of individuals in the creation of the world” (Burrell and Morgan 1979, p.3). This fundamental division presents mutually exclusive views of the social world whereby objectivist studies consider social phenomena as caused by influence of objective, exogenous social structures, whereas subjectivist studies consider social phenomena as products of the actions of human ‘agents’ in the light of their subjective interpretation of the world (Jones 1999, p.104).

One of the world's most cited sociologists (Bryant and Jary 2001) Anthony Giddens offers structuration theory as an attempt to overcome this dualism of structure vs. agency. Giddens (Giddens 1976; Giddens 1979; Giddens 1984) suggests that agency and structure should instead be viewed as a mutually interacting duality, i.e. structure and agency as two aspects of the same whole. Structuration theory and its focus on structures as instantiated in human action and otherwise existing only as "memory traces" (Giddens 1984, p.17) offers an emergent perspective on structure and agency and is an appropriate theoretical foundation for our analysis of the nature and dynamics of organisational processes in the field of technical support work. In particular, technical support work exhibits an interesting mix of routinised and non-routinised organisational processes which take place in both highly regularised (e.g. following a standard problem resolution procedure) and non-regularised (e.g. experimentation and adaptation required to resolve a problem not encountered before) social and organisational contexts.

Although structuration theory is a general theory of social organisation, rather than a theory specific to the field of Information Systems (IS), it has been applied in the IS field in a number of ways (Walsham and Han 1991; Rose 1998) with various degree of faithfulness to Giddens's original ideas (overview in Jones 1999; Jones and Karsten 2003). Structuration theory's key tenets of duality of structure and agency and the focus on the ongoing process of structuration provide the most suitable theoretical basis for this research. In that, this research follows Jones – "... IS are seen as social systems, existing in social and organisational contexts that influence their development and use, and are also implicated in sustaining and changing these contexts then structuration theory offers potentially significant insights on IS phenomena" (Jones 1999, p.103).

### **3.3.3. The Duality of Structure and Agency**

In carefully converting the dualism into a duality, structuration theory makes use of some specific and non-standard meanings for key terms. It is important therefore to begin our outline of structuration theory with defining the key concepts, as presented below (Giddens 1979, p.66):

<b>Structure</b>	Rules and resources organised as properties of systems. Structure exists only as structural properties.
<b>System</b>	Reproduced relations between actors or collectivities, organised as regular social practices.
<b>Structuration</b>	Conditions governing the continuity of transformation of structures, and therefore the reproduction of social systems.

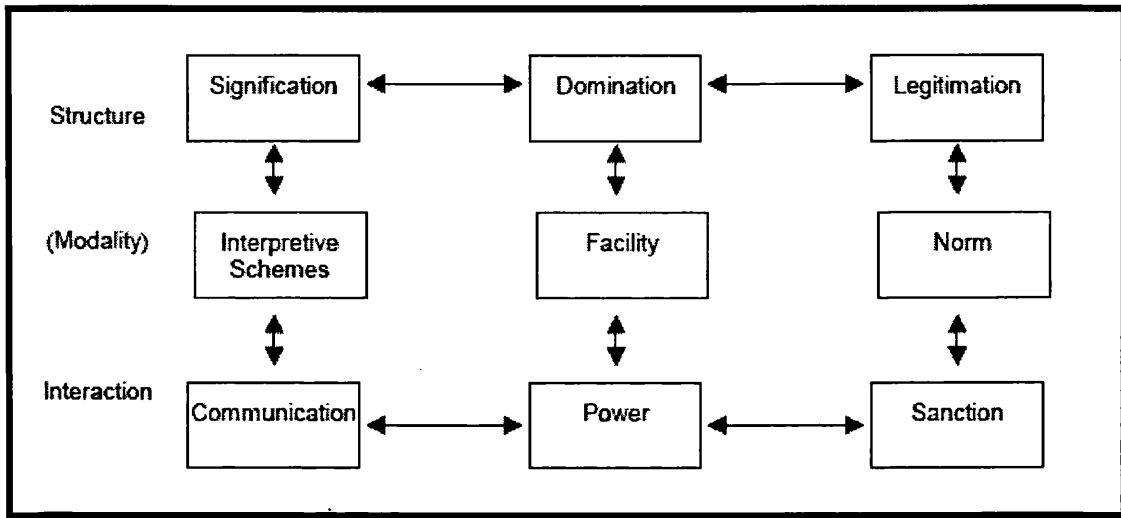
**Table 6: Structuration Theory – key concepts**

The duality of structure and agency refers to the “essential recursiveness of social life, as constituted in social practices: structure is both medium and outcome of the reproduction of practices” (Giddens 1979, p.69). Social structure is therefore seen as being drawn on by human agents in their actions, while the actions of humans in social contexts serve to produce, and reproduce, the social structure (Jones and Karsten 2003, p.6). Giddens suggests that social structures do not exist independent of human action, nor are they material entities and in his formulation human agency and social structure are far from being opposed, but rather, they presuppose each other (Sewell 1992). Structure is therefore a resource to be deployed by human agents in their actions; it is enabling as well as disabling, and the focus is on structuration as an ongoing process, rather than structure as a static property of social systems (Jones 1999), as will be discussed later.

When humans act in organizations, they create and recreate three fundamental elements of social interaction: meaning, power, and norms (Giddens 1976, p.104). A closer look at agency and structure as a duality allows for clarity through making both analytical distinctions and analytical links between structure and agency. Specifically, (Giddens 1984) identifies three distinct dimensions of structural features of social systems: the **structures** of *signification*, *domination* and *legitimation*. These three dimensions of structure are interlinked with corresponding three distinct dimensions of human **agency**: *communication*, *power* and *sanctions* through the **modalities** of *interpretive schemes*, *facilities*, and *norms*.

The significance of the level of modality is that it provides a means of articulating the connection between the levels of "action" and "system" (Wilmott 1981, p.472). The introduction of the level of modality provides the coupling elements" whereby the bracketing of actors' strategic conduct or the properties of social systems are

"dissolved in favour of an acknowledgment of their interrelation" (Giddens 1979, p.81). Although in practice the three levels are intimately interlinked, however treating them as analytically distinct allows us to illuminate the dimensions of interaction between structure and agency, as illustrated on the following diagram (based on Jones 1999):



**Table 7: Structuration Theory – interaction of Structure and Agency**

**Interpretive schemes** represent the shared stocks of knowledge that agents draw on to interpret their own and others' behaviour and "... form the core of mutual knowledge whereby an accountable universe of meaning is sustained through and in processes of interaction" (Giddens 1979, p.83). Viewed from the perspective of human agency, interpretive schemes enable the constitution of shared meaning and mediate communication. From the perspective of social systems, interpretive schemes also represent the social structures of signification as they are produced and reproduced in regular social practices as rules that inform and define those practices.

**Facilities** represent agents' access to or command of two kinds of resources: allocative (extending over objects or material phenomena) and authoritative (extending over persons). Giddens argues that structure is a "virtual order of transformative relations ... that exists as time-space presence, only in its instantiations in practices and as memory traces orienting the conduct of knowledgeable human agents" (Giddens 1984, p.17). Viewed from the perspective of human agency, facilities are the organisational capabilities for humans to accomplish outcomes and exercise power, which is here understood as "transformative capacity," the power of

human action to transform the social and material world (Giddens 1976, p.111). From the perspective of institutional properties, facilities constitute organisational structures of domination, which reflect the fact that all social systems are marked by an asymmetry of authoritative and allocative resources. Therefore, according to this formulation even apparently material allocative resources such as land, which might seem to have a real existence, become resources when incorporated within the process of structuration, and “the transformational character of resources is logically equivalent to, as well as inherently bound up with the instantiation of, that of codes and normative sanctions” (Giddens 1984, p.33).

**Norms** represent the rules and values governing appropriate conduct. Viewed from the perspective of human agency, norms are characterised by normative sanctions delimiting legitimate human behaviour. From the perspective of institutional properties, norms constitute the organisational structures of legitimation, whereby a moral order within an organization is articulated and sustained through rituals, socialization practices, and tradition (Orlikowski 1992, p.10). As we have outlined above, all these elements of social systems are intimately interlinked – for example, “... the operation of norms depends upon power relationships for their effectiveness and are deployed through symbolic and linguistic devices” (Jones and Karsten 2003, p.6)

### **3.3.4. The emergent nature of structuration**

The duality of structure and agency in Giddens’s formulation asserts that “... the main substantive focus of social theory is not individual action and the experience of the individual actor (methodological individualism), nor the existence and requirements of some kind of societal totality (structural functionalism) but **societal practices** (Clark 1990). Furthermore, the emergent nature of structuration theory becomes evident in Giddens’s claim that the conceptualisation of structure as only a virtual order is true even in the case of resources, such as land, with an apparently “real existence”. Giddens argues that even such material allocative resources “become resources only when incorporated within the processes of structuration” (Giddens 1984, p.33).

Giddens's formulation presents structure as "a 'virtual order' ... that exists, as time-space presence only in its instantiations in [reproduced social] practices and as memory traces orienting the conduct of **knowledgeable agents**" (Giddens 1984, p.17). Human agents have the power to make a difference, and such "causal powers" indicate that human agents "... are neither cultural dopes nor simply the product of class forces. They have a capacity for self-reflection in day-to-day interaction, a practical, often tacit consciousness of what they are doing and ability under certain circumstances to do it" (Clark 1990).

A further indication of the emergent nature of structuration is presented in Giddens's conceptualisation of consciousness and knowledgeability of human actors. Giddens distinguishes between two types of **consciousness**: practical – concerned with our ability to act in a knowledgeable way, and discursive – concerned with our ability to explicitly describe actions and motivations (Giddens 1984, p.41). Giddens regards human agents as **reflexively** knowledgeable about their actions, engaged in a "continuing monitoring of action which human beings display and expect others to display" (Giddens 1984, p.3), thus "maintaining a continuing 'theoretical understanding' of the grounds of their activity" (Giddens 1984, p.5). Giddens uses the term **discursive penetration** to "describe this awareness of social actors of their engagement in social reproduction and production, which leads to a **double hermeneutic** whereby the concepts that sociological observers describe are already constituted as meaningful by social actors and can themselves become elements of the actors' understanding of their own condition" (Jones and Karsten 2003, p.13). Giddens does emphasise the unacknowledged conditions and **unintended consequences of action** whereby "the production or constitution of society is a skilled accomplishment of its members but one that does not take place under conditions that are either whole intended or whole comprehended by them (Giddens 1976, p.108). Nevertheless, human actions may have a (purposeful or otherwise) transformative effect on the very structures within which the actions take place, and social structures are therefore not only potentially mutable, but also constraining and enabling.

Thirdly, Giddens suggests that even in social relations characterised by domination and power, whereby superior agents' preferred outcomes are achieved through the actions of subordinate agents, the subordinate agents always have the possibility of



“acting otherwise” and not offering their co-operation. Giddens refers to this as a **dialectic of control** and suggests that “... all forms of dependence offer some resources whereby those who are subordinate can influence the activities of their superiors” (Giddens 1984, p.16). Therefore, Giddens argues that no matter how oppressive and comprehensive (even up to the threat of death) are the structural constraints placed upon subordinate agents, they carry no weight without the acquiescence of those threatened with them, in this case the individual’s wish not to die (Giddens 1984, p.175). For example, when an asymmetry of resources is drawn upon by humans in their interactions through the exercise of power, the structure of domination characterised by this asymmetry is reaffirmed. However, when the asymmetry of resources is challenged (either explicitly altered or gradually shifted).

### **3.3.5. Structuration theory and organisational routines**

The contextual nature of organisational routines has been illustrated from a number of perspectives, and in an organisational context, routines occupy “the crucial nexus between structure and action, between the organisation as an object and organising as a process” (Pentland and Rueter 1994, p.484). An important outcome of engaging in organisational routines is the effect of the agent’s actions on the structures that constrain and enable further action. The concept of routine as a matter of structure and agency represents institutionalised features of social systems and the routinised character of most social activity is something that has to be ‘worked at’ continually by those who sustain it in their day-to-day contact (Giddens 1984, p.86), thus continuously emerging rather than mindless and automatic.

As highlighted above, understanding of rules from social, behavioural, and cognitive perspectives plays a very important part in our understanding of organisational routines. For Giddens, rules of social life and formulated rules are different. Whereas the former are “techniques of generalisable procedures applied in the enactment/reproduction of social practices”, the latter are “codified interpretations of rules, rather than rules as such” (Giddens 1984, p.21). However, the emphasis on structure being constantly produced and reproduced through action also illuminates the routinisation aspect of structuration. For (Giddens 1984, p.60), routine is “integral to the continuity of the personality of the agent ... and to the institutions of society”. Individuals acquire ontological security through their engagement in predictable

routines and encounters whereby those encounters are also constitutive of social institutions, thus enabling the continuity of social life (Currie and Galliers 1999, p.111). Furthermore, the conceptualisation of routines as effortful accomplishments facilitates our understanding of the interrelation between the ostensive and performative aspects of organisational routines in active engagement of individuals in ongoing practices, the interpenetration of agency with various forms of structure and the irreducible role of reflexive self-monitoring on part of human agents.

### **3.3.6. Structuration Theory Critique**

Structuration theory has attracted considerable debate (c.f. Cohen 1989; Bryant and Jary 1997) and criticism of some of its key tenets (c.f. Gregson 1989; Archer 1990; Sewell 1992). This is perhaps not surprising, since Giddens rejects both naturalistic and interpretative sociology and claims to provide a means of transcending their differences has provoked considerable criticism from adherents of both schools and accusations of syncretism (accepting incompatible positions) and wilful eclecticism (Jones 1999, p.107). Similarly, Giddens's post-empiricist and anti-positivist stance denies the existence of universal laws of human activity and emphasises the centrality of the interpretative endeavour (Bryant and Jary 1991), describes social science as "irretrievably hermeneutic" (Giddens 1993, p.13), and mediates between hermeneutic, functionalist, and structuralist accounts of the relationship between structure and agency (Giddens 1984, p.26). A number of specific criticisms of structuration theory are reviewed in this chapter in order to better illustrate the key postulates of structuration theory as discussed above.

Giddens suggests that structure is both constraining and enabling and that there exists a potential for change in every action that [re]produces structure, since human beings are in a constant state of reflexive monitoring of their situation and, unless drugged and manhandled by others", always have the possibility of doing otherwise (Giddens 1993). This central implication has led to criticism that, unanticipated consequences and unacknowledged conditions notwithstanding, structuration theory assumes an inappropriately voluntaristic view of agency (Bhaskar 1979). It has been suggested that in some well-ordered institutions, such as monasteries, social structures are less dependent on individual agency and social rules dominate social reproduction (Harré

1983), and in some structural constraints may be “relatively independent” (Layder 1987).

Giddens’s notion of duality of structure and agency conceptualises structure as a virtual order “... that exists, as time-space presence, only in its instantiations in reproduced social practices and as memory traces ...” (Giddens 1984, p.17). This conceptualisation of structure is critical to the use of structuration theory for analysing the role of physical resources such as office layouts, technological artefacts, and so on, in the formation, persistence, and endogenous and exogenous change of organisational routines. In proposing that structure is only given substance through the actions of social actors and Giddens adopts a specifically subjectivist position, that has led some critics to identify him as idealist (Jones and Karsten 2003, p.12). It has been suggested that since structure is generative implies that it is real (New 1994), and more generally Giddens’s anti-objectivism is unnecessary and theoretically problematic (Layder 1987). However, Giddens emphasises his conceptualisation and the existence of structure only in the minds of the agents, and not in material artefacts.

Structuration theory has been said to be “fundamentally non-propositional” (Archer 1990) in that “it does not give us anything to test or find out” (Craib 1992, p.108). Furthermore, structuration theory has been described as a “second-order theory” concerned not with theorising the unique concerned not with “theorizing the unique (i.e. with explaining the events or contingencies of particular periods or places), but with conceptualising the general constituents of human society” (Gregson 1989, p.245). Giddens himself distinguishes between theory as a generic category and *theories* as explanatory generalisations, and classifies structuration as the first type. This has important implications for Giddens’s position on the use of specific research methods. In particular, Giddens argues that “... there is [nothing] in the logic or the substance of structuration theory which would somehow prohibit the use of some specific research technique, such as survey methods, questionnaires or whatever...” and refuses to “... wield a methodological scalpel” (Giddens 1984, p.xxx). We shall return to this point in much more detail in Chapter 4 of this thesis when discussing research design, however it is important to highlight at this point that Giddens’s adoption of such position has been criticised as a “... failure to present a viable epistemology” (Hekman 1990). Giddens’s conceptualisation of structuration as a

generic theory has led some authors to suggest that structuration theory is best considered as a *meta-theory*, a way of thinking about the world rather than as an empirically testable explanation of social behaviour (Jones 1999). Some have proposed that it is considered the integrating meta-theory for organisation studies (Weaver and Gioia 1994), although this is contested by (DeCock and Rickards 1995).

As can be seen even from this very brief overview, structuration theory has attracted a great deal of debate including concerning its most fundamental tenets, ontological basis, epistemological position and empirical relevance. Nevertheless, structuration theory is considered as one of the most influential contemporary theories in sociology (Bryant and Jary 2001), and has been demonstrated to be of great value and possessing significant analytical potential when applied to the study of organisational routines (Pentland 1992; Pentland and Rueter 1994; Pentland 1995). Furthermore, structuration theory has informed a great deal of Information Systems research (Jones 1999). Several key uses made of structuration theory in IS research are reviewed further in this chapter, with particular emphasis on how IS researchers have tackled one of the key problems of applying structuration theory in the field of IS – the materiality of technology.

The previous sections of this chapter have built a theoretical foundation for conceptualising IT support process from the perspective of organisational routines; and the context of those routines from the perspective of structuration theory. The following section of this thesis reviews the theoretical position on the technological artefact and use of technology in organisational processes from the perspective of structuration theory.

### **3.4. *Structuration Theory and Information Systems***

A recent survey (Jones and Karsten 2003) identified more than 350 articles in the IS field that had cited Giddens since 1986, of which more than 250 articles included significant discussion of his work. Although this constitutes only a few percent of leading IS journals and conference publications over that period (Jones, Orlikowski et al. 2004), Giddens is one of the most widely cited social theorists in IS research (Jones 2000). This is an intriguing phenomenon, especially since social theory appears to be a minority interest in the field of IS as a whole and Giddens thus

remains a relatively little-known force among IS researchers, and much of the discussion of Giddens within the IS field, is often concerned with debates based on secondary literature (discussed in detail below), such as Adaptive Structuration Theory or the positions taken by Geoff Walsham or Wanda Orlikowski (Jones, Orlikowski et al. 2004, p.299-300).

Giddens himself says very little about IS, except a mention in reference to time-space distancing, whereby email and video may facilitate interaction and social integration (Giddens 1984). Nevertheless, structuration theory has been used in IS research in a variety of ways, for example as operational studies, meta-theory and selected use of individual concepts (Walsham and Han 1991) Operational studies typically apply structuration theory to analysis of IS *in use*, emphasising the inter-linked nature of agency and structure. Meta-theoretical application of structuration theory emphasise reconciliation of structure and agency overcoming the agency-bias of social constructivism (Pinch and Bijker 1987) and structure-bias of institutional analysis (Kling and Iacono 1989), for example in the use of structuration theory as a meta-theory and Actor-Network theory as a more detailed methodological and analytical device (Walsham and Sahay 1999). Additionally, particular concepts, such as structural contradiction, and time-space distancing, have been applied in the study of various IS topics, including development, strategy and resistance (Walsham and Han 1991). It is appropriate to begin our review of structuration theory application in the field of IS with the most ambitious of its uses - attempts to reconstruct structuration theory to accommodate technology (Jones 1999), particularly Adaptive Structuration theory (DeSanctis and Poole 1994), Structural Model of Technology (Orlikowski 1992), and the Practice Lens Model of Technology (Orlikowski 2000).

### **3.4.1. Adaptive Structuration Theory**

Adaptive Structuration Theory (DeSanctis and Poole 1994) makes an analytical distinction between social structures within action and social structures within technology. Social structures, such as reporting hierarchies, organisational knowledge, and standard operating procedures, serve as templates for planning and accomplishing tasks. Designers incorporate some of those structures into the technology reproducing or modifying them, thus creating a new array of social structures within the

technology. Advanced information technology can be analysed in terms of specific structural features, including rules (e.g. voting algorithms) and resources (stored data, UI), governing exactly how information is gathered, stored and managed by users, bringing meaning ('signification') and control ('domination') to the social practice.

Furthermore, advanced information technology can be analysed in terms of the 'spirit' of the feature set (Poole and DeSanctis 1990), identified through reading technology as 'text' and analysing its philosophy in terms of design metaphor, naming and presentation of features, nature of user interface, manuals, and training. Spirit of technology is the general intent with regard to values and goals underlying a given set of structural features, providing 'legitimation' by supplying a normative frame with regard to behaviours which are appropriate in the context of the technology. Together, the structural features and the spirit of the technology form its structural potential, and users of the technology draw on this, and other sources of structure, such as organisational environment, corporate information, cultural beliefs and modes of conduct.

The act of bringing the rules and resources from the technology or other sources of structure is termed 'structuration', and the immediate, visible actions of a group's application of a specific technology-based rule or resource within a particular context at a point in time can be analysed as 'appropriations' (Giddens's 'modalities'). Groups actively choose structural features of the technology from among a large set of potentials, and four types of appropriations are identified. Firstly, groups may use these structures directly, relate these structures to others, constraint or interpret the structures as they are used, or make judgements about the structures confirming or negating their usefulness. Secondly, groups may choose to appropriate technology 'faithfully' – consistent with the spirit and structural feature design, or 'unfaithfully'. Thirdly, group members may appropriate technology for different 'instrumental uses', or purposes. Fourthly, the group members' attitudes, such as comfort, respect, and challenge, as technology structures are appropriated set the tone for applications of the technology. Overall, Adaptive Structuration Theory seeks to illustrate the dialectic of control between the group and the technology, by validating propositions such as: 'Given advanced information technology and other sources of social structure  $n$ , to  $n$ , *and* ideal appropriation processes, *and* decision processes that fit the task at hand,

*then* desired outcomes of advanced information technology will result' (DeSanctis and Poole 1994, p.131 emphasis in original).

### **3.4.2. Structural Model of Technology**

The Structural Model of Technology (Orlikowski 1992) is founded on the concepts of 'duality of technology' – 'technology is created and changed by human action, yet it is also used by humans to accomplish some action'. Technology is 'interpretively flexible', referring to the degree to which users of a technology are engaged in its constitution (physically and/or socially) during development or use, due to the time-space discontinuity and recursive nature of design and use of the software, which typically take place in different organizations – 'vendor' and 'customer'. Interpretive flexibility is influenced and constrained by characteristics of the relevant actors (e.g. motivation, experience, interests) and characteristics of the institutional context of its design and use (e.g. social relations, resource allocations, managerial priorities), and the material properties of the artifact (e.g. specific hardware and software comprising the technology). Technology is therefore a product of human action: 'an outcome of such human action as design & development, appropriation, and modification' – being constituted through development, as well as medium of human action: 'facilitating and constraining human action through provision of interpretive schemes, facilities, and norms' – conditioning, rather than determining performance of social practices. Similarly, 'institutional properties influence humans in their interaction with technology (e.g. intentions, design standards, professional norms, and available resources (time, money, skills)' bearing an imprint of the social and historical conditions under which it is built and used, and 'interaction with technology influences institutional properties of an organization, through reinforcing or transforming the structures of signification, domination, and legitimation' (Orlikowski 1992; Jones 1999).

According to Orlikowski (1992, p.16), the structural model of technology comprises the following components (depicted below):

*(i) human agents - technology designers, users, and decision-makers; (ii) technology--material artifacts mediating task execution in the workplace; and (iii) institutional properties of organizations, including organizational dimensions such as*

structural arrangements, business strategies, ideology, culture, control mechanisms, standard operating procedures, division of labor, expertise, communication patterns, as well as environmental pressures such as government regulation, competitive forces, vendor strategies, professional norms, state of knowledge about technology, and socio-economic conditions.

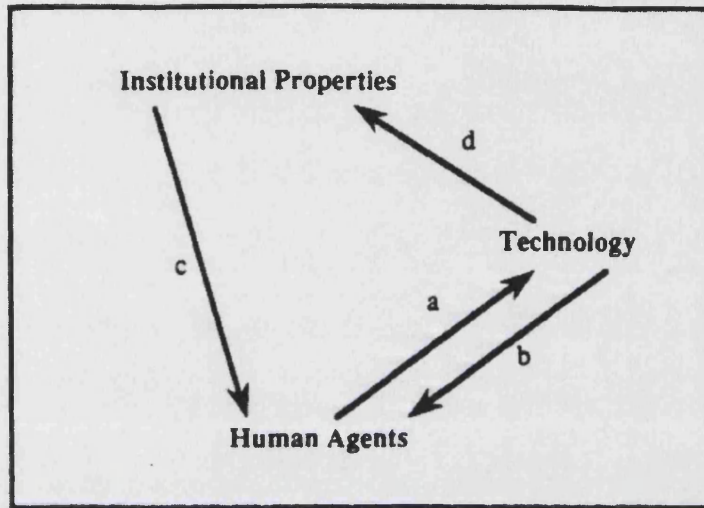


Figure 3: Structural Model of Technology (Orlikowski 1992)

The structural model of technology is based on the following relationship between institutional properties, technology and human agents:

Arrow	Type of Influence	Nature of Influence
a	Technology as a Product of Human Action	Technology is an outcome of such human action as design & development, appropriation, and modification
b	Technology as a Medium of Human Action	Technology facilitates and constrains human action through provision of interpretive schemes, facilities, and norms
c	Institutional Conditions of Interaction with Technology	Institutional Properties influence humans in their interaction with technology, e.g. intentions, design standards, professional norms, state of the art in materials and knowledge, and available resources (time, money, skills)
d	Institutional Consequences of Interaction with Technology	Interaction with technology influences institutional properties of an organization, through reinforcing or transforming the structures of signification, domination, and legitimation

Table 8: Structural Model of Technology (Orlikowski 1992)



The Structural Model of Technology presents structuration as a historically and contextually embedded dynamic process and assumes that range, content and relative power of the elements (technology, human agents, and institutional properties) will vary over time, interact recursively, and may be in opposition, creating tension and potential for change – precluding deterministic conclusions.

### **3.4.3. Practice Lens Model of Technology**

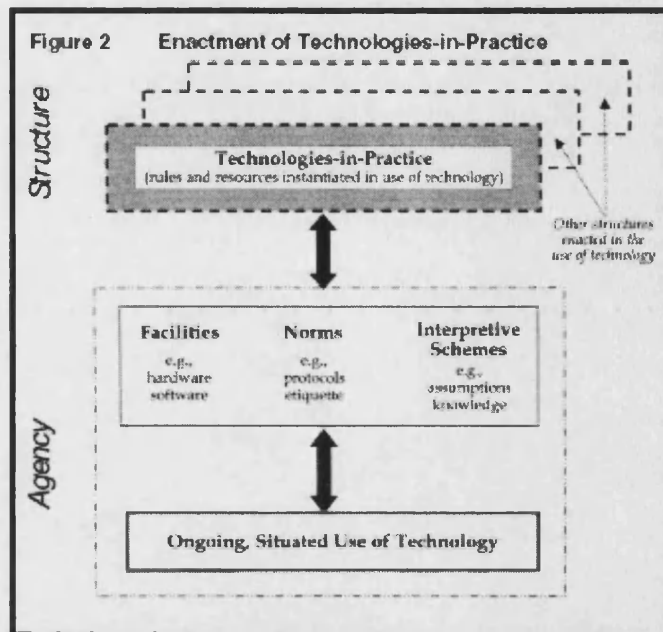
Both adaptive structuration theory and Structural model of technology deal with the material nature of technology by suggesting that structures are embedded within the technology. In doing so, they draw on the concepts of ‘social shaping of technology’ (Pinch and Bijker 1987), whereby technology’s production is shaped by the cultural meanings and social interactions among groups involved in its production; and ‘inscription’ (Latour 1992) – the processes by which dominant interests are reflected in the form and functioning of technology. However, conceptualising inscribed properties of technological artefacts – data, procedures and UI – as external to human action is a departure from Giddens’s view of structure as a set of rules and resources instantiated in recurrent social practice, thus having only a virtual existence and importance only within the process of structuration. Conversely, some material properties of technology, such as specific hardware (e.g. power) may be only indirectly interpretively flexible (Jones 1999). Furthermore, both the Adaptive Structuration Model and the Structural Model of Technology assume stabilisation, completeness and predictability of technological artefact following development which is less appropriate in the context of modern highly configurable and user-programmable systems which are capable of being customised and conditioned with relative ease within the ‘customer’ organisation.

The Practice Lens model (Orlikowski 2000) makes an analytical distinction between the technological artefact and its use. On the one hand, technology is an identifiable, relatively durable entity with material and cultural properties that transcend the experience of individuals and particular settings. On the other hand, use of technology involves a repeatedly experienced, personally ordered and edited version of the technological artefact, being experienced differently by different individuals and differently by the same individuals depending on the circumstances. Therefore,

although elements of technology such as data structures, algorithms, user interfaces, and so on, are built into a particular artefact and are thus external to human action, as inscribed properties of a technological artefact these properties of technology cannot be conceptualised as structures.

(Orlikowski 2000, p.407) suggests that through regularised engagement with a particular technology, and some or all of its material and symbolic properties, in particular ways in particular conditions, users repeatedly enact a set of rules and resources which structures their ongoing interaction with that technology. From this perspective, the structures are not embodied in technology, but are emergent and enacted through recursive interaction. Furthermore, when people use a technology, they draw not only on the material and symbolic properties comprising the artefact, but also on their skills, power, knowledge, assumptions, and expectations, influenced typically by training, communication and previous experiences (Orlikowski and Gash 1994); as well as emotional and intellectual attachments associated with particular technologies and their use; and knowledge and experiences with the institutional contexts in which they live and work.

Orlikowski thus addresses the problem of separating structure and agency found in both Adaptive Structuration Theory and Structural Model of technology through specific formulation of her postulate that structures are not inscribed and subsequently appropriated but are rather emergent and enacted as *technologies-in-practice* – sets of rules are resources that are (re-)constituted in recurrent engagement with technology. As enactment of technology in practice is situated within a number of nested and overlapping social systems, people’s interaction with technology will always enact other social structures (e.g. a hierarchical authority structure within a large bureaucracy) (Orlikowski 2000, p.411). The recursive constitution of technologies-in-practice and the duality of structure and agency in the Practice Lens model are shown in the following diagram:



**Figure 4: Practice Lens Model of Technology (Orlikowski 2000)**

The Practice Lens Model makes the point that human interaction with technologies is typically recurrent, and ongoing constitution off a technology-in-practice through present use is at the same time shaped by previous technologies-in-practice enacted in the past (Orlikowski 2000, p.410). Thus, a technology-in-practice also serves essentially as a “template for organizing behaviour as well as an interpretive framework for rendering action in the setting meaningful” (Barley 1988, p.125). Continued habitual use of technology will tend to re-enact the same technology-in-practice, thus further reinforcing it over time so that it becomes taken for granted, and through repeated enactment reconstitute that technology-in-practice. However, following Giddens, Orlikowski suggests that such reconstitution “may occur in one of two forms: *reinforcement*, where actors enact essentially the same structures with no noticeable changes; or *transformation*, where actors enact changed structures, where the changes may range from the modest to the substantial (Orlikowski 2000, p.411 emphasis in original).

Technologies-in-practice are thus seen as susceptible to change in response to a change in people’s knowledge, power, motivations, circumstances, or indeed deliberate modifications to properties of a technological artefact, for example through use of plug-ins. Orlikowski notes that technologies are never fully stabilised, even in the case of those technologies that have reached apparent “closure” (Bijker 1995), and

suggests that a technological artefact may be considered “stabilized-for-now” (Schryer 1993). This is suggested for analytical and practical convenience as different elements of the technological artefact may continue to be developed, functions modified, and materials changed. Furthermore, people may adjust their technologies in practice. This can happen intentionally – for example by responding to external factors such as regulation, or experience of the artefact (e.g. backing up files at every opportunity as response to unreliable file storage). Similarly, people may discover new forms of working with the artefact through training or observing colleagues, or through improvisation – that is, generating situated innovations in response to unexpected opportunities or challenges, whereby a temporary workaround can turn out to be more effective than the original practice and thus can become the preferred practice (Tyre and Orlikowski 1994).

Drawing on the concept of interpretative flexibility (Pinch and Bijker 1987; Orlikowski 1992), an important aspect of the practice lens model of technology is its recognition that the recurrent use of a technology is not infinitely malleable, and “saying that use is situated and not confined to predefined options does not mean that it is totally open to any and all possibilities” (Orlikowski 2000, p.409). In several case studies Orlikowski analyses the properties of the technological artefact by considering the following components: electronic communication (e.g. messages, bulletin boards), text editing (e.g. emphasis of categorisation vs. free text), document management (e.g. search and retrieval), customisation (e.g. direct modification of user interface), integration and replication (e.g. links between components within the artefact, and between the artefact and other systems), security (e.g. access control), and application development (e.g. customisation of logic and components through Application Programming Interface).

The Practice Lens model (Orlikowski 2000) conceptualises technology in familiar terms of structuration theory (Giddens 1976; Giddens 1979; Giddens 1984) but unlike the previous approaches tries to remain faithful to the latter’s central tenets. Orlikowski herself puts it very well:

*... I have sought to augment the existing structurational perspective on technology by proposing a view of technology structures, not as embodied in given technological artifacts,*

*but as enacted by the recurrent social practices of a community of users. This view directs researchers' attention to what people do with technology in their everyday practices, and how such use is structured by the rules and resources implicated in their ongoing action. Rather than trying to understand why and how a given technology is more or less likely to be appropriated in various circumstances, a practice lens focuses on knowledgeable human action and how its recurrent engagement with a given technology constitutes and reconstitutes particular emergent structures of using the technology (technologies-in-practice). Thus, the research orientation is inverted – from a focus on given technologies, embodied structures, and their influence on use – to a focus on human agency and the enactment of emergent structures in the recurrent use of technologies. (Orlikowski 2000, p.421)*

### **3.5. Enriching Practice Lens model of technology**

The Practice Lens model of technology “...focuses on knowledgeable human action and how its recurrent engagement with a given technology constitutes and reconstitutes particular emergent structures of using the technology” (Orlikowski 2000, p.421). In doing so, this model diverts the focus from how and why a particular technology is more or less likely to be appropriated in various circumstances, and remains more faithful to Giddens’s original ideas by suggesting that structures are emergent from interaction, rather than embodied in technology (Jones 1999). Orlikowski goes on to suggest that although technology use is always situated and emergent, such use is not completely unique, and regular use of the same technology tends to be recurrent, the same technologies-in-practice become stabilised, routine, taken for granted, and even institutionalised in some cases, and it is this stabilisation that allows researchers to identify and analyse technologies-in-practice. However, the Practice Lens model of technology suffers from a number of limitations and the following sections of this chapter develop a synthesised theoretical framework on the basis of the Practice Lens model, grammatical model of organisational routines, and the ostensive/performative duality of organisational routines.

#### **3.5.1. Grammatical Composition**

Firstly, Orlikowski does not define what constitutes recurrent or habitual use of technology, and as a consequence, she does not offer methodological guidance on identification of recurrent or habitual use of a particular technological artefact. For

example, in analysing a number of case-studies using the practice lens model, Orlikowski identifies the following instances of ongoing situated use of the Notes groupware software: “Developers use Notes extensively to collaborate on the design and development of the notes product”, “Technology staff use Notes frequently for technical problem-solving and co-operation”, “Consultants use Notes minimally, sporadically, and perfunctorily”, “Consultants use Notes regularly to improve their personal efficiency”, “Support specialists use Notes and the [support tool] application routinely to deliver electronic technical support to clients”, and “Support specialists use Notes and the [support tool] application to experiment with new ways of working” (Orlikowski 2000, p.415-420). Whilst probably constrained by the publication format, this articulation of Orlikowski’s conceptualisation of ongoing situated use of technology thus suffers from a lack of conceptual and operational definition and treats the agency of engagement with technological artefact as something of a black box.

We suggest that a synthesis of the practice lens model of technology and grammatical model of organisational routines (Pentland 1995) would enrich the Practice Lens framework by providing an explicit empirical and analytical reference for identifying the component parts of organisational routines as well as evaluating their recurrent nature. When Orlikowski refers, for example, to “Technology staff use Notes frequently for technical problem-solving and co-operation” she emphasises a characteristic of engagement with the technological artefact but leaves the reader wondering what exactly the technology staff were doing with the artefact and what they were trying to achieve in different circumstances of use. As outlined in Section 3.2.6.a above, a behavioural entity can be conceptually deconstructed using the concepts of ‘routine’, ‘performance’, ‘subroutine’, and ‘move’, in the context of a ‘grammatical model’ – in the same way that linguists use grammar to describe a language, we can use grammar to describe certain aspects of a routine (Pentland 1995). Our synthesised theoretical framework therefore suggests that a ‘move’ – any stretch of action with a distinctive bearing on a set of circumstances – is a more appropriate and most granular unit of analysis when studying engagement with technological artefact.

The specific definition of what behaviours constitute a particular distinctive move, and how various moves constitute subroutines will necessarily depend on the research domain and the particular research questions. Previous research on IT Support organisational processes has focused on specific problem-solving moves (section 2.7.1), organising moves (section 2.7.2) and interpreting moves (section 2.7.3). These moves represent a variety of distinct behaviours that a technical support analyst might undertake to accomplish a particular task, such as obtaining information sufficient to resolve the end-user's enquiry, directing the enquiry to more a suitable or more knowledgeable colleague, or engaging with the end-user in order to ascertain the nature of the enquiry more clearly respectively. The objective of the task at hand can in turn be used to describe how such individual moves (e.g. reassigning an enquiry) are combined into sub-routines (e.g. organising problem-solving). Structure provides constraints on which moves are available, and at the same time moves enact structure (e.g. expectation of functional specialisation and enactment thereof through reassigning enquiries). The whole organisational routine is the set of possible performances for a particular task, described in part by a grammar and made up of its constituent parts – moves and subroutines, enabled and constrained by a variety of organisational, social, physical and cognitive structures.

Orlikowski's depiction of ongoing situated use of technology at the bottom part of Figure 4 above should therefore include a reference to the grammatical composition of such use into moves and subroutines, which make up specific performances of an organisational routine. The diagram below (Figure 5) illustrates the grammatical composition of use of technology in a necessarily simplified form, but can nevertheless be used as an analytical and empirical guide to analysing recurrent forms of engagement with a particular technology through highlighting which specific moves and subroutines are recurrent; which specific performances were observed and how much variation there was between the performances; and finally as outlined further in this chapter how such variation can be examined in terms of specific enabling and constraining structures and the mutual interaction of those structures with the social agency represented by those specific moves and subroutines.

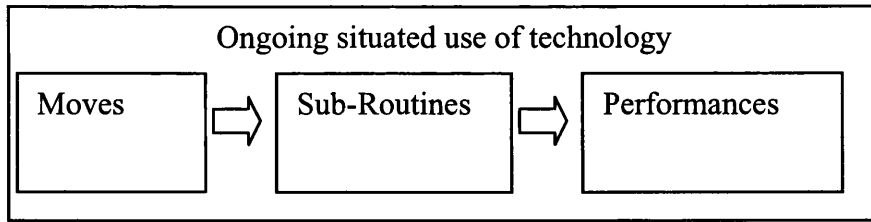


Figure 5: Practice Lens and Grammatical Model of Organisational Routines

### 3.5.2. Performative and Ostensive Aspects

Secondly, stabilisation of technologies-in-practice allows researchers to seek bounded generalisations about “the types of technologies in practice likely to be enacted by particular types of users with specific technologies in various contexts and times” (Orlikowski 2000, p.421). Orlikowski identifies a number of technologies-in-practice in her case studies: limited use, collaboration, individual productivity, collective problem-solving, process-support, and improvisation. In Orlikowski’s definition, a technology-in-practice is a repeatedly experienced, personally ordered and edited version of the technological artefact – a specific structure routinely enacted as we use the specific device in recurrent ways in our everyday activities. However, this definition seems to include elements of both cognition/perception and execution, and as such it also suffers from a lack of conceptual and operational definition.

We suggest that a synthesis of the practice lens model of technology and conceptualising organisational routines as an ostensive/performative duality (Feldman and Pentland 2003) would enrich the Practice Lens framework by providing an explicit analytical reference for identifying empirical evidence of both the abstract (ostensive) and actual practice (performative) aspects of an organisational routine. Orlikowski suggests that ongoing enactment of a technology-in-practice reinforces it, so that it becomes regularised and routinised – a habitual response within the daily exigencies of organisational life (Orlikowski 2000, p.410) – serving essentially as a behavioural and interpretive template (Barley 1988, p.49). Following Orlikowski’s formulation, structures are not inscribed and subsequently appropriated but are emergent and enacted as *technologies-in-practice* – sets of rules are resources that are (re-)constituted in recurrent engagement with technology – an organisational routine. Whilst this view does direct the researcher’s attention to what people do with technology in their everyday practices through its focus on human agency and the

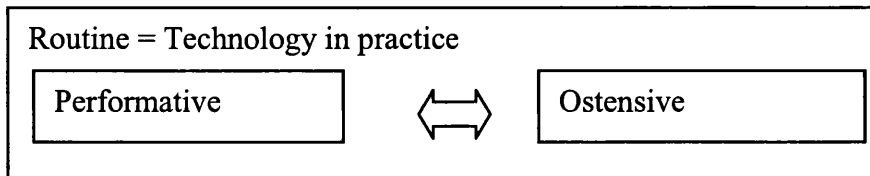


enactment of emergent structures in their use of technologies, it does not offer sufficient guidance on analysing just how a technology-in-practice can serve as a “template for organising behaviour as well as an interpretive framework for rendering action in the setting meaningful” (Barley 1988, p.125).

As outlined earlier in this chapter, people can use the ostensive aspect in relation to the performative aspect of the routine as *guiding*, *accounting*, and *referring* – to signify that some performances are part of a recognisable routine and to legitimate some performances as appropriate to that routine (Feldman and Pentland 2003, p.106). Similarly, the performative aspect of organisational routines is essential for the *creation*, *maintenance*, and *modification* of the ostensive aspect in much the same way that speaking creates, maintains and alters a language (Feldman and Pentland 2003, p.107). We suggest therefore that a technology-in-practice can be conceptualised as an organisational routine possessing both ostensive and performative aspects. Performances of a routine are specific actions taken by specific people at specific times, however our observation (through various sources of empirical evidence) of the performative aspect of an organisational routine cannot encompass the ostensive (abstract pattern) aspect of that routine because the ostensive aspect incorporates the subjective understandings of diverse participants. The ostensive aspect of an organisational routine may be (partly) codified in an operational procedure, or it may exist in a taken-for-granted norm involving a significant tacit component embedded in procedural knowledge (Cohen and Bagdayan 1994).

Such conceptualisation offers more potential for identifying and analysing the ostensive aspect of organisational routine by specific reference to its performative aspect, for example by juxtaposing evidence of codified ostensive aspects of organisational routines (e.g. operational procedures) in a set of circumstances with the actual performances carried out in those circumstances. As elaborated on in section 3.2.6.b above making the distinction between ostensive and performative aspects of organisational routines and conceptualising an organisational routine as consisting of both the idea (ostensive) and the enactment (performative) allows us to explore the relationship between these two aspects without mistaking either one for each other or the whole. Orlikowski’s depiction of technology-in-practice at the top part of Figure 4

above should therefore include a reference to the ostensive and performative aspects of organisational routines, as illustrated in a necessarily simplified form in the diagram below.



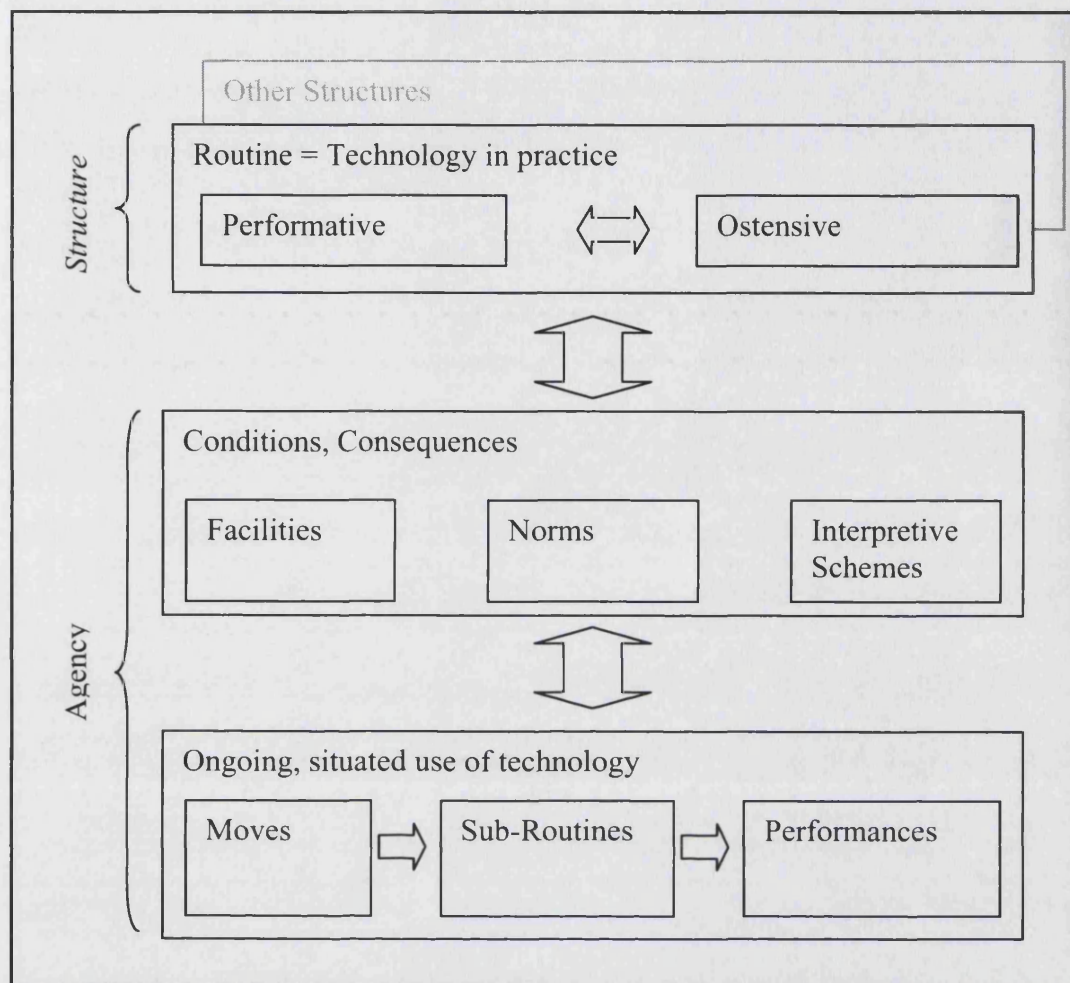
**Figure 6: Practice Lens and Duality of Organisational Routines**

### 3.5.3. Synthesised theoretical framework

The practice lens model of technology allowed Orlikowski to identify a number of acknowledged and unacknowledged conditions and intended and unintended consequences associated with each of the technologies-in-practice (Orlikowski 2000, p.421). The three kinds of conditions are interpretive – referring to shared understandings and meanings that members of a community construct to make sense of their world (including technology); technological – referring to the technological properties available to users in their work practices; and institutional – referring to the normative and authoritative social structures that constitute part of the larger social system within which users work. Similarly, Orlikowski identifies three kinds of consequences: processual – referring to changes (if any) in the execution and outcome of users’ work practices; technological – referring to changes (if any) in the technological properties available to the users; and structural – referring to changes (if any) in structures that users enact as part of the larger social system in which they are participating. Orlikowski conducts a comparison of the conditions and consequences associated with technology use in her case studies, and suggests that three distinct types of technologies-in-practice can be discerned: inertia – referring to cases where users choose to use technology to retain their existing way of doing things (limited, perfunctory use); application – referring to cases where users choose to use technology to augment their existing ways of doing things (reinforcement or enhancement to the structural status quo, noticeable changes in technological properties and work processes); and change – referring to cases where users use technology to substantially alter their ways of doing things (transformation in the structural status quo, significant modifications to technological properties and work

processes). The operational focus on conditions and consequences allows for a more focused approach to the analysis of the modalities of facilities, norms, and interpretive schemes.

At this point, we are in a position to make explicit our synthesised theoretical framework which will be used to inform data collection and guide analysis. We have identified a number of dimensions where the original practice lens model can be extended in order to provide clear analytical distinctions between, for example performative and ostensive aspects of technologies-in-practice, by explicitly considering technologies-in-practice as organisational routines. This allows us to establish a clear analytical link between various sources of empirical data as pertaining to the ostensive (procedural) aspect of enactment, such as mission statements, operational procedures, and manuals for a range of circumstances; and the performative (execution) aspects of enactment, i.e. what people actually do in those circumstances. We have also provided an explicit framework for analysing enactment from the performative perspective by building a clear analytical foundation of the building blocks of enactment. This allows us to analyse the constituent parts of performative aspect of organisational routines and not only clearly identify repeated patterns, for example through transaction log analysis, but also analyse a variety of permutations of sub-patterns in order to derive a more thorough understanding of the organisational processes. Finally, the focus of the model on conditions and consequences allows us to operationalise the concepts of facilities, norms, and interpretive schemes. Such operationalisation assists in organising data collection for example in interviews, by providing a tangible point of reference with interview respondents that can be traced in subsequent data analysis. The synthesised theoretical framework is illustrated in a simplified form in the diagram below:



**Figure 7: Synthesised Theoretical Framework**

It is necessary to define the terms of our analysis in terms of granularity of concepts before we begin our discussion of specific data collection method and data analysis techniques. The research presented in this thesis ultimately explores the duality of structure and agency through the use of technologies-in-practice concept, but it is important to define at what level – individual, community – these technologies-in-practice are analytically and empirically located. For example, the original practice lens model specifies its object of research as:

*...technology structures, not as embodied in given technological artefacts, but as enacted by the recurrent social practices of a community of users. This view directs researchers' attention to what people do with technology in their everyday practices, and how such use is structured by the rules and resources implicated in their ongoing action. (Orlikowski 2000, p.421).*

In terms relevant to the research presented in this thesis, the Oxford dictionary's definition of community specifies a group of people with a common profession or holding certain attitudes and interest in common considered collectively. The original practice lens model of technology (Orlikowski 2000) does not make an explicit distinction between the individual and collective levels of analysis, although alluding to aggregated consideration of individual actions, for example in reference to multiple agents enacting a particular technology-in-practice. Nevertheless, we can establish the following terms of reference for our synthesised theoretical framework, based on the original conceptualisations and definitions made by structuration theory (Giddens 1979, p.66).

As outlined above, technology-in-practice is a structure, and structures are rules and resources organised as properties of systems. This conceptualisation of structure is thus devoid of direct reference to subject, and subject is only implicated through the concept of systems, which are reproduced relations between actors of collectivities, whereby structures are both the medium and outcome of recursively organised social practices. In analytical terms, a technology-in-practice concept is thus marked by the absence of the subject, but enactment of rules and resources implicated in a particular technology-in-practice takes place at an individual level in the context of nested and overlapping social (collective) systems. In practical terms, the conceptualisation of duality of structure and agency allows us to identify, explore and analyse specific interactions of an individual (as moves, subroutines, and performances) with particular properties of a technological artefact, but place such identification, exploration and analysis in the context of and with specific reference to the social/collective dimension.

Having established our synthesised theoretical framework and terms of analysis, we are now in a position to begin discussing specific data collection methods and data analysis techniques.

### **3.6. Chapter Summary**

This chapter introduced the theoretical basis for the research presented in this thesis. Our conceptual and practical points of departure developed in Chapter 2 called for a

theoretical perspective on organisational processes, regularised/recurrent patterns of engagement with the technological artefact and the construction of such patterns, as well as a broader theoretical perspective in which the contextuality of such engagement can be studied. This chapter presented a thorough review of the theoretical perspectives on organisational routines and their emergent nature as a corollary of the duality of structure and agency based on the theoretical perspective afforded by the structuration theory. This chapter also reviewed a number of approaches to analysing the role of the technological artefact in formulation, persistence and change in organisational routines, suggesting that the practice lens model of technology remains the most faithful to the original ideas developed in structuration theory. This chapter then developed a synthesised theoretical framework based on contributions from the grammatical model of organisational routines, performative/ostensive dimensions of organisational routines, and the practice lens model of technology, whereby the synthesised theoretical framework overcomes a number of limitations of the practice lens model of technology.

The following chapter presents the ontological, epistemological and methodological foundation for the research presented in this thesis, discusses the process of selection of the research site, and operationalises the synthesised theoretical framework developed in Chapter 3 by grounding it in specific data collection and analysis methods.

## CHAPTER FOUR – RESEARCH DESIGN

### **4.1. Chapter introduction**

This chapter presents the ontological, epistemological and methodological foundation of the research presented in this thesis. A number of ontological and epistemological perspectives are reviewed and the interpretivist approach undertaken by this thesis is developed and justified by reference to the research objectives. This chapter discusses the selection of the research site and the guiding principles of conducting interpretive research. Following that, this chapter grounds the synthesised theoretical framework developed in chapter 3 by reference to triangulated analysis based on a wide variety of data collection and analysis methods.

### **4.2. Reflexivity**

As researchers we bear a great responsibility to engage with ourselves through thinking about our own thinking and evaluating the researcher and the “objects” of research (Alvesson and Sköldbberg 2000) in order to scrutinise the (unacknowledged) pre-understanding influencing research (Weick 1999). Foregrounding the meta-theoretical assumptions in constitution of organisational analysis (Burrell and Morgan 1979) plays a key part in this engagement, however the process of scrutinising one’s research should not stop there. The research process is by its nature messy and opportunistic: decisions taken for practical reasons “on the ground” can have profound implications for the subsequent conduct of one’s research (Scott 2000). Not being open to the possibility of deconstruction and interpretation of one’s research in terms of meta-theoretical position, appropriateness of research methods, and the validity of conclusions would amount to abdication of intellectual responsibility (Weick 1999).

Reflexivity is often broadly understood to be an ontological and epistemological commitment for the researcher to autonomously and rationally scrutinise the researcher/object relationship as part of the empirical evidence for (or against) the claims advanced (Harding 1987, p.9). However, it is unlikely that researchers can access and understand their cognitive assumptions as any theory of knowledge presupposes knowledge of the conditions in which knowledge takes place, and as

researchers we may not be able to detach ourselves from our meta-theoretical commitments so as to reflexively assess them. This circularity of epistemological and ontological issues suggests that reflexivity is an unending spiral of deconstructive unsettling with no fixed truth or final answer (Linstead 1994).

Reflexive interpretation has been suggested to operate at four general levels (Alvesson and Sköldberg 2000). Firstly, it concerns systematic techniques in research procedures, such as well reasoned logic and rigorous techniques for processing data. Secondly, it requires clarification of the primacy of interpretation insofar as method cannot be disengaged from theory and other elements of pre-understanding. Thirdly, it requires an awareness of the political ideological character of research since social science is a social phenomenon embedded in a political and ethical context and can hardly avoid either supporting/reproducing or challenging existing social conditions. Fourthly, it suggests reflection in relation to the problem of representation and authority by decoupling of text and author and calling into question the researching subject and the researched object (Alvesson and Sköldberg 2000).

Researchers are themselves social actors interpreting the world and already involved in others' construction of reality, and the researcher's ontological and epistemological position can allow taking up any appropriate position along the spectrum between "independent observer" to "action researcher" (Walsham and Sahay 1999), with dramatic implications for the status of the research and its conclusions. For that reason, researchers committed to epistemic (sociorational analysis of the actors' and researcher's habitus) or hyper- (deconstructions of deconstructions) reflexivity "would see those who focus purely upon methodological reflexivity as dogmatic, since they exclude from scrutiny their own taken-for-granted beliefs" (Johnson and Duberley 2003, p.1294). However, a counter-accusations of incipient and debilitating relativism can be made in reference to the unending spiral of such discursive unsettling and repudiation of authoritative textual monologue as implicit in hyper reflexivity (Johnson and Duberley 2003). Even epistemic reflexivity is problematic because knowledge is not created by actions of individual researchers but by aggregated actions and multiple interactions by different researchers operating in the context of institutionalised practices (such as channels of dissemination) within research communities. We therefore cannot confine our attention to the researcher-



subject dimension but must examine the relationship between researchers and the research network (Hardy, Phillips et al. 2001).

The conduct of research presented in this thesis was informed by the need for ongoing reflexive interpretation of the research objectives, methods, analysis and conclusions through a hermeneutically informed approach as discussed in more detail further in this chapter. Moreover, the presentation of this research benefits from elements of methodological confessional (Van Maanen 1988) and lived methodology (Scott 2000) as part of the interpretive research process as outlined further in this chapter, and applied in the description of the motivations for this research in Chapter 1.

### **4.3. *Philosophical foundation***

Researchers make explicit or implicit assumptions about the nature of the world and of knowledge (Mingers 2001), and must understand the implications of their research perspective and acknowledge the extent to which the adopted perspective will focus their attention and may bias the perception of the phenomena they study (Orlikowski and Baroudi 1991). Researchers need to be aware of the different paradigms as alternate views of social reality (Burrell and Morgan 1979), and be able to identify and examine their research in terms of the four basic elements of any research process – research methods/techniques, methodology governing the choice and use of those methods, theoretical perspective underpinning the methodology, and epistemology and ontology informing the theoretical perspective (Crotty 1998).

Research methods are the techniques or procedures used to gather and analyse data related to some research question or hypothesis; methodology is the process or strategy underlying the choice of particular methods; and theoretical perspective is the philosophical stance informing the methodology and providing a context for the process and grounding its logic and criteria (Crotty 1998). A paradigm is a construct that specifies a general set of philosophical assumptions covering ontology (what is assumed to exist), epistemology (the nature of valid knowledge), ethics or axiology (what is valued or considered right), and methodology (Mingers 2001). Paradigms reflect networks of schools of thought which differentiate in approach and perspective but share common fundamental assumptions about the nature of reality (Morgan 1981), and “delineate a way of seeing and researching the world” in terms of ontology,

human rationality, social relations, criteria for constructing and evaluating knowledge, appropriateness of research methods for generating valid evidence, and the purpose of knowledge in practice (Chua 1986).

The same ontology can lead to more than one epistemology, and the same epistemology can have several methodologies (Lee 2004). Moreover, recent IS research has been characterised by considerable diversity of problems, theories, and research methods (Benbasat and Weber 1996; Robey 1996) and some authors have called for a plurality of perspectives (Lee 1991; Fitzgerald and Howcroft 1998; Mingers 2001). It is therefore vitally important for researchers to “indicate something about their beliefs, so that readers can have access to the intellectual choices that are embedded in the research effort” (Zuboff 1988).

### **4.3.1. Paradigm overview**

The following section of this chapter discuss the ontological and epistemological position of this thesis as a basis for methodology of the research and particular research techniques employed in collecting and analysing empirical data. An epistemological position embodies an understanding of how we know what we know, and provides a philosophical grounding for the research methods. Although ontological issues and epistemological issues are conceptually separate, in practical research they tend to emerge together (Crotty 1998). Researchers commonly distinguish between at least two paradigms: positivist and interpretive (Lee 1991), or distinguish four dimensions as functionalist, interpretive, radical humanist, and radical structuralist (Burrell and Morgan 1979). The following sections of this chapter set out the ontological and epistemological position of this thesis following a brief overview of the key postulates offered by a widely used tri-fold classification of social science research (Chua 1986) as positivist, interpretive and critical perspectives.

#### **4.3.1.a. Positivist**

A positivist theoretical perspective is rooted in objectivism – an epistemological notion asserting that meaning exists in objects independently of any consciousness, which is itself rooted in realism – an ontological notion asserting that realities exist outside the mind (Crotty 1998, p.10). Positivist studies are premised on the existence of a priori fixed relationships within phenomena in an objective physical and social

world whose nature can be relatively unproblematically apprehended, characterized, and measured (Orlikowski and Baroudi 1991, p.9).

The positivist approach is closely linked to natural sciences. Logical positivism, drawing on the work of Ludwig Wittgenstein (1889-1951), rests on the principle of verification of synthetic statements (i.e. where what is predicated of the subject is not included in its definition, unlike analytic statements) whereby scientific laws can be discovered by observation, experimentation and comparison. Post-positivism takes on the contributions of Karl Popper (1902-1994) who argued that scientists engage in a continual process of conjecture and falsification, rather than observation and experimentation; Werner Heisenberg (1901-1976) who articulated the 'uncertainty principle'; Thomas Kuhn (1922-1996) and his view of 'normal science' as a puzzle-solving activity within the overarching conceptual paradigm; and Paul Feyerabend (1924-1994) who argues that all science is necessarily an anarchic exercise and scientific values are no more than any other beliefs.

The positivist approach is nomothetic, concerned with the discovery of general and universal laws. Positivist studies rest on application of the rules of formal logic and hypothetico-deductive logic so that the theoretical propositions satisfy requirements of falsifiability, relative explanatory power, and survival (Lee 1991, p.343-344). Positivist research is commonly evidenced by formal propositions, quantifiable measures of variables, hypotheses testing, the drawing of inferences about a phenomenon from the sample to a stated population (Orlikowski and Baroudi 1991, p.5), and experimental or quasi-experimental design (Lee 1991).

#### **4.3.1.b. Interpretivist**

Where the positivist approach follows the value-free, detached methods of natural sciences to offer explanation, predictability and control in social sciences, the interpretive approach looks for culturally derived and historically situated interpretations of the social world (Crotty 1998, p.67). Following terminology introduced by Wilhelm Windelband's (1848-1915), the positivist approach is nomothetic, i.e. concerned with generalized understanding of objective phenomena, whereas the interpretive approach is ideographic, i.e. concerned with the meaning of

contingent, accidental, and often inter-subjective phenomena (c.f. Luthans and Davis 1982).

In contrast to the positivist approach, interpretivist research assumes that our knowledge of reality is "...a social construction by human actors, and that value-free data cannot be obtained, since the enquirer uses his or her preconceptions in order to guide the process of enquiry, and interacts with the human subjects of the enquiry, changing the perceptions of both parties" (Walsham 1995, p.376). Interpretivism is associated with constructionism – an epistemological notion asserting that meaning comes into existence in and out of our engagement with the realities in the world, and is at once a realist (accepting that the world exists independently of our consciousness) and a relativist (what is said to be "the way things are" is really just "the sense we make of them") position, meaning that description and narration are not seen as straightforward representations of reality (Crotty 1998). One can usefully distinguish between constructivism, which describes the 'meaning-making activity of the individual mind' and constructionism, which stresses that 'each of us is introduced directly to a world of meaning' through cultures and sub-cultures (Crotty 1998, p.58,79). Furthermore, one can usefully distinguish between weak constructionism, where the researcher attempts to understand the existing meaning systems of actors and interpret them in the researcher's recounting, and strong constructionism where retelling the actors' story is never fully possible because through intervention of the researcher's own interpretive schemes the researchers themselves enact the social reality they are studying (Orlikowski and Baroudi 1991, p.15)

Interpretive research assumes that "our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools, and other artefacts" (Klein and Myers 1999, p.69), and such notion of knowledge is a social construction that applies equally to researchers (Walsham 1993). Interpretive studies are evidenced by a nondeterministic perspective where the intent of the research was to examine and understand a phenomenon within cultural and contextual situations and from the perspective of the participants (Orlikowski and Baroudi 1991), and are associated with field studies, such as case studies and ethnographies. Interpretivist perspective is discussed in detail in section 4.3.2 (below).

#### **4.3.1.c. Critical**

As we have seen, interpretivism adopts an anti-positivist stance in that “the social world is essentially relativistic and can only be understood from the point of view of the individuals who are directly involved in the activities which are to be studied” (Burrell and Morgan 1979, p.5). By virtue of this position, interpretivism is an uncritical form of study, seeking to understand, read the situation in terms of interaction and community, and accepting the status quo, as opposed to research that seeks to challenge, reads the situation in terms of conflict and oppression, and rejecting the status quo seeking to bring about change (Crotty 1998, p.113).

The central idea within critical philosophy is the belief that social reality is historically constituted, and hence that human beings, organizations, and societies are not confined to existing in a particular state (Chua 1986, p.619). Critical philosophy suggests that humans, by recognising the possibilities of their unfulfilled potentiality, can act to change their material and social circumstances. However, the potential for such action is constrained because humans exist in the context of the totality of relationships of which they are part, i.e. the prevailing systems of economic, political and cultural authority (Orlikowski and Baroudi 1991, p.19). Critical philosophy assumes that social relationships and practices of societies and organisations are characterised by inherent contradictions which lead to inequalities and conflicts, although the contradictory elements “may be masked or concealed by a variety of devices – role segmentation, ideological formulations, segregation of participants, and others” (Benson 1973, p.383). Social relationships are thus unstable and constantly undergoing change with new social forms emerging from the inherent contradictions in the practices of societies and organisations.

Critical research philosophy emphasises the processual development of phenomena in the belief that knowledge is grounded in social and historical practices and there can be no theory-independent collection and interpretation of evidence (Chua 1986, p.620). This leads to research outcomes which are different from positivist research, in that “generalisations stemming from this approach would point to regularities of process rather than cross-sectional differences” (Benson 1973, p.391). Critical research outcomes also differ significantly from interpretivist research. Although critical and interpretive researchers share the belief that understanding of the language

of research subjects is temporally and spatially bound, critical researchers believe that interpretation of the social world and acceptance of self-understanding of participants are not enough and that the material conditions of domination need also be understood and critiqued through the particular theoretical framework used in the research (Orlikowski and Baroudi 1991, p.20-21).

### **4.3.2. Philosophical underpinning of this thesis**

Although our review of the tri-fold research perspectives classification (Chua 1986) is necessarily brief, it serves the purpose of placing this thesis in the wider epistemological and ontological context – a necessary precursor to the discussion of research methodology, particular research techniques and research outcomes. This thesis follows an interpretivist approach, looking for culturally derived and historically situated interpretations of the life-world (Crotty 1998, p.67). As has been illustrated above, the approach undertaken by the research presented in this thesis aims neither to conduct allegedly value-free, detached observations seeking to offer predictability (as does the positivist approach); nor to critique the status quo seeking to be “reflexive, critical, emancipatory, thus transcending alienated theorising” (Benson 1983, p.53). The interpretive theoretical perspective helps IS researchers to produce “an understanding of the *context* of the information system, and the *process* whereby the information system influences and is influenced by the context” (Walsham 1993, p.4-5). The primary purpose of this research is to describe, interpret, analyse, and understand the social world from the participants’ perspective without imposition of formulations of structure, function, purpose and attribution (Glasser and Strauss 1967).

Interpretivism as a theoretical perspective is rooted in constructionism as epistemology. Constructionism is the view that “all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context” (Crotty 1998, p.42). It is important to note that constructionism does not suggest that we create meaning, but rather that we construct meaning in reference to the world and objects in it. Experiences do not constitute a sphere of subjective reality separate from, and in contrast to, the objective realm of the external world (Crotty 1998, p.45). Instead, central to the understanding of constructionism is the notion of intentionality in phenomenology. Intentionality, as referentiality and relatedness (from Latin *tendere* – “to tend, move towards”, hence in-tend/ex-tend), rather than

deliberation or purposefulness, implies that “there is thus no answer to the question whether philosophy must begin with the object (realism) or with the ego (idealism). The very idea of phenomenology puts this question out of play: consciousness is always consciousness of, and there is no object which is not an object for” (Lyotard 1991, p.65). The concept of intentionality implies that constructionist epistemology rejects both objectivist epistemology – the notion that truth and meaning reside in their objects independently of their consciousness; and subjectivist epistemology – the notion that meaning is imposed on the object by the subject.

In rejecting subjectivism, constructionism cannot be reduced to individualism. While humans are engaging with the world and making sense of it, such description is incomplete if it is not set in a genuinely historical and social context. As a direct consequence of human evolution, culture directs human behaviour and organises human experience. Therefore, it is appropriate to view culture as a source (as well as a result) of human thoughts and actions which allows us to acknowledge that human beings inherit a culture in which they live. It is therefore useful to refer to epistemological considerations focusing exclusively on the meaning-making activity of the individual mind as *constructivism*, and reserve the term *constructionism* where the focus includes collective generation and transmission of meaning (Crotty 1998, p.53-54,58).

At this point, it is important to note that the ontological foundation for this thesis is realism – the notion asserting that realities exist outside the mind. Realism in ontology is often taken to imply objectivism in epistemology, however “accepting that the world, and things in the world, exists independently of our consciousness does not imply that meanings exist independently of consciousness – the existence of a world without mind is conceivable, but meaning without a mind is not” (Crotty 1998, p.10). Realism in ontology and constructionism in epistemology are quite compatible, and it is necessary to further explore this compatibility. The Oxford Concise Dictionary of Sociology defines constructionism as “a general term sometimes applied to theories that emphasize the socially created nature of social life”. This definition focuses on the concept of “construction of social reality” whereby social reality is socially constructed – this assertion is relatively unproblematic to accept. One can contrast this with the concept of “social construction of reality” whereby all meaningful reality, precisely as meaningful reality, is socially constructed and culturally influenced, as the “meanings with which we are endowed arise in and out of interactive human community” (Crotty 1998, p.54-55).

This aspect of constructionism with regard to natural sciences is seemingly at odds with the realist ontology. Some argue that the natural scientists thus also have to content with the social construction of (natural) reality, although unlike social scientists they do not need to engage in double-hermeneutic of “entering and grasping the frames of meaning involved in the production of social life by lay actors ... and reconstituting these within the new frames of meaning involved in technical conceptual schemes” (Giddens 1976, p.79). It is beyond the scope of this thesis to explore this debate in greater detail, and it would suffice for our purposes to acknowledge at this point that even natural scientists’ starting point is rooted in their culture, experience, and paradigm (Kuhn 1970).

Two primary variants of constructionism, and thus interpretivist theoretical perspective are recognisable. In the “weak” constructionist view, the researcher attempts to understand the existing meaning systems shared by actors in order to interpret their action and events in subsequent recounting (Orlikowski and Baroudi 1991, p.15). The social scientist is therefore “redescribing an act or experience by setting it into progressively larger contexts of purpose and intelligibility, ... [and] reveals *what* the agents are doing by seeing what they are up to and how and why they would be up to that” (Fay 1987, p.88). However, in the “strong” constructionist view recounting the actors’ story is never fully possible “...as the interpretive schemes of the researcher always intervene, and hence the researcher in part creates the reality they are studying through the constructs used to view the world” (Orlikowski and Baroudi 1991, p.15). Interpretivist social analyses of technology based on constructionist epistemology can likewise be differentiated into “restricted” and “thoroughgoing” studies. Restricted interpretivism holds that “the most significant influence of social construction occurs during design and development, as the multitude of design possibilities are narrowed down through a process of social construction, wherein the dominant interests and social groups hold sway” (Woolgar and Grint 1991, p.369). This form of interpretivism takes issue with technological determinism only during the process of its construction up to the point of stabilisation (Pinch and Bijker 1987), thereafter there is little disagreement on what the technology can do. By contrast, “thoroughgoing” interpretivism holds that “the nature and capacity of the technology remain essentially indeterminate ... [also] long before or after any selected point of stabilisation” (Woolgar and Grint 1991, p.370). Technological artefacts can thus be construed as texts that are essentially embedded in (and at the same time, constitute) their interpretive contexts (Woolgar 1991).



The implication of the differences between “weak” constructionism and “restricted” interpretivism on the one hand, and “strong” constructionism and “thoroughgoing” interpretivism on the other hand has implications for how interpretive research relates to positivist research methods. From the point of view of “weak” constructionism interpretive research can complement positivist research by generating hypotheses for further investigation and by filling in knowledge gaps such as contextual exigencies and meaning systems that the positivist research cannot attend to (Orlikowski and Baroudi 1991, p.15). In this view, a triangulation of interpretive and positivist research is possible and indeed advocated. However, from the point of view of strong constructionism no such triangulation is possible because such research is based on philosophical assumptions which preclude the researcher from selection of research perspective based on the nature of the phenomenon, for there is no way in which the researcher can independently assess that nature without relying on their predispositions (Orlikowski and Baroudi 1991, p.16).

The view expressed by this research and presented in this thesis is that of “weak” constructionism. Whilst technology is a social phenomenon and technological artefacts are locally negotiable and interpreted by situated agents, this position must be qualified in a number of ways. A user centric-understanding of technology, and the unfathomable depths of relativism derived from understanding of technology as infinitely malleable in local contexts of application, avoids dealing with the distinctive standardisation of technologies, and the historic conditions under which particular technologies emerge, develop, and become socially and institutionally embedded. In short, it is the position expressed in this thesis that such historical developments over time coalesce in ways that can make technology a recalcitrant ally, and that “situated accounts of technology must be supplemented by wider reflection that captures the complex web of dependencies, interoperabilities, and institutional relations that sustain the embeddedness of technology in local contexts” (Kallinikos 2004, p.141).

#### **4.4. *Research methodology***

As we have illustrated above, epistemology and theoretical perspective inform and guide, but do not exclusively determine the research methodology and methods. Research methods are the particular techniques or procedures used to gather and analyse data related to the research question; methodology is in turn the “strategy, plan of action, process or design lying behind the choice and use of particular

methods and linking the choice and use of methods to the desired outcomes (Crotty 1998, p.3). In the previous chapter we picked up the two broad research themes arising from literature review, namely a) consistency of use of the technological artefact as part of daily work process, and b) the mutual interdependency of the use of the technological artefact and the particularities of immediate and wider organisational circumstances of the artefact's implementation. In the preceding section of this chapter we identified the desired outcomes of our research based on the underlying epistemological position. Constructionist epistemology (in its "weak" form) together with interpretivism as a theoretical perspective indicate that triangulation between qualitative and quantitative research methods is possible in order to facilitate a deeper understanding of the context of the technological artefact and the process of its use from an anti-positivist uncritical perspective. Furthermore, we have identified a number of theoretical models (structuration theory, grammatical model of organisational routines, practice lends model of technology) to inform our data collection and guide data analysis. What remain to specify are the overarching research methodology, specific research methods employed in data collection, and analytical framework used in data analysis.

The research presented in this thesis follows interpretive case-study as the underlying research methodology, and hermeneutics as the principle data analysis approach. As has been stated above, interpretive is not a synonym for exclusive use of qualitative research methods. In fact, "the predominant distinction between quantitative and qualitative methods in sociology serves primarily to conceal and confuse theoretical positions [... and ...] focuses our attention on the techniques through which social life is represented in the course of research, as opposed to the process of representing social reality" (Morrow 1994, p.207). Therefore, the research presented in this thesis makes use of a number of specific techniques, such as transaction log analysis, interviews, verbal protocol analysis, and task analysis are employed at different stages of the research process in order to build a more detailed picture of the context and process of engagement with the technological artefact. Hermeneutics is concerned with interpreting and understanding the products of human mind which characterise the social and cultural world" (Burrell and Morgan 1979, p.235) by means of studying texts through a series of dialogues with the text, and constantly re-examining one's understanding. Hermeneutic mode of analysis, described as the principle of

“hermeneutic circle” (discussed below) has been used to analyse textual representation of other data and treating other phenomena of social life as text. For example:

*“[...] many hermeneutic scholars have extended their conception of text to include not just the documentary artefacts that human subjects create, but also their individual actions, group behaviours, and even social institutions, all of which, as text analogues, have meanings that can be read and interpreted” (Lee 1994, p.148)*

It is tempting to divide the following part of this chapter into Data Collection and Data Analysis sections. However, the approach taken in this thesis is one of “telling, showing, telling” in order to provide a natural link between data and theory, insofar as interlocking of data and theory reinforces the coherence of our storylines, giving them the quality of straightness (Golden-Biddle and Locke 1997). It is therefore more appropriate to first introduce the principles guiding empirical research presented in this thesis, and structure the rest of this chapter around the theoretical model and introduce specific data collection methods (and analysis of data collected through those methods) as constituent parts of that model.

#### **4.4.1. Guiding Principles**

As stated above, positivist studies rest on application of the rules of formal logic and hypothetico-deductive logic so that the theoretical propositions satisfy requirements of falsifiability, relative explanatory power, and survival (Lee 1991, p.343-344). Although interpretivist research does not predefine dependent and independent variables and does not seek to apply a predetermined set of criteria in a mechanistic way, it should also follow a set of criteria as a guiding principle for both conducting interpretive field studies and evaluating the contribution of the research. Indeed a call was made to “... discuss explicitly the criteria for judging qualitative, case and interpretive research in information systems” (Lee, Baskerville et al. 1995, p.365). Whilst interpretivist research is by its nature emergent, nevertheless a recognised and very useful set of criteria for conducting interpretive research was later published (Klein and Myers 1999) and serves as underlying guiding principles of the research presented in this thesis, as summarised in the following table (adapted from Klein and Myers 1999, p.72):

<p><b>The Fundamental Principle of the Hermeneutic Circle</b>  This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.</p>
<p><b>The Principle of Contextualization</b>  Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.</p>
<p><b>The Principle of Interaction Between the Researchers and the Subjects</b>  Requires critical reflection on how the research materials (or “data”) were socially constructed through the interaction between the researchers and participants.</p>
<p><b>The Principle of Abstraction and Generalization</b>  Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.</p>
<p><b>The Principle of Dialogical Reasoning</b>  Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings (“the story which the data tell”) with subsequent cycles of revision.</p>
<p><b>The Principle of Multiple Interpretations</b>  Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it.</p>
<p><b>The Principle of Suspicion</b>  Requires sensitivity to possible “biases” and systematic “distortions” in the narratives collected from the participants.</p>

**Table 9: Guiding principles for conducting interpretive research**

The principles summarised in the table above are derived primarily from anthropology, phenomenology and hermeneutics, and offer a set of explicitly articulated propositions which are consistent with the philosophical base of interpretivist research. It has to be noted, however that this list is not meant to be exhaustive, and indeed the authors (Klein and Myers 1999, p.68) acknowledge that not all forms of interpretivism are necessarily hermeneutic and as such additional sets of principles and debate on this issue in general are welcomed. Nevertheless, these principles offer a consistent premise for conducting and evaluating hermeneutic interpretivist research and are thus an appropriate foundation for the research presented in this thesis, as will be highlighted in the following sections. Following the

“telling-showing-telling” narrative approach presented in this thesis, the guiding principles illustrated above will be referred to in more detail throughout the rest of the thesis.

#### **4.4.2. Case study parameters**

One of the first choices in conducting field research concerns the primary mode of data collection, and this choice is informed by the researcher’s epistemological position and theoretical perspective. This choice should not be confused with the choice between qualitative and quantitative methods, but rather concerns the broader format of the data collection and methodology. The methodology of the research presented in this thesis is informed by the “weak” constructionist view and interpretive perspective, and uses structuration theory as the overarching theoretical perspective. However, Giddens himself offers little methodological guidance by saying “I do not try to wield a methodological scalpel ... there is [nothing] in the logic or the substance of structuration theory which would somehow prohibit the use of some specific research technique, such as survey methods, questionnaires or whatever” (Giddens 1984, p.xxx). However, he does offer a formulation of the broader research methodology by saying that “...the intellectual claims of sociology do not rest distinctively upon hard-edged research. All social research in my view, no matter how mathematical or quantitative, presumes ethnography” (Giddens 1991, p.219).

Interpretative field study is based primarily on ethnography, indeed there is no hard distinction between ethnography and an in-depth interpretative case study other than the length of time spent on site and the extent to which the researcher is immersed in the life of the social group under study (Klein and Myers 1999, p.69). “Ethnographies usually require long periods of time in the ‘field’ and emphasize detailed, observational evidence... In contrast, case studies are a form of enquiry that does not depend solely on ethno-graphic or participant-observer data” (Yin 2003, p.11). Interpretive case-studies, particularly those based on qualitative data, have been extensively criticised in the literature to the extent of suggesting that “qualitative research on organizations cannot be expected to transcend story-telling” (Miles 1979, p.600). This criticism was based on a number of reasons, such as: (a) within-case analysis is “essentially intuitive, primitive, and unmanageable”, (b) cross-case

analysis was “even less well formulated than within-site analysis”, and (c) respondents objected to case study results much more frequently than to survey results, either threatening the research team with legal suit or attempting to rewrite history in order to appear more favourably in the case study” (Miles 1979, p.597-599).

The issue at hand should not confuse the types of evidence (e.g. qualitative data), types of data collection methods (e.g. ethnography) and research strategies (e.g. case-studies) (Yin 1981, p.58). As a research strategy, the distinguishing features of the case study are that it attempts to examine a) contemporary phenomenon in its real-life context, especially when b) the boundaries between phenomenon are not clearly evident (Yin 1981, p.59). One of the first choices in conducting empirical research is therefore defining what questions that research aims to answer. For example, “how” and “why” questions are best addressed through experiments, historical analyses, and case studies, whereas “who”, “what”, “where”, and “how many/much” are best addressed through surveys and archival analysis (Yin 2003, p.5). The questions posited by the research presented in this thesis are mainly concerned with how/why would a technological artefact (in our case – ITSM software) be used consistently as part of the normal daily work processes, and how/why does use of the technological artefact relate to the particularities of the immediate context of implementation and use and the wider organisational context. However, in order to answer those questions we also require identifying patterns and recurrence of the use of technological artefact; as such one of the additional questions is what constitutes consistent use of ITSM software?

The range of questions posited by our study suggests that a mix of data collection techniques is appropriate; however we can make a number of educated choices concerning the overall parameters of the field study at this point. Practical reasons, such as timescale of research and access to field site preclude the use of traditional extended ethnography as the primary research strategy. Furthermore, as our research questions emphasise the contextuality of engagement with the technological artefact, experiments are not an appropriate form of enquiry, as they deliberately divorce a phenomenon from its context (Yin 1981, p.59) and require control of behavioural events (Yin 2003, p.5). Similarly, as we have stated before, the research presented in this thesis aims to understand the existing meaning systems shared by actors in order to

interpret their action and events in subsequent recounting (Orlikowski and Baroudi 1991, p.15). As such survey-based research methods are not appropriate since they will impose too much of the researcher's own preconceptions on respondents. This is not to say that the purpose of this research is to be objective and value-free (as in positivist research), but rather that preference should be given to research methods which allow respondents to highlight relevance of their own accord and use their own words to express themselves.

#### **4.4.3. Research site selection**

Having established case-study research as the primary research strategy, we must decide whether to focus on within-case analysis in a single site or a cross-case analysis based on data collected at multiple sites. As we have highlighted in the previous chapter, the mix of routine and non-routine aspects of technical support work, and its contingency on a wide variety of contextual factors, one of which is the very technology employed to augment the work processes, calls for a situated action (Suchman 1987) analysis of the technical support work pattern with particular reference to the ongoing interaction of technical support analysts with the technical support software artefact. Therefore the research presented in this thesis requires an in-depth perspective on the multitude of local context factors, and it is more appropriate to limit our field work to a single site.

Site selection should be carefully thought out (Benbasat, Goldstein et al. 1987), and in the case of research presented in this thesis the object of research consists of both the Help Desk software artefact and the organisation at which that software artefact is used. The researcher's own experience of IT Service Management (ITSM) industry as outlined in Chapter 1 warranted extensive consideration of the choice of the research site so as to not unduly prejudice the research process. The research presented in this thesis is based on an in-depth interpretive case-study of TP HelpDesk software as used by the IT Services Department of XYZ University, which were chosen for the following reasons:

The particular software artefact was at the time of research a well-known market-leading product in ITSM industry widely used in medium-sized commercial and public sector organisations. The vendors of this software were among the first in the ITSM industry to recognise the potential of "generic" extensively and supportably customisable Help Desk software based on the ITIL principles of Incident and Service Level Management integrated through a Configuration Management Database, and

the researcher had developed a good network of contacts with the software company from previous experience in ITSM industry. The particular organisation in which TP HelpDesk software artefact was implemented was chosen based on a number of criteria, including level of involvement with the vendors of TP HelpDesk software – XYZ University IT Services department actively participate in structured consultation on further development of the software; favourable attitude to research – an academic institution was receptive to acting as a research site and was familiar with the principles of case-study research; and suitable size of the organisation and implementation.

#### **4.5. Data collection and analysis**

It is appropriate at this point to elaborate on specific data collection and analysis techniques and relate these techniques to the broader philosophical position of this research, as presented earlier in this chapter.

##### **4.5.1. Transaction log analysis**

The object of this thesis is an examination of how patterns of interaction between technical support analysts with Help Desk software become routinised, and requires an analysis of specific instances of such interaction. Data on specific instances of actual use of Help Desk software is readily available for this research, in the form of access to both the front-end (UI, reports) and back-end (database) access to the Help Desk system. Elements of this research focus on data obtained from transaction logs recorded by the Help Desk software both directly – by statistically evaluating certain regularised patterns of use, as well as indirectly – by serving as a building block for other types of analysis, particularly as a basis for verbal protocol analysis.

In an extensive overview of transaction log analysis in library and information science research (Peters 1993) the development of transaction log analysis methodology can be divided into three phases: mid-1960s to mid-1970s – emphasis placed on evaluating system performance rather than user behaviour; late 1970s to mid 1980s – first application to online catalogue systems and equal emphasis placed on system use and user behaviour; and late 1980s to date – diversification of transaction log application. This review (Peters 1993) also identifies a variety of uses of transaction log data, such as improving and information retrieval system, improving human



utilisation of the system, improving understanding of how the system is used by its users, and study of prototype systems or potential improvements. Similarly, transaction log analysis is commonly used to evaluate performance of a variety of electronic systems such as email and web servers.

Transaction log analysis has considerable value as a data collection method. The information on user behaviour can be culled from them both automatically – through calculation of summary statistics and manually – for example by examining query strings for semantic clues on search motivations and searching strategy (Jones, Cunningham et al. 2000). However, it has been noted that “students of transaction log data have begun to ask as many questions about what the transaction logs cannot reveal as they have asked about what transaction logs can reveal” (Kurth 1993, p.98). With reference to information retrieval systems in particular, the cognitive limits of the methodology have been highlighted as users’ perceptions of their searches are not recorded, transaction logs cannot measure the information needs that users are unable to express in their search statements (input), and they cannot reflect users’ satisfaction with search results (output)” (Griffiths, Hartley et al. 2002). In general, transaction log analysis is best used in combination with a method which illuminates user perception and motivation, and in the research presented in this thesis transaction log analysis is used largely as a basis for other types of analysis.

#### **4.5.2. Task analysis**

Task analysis covers a range of techniques used by ergonomists, designers, operators, and assessors to describe, and in some cases evaluate, the human-machine and human-human interaction in systems (Kirwan and Ainsworth 1992, p.1). In the fields of software engineering and human-computer interaction (HCI), task analysis is generally used to describe actions that a user must perform with the user interface of specific software programs such as mouse clicks, typing, and so on, in order to accomplish a goal with that piece of software (Diaper and Standon 2003, p.221). Aspects of task analysis discipline seek to model specific tasks through the process of cognition, whereas other aspects of the discipline place emphasis on describing the contents of knowledge and focusing on whole jobs (DuBois and Shalin 2003). Task analysis is a complex discipline with a strong emphasis on cognition and psychology

and forms a substantial part of requirements analysis and algorithm and UI software design processes.

Elements of task analysis offer an invaluable insight into how patterns of interaction between technical support analysts with Service Desk software become routinised. In particular, hierarchical task analysis (HTA) as developed by Annett and Duncan in the late 1960s (Annett and Duncan 1967; Annett, Duncan et al. 1971) is a technique that adopts a system perspective in breaking down a job or a task into subtasks, whereby tasks are operations which are “any unit of behaviour, no matter how long or short its duration and no matter how simple or complex its structure which can be defined in terms of its objective” (Annett, Duncan et al. 1971, p.3). This focus allows tasks or jobs to be broken down and analysed in a comprehensive and exhaustive manner using logical decomposition (Patrick 1999, p.108).

Using elements of HTA to break down and analyse the tasks from the perspective of the design of the Service Desk software, for example by encapsulating the operations required in order to log or progress an incident, will allow a direct parallel analysis of the performance (and constituent subroutines and tasks) from the perspective of the organisational routine, for example by illuminating how interaction with the Service Desk software fits into the overall task of first response to an end-user IT Support enquiry. Task analysis is a complex and mature discipline, and the purpose of this thesis is not to evaluate the design of the Service Desk software, nor to specifically analyse its algorithms, processes, and UI features. However, the research presented in this thesis was greatly enriched by using elements of hierarchical task analysis to account for a variety of contextual factors, including variations of use and instances of non-use of the Service Desk software by support analysts in a range of circumstances.

### **4.5.3. Verbal protocol analysis**

Although the interviews conducted at the research site were semi-structured, in the sense that a pool of particular pre-prepared questions was adjusted through the course of the interview, the starting focus for an interview with a particular support analyst was grounded in specific instances of use of the Help Desk software by that support analyst to log and progress individual technical support enquiries received from end-

users. As such, parts of the interviews borrowed heavily from the ‘thinking aloud’ verbal protocol method originally developed within the field of cognitive psychology.

Verbal protocol analysis may be the most widely used process tracing method today (Kuusela and Paul 2000) and it has provided the rationale for collecting verbal data in many diverse fields, including cartography (e.g. Suchan and Brewer 2000), consumer decision-making (e.g. Douglas, Craig et al. 1981), reading comprehension research (e.g. Pressley and Afflerbach 1995), e-learning (Cotton and Gresty 2006), various engineering fields (e.g. Sanderson 1990), software engineering (overview in: Hughes and Parkes 2003), and system usability testing (e.g. Denning, Hoiem et al. 1990; Nielsen 1993). Verbalisation as a technique has its roots in the work of Wundt, Boring, and James (overview in: Lyons 1988) in philosophy and psychology, and most works using verbal protocol analysis (review in: Boren and Judith 2000) cite Ericsson and Simon’s *Protocol Analysis: Verbal Reports as Data* (Ericsson and Simon 1984).

A process tracing procedure attempts to investigate problem-solving by asking respondents to verbalise their thoughts whilst performing a task (Ericsson and Simon 1984). Such procedure focuses directly on the sequence of cognitive events that occur between the introduction of information stimuli and the decision outcome and assessing what information, and in which order, was accessed to form a decision (Kuusela and Paul 2000). Ericsson and Simon (1984) defined three levels of verbalisation: Level 1 verbalisations are those that need not be transformed before being verbalised during task performance (e.g. verbalising sequences of numbers); Level 2 verbalisations are those that must be transformed before being verbalised during task performance (e.g. transforming images or abstract concepts into words); Level 3 verbalisations are those that require additional cognitive processing beyond that required for task performance or verbalisation (e.g. filtering information, inferences, under outside influence, or referencing long-term memory). Unlike introspection, “...Ericsson and Simon’s model of data values “hard” (attentive, sequential) verbal data which can be used to validate hypothesised cognitive models; in their model, under no circumstances are verbalisations to be valued for their subjective content” (Boren and Judith 2000, p.262). Following the critique that “when people attempt to report on their cognitive processes [...] they do not do so on the

basis of any true introspection. Instead, their reports are based on a priori, implicit causal theories, or judgements about the extent to which a particular stimulus is a plausible case of a given response.” (Nisbett and Wilson 1977, p.221), Ericsson and Simon argue against using Level 3 verbalisations. Furthermore, some verbalisations such as value judgements cannot be considered data at all because “they raise difficult problems of interpretation and analysis” (Ericsson and Simon 1984, p.223).

In verbal protocol analysis verbalisation can occur either during decision-making – concurrent data, or after – retrospective data, and both methods have limitations (Kuusela and Paul 2000). To denote underlying cognitive processes, verbal data must be relevant, consistent, and remembered (Ericsson and Simon 1984). However, errors of communication (e.g. insufficient vocabulary), commission (distortion or systematic misreporting), and omission (missing elements) present potential problems for verbal reports data (Rip 1980). As a whole, the influence of time and the potential for subjects to infer and generate responses based on similar memory structures by mixing past and present experiences, and present thought processes in a more rational or socially desirable fashion may cause subjects to present processing information differently from thoughts mulled over privately (Kuusela and Paul 2000, p.391).

The object of this thesis is an analysis of the process of routinisation of interaction between technical support analysts and Help Desk software which requires an analysis of particular instances of such interaction. As such, this research touches upon areas of software engineering and human-computer interaction, but from a sociological, rather than cognitive perspective, that is located precisely in Level 3 verbalisations as categorised by Ericsson and Simon. The semi-structured interviews with technical support analysts were anchored in specific instances of use of Help Desk software (support calls). At the start of each interview, technical support analysts were presented with a record of one or several particular end-user enquiries obtained during the observation and transaction log phases of data collection. The interview subjects were asked to verbalise their thoughts on what a particular end-user enquiry was about, what was the appropriate support procedure, and how such procedure was instantiated in the use of Help Desk software (e.g. by using certain call-logging features and not others). Apart from being a conversational ice-breaker and a tangible point of focus for the interview, the verbal responses of interview

subjects regarding those particular support calls and similar calls in the past, allowed the researcher to more easily break up a particular performance of the entire routine of technical support process into its constituent parts: support call, and elements constituting a support call and analyse those parts separately.

#### **4.5.4. Interviews**

Routinised social activity is not mindless or automatic but rather is an effortful accomplishment, “grounded in practical consciousness” (Giddens 1984, p.60), and the synthesised theoretical framework underpinning this research places considerable emphasis on examining both ostensive and performative (Pentland and Feldman 2005) aspects of organisational routines. The ostensive aspect of organisational routines refers to the abstract patterns that participants use to guide, account for and refer to specific performances of a routine (Feldman and Pentland 2003). An interpretive case-study is an appropriate research strategy for this study since interviews, which are its main source of data (Walsham 1995), seek to capture the respondents’ interpretation of events and actions and illuminate beliefs and aspirations.

A qualitative research interview is an “attempt to understand the world from the subjects’ point of view, to unfold the meaning of peoples’ experiences, to uncover their lived world prior to scientific explanations” (Kvale 1996, p.1). As such, this research deliberately sought to engage with people in different roles and at different levels of organisational hierarchy within the IT Services department of XYZ University in order for the researcher to build fuller understanding of the wide variety of points of view and experiences within the organisation and how this diversity informs the range of situational contexts that respondents operate in day-to-day. The objective of the interviews was to try and engage with respondents such that they would describe what is important and meaningful to them in their own words without the constraints imposed by a priori categories or analytical constructs, thus making the interview both a source of information concerning facts and events and as a source of evidence of the perspective of the interview respondent (Trauth and O'Connor 1991).

Qualitative interviews can be categorised according to three basic types (Patton 1990). The informal conversational interview focuses on questioning in immediate context

and can occur spontaneously during the course of field work. Interviews of this type are highly individualised and not systematic, although can reveal valuable unanticipated information. At the other end of the spectrum, the standardised open-ended interview requires the interviewer to adhere to a strict script with limited flexibility allowed for exploratory deviation from the pre-prepared script. Interviews of this type are systematic and comprehensive but lack an individualised approach and may thus limit the researcher's exposure to other issues which the respondent may also deem valuable and relevant. Lastly, the interview guide approach is based on a pre-prepared list of topics of interest and some guide questions but allows considerable degree of individual flexibility for researcher to engage with the interview respondent to highlight issues of relevance and deviate from the pre-prepared list as deemed contextually valuable. Interviews of this type seek to mitigate for the limitations of the other two types and try to balance the individual approach and the interview as revealing as possible while preserving some structure to facilitate subsequent systematic analysis.

This research benefited from both informal conversational and guide interviews. The informal conversations tended to be brief and took place on numerous occasions with many individuals. Such conversations tended to be confined to one or at most two topics and were absolutely invaluable as leads for more in-depth investigation, or as follow-ups to previous interviews. Some of the conversations were initiated by the researcher in a premeditated fashion for example to ascertain the viability of a certain topic of enquiry. Other conversations were spontaneous and initiated by the respondents themselves – usually providing bits of background information, highlighting links between issues previously thought by researcher to be unrelated, or suggesting topics of enquiry. The informal nature of such conversations, for example several took place in a pub after work, did not lend itself to short-hand note-taking or audio recording, however field notes documented shortly after the event later proved to be a valuable source of data.

However, some of the most valuable data obtained during the course of this research came from in-depth, semi-structured interviews (Fontana and Frey 2000). The interviews were based on a loose set of topics of enquiry delimiting the outer boundaries of this research, namely – call logging, collaborative work practices,

service level management, knowledge reuse, and application of ITIL principles. For each topic, a very basic script had been prepared in advance, designed mainly for the researcher's benefit to ensure that each of the topics had been covered from a variety of perspectives during the interview. The semi-structured nature of the interview allowed this researcher to adopt a pragmatic approach and "be attentive and ready to put the interview guide aside" (Buchanan, Brody et al. 1988) to suit the progress of the interview, as well as make allowances for the respondent's level of experience and expertise by adopting different terminology and tone of the questions.

The pre-prepared interview guide contained not only the topics of enquiry of this research, but also supplementary material on which parts of the interviews were based allowing the researcher to probe more deeply into a variety of issues. For example, a typical interview script contained the following items: a) introductions and purpose of research; b) illustration of the respondents' role in their own words; c) discussion of the role of Help Desk software artefact in their daily work in their own words. Following that, the interview respondents were asked to describe a sequence of actions, sometimes by arranging a series of screenshots, in order by which they accomplish a certain objective (e.g. logging a call) – as a basis for triangulating our **task analysis**. At other times, interview respondents were asked to reflect on particular statistics obtained from TP HelpDesk software – as a basis for triangulating our **transaction log analysis**. The emergent and situated nature of respondents' daily work called for an examination of a wide variety of scenarios. Where interview respondents remarked that they would follow a course of action A, unless it was in circumstances B, they were asked to think aloud and outline as many alternative scenarios and their antecedent conditions as possible – as a basis for triangulating our **verbal protocol analysis** with other findings.

Although the focus of this research may not at first glance be as potentially controversial as organisational power and politics, such potentially sensitive dimensions nevertheless play a significant role in the theory of structuration (Giddens 1984), which forms the basis of our synthesised theoretical framework. More generally, all social research must address the methodological issues of the subjects' rights to freedom from coercion to participate in research, and constraints upon the undue use of deception and concealment – whereby voluntary informed consent is

considered by many to be the central norm governing the relationship between the investigator and the research participant (Kimmel 1998, p.67). This research complies with the London School of Economics and Political Science research ethics policy, and following (Pentland 1992), all interview subjects were informed that (1) no individual was obliged to participate in any way; (2) no individual or group was being evaluated in any way; (3) confidentiality would be maintained both with other individuals and with management; (4) the confidentiality of organisation and all persons involved would be protected with the public.

#### **4.5.5. Hermeneutic analysis and triangulation**

As shown above, the research presented in this thesis combined qualitative and quantitative evidence obtained through a variety of data collection techniques as part of an interpretive case study. Transaction logs quite readily lend themselves to statistical analysis to derive an initial understanding of how the Service Desk software is used within the organisation. However, transaction log analysis is also one most susceptible to researcher's bias, as statistical analysis depends on formulation of hypotheses to be tested using the underlying data pool. Therefore transaction log analysis in this research is used to identify major, easily visible usage trends, and serves as a foundation for the other forms of data collection and subsequent analysis through triangulation (as discussed further in this chapter). The other forms of data collection – archival records, semi-structured interviews, task analysis, and verbal protocol analysis, allowed the research presented in this thesis to collect large amounts of largely textual data.

A clearly defined empirical point of departure, combined with a well grounded research starting point afforded by transaction log evidence facilitated identifying and defining the data indicators, as well as relating the major data points to the conceptual constructs through the process of triangulation. The process of triangulation involves a continual juxtaposition and comparison of data collected from different sources that purport to describe the same phenomena (Zuboff 1988). Similarly, a major aspect of triangulation of empirical data involved checking inferences drawn from one set of data sources by collecting data from other sources – not necessarily in order to seek convergence of data but to deepen the understanding of apparently contradictory data (Trauth and O'Connor 1991). The principle of triangulation was invaluable both in



data collected and subsequent analysis in terms of following the guiding principles of interpretive research (Klein and Myers 1999), for example through dialogical reasoning, multiple interpretations, and contextualisation. Triangulation was thus the most effective method to access the different meanings that respondents attached to the same phenomenon, action of event, as well as illuminating a number of instances of systematic bias and distortions in individual narratives.

This research is based mainly, but not exclusively on qualitative textual data, in the forms of transcribed semi-structured interviews (including verbal protocol), notes taken during or immediately after informal conversations, and archival records to which the researcher had access to. Hermeneutic mode of analysis is appropriate to our study as it focuses on the centrality of language in transfer of meaning and aims to gain an understanding of the text that goes beyond the author's own understanding, by bringing forth implicit meanings and assumptions thus decipher indirect meaning of texts (Crotty 1998). Analysis of textual data is deceptively difficult as constructing traditional narratives can be a "burdensome and unrewarding activity" (Miles 1979, p.593) due to the sheer complexity of developing an appropriate coding scheme for subsequent tabulation and analysis. A full case study database, containing case study notes, documents, tabular data, and narratives, was maintained in order to preserve the chain of evidence. However, by focusing on note-taking in order to build an integrated narrative around the major data points, rather than attempting to write a number of narratives organised by data sources (Yin 1981), this research was able to benefit from building a coherent, multi-faceted understanding of the research domain.

Data collection and subsequent analysis were guided by the synthesised theoretical framework presented earlier in this chapter. The framework was applied in an instructive, rather than prescriptive fashion, applying the principles of hermeneutic circle and contextualisation to the idiographic data points from various sources in order to progressively derive a more abstract and generalised understanding of the whole. The concept of duality of structure and agency in structuration theory precludes a simple sequential understanding of the social world as structure and agency are interlinked, interdependent and the modalities of facilities, norms and interpretive schemes are distinct for analytical convenience but are empirically overlapping. The research presented in this thesis aims to account for the actions

observed, rather than present a description, however “thick” (Guba and Lincoln 1996). As such, although for clarity of presentation and facilitation of analysis the following sections introduce the findings and analysis of our case study in a largely linear fashion, it should be kept in mind that the integrated narrative was achieved through a great many iterations between the data points, operational constructs, and theoretical concepts.

#### 4.5.6. Major data types and summary of empirical data

Four major types of empirical data are relevant to this research, as outlined in the following table:

Data Object	Data Interpretation
Mission statements, operating procedures, SLDs/KPIs, management reports, directives on use of Help Desk software. Collected as textual data.	Trace of the ostensive aspect of organisational routine. Indication of norms influencing daily work activities.
Archival computer traces detailing interaction of support analysts with the Help Desk software. Collected as system transaction log data.	Trace of the performative aspect of the routine. Engagement with particular norms and resources through ongoing use of Help Desk software.
Configuration/customisation of Help Desk software to facilitate particular ongoing processes and data capture: e.g. Hot Topics, auto-populated data input fields. Collected as screenshots of GUI, algorithmic representation of work process.	Trace of the interaction between performative and ostensive aspect of the routine. Interaction with and between norms and resources influencing the daily work of support analysts.
Interviews with support analysts focusing on their sense-making and signification of particular forms of interaction with the Help Desk software. Collected as field notes, transcribed retrospective verbal protocols, and interview notes.	Trace of the interaction between performative and ostensive aspect of the routine. Indication of interpretive schemes held by support analysts, including particular assumptions, wider industry experience and knowledge.

Table 10: Major empirical data types

Written strategic mission statements, operational plans, standard operating procedures, service level definitions (SLDs), key performance indicators (KPIs), and samples of service reports used to support management decisions provide a view on the (codified) operational orientation of the service as a whole, and the ongoing objectives put before technical support staff. Such data, including the particularities of language of the documents, provides a trace of the ostensive aspect of the routine as work processes presented to individual support analysts by the organisation – as such an indication of the norms influencing the daily work activities by individuals.

Archival computer traces detailing the interaction of the support analysts with the software provide a view on the real-world ongoing service activities as carried out by technical support analysts. Such data provides a trace of the performative aspect of the routine as work processes actualised by individuals within the organisation through daily ongoing engagement with the technological artefact.

Configuration of the software artefact as it relates to facilitation of particular ongoing processes and emphasis on capturing particular data provides a view on the instantiation of particular facilities in the software artefact. Such data, provides a trace of the interaction between the ostensive and performative aspects of the routine as particular forms of engagement with the software artefact presented to individual technical support analysts by the organisation – as such an indication of interaction between the norms and facilities influencing the daily work activities by individuals. It is important to note that such configuration, although instantiated in the software does not mean that the technological artefact itself embodies particular rules and resources. Instead, the characteristics of the technological artefact become rules and resources drawn upon by individuals in the course of their interaction with the software artefact, as will be demonstrated further.

Interviews with technical support analysts focusing on the ongoing engagement with the software artefact provides a view on the way individuals make sense of, and attribute significance to, the norms influencing daily work activities, ongoing engagement with facilities instantiated in the software artefact, the facilitation and emphasis of particular forms of engagement with the software artefact, and the links

between these three elements. It is important to note that operational instantiation refers not to the instantiation or embedding of rules and resources within the technological artefact, but rather facilitation and emphasis on (or control of) particular forms of engagement, where individual technical support analysts have the option to do otherwise. It was often the case that the technological artefact was either not-used in a variety of circumstances or used in was different from the original design, and in both cases empirical data pointed to emergence of structures through technologies-in-use, rather than inscribed within the artefact. Such data provides a trace of the interaction between the performative and ostensive aspects of the routine at individual and group levels – as such an indication of the interpretive schemes, including particular assumptions and wider industry knowledge and understanding held by individual support analysts influencing their daily work activities.

The case study spans a period of 5 years in terms of the scope of empirical data such as transaction logs and documentary evidence made available to the researcher. However, for practical reasons access to the research site was limited to only a few months during early 2006 and thus the study benefits from a historicity of perspective, but does not constitute a longitudinal analysis. Similarly, for practical reasons extended (in-situ) observation of study participants was not possible. Nevertheless, the historicity of perspective afforded to this research is reinforced by the fact that we were able to interview a number of individuals who had not only been with the organisation for a number of years, but had also changed roles within the IT Services department. In fact, comparing responses of people who held the same role at different times allowed this research to gain an invaluable perspective on the persistency aspect of organisational routines. To this end, during early 2006, a number of individuals who have held a wide variety of roles within the IT Services department throughout 2002-2006 were interviewed, as illustrated at appropriate points later in the thesis and summarised in the following table:

<b>Role, brief description of responsibilities</b>	<b>Individuals Interviewed</b>
Academic Support Manager	2
Help Desk Manager	2

<b>Role, brief description of responsibilities</b>	<b>Individuals Interviewed</b>
Help Desk Officer	2
Help Desk Advisor	3
PC Support Team Manager	1
PC Support Officer	1
Cluster Support Specialist	2
Cluster Support Officer	2
Systems Team Specialist	1

**Table 11: Interviewee Summary**

In addition to the interview material, this study was able to benefit from the following sources of empirical data which are used in various sections throughout this thesis:

<b>Data Object</b>	<b>Data Source</b>
Transaction Logs	203,707 incidents logged in the Help Desk software during 2002-2006
IT Services department documentation	Annual reports: 2000-2006 (5 documents) Strategy Plan (2 documents) Annual team operational plans (16 documents) Departmental and team support/service policies (5 documents) Departmental and team service level definitions (7 documents) Extracts of operational managers monthly meetings as pertaining to use of TP HelpDesk software (56 documents) Internal training documentation (6 documents)
TP HelpDesk software artefact documentation	Software manual covering administration, usage and design including key processes, workflows and database schema (12 documents) User Interface screenshots (43 documents)

**Table 12: Empirical Data Sources Summary**

#### **4.6. Chapter summary**

This chapter presented the ontological, epistemological and methodological foundation of the research presented in this thesis. Following a review of positivist,

interpretivist and critical perspectives, the interpretivist approach rooted in constructivist epistemology and realist ontology is presented and justified in terms of our research objectives. Following the conceptual and practical points of departure developed in Chapter 2, this research aims to develop “an understanding of the *context* of the information system, and the *process* whereby the information system influences and is influenced by the context” (Walsham 1993, p.4-5). This chapter then discussed the practical considerations of site selection and outlines how and why the TP HelpDesk software use in IT Help Desk team of IT Services department of XYZ University was chosen. Following that, the chapter grounded the synthesised theoretical framework developed in Chapter 3 in terms of general underlying principles of interpretive research, as well as specific data points and data collection and analysis methods. The research presented in this thesis employs triangulated analysis of multiple data sources, including transaction logs, task organisation, verbal protocol, in-depth semi-structured interviews, and documentary evidence.

The following chapter presents a description of the architecture and functionality of the TP HelpDesk software artefact with specific reference to the default configuration and in-built customisation options.

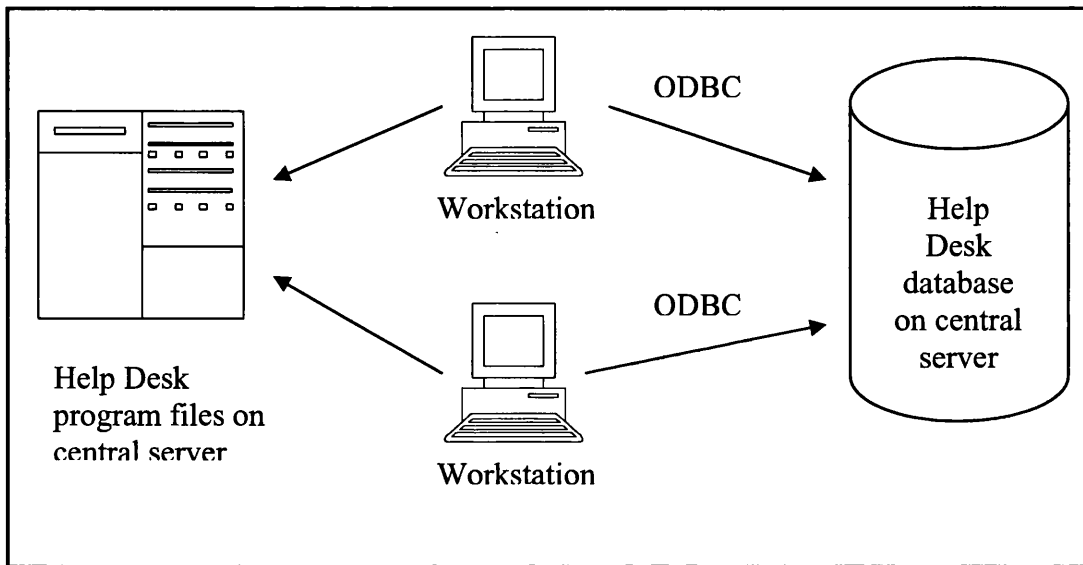
# CHAPTER FIVE – TP HELPDESK SOFTWARE ARTEFACT

## 5.1. Chapter introduction

This section introduces the TP Help Desk software artefact, which ‘automates and organises your help desk by tracking calls and ensuring that any agreed service levels are fulfilled’ as stated in the manual, thus providing core Incident and Service Level Management functionality in ITIL terminology. For the purposes of our analysis, this Help Desk software can be conceptualised as almost consisting of two separate software products: the generic out-of-the-box product and the product which has been deployed within a particular organisation. The reason for this distinction is that the vendors of this Help Desk software include a number of modular functionality options which the client organisations may chose not to implement, as well as extensive customisation options whereby the client organisation is able to customise some of the functionality as well as the look and feel of this Help Desk software to suit their needs. As such, the choices made by the client organisation with respect to the functionality and customisations represent empirical evidence of considerable significance to understanding the process of daily use of the Help Desk software by technical support personnel. The following parts of this section focus on the underlying principles, default functionality and GUI, and the technical process by which customisations of this software can be implemented at a client organisation.

### 5.1.1. Software Architecture

The TP HelpDesk software is designed as a client-server application ‘*combining the user-friendly front-end of Microsoft Windows with a choice of powerful databases*’ (software manual), with all Help Desk data and configuration information stored in a central database. It is necessary to briefly consider the deployment and architectural features of this Help Desk software in order to be able to analyse the ways in which customisation options are implemented in the product by the software vendor and used by the client organisations. The following chart illustrates the general setup and architecture of the TP HelpDesk software system:



**Figure 8: TP HelpDesk software architecture**

The core TP Help Desk program files, such as application executable, supplementary components and management reports, are installed on a dedicated application server located in the data centre, with members of staff accessing the main executable via a network shortcut. The Help Desk database is installed on a central database server. The technical support personnel workstations contain a limited number of auxiliary registry settings, and can run the TP HelpDesk software user interface via authenticated access to the program files on the application server and connect to the TP HelpDesk system database by configuring an appropriate data source using Open Database Connectivity (ODBC) standard middle layer. Such separation of application and database from the workstations allows point upgrades (e.g. 6.3 to 6.4 – such updates consist mainly of bug-fixes, and do not include major feature releases), and administrative changes and maintenance to be applied centrally without the need to reconfigure the workstations – for example, ODBC provides access to the database regardless of what database engine (e.g. Microsoft SQL Server or Oracle) hosts the system. The version of the software deployed at the time of this research was 6.4.

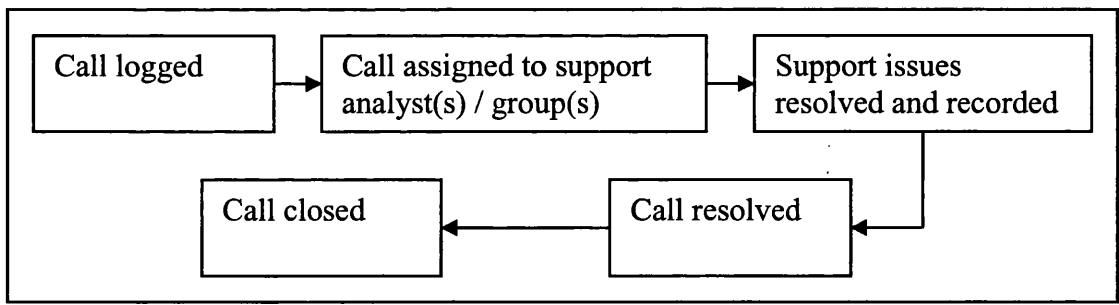
### **5.1.2. Elements and Workflow**

The TP HelpDesk Software “automates and organises your help desk by tracking calls and ensuring that any agreed service levels are fulfilled” (software manual). The TP HelpDesk software includes an end-user (customer) database and a sophisticated



report writer (Crystal Reports), which enables the production of standard or customised reports. The software is based around Incident Management call-logging functionality with a number of additional (separately licensed) vendor-supplied and certain third-party modules providing other features, such as auto-discovery of networked hardware and recording into inventory database, remote control of end-users' PCs, knowledge base, and advanced call search (find similar calls).

A “call” refers to support requests from “end-users” of the Help/Service Desk and is the basic unit of information held in the system. A call has a number of components, such as “action tracks” – steps required to resolve the problem; “reminders” – pop-up alarms or system messages to support analysts; “notes” – free-text comments, attached to the entire call or to its action tracks; and “documents” – files attached to the call by the support analyst. Responsibility for the call and the action tracks is reflected in “assignments” of the call to support analysts and/or groups. A call logged in the TP HelpDesk software must have an assignment to a support analyst or a support group, and can contain multiple assignments to multiple support analysts or support groups. The software is based on the following basic two-step resolution incident management process:



**Figure 9: TP HelpDesk Software Incident Process**

**5.1.3. Graphical User Interface (GUI) Layout**

Figure X, below, illustrates the general layout presented to technical support analysts working on a call logged in TP HelpDesk software. The left-hand side of the application screen accommodates the Call Task and Call Info panes, and the main workspace on the right-hand side displays the various windows for data entry and display, such as the Call Details window (pictured).

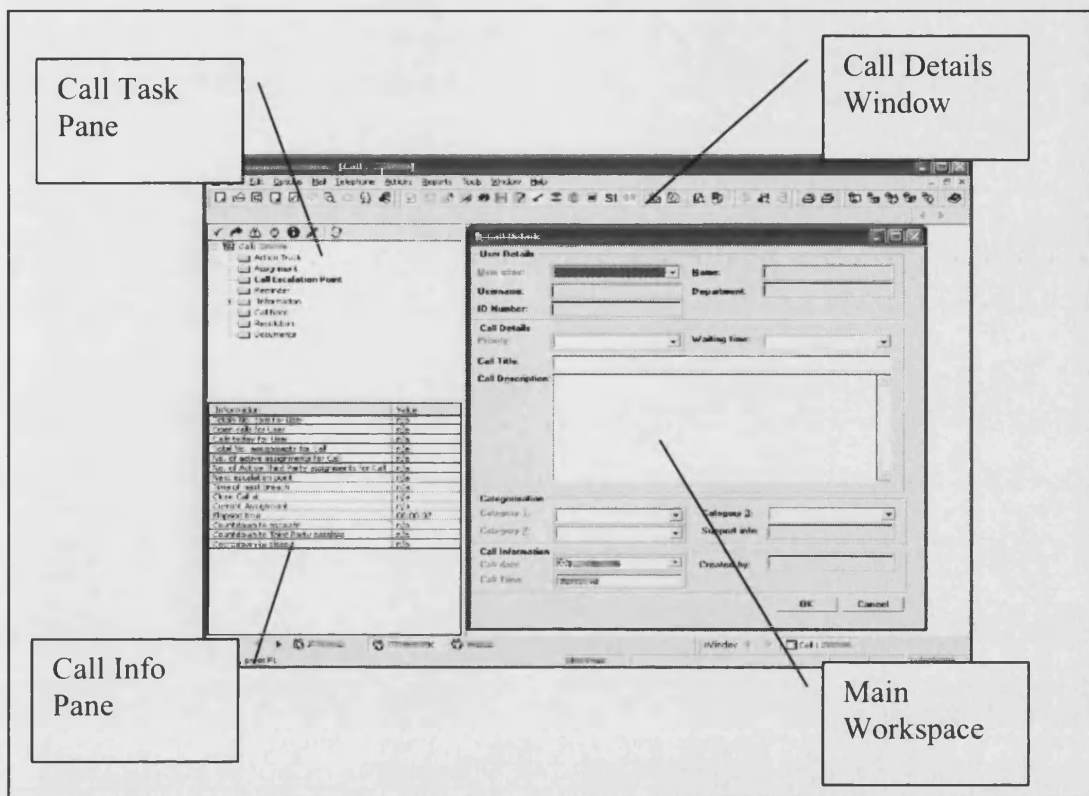


Figure 10: TP HelpDesk Software GUI layout

The software includes numerous screens providing access to all of the functionality of the artefact, including updating end-user records, updating inventory records, setting up analysts, configuring security permissions, etc. This section outlines those windows which were found significant during the research, namely those required to log and progress a call through the system, with particular emphasis on customisations made to those windows, including differences in customisations for different teams.

#### 5.1.4. Service Level Management

Being able to monitor and report on the quality of service provided by the technical support function to the organisation, as an indicator of Business-IT alignment is frequently cited as a key top-level management concern (Luftman and McLean 2004). Similarly, being able to monitor workloads, identify trends and areas for improvement, are crucial to the successful day-to-day management of a Help Desk. TP HelpDesk software includes a number of facilities enabling management reporting, which can be broadly classified into real-time “workload-related” alerts, and aggregate “performance-related” historical reports.

Real-time “workload-related” alerts are based on a defined maximum elapsed time for dealing with particular calls (“turnaround time”), for example closing calls within 8 business hours. The software includes a “Workload list” window which shows all calls currently assigned to the support analyst and/or group, ranked in order of severity – items change colour and are shown higher on the list following breach of one or more service levels, as shown in FIGURE X, below.

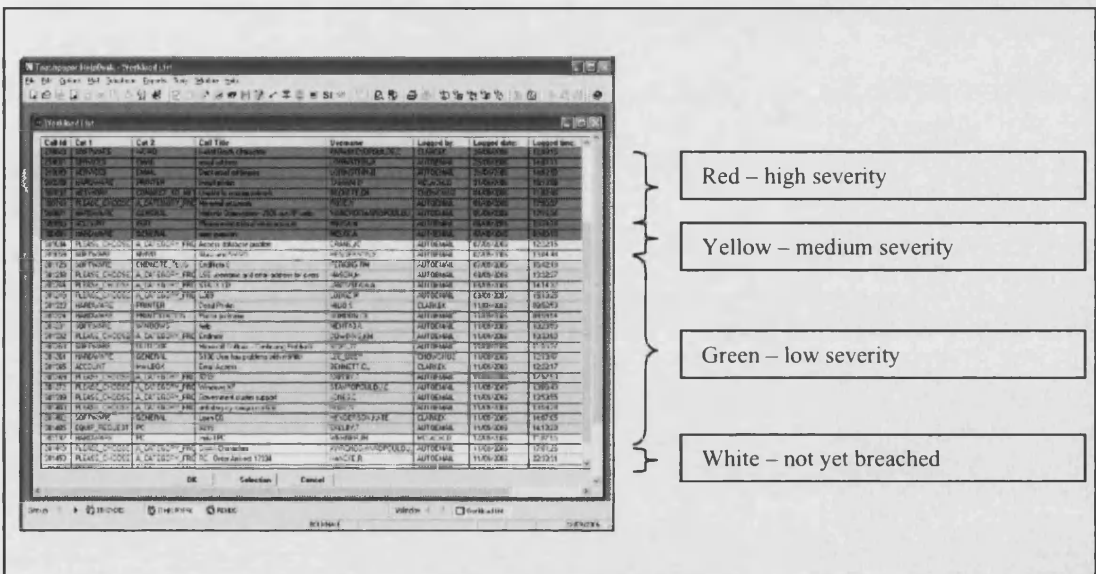


Figure 11: TP HelpDesk Software GUI - Workload List

Aggregate historical service level reporting evaluates various categories of data stored in the Help Desk database against a set of criteria defining a particular management report, which may or may not be based on actual service level definitions. TP HelpDesk software provides standard and customisable reporting functionality built on an industry standard software package called Crystal Reports, and includes a number of standard management reports, such as ‘show all calls currently outstanding for a particular team’ as well as allowing for sophisticated reports to be designed by the client organisation itself.

**5.2. Help Desk Software Customisation Options**

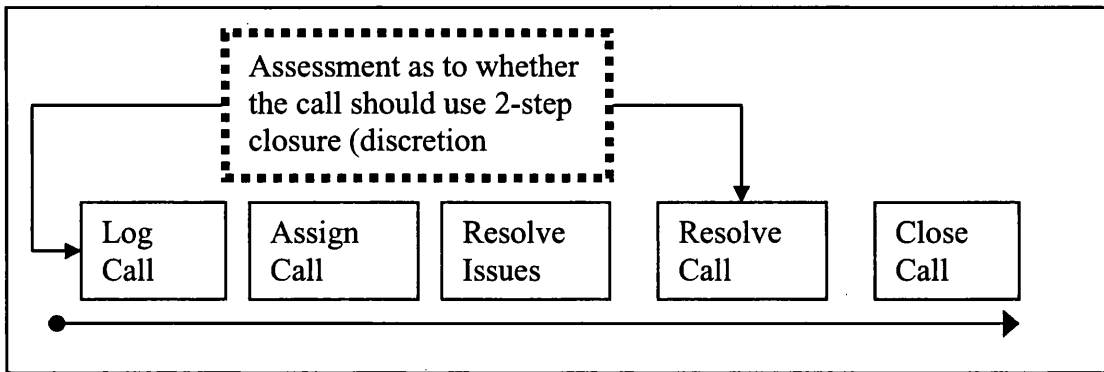
As illustrated in our literature review chapter, it is accepted in the industry that it is not possible to use a generic Help Desk software tool without customisation, and products designed to appeal to maximum number of potential customers (so to

everybody, and therefore by extraction, to nobody in particular) cannot anticipate the idiosyncrasies of any one particular implementation (Bruton 2004). Similarly, TP HelpDesk software vendor positively advertises such flexibility of the product as a major selling point – *‘Help Desk [software] is pre-configured to match most of the requirements for most help desks. However, one of the most powerful features of Help Desk [software] is the way in which almost every element can be configured.’* (software manual).

It is important to highlight the importance of customisation in deploying the Help Desk software artefact to a particular client organisation. Customisations allow non-trivial changes to be made to the functionality and presentation of the Help Desk software independently both between organisations and between different groups/teams within the same organisation. Such changes serve to bring the default out-of-the-box configuration of the software artefact closer to the particular organisational context of the client organisation, and as such represent an extremely valuable source of empirical data for examining the use of the software artefact within an organisation, both as evidence of mapping particular artefact capabilities to particular organisational contexts, and as anchor points for asking interviewees to reflect on the particulars of using the software artefact at their site.

### **5.2.1. Customising workflow**

The basic Incident Management workflow as presented in the diagram below cannot be altered within the Help Desk software, however a number of features allow the Help Desk software to be adapted to variations in local implementation context. The simplest workflow customisation option supplied by the software vendor is the ability to utilise a single-step call closure instead of a two-step call-resolution/call-closure process for some or all calls, and some or all support teams. In this way, two-step closure can be used in instances where quality assurance or supervisor authorisation is required as part of the working procedure before a call is closed. Even a seemingly simple customisation option such as this one allows for powerful implications with regard to the workflow the Help Desk software is supposed to support, both from procedural and implementation in technology standpoints.



**Figure 12: TP HelpDesk Software: Customising Workflow**

For example, an assessment needs to be made as to whether a particular call or group of calls should use 2-step closure – this assessment can either be left in the hands of the 1<sup>st</sup> line support personnel who receive the call from the end-user, or be implemented procedurally by making all calls go through 2-step or 1-step closure without allowing discretion. Moreover, such assessment can be implemented procedurally by requiring sets of calls identified by call category (e.g. calls about “X”), or sets of calls identified by end-user category (e.g. calls from end-user “X”), or sets of calls identified by 1<sup>st</sup> line support analysts category (e.g. calls logged by analyst “X”) to be logged with 2-step or 1-step closure process. Furthermore, where discretion on choice of call closure procedure is allowed to analysts progressing the call in the Help Desk software, such choice can be implemented procedurally at the start of a call (e.g. decide on procedure and click on appropriate button) or once the call is ready to be closed (e.g. decide whether supervisor should assess and confirm). The range of possible options is greatly extended when responsibility for logging calls (e.g. 1<sup>st</sup> line) is separated from responsibility for resolving calls (2<sup>nd</sup> line) and/or closing calls (supervisor), and where responsibility for categories of calls is differentiated between support teams according to areas of functional responsibility (e.g. only team “X” is allowed to close calls about “X”). Similarly, the choice of initial call assignment (responsibility) can be made discretionary or compulsory: some procedures may require calls to be initially assigned to the analyst/group who log the call (e.g. team “X” is initially responsible for all calls), other procedures may allow 1<sup>st</sup> line support analysts to immediately hand over responsibility for the call to another support analyst and/or group (e.g. all calls about “X” should be immediately logged for team “X”).

## 5.2.2. Customising entities, data elements and GUI

In addition to the operational data, the Help Desk database schema holds the data definitions for entities, elements, views and windows – all of which can be customised by the client organisation. Entities are system objects and can be renamed system-wide: for example, some organisations place considerable importance on using correct terminology and refer to technical support personnel as “operators” rather than “analysts”, or “call reference” instead of “ticket number”. Elements are data items within the database (such as EndUserID) and can be added to the default out-of-the-box database: for example, some organisations may want to customise the types of information they hold about the end-users, and can add extra contact details data elements. Views allow different support analysts or groups different displays of GUI windows on the same information: for example, some organisations may limit the amount of information visible to a 1<sup>st</sup> line support, and give 2<sup>nd</sup> line support analysts greater access. Windows are the Graphical User Interface (GUI) forms used to record support analysts input and display information back to the analyst: window layout can be customised extensively by adding, removing or rearranging default and custom elements. Views allow groups of customised windows to be presented to different groups of support analysts. Therefore, as shown in FIGURE XXX, technical support personnel from teams A and B working on workstations A and B respectively, may share a common installation of both core Help Desk software program components and the backend database – allowing collaboration on logging and progressing support enquiries, and yet utilise different instances of customised windows and elements in their workflow.

Customisations such as elements definitions, window geometry and element components, and view groupings are held in the database and are editable by client organisations using a vendor-supplied utility called TP HelpDesk Designer. The following diagram briefly illustrates the process of implementing customisations to the out-of-the-box configuration of elements, views and windows in TP HelpDesk software. A new data element (e.g. additional call reference) can be added to the database schema [1] and defined as per data type, validation rules and input masks. This new data element is then added to an appropriate underlying data table (e.g. call table) [2]. Setting up a new view [3] allows for customised instances of various

windows to be grouped together [4], and the new element can be added to the required window in the selected view [5].

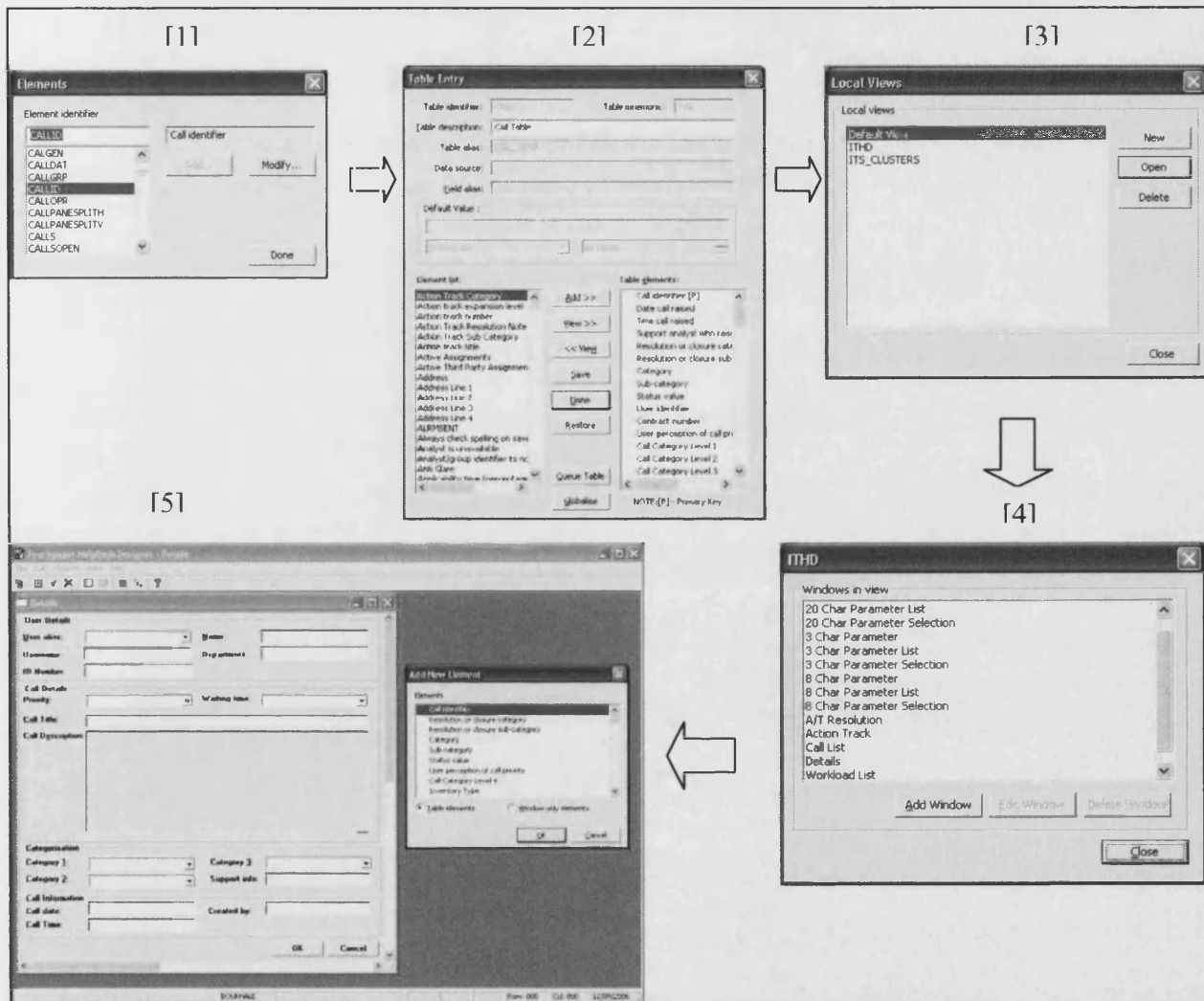


Figure 13: TP HelpDesk Software - Customisation Tool

Furthermore, table elements and window elements, although relating to the same underlying data element, have separate layers of validation. For example, a table element can be defined as data type (e.g. string) and a particular input mask to validate data entry (e.g. a string in the form of XX-YYYY). However, the same table element can be referred to in different ways in different windows. For example, one window may be designed to allow analysts to update the stored value of a particular data element, subject to the data type and input mask constraints, whilst another window may be designed to only look-up the value of a particular element, in which case the window element will not allow updating of stored values. Furthermore, window elements can be configured as compulsory entry, thus not allowing the

analyst to proceed with an operation until a value has been entered for that element. Certain types of data elements can be appropriately set up in a relevant data table to function as drop-down lists when referenced from a window, and such lists can have multiple levels, whereby selecting an item from a top tier (e.g. category 1) presents the relevant subset from a lower tier (e.g. range of category 2 items appropriate to the selected category 1 item).

It is interesting to note that since the element, view and window customisations are stored in the database and are separate from the core application executable, changes to the TP HelpDesk software installation can be implemented without recompiling the executable, and without changes to the auxiliary settings stored on the technical support personnel workstations. In addition to that, customisations to data elements and windows allow for significant flexibility in how TP HelpDesk software is configured in a particular local context. For example, the 'room number' data element can be linked to a number of windows in UI in a variety of ways, including making it read-only, or applying input masks in addition to back-end integrity constraints implemented at the database level. Window design customisations allow for alterations to the context of operation of this software in both subtle and radical ways: for example, underlying a label identifying an important data element, or bringing it to a more visible part of the screen is a relatively subtle indication of the data element's significance compared to making the data label bold/red typeface, or even making it a 'compulsory input' element. Furthermore, as such facility to customise the data elements, views and windows is supplied by the vendor, the TP HelpDesk Designer utility takes care of the underlying data integrity and thus the customisations implemented using the TP HelpDesk Designer utility are fully supported by the software vendor, and retained in the software upgrade cycle. Customisations to the software are carried out by client organisation staff themselves, typically by a few individuals who have received appropriate vendor training and have a suitable level of security permissions in the software system.

It is also important to note that not all windows which form part of the software can be customised. Using Figure 10 as an example, the general layout of the screen designating the functionality of the three panes cannot be altered. Furthermore, the left two panes showing the actions pertaining to the call currently open (top pane) and



the information pertaining to that call (bottom pane) are fixed as shown on the screenshot below and cannot be customised. For those windows that can be customised, all are included in the default view which applies to all analysts unless a different view is specified for that analyst, team, and/or role.

### **5.2.3. Customising call-logging with Hot Topics**

Help Desk software includes a powerful mechanism for facilitating variations of technical support workflow by creating templates (called “Hot Topics”) for logging calls. Such templates simplify call logging process by pre-populating data or automating decision points. For example, clicking on a button corresponding to Hot Topic “X” can automatically log a call for end-user “X”, call category “X”, assigned to team “X”, with the call set up for 1-step closure procedure. A Hot Topic allows optional pre-configuration of the call components, and this allows for complex procedures to be reflected in the software set up. For example, clicking on a button corresponding to Hot Topic “Y” can log a call for end-user “Y”, call category “Y”, call description pre-populated as “YYY”, with multiple separate action tracks for teams “A”, “B”, and “C”, initial responsibility for the call for team “Y”, specifying 2-step call closure procedure. Hot Topic customisations as implemented by various teams at the research site will form a significant part of the analysis presented in this thesis.

### **5.2.4. Customising Teams and Roles**

The TP HelpDesk software system is designed to allow individual support analysts to be organised into teams, where a single analyst can be a member of one or more teams. From workload management point of view, team membership reflects the organisation of IT support processes within the organisation, whereby all analysts with first line support responsibility can be grouped into one team, separate from, for example, the “network administrators” team. In this case, calls can be passed on from an analyst in the first line support team to a particular individual in the “network administrators” team, to a particular individual in the “network administrators” team and the team as a whole, or the “network administrators” team as a whole. Grouping support analysts into teams allows for all members of a particular team to have shared access to a particular set of Hot Topics window layouts, and workload lists.

From security roles point of view two broad levels of security privileges are possible to configure: the standard analyst role and the supervisor role. The supervisor role has elevated privileges over the standard analyst role in that it allows access to calls assigned to any individual analyst within the team, any analyst within the team and the team overall, and just the team overall, whereas the standard analyst role allows access to calls assigned to that particular analyst and/or the team. Role-based security permissions allow further fine-tuning access to various features of the software, such as configuring a particular role to read-only or write access to knowledge base.

### **5.2.5. Customising Service Level Management Reports**

Although this Help Desk software allows a call to have only one service level at any given time, that service level can be set in a number of ways: directly selected when logging the call, set as a system-wide default, set as a user default, or defined by a contract. Contracts can include service levels for a particular call category, and allow for different service levels to be set up for the same end-user: for example if an end-user calls to ask about a non-urgent item, such as a training course, a different service level would apply than if the call had been about a system crash. Service levels include a number of escalation points (which are triggered when a pre-defined percentage of the turnaround time has elapsed), corresponding severity levels (which determines the position and colour of the call as presented on the workload list), and corresponding alert messages (pop-up notifications to support analysts and/or groups) to monitor the call's progress and its urgency. All of these components are configurable by the end-user organisation. For example, where a call has a service level of turnaround in 8 business hours and breaches its first escalation point set at 50%, the Help Desk software can be configured to send a message to the analyst/group responsible for the call and escalate the call on the workload by changing its colour and rank in the workload list, as illustrated in FIGURE X, section 1.2.4.

The architectural design of the Help Desk software also allows for a great degree of customisability of service level management reports. Historical or real-time service level reports query the database directly using a combination of technologies such as Structured Query Language (SQL) to construct the query, Open Database Connectivity (ODBC) to make a connection to the database, and Crystal Reports or

Microsoft Access Reports to graphically present the query output. For example, a management report showing the number of closed calls logged by a particular support group within a particular date range would query the Help Desk software database using the following pseudo-SQL query: “SELECT COUNT(\*) FROM CALL\_TABLE WHERE CALL\_STATUS='CLOSED' AND GROUP\_LOGGED='GROUP\_X' AND DATE\_LOGGED>='YYYY-MM-DD' AND DATE\_LOGGED<='YYYY-M1-D1’, and utilise front-end packages such as Crystal Reports to assist in both building the query and presenting the output. Such flexibility of reporting allows historical service level management reports to be divorced from the real-time alerts and monitoring, although historical reports can also query the call escalation audit trail to match real-time reporting.

### **5.2.6. Customising links with other systems and databases**

Links with other systems and databases allow for data to be imported, exported or updated directly in the database to simplify the process of system administration. For example, although it is perfectly possible to manually set up all end-user (customer) records in the Help Desk software, a larger number of end-user records to be updated will make such manual operation prohibitively expensive, and an automatic update from an existing data source such as the organisation’s MIS system is preferable. Furthermore, the Help Desk software back-end resides on industry standard platforms such as MSDN, MS SQL Server or Oracle – direct access to the database is therefore possible using a variety of tools, including via ODBC connectivity, bypassing tools supplied by TP HelpDesk software vendor.

It is possible to export and import data directly from/into the backend database using a vendor supplied utility, which assists with setting up a mapping file to set up a match between fields in the source and destination databases. The actual process of exporting and importing data involves the use of a separated variable data file, such as a comma separated variable (CSV) file. TP HelpDesk software vendors strongly recommend that good understanding of the backend database structure is required before such action is undertaken.

### **5.3. Chapter summary**

This chapter presented a thorough description of the architecture and functionality of the TP HelpDesk software artefact. A recent review of Information Systems academic literature found that many writers give central theoretical significance to the context, the discreet processing capabilities of the artefact or the dependent variable object of research at the expense of taking the technological artefact for granted or considering it unproblematic once built and installed (Orlikowski and Iacono 2001). Furthermore, as illustrated in our literature review in Chapter 2, modern ITSM software platforms, including TP HelpDesk software are designed to support the core ITIL principles of Incident, Service Level, Inventory and Configuration Management Database (CMDB) and include a number of optional functionality modules and a toolset for customising data, interface, and process flows. A thorough description of the customisability options was therefore necessary in order to determine whether customisations done to TP HelpDesk software at IT Services Department of XYZ University fall within the scope envisaged by TP HelpDesk software vendors.

Moreover, explicit description of the TP HelpDesk software was vital in order to introduce the reader to the conceptualisation of this artefact as almost consisting of two separate software products: the generic out-of-the-box product and the product which has been deployed within a particular organisation. The following chapter discusses the organisational context of the research site and the particular configuration of the TP HelpDesk software artefact used by the various teams at the research site.

## **CHAPTER SIX – PRELIMINARY FINDINGS**

### **6.1. Chapter introduction**

Chapter 6 presents the preliminary context findings of the research presented in this thesis as relates to the research site and the customised deployment of the software artefact at that site. Firstly, the organisational context of the research site is reviewed with specific reference to the strategic and operational objectives, organisational structures, service level definitions, orientation of support processes, physical location context and other aspects. Secondly, preliminary transaction log analysis is used for identification of the primary empirical focus of this research. Configuration of the TP HelpDesk software artefact at the research site is reviewed with specific references to the instantiation of organisational processes as workflows in the software package, data capture configuration, User Interface (UI) configuration and customisation for different teams. Following that, Chapter 6 relates the preliminary findings to literature review and conceptual and practical points of departure developed in Chapter 2, the synthesised theoretical framework developed in Chapter 3, the data collection and analysis methodology developed in Chapter 4. Chapter 6 concludes by presenting preliminary findings of the case-study in discussion of the triangulation and overlapping nature of empirical evidence collected at the research site, and development of a synthesised analytical point of departure, including early empirical evidence of contextuality of the role of TP HelpDesk software in the technical support organisational routines.

### **6.2. XYZ University**

XYZ University is one of the leading social sciences universities, ranked in the top 15 in the world (in 2004) and in the top 5 in the UK (in 2006) by The Times Higher Education Supplement. XYZ University has over 7,500 FTE (full-time equivalent) students, 66% of whom are from outside the United Kingdom; 51% are postgraduates. XYZ University has over 1,732 FTE academic staff, 97% of whom are actively engaged in research and many are engaged in UK public policy development by membership of policy committees (2006 data). There are over 30 active research centres at XYZ University, most of which are financed by industry, commerce, research councils or charitable foundations.

Reporting directly to the Director of XYZ University, the Librarian and Director of Information Services is responsible for managing the XYZ University's Library and the IT Services department. According to the 2005-2006 annual report, the IT Services department looks after the entire technology and technology support services of the XYZ University, such as looking after desktop infrastructure including over 900 open-access campus PCs for students; network infrastructure including 9,680 network points of which 2,650 are in student Halls of Residence bedrooms; systems infrastructure including email system handling an average of 1,280,000 emails/week; and IT support and training for all students and academic and administrative staff. The IT Services Department has 73.5 FTE staff and consists of three groups: Management Information Systems (MIS), Technical Infrastructure, and User Services.

The IT Services department's activities are organised around a number of strategic and operational priorities. In introduction to the 2003-2007 strategic plan the Librarian and Director of Information Services states that '*The watchword [...] is user requirement [...] it is the job of ICT providers at [the University] to know and understand the (changing) needs of our users*'. As such, the strategic and operational priorities are organised around end-user requirements in order to '*provide appropriate facilities to support teaching, learning, research ... within the available resources*' and the ongoing services delivered by the IT Services department to its end-user community are formulated and operational targets made explicit in Service Level Definitions (SLDs). The teams within the department follow the strategic priorities and objectives with specific operational plans (collated as the departmental operational plan) with forward and backward looking components, where the same priority can be traced as an objective in a preceding year and an accomplishment in the following year. For example, operational priorities such as '*Established Service Level Definitions and Software Support Policy to provide a more informed and effective service*' (2001-2002) and '*Reports to be available on SLDs, number and category of queries received*' (2002-2003) illustrates the importance of formalised measurable service delivery to the operational orientation of the department's activities.

The IT Services Department at XYZ University aims to '*adhere to and promote best practice within the [University], the academic community and the IT industry and ensure compliance with regulatory requirements*', as stated in the departmental strategic plan. At the time of this research, the department was in the early stages of planning an organisational processes review which was to incorporate elements of ITIL best-practice, and was beginning to send personnel on ITIL training courses. Therefore, this research was not able to benefit from using results of a formal evaluation although observation and interviews with technical support personnel confirmed a significant level of familiarity with ITIL best-practice and terminology as will be demonstrated further in this chapter. All teams in the IT Services department use '*... a common help-desk system to log, trace and forward support calls*' as per the XYZ University's strategic plan.

This thesis focuses on the role of ITSM software in organising the IT support function in the department, and the ongoing use of the ITSM software by members of IT Services staff to deliver support services to the department's end-user community. As stated in earlier in the earlier chapters, the research presented in this thesis does not present a longitudinal analysis of the research site. However, this thesis is able to benefit from a historicity of perspective afforded by the archival records made available for this research. For example, a useful empirical point of departure for this research is a preliminary transaction log analysis of the usage of Help Desk software within the IT Services department, encompassing a total of 203,707 calls recorded in the Help Desk software, covering the entire five-year period of this study (2002-2006). The following chart illustrates that the majority of calls recorded within the software are logged by the Student IT Help Desk team (later referred to simply as IT Help Desk team):

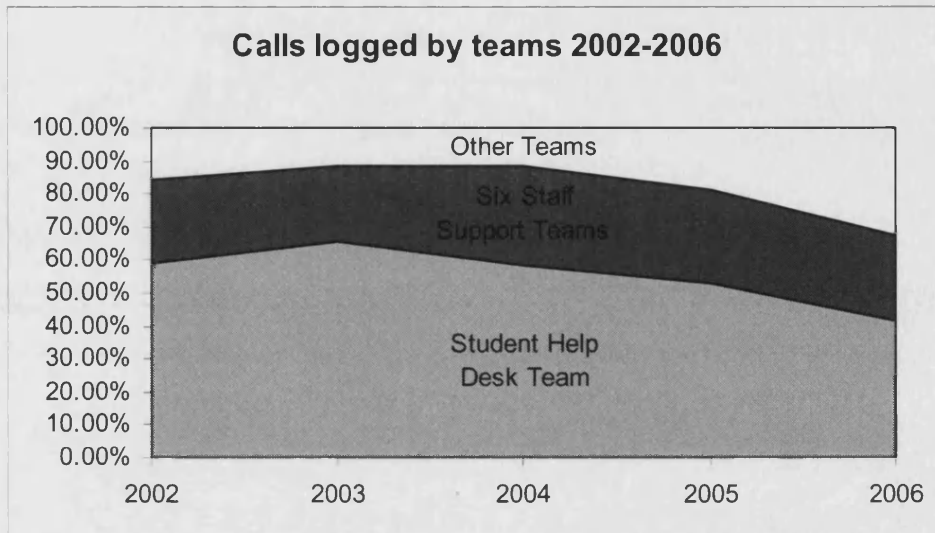


Figure 14: Preliminary Transaction Log Analysis

Therefore, a pragmatic empirical point of departure for this research is the IT Help Desk team, which will allow an in-depth analysis of the variety of IT support activities and the role of ITSM software in organising those activities in a practical, defined-scale setting. The following organisational chart sets out the organisational context in which the IT Help Desk team operates within the IT Services department.

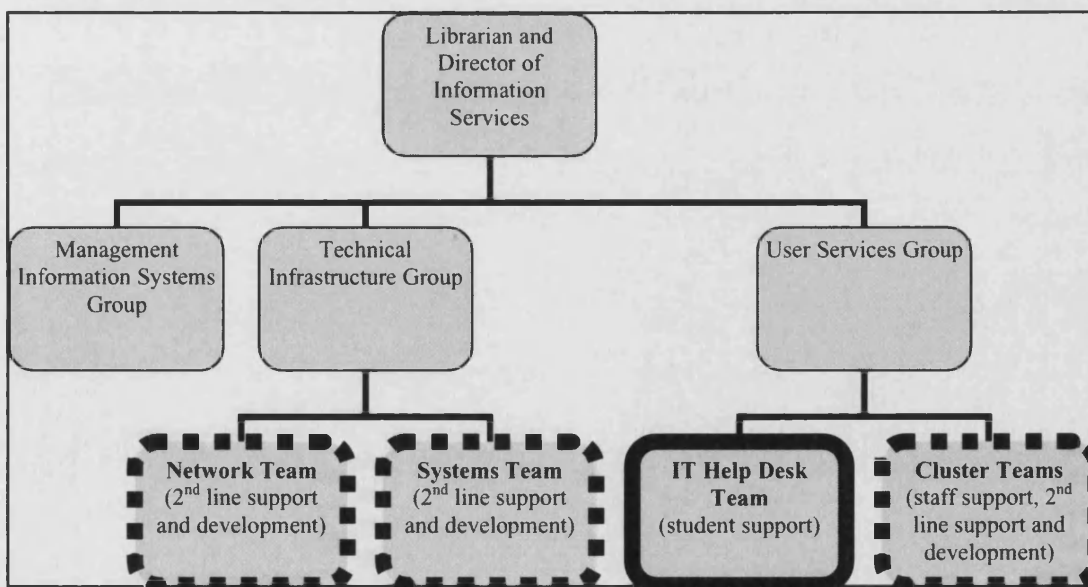


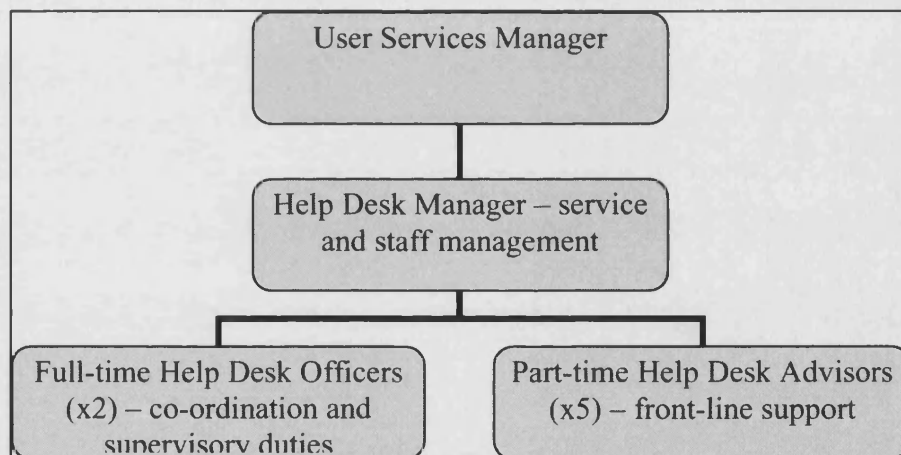
Figure 15: Organisational context of the research site

### 6.2.1. IT Help Desk team

As stated in the IT Services department's operational plan for academic years between 2002/2003 and 2005/2006, 'the IT Help Desk team's contribution to the operation of



*the department is to meet the needs and expectations of the students by providing a prompt, high-quality, friendly and effective support service'. The primary focus of the daily activities of the IT Help Desk team is provision of front-line IT support to the University's taught course students. The IT Help Desk team consists of a mixture of full-time and part-time staff. The Help Desk Manager and two Help Desk Officers are employed full-time on a permanent contract basis, supplemented by a number of part-time Help Desk Advisors recruited from the University's student population each year on a typical 30%-50% annual staff turnover. The typical range of duties within the team includes first-line IT support and troubleshooting for all three roles; service co-ordination and some operational supervisory duties for Help Desk Officers; and budget, service and staff management for Help Desk Manager. Help Desk Advisors and Help Desk Officers report to the Help Desk Manager who reports to the User Services Manager.*



**Figure 16: IT Help Desk Team Organisational Chart**

The IT Help Desk team runs a staffed IT Help Desk and its defined service policy is to accept students' enquiries in person, by phone and via email during office hours, and to deal with enquiries on a first-come first-served basis. The opening hours are quite extensive, covering 9.30am-8pm weekdays and 11am-6pm weekends during term-time and 9.30am-5pm weekdays during vacations. The IT Help Desk is staffed by at least two members of staff (one full-time) during the department's core working hours of 9.30am-5.30pm, and by one part-time member of staff during evenings and weekends. The IT Help Desk is located in the Library in immediate proximity to 450

student-use PCs in the building, and in very close proximity to the rest of the 1,000+ student-use PCs on campus.

The IT Help Desk team operates in a single open-plan office, laid out as shown on the schematic floor plan below, consisting of two desks accommodating two members of Help Desk staff on front-line support duty and their PCs, two additional PCs in a side-by-side arrangement on the desks to provide IT support to drop-in customers where logging in to a PC by the customer is necessary, and a small customer waiting area for serving customers who do not require logging in and accommodating customers waiting to be served. The office includes a partially screened-off area for the Help Desk Manager at the back, as well as a number of items of auxiliary equipment, such as printers, telephones and personal storage (not shown).

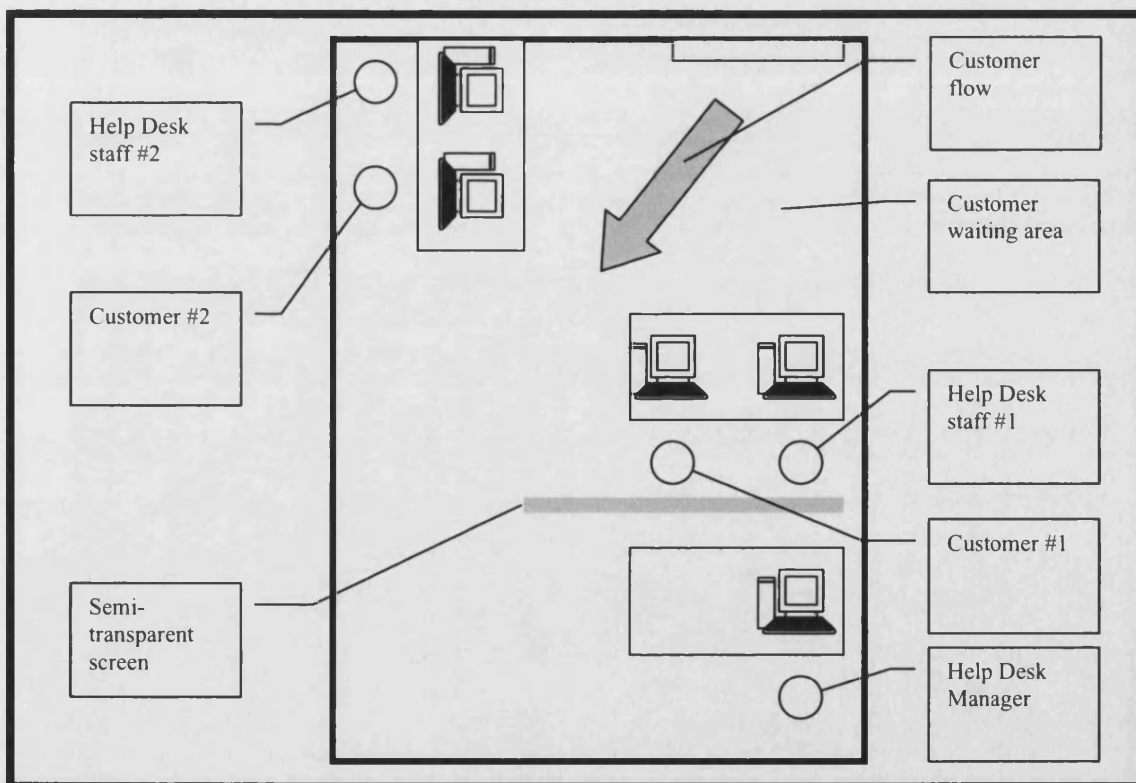


Figure 17: Student IT Help Desk Team Office Layout

The IT Help Desk team specifies a number of Service Level Definitions (SLDs) to define its core services and targets, and archives of its monthly operational performance metrics are freely available online as part of the IT Services department's service level statistics website. An extract from the IT Help Desk

Team's SLDs is given below, and a full listing including detailed analysis is presented further in this thesis:

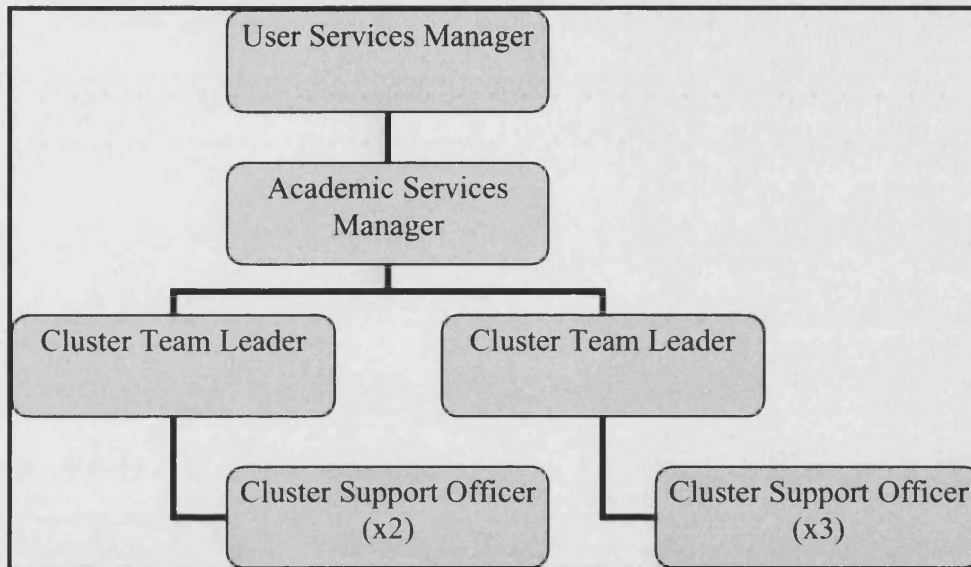
- (SLD-ITHD-1) All queries first heard within 10 minutes of an individual joining the queue
- (SLD-ITHD-2) 85% of queries are resolved at first response
- (SLD-ITHD-3) Email enquiries are responded to within 3 working hours of receipt

It is important to note that whilst the student Help Desk team is a pragmatic starting point for analysis by virtue of having logged the most calls using the software, it is equally important to examine aspects of work demonstrated by other teams, for example for patterns of working without using the software. Such patterns, if any, of how the Help Desk software is used to a greater or lesser extent by various teams or differences, if any, in patterns of use between/across teams and/or individuals will also represent significant empirical objects of study to be included in this research.

### **6.2.2. Cluster Support Teams (Staff & 2<sup>nd</sup>-line Support)**

The IT Services department User Service Group includes six cluster support teams, whose *'...contribution to the operation of the department is to provide a first class frontline and specialist IT advice and support service to staff and research students, by allocating cluster resources to meet academic departmental requirements as effectively as possible and by instigating projects to further enhance the use of IT'* as stated in the 2002/2003 – 2005/2006 departmental operational plans. Each cluster team is responsible for a number of academic departments grouped according to similar IT requirements, for example the 'Accounting & Finance' cluster team is responsible for provision and support of non-centralised IT facilities (i.e. excluding school-wide services such as network and email) and support for use of centralised IT facilities in Accounting & Finance, Statistics, Operational Research, and Mathematics academic departments. Each cluster team consists of Support Specialist and one or more Support Officers, employed on permanent, full-time contract basis. The typical range of duties within the cluster team includes first-line IT support and troubleshooting for both roles; and 2<sup>nd</sup> line support for a particular software application, and budget (including academic departments' IT spending), service and

staff management for Support Specialist. Support Officers report to the Support Specialists, who report to the Academic Support Manager, who in turn reports to the User Services Manager.



**Figure 18: Cluster Support Teams Organisational Chart**

The six cluster teams are located in open-plan offices, typically accommodating 2 or three cluster teams in each office, sometimes separated by screens. All members of the cluster teams have work desks adjacent or opposite one another without partitions between them.

All six cluster teams specify a common set of Service Level Definitions (SLDs) to define their core services and targets, and collated archives of overall monthly operational performance metrics are available as part of the department's service level statistics website. An extract from the common set of cluster support teams' SLDs is given below:

- (SLD-CSR-1) Response to initial user request for assistance within 3 working hours.
- (SLD-CSR-2) Urgent problems to receive immediate priority, and visits or other suitable contact to take place within 3 working hours.

- (SLD-CSR-3) All queries and requests to be completed within 3 working days or at a date agreed with the user, and any slippage notified to the user in advance of the original due date.

### **6.2.3. Systems and Network Teams (2<sup>nd</sup>-line Support)**

XYZ University has a centralised IT systems and network infrastructure, as oppose to faculty-based systems services on a centralised network infrastructure found in some other universities in the UK. According to the 2005-2006 operational plan, the systems team's '*... contribution to the operation of the department is to ensure the provision of reliable and robust server based IT services able to meet the performance and scalability requirements of the School's users*'. Similarly, the plan states that the network team's '*... contribution to the operation of the department is to ensure that there is an underlying network infrastructure which is reliable, resilient and able to meet the ever growing demands placed upon it by the School's IT systems and users*'. Technical Infrastructure Group, comprised of the Systems and Network teams are responsible for all centralised IT resources at XYZ University, such as development, implementation and maintenance of the network infrastructure, server infrastructure (e.g. file storage, printing, email, software applications, etc.), and security policies (e.g. firewall, anti-virus). The following extract from the systems and network teams' SLDs illustrates how the key services provided by these teams are defined:

- (SLD-TIG-1) 98% of email messages arriving at the School delivered within five minutes and those leaving the School processed within five minutes
- (SLD-TIG-2) 99.8% availability of key network components during office hours, on average per calendar month

The systems and network teams have a similar structure, consisting of the systems/network manager and several systems/network specialists, all employed on permanent, full-time contract basis. Each member of the team specialises in a particular area, such as server-based anti-virus protection, and expertise for that

particular area of responsibility is shared to a lesser extent among other members of the team. The systems and network teams are located in adjacent open-plan offices.

In terms relevant to this research, both network and systems teams, in addition to their normal system development responsibilities, act as 2<sup>nd</sup> line support for enquiries referred from the Help Desk team, which supports taught course students, and the cluster support teams responsible for research students and academic staff. In these terms, the typical range of 2<sup>nd</sup>-line support duties includes informing the support teams of new systems developments and deployments, and working with the support teams on particular enquiries which may demand greater technical expertise and/or greater level of systems security access than is available within the support teams.

#### 6.2.4. Intra-departmental Support Policy and Referrals

Areas of responsibility for technical support to the end-user population are delineated quite clearly between the various teams within the IT Services department. The following table summarises the support structure:

End-User Category	1 <sup>st</sup> -line Support	2 <sup>nd</sup> -line Support
Taught-course students	IT Help Desk Team	Systems & Network Teams (services) Cluster Support Specialists (applications)
Research students	Six Cluster Support	
Academic staff	Teams	

**Table 13: IT Services support structure**

Furthermore, support responsibilities are delimited according to the nature of the enquiry, with different levels of support offered for different applications and services. The IT Services department at XYZ University defines several levels of technical support as illustrated in the following table:

Level	Definition
Minimal Support	<ul style="list-style-type: none"> <li>• Advice on supplier</li> <li>• Inclusion in standard 'build' if required for teaching</li> <li>• No manuals or documentation</li> </ul>

Level	Definition
Technical Support	As minimal plus: <ul style="list-style-type: none"> <li>• Purchase of License</li> <li>• Ensure functionality in standard 'build'</li> <li>• Forward error reports to the suppliers</li> <li>• Manuals available in the Library</li> <li>• [ITS produced] Local Documentation</li> <li>• Upgrades made annually as available</li> </ul>
Basic User Support	As technical plus: <ul style="list-style-type: none"> <li>• Basic help given to users with specific problems with the software</li> <li>• Server upgrades installed when they arrive</li> </ul>
Intermediate User Support	As basic plus: <ul style="list-style-type: none"> <li>• Courses and/or local documentation available on use of the package</li> <li>• ITS provides an internal expert in the software</li> <li>• The ITS expert actively monitors for patches and upgrades and installs (on server) as necessary</li> </ul>
Full Support	As intermediate plus: <ul style="list-style-type: none"> <li>• Help will always be available whatever the problem</li> </ul>

**Table 14: IT Services Support Policy**

Referrals of support requests between various teams are defined in a standard Service Level Definition, as follows:

(SLD-ITS-1) Urgent problems which cannot be fixed at the first attempt referred if appropriate to other staff in IT Services, who are asked to respond within 3 working hours

(SLD-ITS-2) Problems which cannot be resolved are referred to appropriate staff in IT Services who will be asked to provide a resolution within 1 working day

### **6.3. Configuration of TP Help Desk Software at XYZ University**

As has been demonstrated, the TP HelpDesk software allows for considerable range of vendor-supported customisations to be implemented in a relatively straightforward

way. Moreover, such customisations allow powerful insight into the working practices and organisational processes implemented within different support teams, by analysing which features are or are not implemented, and later on analysing transaction logs to ascertain which features are made use of, and seeking comments from research study subjects as to why particular options are or are not chosen over time. This section provides an in-depth illustration of the empirical findings of this research study focusing on the configuration of the software artefact as employed by the various IT Services teams at XYZ University.

### **6.3.1. Customised Workflow**

Two interesting findings were made during our analysis of the customised configuration of the TP HelpDesk software at XYZ University. The analytical significance of these findings is discussed in detail in the following chapter; however it is appropriate to illustrate the context of these two findings at this point.

Firstly, none of the teams in the IT Services Department of XYZ University used two step call closure. A two-step closure procedure presupposes that first line support analysts “resolve” the end-user’s enquiry, categorising, and logging all relevant information within the call. The call is then recorded as “resolved” pending “closure” by a team supervisor, who would typically check that the enquiry is appropriately resolved, end-user is satisfied with the resolution details, and the call is logged correctly. A thorough analysis of the security permissions granted to support analysts within the TP HelpDesk software shows that all analysts have the required security access to close calls. Furthermore, this finding is supported by our analysis of the TP HelpDesk software training as provided to support analysts, whereby call “resolution” is treated as synonymous with call “closure” and analysts are trained to close support calls themselves as they deem appropriate.

Secondly, although support analysts are organised into a number of teams within the software, all analysts are set up as supervisors within their respective teams. As discussed above, the call assignment functionality of the TP HelpDesk software allows for specification of call responsibility and workflow, whereby responsibility for a call or particular action within a call can be “assigned” to an analyst, an analyst and the entire team, or just the entire team. Our analysis of the roles and security



permissions granted to support analysts in the TP HelpDesk software indicates that every analyst within a particular team is able to view and modify all calls assigned to members of the same team or the team itself. This finding indicates that although call assignment functionality can still perform the role of workflow management, in practice there is nothing implemented in the software to prevent analysts from looking at each other's calls and indeed close each other's calls as they deem appropriate.

### **6.3.2. Customised entities, data elements and GUI**

Although the process of implementing customisations to entities, data elements, and GUI has been demonstrated to proceed in that logical order (as demonstrated earlier in this chapter), it is more convenient to present the findings in reverse order: starting from the visible GUI elements on the screens in use by various teams and progressing to data elements and entities. The software includes numerous screens providing access to all of the functionality of the software, including updating end-user records, updating inventory records, setting up analysts, configuring security permissions, etc. This section outlines those windows which were found significant during the research, namely those required to log and progress a call through the system, with particular emphasis on customisations made to those windows, including differences in customisations for different teams.

#### **6.3.2.a. Call Details Window**

##### **6.3.2.a.1. IT Help Desk Team**

The following screenshot illustrates the main call details window as implemented in the IT Help Desk team:

Figure 19: TP HelpDesk Software - IT Help Desk Team Main Call Window

**Mandatory Elements:** As can be seen a number of element labels are coloured red – User Alias, Priority, Category 1, Category 2, Call date and Call Time. The red-labelled elements are mandatory, and must be completed in order for a call to be successfully logged into the software. For example, as shown below, “User Alias”, “Priority”, “Category 1” and “Category 2” elements are blank and attempting to log a call with either of those elements incomplete will fail with a corresponding error message.

**Optional Elements:** A number of element labels pertaining to selectable elements are coloured black – Waiting time, Call Title, Call Description, and Category 3. The selectable black-labelled elements are optional and do not have to be completed in order for a call to be successfully logged into the software

**Linked Lookup Elements:** A number of element labels pertaining to non-selectable elements are coloured black – Name, Username, Department, ID Number, and

Support Info. These elements are linked to other selectable elements in the window. For example, the top part of the window relates to end-user records, whereby selecting an end-user record from the “User Alias” drop-down list would automatically populate those elements with relevant details from that end-user’s record. Similarly, selecting a category from the category 2 list would populate the “Support info” element with the name of the team set up as a linked entry to that category 2 item.

**Automatically populated Elements:** A number of elements are automatically populated when a call is inserted into the database. These elements are stamps, such as the date/time a call is created and who created that call – distinct from both pre-populating data in a call from Hot Topic and from the automatic audit trail created by the software for every interaction. The bottom part of the window as illustrated above shows three such elements: “Call date” and “Call Time” are selectable, whereby logging a call may be backdated, whereas the “Created by” element is configured as non-selectable and will be automatically populated with the name of the analyst who logs that call.

#### **6.3.2.a.2. Cluster Support Teams and other teams**

The following screenshot illustrates the main call details window as implemented in the cluster support teams and other teams in the IT Services department.

**Call Details**

**User Details**

User alias:  Name:

Username:  Building:  Office:

LSE ID #:  Department:  Ext:

**Call Details**

Call Title:  Deadline:

Description:

**Categorisation**

Category 1:  Support Info:

Category 2:  Priority:

Category 3:  Status:

**Call Timeline**

Created by:  Date:  Time:

Updated by:  Date:  Time:

OK Action Track Reminders Add Note Cancel

**Figure 20: TP HelpDesk Software: Other Teams Main Call Window**

**Mandatory Elements:** As can be seen a number of element labels are coloured red indicating mandatory elements – User Alias, Category 1, Category 2, Priority, Status, Date, and Time. Similarly to the IT Help Desk call details window these elements must be completed in order for a call to be successfully logged into the software.

**Optional Elements:** A number of element labels pertaining to selectable elements are coloured black – Call Title, Deadline, Description, and Category 3. The selectable black-labelled elements are optional and do not have to be completed in order for a call to be successfully logged into the software.

**Linked Lookup Elements:** A number of element labels pertaining to non-selectable elements are coloured black – Name, Username, Building, Office, LSE ID Number, Department, Ext (Extension), and Support Info. These elements are linked to other selectable elements in the window. The top part of the screen relates to end-user records, whereby selecting an end-user record from the “User Alias” drop-down list

would automatically populate those elements with relevant details from that end-user's record, although in greater detail than on the IT Help Desk call details window. Similarly, selecting a category from the category 2 list would populate the "Support info" element with the name of the team set up as a linked entry to that category 2 item.

**Automatically Populated Element:** A number of elements are automatically populated when a call is inserted into the database. These elements are stamps, such as the date/time a call is created, who created that call and who last updated the call – distinct from both pre-populating data in a call from Hot Topic and from the automatic audit trail created by the software for every interaction. The bottom part of the window as illustrated above shows six such elements: "Date" (created) and "Time" (created) are selectable, whereby logging a call may be backdated, whereas the "Created by", "Updated by", "Date" (updated) and "Time" (updated) elements are configured as non-selectable and will be automatically populated with the name of the analyst who logs that call and date, time and name of the analysts who last updated that call.

### **6.3.3. Shared entities, data elements and GUI**

It is important to note that the IT Services department of XYZ University uses a single core of the TP HelpDesk software, i.e. a single back-end database and a single set of core system components such as configuration of the software, setup of support analysts, roles, privileges, team membership lists, etc. The underlying table structure, and the data elements are shared in the sense that they can be made available to various teams, although not all teams make use of all elements, nor indeed make use of the same elements in all instances. Furthermore, based on the analysis of the configuration of the TP HelpDesk software at IT Services department of XYZ University it is important to note that all teams use default out-of-the-box windows, apart from the call details window as specified above, and a small number of windows that are customised from the out-of-the-box configuration but remain identical for all teams listed below.

### **6.3.3.a. Common Data Elements**

As has been demonstrated above, the TP HelpDesk software has a centralised installation base for the entire IT Services department of XYZ University. This means that all the teams within the IT Services department use the same back-end database to record and progress calls, although as we illustrated above some of the major components such as the main call window have been customised for use by different teams. TP HelpDesk software is designed to have a central installation base for a number of reasons, such as ease of deployment and maintenance, access to shared components, including maintaining data integrity of the back-end database.

We have shown that a number of windows, including the main call window and call closure window are associated with a number of mandatory elements, such as call category 1 and 2, and call closure details. Our analysis of the back-end database schema indicates that the relationship between mandatory elements as specified in the various UI windows and the mandatory data elements in the back-end database is a very loose one. This means that whilst categories 1 and 2 are specified as mandatory elements in the main call window for both IT Help Desk team and the other teams, these data fields are in fact not mandatory in the database back-end. Data and window elements which are mandatory on both GUI and back-end database include call reference (`call_id`) and date/time/analyst stamps – both of which are populated automatically, but no call categories, priorities, call details or call closure details elements. An important implication of this loose relationship between the mandatory elements as specified during GUI window design and truly mandatory elements as specified in the back-end database schema is that elements can be (but do not have to be) specified as mandatory on GUI windows in order to ensure data capture by support analysts in the process of logging or progressing a call.

### **6.3.3.b. Call Closure Window**

The following screenshot illustrates the call closure window as implemented in all teams in the IT Services department.

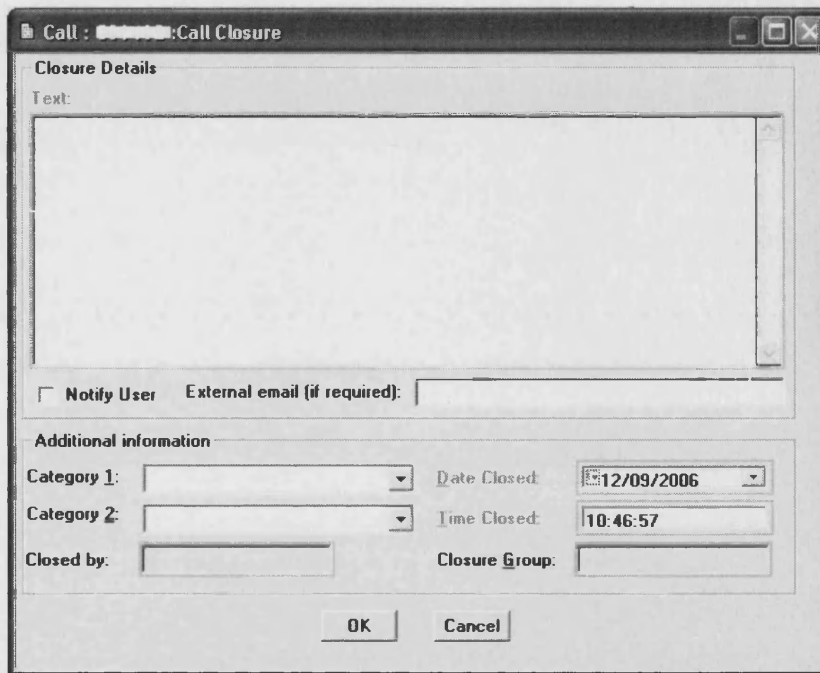


Figure 21: TP HelpDesk Software - Shared Call Closure Window

**Mandatory Elements:** As can be seen a number of element labels are coloured red indicating mandatory elements such as Text, Date closed and Time Closed. these elements must be completed in order for a call to be successfully logged into the software.

**Optional Elements:** A number of element labels pertaining to selectable elements are coloured black – Notify User, External Email, Category 1 (closure), and Category 2 (closure). The selectable black-labelled elements are optional and do not have to be completed in order for a call to be successfully logged into the software.

**Automatically Populated Elements:** A number of elements are automatically populated when a call is inserted into the database. Similarly to the call details window these elements are stamps, including “Date Closed” and “Time Closed” which are mandatory but editable by the support analyst, and “Closed by” and “Closure Group” which are not editable and are automatically completed with the details of particular analyst and team which closed that call.

#### 6.3.4. Customised Hot Topics

As illustrated in the previous section the Help Desk software allows Hot Topics to be customised in a variety of ways, including augmenting the basic underlying IT

support process, for example by varying two-step and one-step call closure for different calls, and facilitating the process of logging calls by pre-populating information for categories of calls from a template. Therefore, an examination of how the Hot Topics are configured and how they relate to the work process is necessary, in order to be able to analyse the relationship between the technical feature (e.g. the configuration of a particular Hot Topic) and the other factors derived from the core analytical dimensions of the synthesised analytical framework introduced in CHAPTER 4.

The Help Desk software allows for a total of 20 Hot Topics to be active at any given time: 10 system-wide Hot Topics visible to all teams; and 10 team-specific Hot Topics visible to the corresponding team. The Hot Topics are accessible using buttons along the top of the main software window, as illustrated previously in FIGURE XXX. Interviews with the member of staff responsible for maintaining the IT Services department's installation of the Help Desk software indicated that Hot Topics are rarely, if ever, deleted from the Help Desk system, but are instead swapped in and out of the main software screen making them accessible to the analysts. Consequently, this research was able to apply task analysis techniques to examine the typology of Hot Topics covering the entire 2002-2006 period.

#### **6.3.4.a. IT Help Desk Team**

A task-analysis examination of the Hot Topics design elements illustrates that there are three broad design typologies of Hot Topics as implemented in the IT Help Desk team, whereby upon clicking the corresponding button to open a new call results in:

- A) No additional information is needed and the call is automatically closed
- B) Some additional information is needed and the call is automatically closed
- C) Some additional information is needed and the call is automatically re-assigned

The screenshot shown below (dated February 2006) demonstrates the Hot Topic buttons as visible to the IT Help Desk team. The 5 buttons to the left of the vertical red line are the system-wide Hot Topics visible to all teams in the IT Services department, and 8 buttons to the right of the vertical line (inserted in the screenshot



for clarity of presentation) are the Hot Topics configured for and visible to the IT Help Desk team.

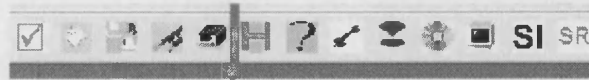


Figure 22: TP HelpDesk Software - IT Help Desk Team Hot Topics

A detailed analysis of the configuration of various Hot Topics as customised for the IT Help Desk team, as well as transaction log analysis of which Hot Topics are used more often are given in the following chapter. A hierarchical task analysis of the three types of Hot Topics illustrates the sequence of actions required to log a call in the following table:

Hot Topic	Sequence of Actions
<p><b>Type A</b> (no additional information, call automatically closed)</p>	<ul style="list-style-type: none"> <li>• Support analyst clicks corresponding icon</li> <li>• Call created</li> <li>• <u>All</u> information for main call window is pre-populated form template</li> <li>• Main call window <u>is not</u> shown to support analyst</li> <li>• <u>All</u> information for call closure window is pre-populated from template</li> <li>• Call closure window <u>is not</u> shown to support analyst</li> <li>• Call is automatically closed</li> <li>• Popup window showing call reference number shown to support analyst</li> </ul>
<p><b>Type B</b> (some additional information required, call automatically closed)</p>	<ul style="list-style-type: none"> <li>• Support analyst clicks corresponding icon</li> <li>• Call created</li> <li>• <u>Some</u> information for main call window is pre-populated form template (e.g. call categories 1 and 2)</li> <li>• Main call window <u>is</u> shown to support analyst</li> <li>• Support analyst enters additional information as required (e.g. end-user ID)</li> <li>• Support analyst clicks OK on main call window</li> <li>• <u>All</u> information for call closure window is pre-populated from template</li> <li>• Call closure window <u>is not</u> shown to support analyst</li> <li>• Call is automatically closed</li> </ul>

<p><b>Type C</b> (some additional information required, call automatically reassigned)</p>	<ul style="list-style-type: none"> <li>• Support analyst clicks corresponding icon</li> <li>• Call created</li> <li>• <u>Some</u> information for main call window is pre-populated form template (e.g. call categories 1 and 2)</li> <li>• Main call window <u>is</u> shown to support analyst</li> <li>• Support analyst enters additional information as required (e.g. end-user ID)</li> <li>• Support analyst clicks OK on main call window</li> <li>• Call assignment information is pre-populated from template (e.g. assignee person and/or team, notification message)</li> <li>• Call is automatically inserted into the assignee's workload list</li> </ul>
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**Table 15: TP HelpDesk Software - Task Analysis of Hot Topic Design Typology**

#### **6.3.4.b. Cluster Support Teams (staff support)**

Our analysis of the Hot Topics implemented in the 6 cluster teams demonstrated that although different cluster teams make use of different hot topics, the basic three-fold design typology as illustrated above remained the same. There was some variation in the Hot Topic templates, such as the specified pre-selected call categories and pre-selected assignments for type C Hot Topics, but there was no major difference in the underlying design of the Hot Topic workflow.

However, our analysis did reveal one interesting finding. All of the type C Hot Topics configured for the Help Desk team showed that the pre-configured assignee was either the Help Desk Manager (e.g. ITHD\_SUPERVISOR\_REF Hot Topic) or another team entirely (e.g. ITHD\_NET\_SUPPORT). In contrast, all of the 6 cluster teams had a type C Hot Topic where the pre-configured assignee was automatically selected to be the support analyst who was logging the call. Calls logged using such type C Hot Topics are automatically inserted into that support analyst workload list. This finding and its implication for the workflow analysis is discussed in detail in the following chapter.

#### **6.3.5. Customised links with other systems and databases**

As we have described earlier in this chapter, TP HelpDesk software provides a number of facilities for direct integration with a variety of external systems. Our

analysis of its implementation at XYZ University showed that the back-end database had an automated batch-based one-way update link with the master MIS database, whereby any change to an end-user’s set of detail (e.g. change of department, email address, etc.) in the master MIS database would be automatically reflected in the TP HelpDesk software system – in other words, TP HelpDesk database slaved to an external master data set through the use of custom designed back-end scripts. Additionally, support analysts login authentication was automatically linked to XYZ University’s Active Directory domain, thus implementing single sign-on functionality provided by TP HelpDesk software vendor.

### 6.3.6. Customised Service Level Management Reports

The TP HelpDesk software includes a number of generic reports detailing a variety of statistical and operational information based on data contained in the back-end database. The majority of reports are designed to show information for different teams/analysts, different categories of calls, and different date/time ranges, such as “show all calls currently outstanding for a particular team”, or illustrate graphically the average number of business hours elapsed between call open and call close status broken down by team by day/week/month.

The generic reports allow for considerable flexibility in monitoring the calls going through the Help Desk software, however our case-study findings indicated that the end-of-month SLD statistics were based on a number of reports designed specifically to cater for XYZ University’s IT Services department SLDs. We have specified the Service Level Definitions in operation in the various teams in the IT Services department earlier in this chapter, and can now illustrate how the custom-designed SLD reports are calculated, including dependency on custom data fields not part of the standard TP HelpDesk software configuration:

Service Level Definition	Service Level Report Calculation
<p><b>(SLD-ITHD-1)</b> All queries first heard within 10 minutes of an individual joining the queue</p>	<p>The main call window for the IT Help Desk team includes a drop-down selection for “waiting time” with options “&lt;10 minutes” and “&gt;10 minutes” (linked to a corresponding data element). The report calculates the calls where the latter is specified as a proportion of all calls logged by the IT Help Desk</p>

Service Level Definition	Service Level Report Calculation
	team. Waiting time is pre-populated as “<10 minutes” for all IT Help Desk Hot Topics and is also assumed to be that where it is not specified in the call. A clearly visible poster in the IT Help Desk encourages end-users to report instances of waiting time exceeding 10 minutes.
<b>(SLD-ITHD-2)</b> 85% of queries are resolved at first response	The report calculates the calls closed within 45 minutes of being logged during business hours as a proportion of all calls logged by the IT Help Desk team.
<b>(SLD-ITHD-3)</b> Email enquiries are responded to within 3 working hours of receipt	The report calculates the proportion of calls logged by support analyst “AUTOEMAIL” for the IT Help Desk team where the time stamp on the “First Response” action track closure note is within 3 business hours of the call being logged.
<b>(SLD-CSR-1)</b> Response to initial user request for assistance within 3 working hours	The report calculates the proportion of calls logged by a support analyst in the relevant cluster team where the time stamp on the “First Response” action track closure note is within 3 business hours of the call being logged.
<b>(SLD-CSR-2)</b> Urgent problems to receive immediate priority, and visits or other suitable contact to take place within 3 working hours	The report calculates the proportion of calls logged by a support analyst in the relevant cluster team where call priority is specified as CLUSTER_HIGH and the time stamp on the “First Response” action track closure note is within 3 business hours of the call being logged.
<b>(SLD-CSR-3)</b> All queries and requests to be completed within 3 working days or at a date agreed with the user, and any slippage notified to the user in advance of the original due date.	The report calculates the proportion of calls logged by a support analyst in the relevant cluster team where call closure time stamp is within 3 business days of the call being logged or a custom window/data element “DEADLINE” specifying date agreed with the user.
<b>(SLD-ITS-1)</b> Urgent problems which cannot be fixed at the first attempt referred if appropriate to other staff in IT Services, who are asked to respond within 3 working hours	The report calculates the proportion of calls where there is more than one assignment (to a team other than the team which logged the call) and the time stamp on the “First Response” action track closure note is within 3 business hours of the assignment creation time stamp.
<b>(SLD-ITS-2)</b> Problems which cannot be	The report calculates the proportion of calls where there is more than one assignment (to a team other

Service Level Definition	Service Level Report Calculation
resolved are referred to appropriate staff in IT Services who will be asked to provide a resolution within 1 working day	than the team which logged the call) and the time stamp on the assignment closure note is within 3 business hours of the assignment creation time stamp.

**Table 16: TP HelpDesk Software - Service Level Management Report Design**

### **6.3.7. Unsupported Customisations: AutoEmail module**

TP HelpDesk software vendors supply a separately licensed out-of-the-box AutoEmail module which facilitates automatic logging of calls arriving via email. This module supports one incoming mailbox for assigning calls via a designated hot topic to a first response team. The module implements the following algorithm: a) end-users send emails to a mailbox (e.g. [helpdesk@xyz.ac.uk](mailto:helpdesk@xyz.ac.uk)); b) there is a monitoring process handled by an auxiliary piece of software which monitors the mailbox and automatically creates calls for those emails using a designated hot topic, mapping sender's address to end-user record, email subject to call subject, email body to call details; and c) creating assignments and action tracks if any are specified in the hot topic (including default assignment). The module also processes updates to calls (if subject line is suitably formatted) from both analysts and the end-user for incoming messages, and handles notifications of updates to calls as an outgoing email to end-users. Such a structure assumes classic first/second line support model, where first line team deal with the calls that they can, and escalate those that they cannot.

XYZ University operates a distributed support model, where the helpdesk and each cluster are first response teams for their groups of end-users, effectively operating seven "helpdesks" each with their own email address for support requests from end-users. Our analysis demonstrates that the out-of-the-box AutoEmail module did not match the support requirements of the IT Services department of XYZ University. However, the module was extensively customised by support staff to adapt it to the local context of implementation, and the customisations went far beyond what was supported by TP HelpDesk software vendor. The customisations were carried out on the back-end of the AutoEmail module and consisted of several components: a lookup table mapping end user departments with support teams, redirect rules from various support email addresses to a central "holding" mailbox, a back-end database trigger

for reassigning incoming calls, and a back-end scheduled job for outgoing messages. Similarly, an even more heavily customised solution was implemented to support outgoing emails from the TP HelpDesk software using different senders' email addresses. The final solution implemented the following algorithm:

1. End-user sends an email as normal to their support team's normal email address
2. A mailbox rule forwards messages from teams' email boxes to a holding mailbox
3. The TP HelpDesk software AutoEmail module creates calls for calls arriving into the holding mailbox assigning them to a holding team (no members, not a real support team)
4. A back-end database trigger fires as soon as a new call is logged to the holding team and...
  - a. gets the end-user's department from the call details
  - b. matches it up with a support team from the lookup table
  - c. reassigns the call to the appropriate team
5. When a call is closed the analyst can tick a "notify user" check box and insert an extra email address if necessary
6. A back-end database batch job fires at 5 minute intervals to see if any calls have the notify option selected and...
  - a. constructs an email message with predetermined header, footer, and return email address for each team
  - b. checks the end-user's main email address from end-user records
  - c. adds the extra email address if specified in the call closure window
  - d. sends the call closure details as an email message to the end user

Our case study findings indicate that significant effort went into designing the above customisation in order to produce a final solution that would support incoming and outgoing emails without changing the departmental support structure. The customisations are done almost entirely on the back-end of the TP HelpDesk software and only utilise the out-of-the-box functionality in step 3 of the sequence illustrated above. This finding is significant because it demonstrates the technological malleability of the TP HelpDesk software artefact and the willingness on part of IT Services department to modify the software artefact to suit the local context of implementation to the extent of making customisations that are unsupported by the TP HelpDesk software vendor.

#### **6.4. *Triangulation and overlapping nature of empirical evidence***

In a technologies-in-practice analysis of utilisation of Lotus Notes technology in two organisations (Orlikowski 2000) was able to derive and present a clear distinction, for example between three technologies-in-practice (collective problem-solving, limited use, and individual productivity) observed for different groups of users within one organisation, and two technologies-in-practice (process support, and improvisation) prevalent for the same group of users within the other organisation. Furthermore, (Orlikowski 2000, p.413) notes that those technologies-in-practice should not be seen as exhaustively characterising what people did with the technology in those sites, and given the situated and emergent nature of technologies-in-practice one can be sure that other technologies-in-practice were being enacted at the same time, and indeed these technologies-in-practice were also evolving at that time.

The case presented in this thesis provided a very rich base for theoretical analysis, with a large and varied pool of raw empirical data collected at the site. The abstract nature of key theoretical constructs forming the base of the technologies-in-use theoretical framework (Orlikowski 2000) offers little guidance on specification of data constructs at methodological and operational level. However, the refinements made to the technologies-in-practice framework in this thesis using the concepts of ostensive and performative aspects of organisational routines (Pentland and Rueter 1994) and grammatical model of organisational processes (Pentland 1995) deconstructing such processes into performances, subroutines, and moves (Pentland 1992) allowed for considerable degree of grounding and theoretical saturation (Eisenhardt 1989) of the theoretical analysis in empirical base throughout the iterations of theory-data cycles of the hermeneutic circle of analysis (Klein and Myers 1999).

The nature of empirical evidence collected during this study involves considerable overlapping at even the most fundamental categorical level of modalities of facilities, norms and interpretive schemes (Giddens 1984), as will be demonstrated further. However, the analytic, rather than ontological distinction between the use of a technology and its artefactual character (Orlikowski 2000, p.408) which forms the underlying basis of the synthesised theoretical framework presented in this thesis

helped this research to build a coherent and consistent picture of technology-mediated organisational processes when triangulating evidence from multiple data sources and different types of data relating to the artefact, its use and immediate and wider contexts.

For example, although the intangibility of interpretive schemes as a concept makes it difficult to operationalise in empirical research, this study was able to utilise elements of verbal protocol analysis as discussed in Chapter 4, anchoring the interview in specific instances such as dealing with different kinds of calls, and asking interview respondents to reflect on why a particular course of action is or is not taken. The following general questions exemplify the beginning phase of the interviews: “*Could you talk me through what happens during a typical day, for example first thing in the morning?*”, or “*What do you do when a student drops in and asks for help?*”. As the interview develops, the questions become more specific, such as “*Would you log this enquiry, and how – could you talk me through step-by-step?*”, “*Which Hot Topic would you use?*”, or more specifically, “*It seems that there are several different ways to deal with this enquiry, what made you choose this one?*”

However, interview respondents very frequently also referenced the modality of norms in their responses, referring to aspects such as formal procedures, informal accepted ways of working, and indeed possibility of sanctions; and intimately linked norms, interpretive schemes and facilities by discussing both processual and physical constraints in illustrating whether a potential course of action makes sense in a particular set of circumstances. In this way, the semi-structured nature of interviews allowed the interview respondents to articulate some of the “knowledge which they possess and apply, in the production and reproduction of day-to-day social encounters” (Giddens 1984, p.22), the discursive aspect of that knowledge through verbal protocol, and attempted to get a sense of some of the tacit knowledge through “what would happen if...” verbal protocols exploring alternative scenarios for those specific interview anchor points.

As outlined in detail in the previous chapter, we can summarise the various types of data as pertaining to one (or more) categories: strategic and operational orientation of the service – such as mission statements, formal reports and directives; actualisation



of the orientation of the service – such as transaction logs of actual interactions with the TP HelpDesk software; operational instantiation of the orientation of the service in technological artefact – such as particular customisations made to the software to facilitate particular modes of usage and perhaps discourage others; and operational interpretation of the orientation of the service – such as interview feedback focusing on signification of particular forms of interaction with the software. By triangulating evidence from such multiple sources, we can not only be more confident of illuminating a variety of perspectives on the object of research, but also trace out the ostensive (abstract) and performative (tangible) aspects of organisational routines. Furthermore, by analytically breaking down organisational routines into specific performances constituted of particular (often interchangeable) sub-routines and moves, we can obtain a deeper perspective on the variety of contextual factors such as facilities (including technological properties), norms and interpretive schemes at play in a given set of circumstances.

For example, as will be shown further, for the most part interview respondents tended to identify the process of logging calls on a day-to-day basis with the role of the software artefact – TP HelpDesk software as part of that process; although at times a different instrument was used to record incoming calls, and sometimes call recording did not take place at all. By focusing this research on the organisational processes and treating use of the software, use of its alternatives, and non-use of any software functionality as aspects of enactment of those organisational processes, this study was able to gain an invaluable perspective whereby the software artefact and its use are clearly presented as part of the whole picture of organisational processes and contexts. Similarly, transaction log analysis provided invaluable insights into the ongoing practices of software use at the research site, illuminating the performative aspect of a variety of organisational routines. However, without additional empirical evidence, both in the form of text – such as mission statements, performance reports, etc. and in the form of interviews provided by individuals holding a variety of roles within the department it would have been impossible to relate the performative aspect of organisational routines with the ostensive aspect – the assumptions, beliefs, etc. surrounding those organisational practices.

## **6.5. Analytical point of departure**

In a study of use of groupware technology to augment software support work (Orlikowski 1995) observed that the use of a call-tracking system shifted the work of support from being solely solving problems to both solving problems and documenting work in progress. In that study, (Orlikowski 1995) also noted a number of benefits reported by support specialists concerning use of the software, such as helping to manage the cognitive load of problems particularly where activities were spread out over a number of days.

In a different study (Pentland 1992) of a software support group's use of a call tracking database to keep contemporaneous notes on what steps had been taken by support specialists to resolve a customer problem, (Pentland and Rueter 1994) noted that the software support performances were recorded by support specialists in the call tracking database as a by-product of normal operations. (Pentland and Rueter 1994) concluded that the software support performances analysed as part of their study were all constructed from the same basic lexicon of moves, but that the sequence of those moves varied considerably from performance to performance nevertheless accomplishing the functionally similar objective of responding to a customer's problem. Furthermore, (Pentland and Rueter 1994) observed that:

*... the specialists were quite diligent about maintaining these records. Because the database served a variety of useful purposes for the support specialists and their managers, the information recorded was quite reliable, although not necessarily complete in every detail ... because the specialists recorded only actions and events that they needed for their own purposes. (Pentland and Rueter 1994, p.493)*

Therefore, since ITSM software in general, and TP HelpDesk software in particular, provide a vast range of functionality beyond simple call logging, the first point of interest in the research presented in this thesis was to identify explicitly the purposes which the TP HelpDesk software was set up to fulfil within the IT Services department of XYZ University. An early interview with the Academic Support Manager, chiefly responsible for maintenance and implementation of TP HelpDesk software at XYZ university and line-manager of the cluster support teams, illustrates:

*It [TP HelpDesk software] is there for several reasons - it's there to provide staff with a tool that helps them to do their day-to-day jobs helping them to deal with calls as they come in [...] make sure they are not forgotten about; [...] it's there to enable us to pass on calls to other people and not lose sight of them; [...] it's there for service managers, and by that I mean both the team leaders of small teams and other more senior managers in the structure to be able to get an overview of performance and workload so that we can spot and prevent particular problems before they become a major downfall as a service; [...] and it is there to actually produce some more formal sort of performance review of how we are dealing with calls [...] as a measure of our performance against Service Level Definitions. [ASM]*

However, at the same time the Academic Support Manager also highlighted a variance in the practices using the TP HelpDesk software within the IT Services department:

*Well, it's true to say with all helpdesk software that some people make a bit more use of it than others, and some teams are very-very meticulous about logging absolutely everything they do. For some of the other teams, although all the kind of substantive work [...] and kind of bigger jobs are picked up and put into it, they don't make quite so much day-to-day use of it. [...] And actually at times some teams probably have under-recorded [...] their workload, which can be a problem because it then creates the impression that we haven't had as much work as we've had [...]. [ASM]*

Similarly, the Academic Support Manager commented that there exists a wide diversity of perception with regard to the practice of using TP HelpDesk software for logging calls:

*It [the perception of helpdesk software held across the department] is very-very varied. I mean some people think it's just a waste of time and they don't want to have to use it and it's a chore, either a necessary or unnecessary chore. Some people think it's really useful and integral to their working day and they couldn't survive without it and it's very good.[...] And you know, you've got any [number of] views in between [ASM]*

## **6.6. Contextuality**

In a study of how software support specialists accomplish collective knowledgeable performances resolving customers' problems (Pentland 1992) showed that the variety of moves employed by software support specialists to achieve collective knowledgeable performances and successfully resolve customer problems exhibited a distinctively organisational nature, where individual behaviour was contingent on physical, competence and ritual contextual structures, as elaborated earlier. A situated perspective on use of technology developed on the foundation of technologies-in-practice framework is based on the central principle of: *"use of technology involves a repeatedly experienced, personally-ordered and edited version of the technological artefact, being experienced differently by different individuals and differently by the same individuals depending on the time or circumstance"* (Orlikowski 2000, p.408).

Comments from the Academic Support Manager as given above, and other interview respondents indicated early on in the study that the practices of logging calls and using TP HelpDesk software at XYZ University are similarly contingent on a variety of contextual factors, including perceptions of value of call logging in the broad sense in general and using TP HelpDesk software in particular, with considerable variance across the department. Furthermore, such contextual factors are simultaneously at play in a variety of often contradictory ways, which not only makes formulation of structured analytical distinctions a complex endeavour, but also the presentation of analytical findings in an easy-to-follow sequential manner quite difficult. However, such complexity makes situated perspective analysis based on technologies-in-practice framework very appropriate for this study.

## **6.7. Chapter summary**

This chapter presented the preliminary findings of the research presented in this thesis as relates to the research site and the customised deployment of the software artefact at that site. Organisational context of XYZ University, IT Services department, and technical support teams was outlined, with specific reference to their stated strategic and operational goals and priorities, including ITIL processes, and service level definitions. More specifically, early transaction log analysis identified the Student IT Help Desk team as the one logging the vast majority of calls over the 2002-2006 period, suggesting it as the empirical focus of our research. Following the introduction

of the organisational context, Chapter 6 presented the findings of our research as pertaining to the specific configuration of TP HelpDesk software artefact in the Student IT Help Desk team and other teams, with specific reference to the instantiation of organisational processes as workflows in the software package, data capture configuration, User Interface (UI) configuration and customisation for the different teams. Chapter 6 concluded by presenting preliminary findings of the case-study in discussion of the triangulation and overlapping nature of empirical evidence collected at the research site, and development of a synthesised analytical point of departure, including early empirical evidence of contextuality of the role of TP HelpDesk software in the technical support organisational routines.

## **CHAPTER SEVEN – CASE STUDY ANALYSIS**

### **7.1. Chapter introduction**

As outlined in the preceding chapters, the research presented in this thesis aims to contribute to the established understanding of Business-IT alignment. Our literature review has highlighted the growing recognition that such alignment is a fusion of the business and IT functions along organisational strategy, structure, and culture dimensions (McKeen and Smith 2003). However the current understanding of the issue tends to focus on the “macro” issues of IT governance with an emphasis on an optimal mix of IT organisational structure, such as roles and responsibilities, and operational processes such as Service Level Agreements, ITIL, and maturity scorecards (Ribbers 2002; Patel 2004).

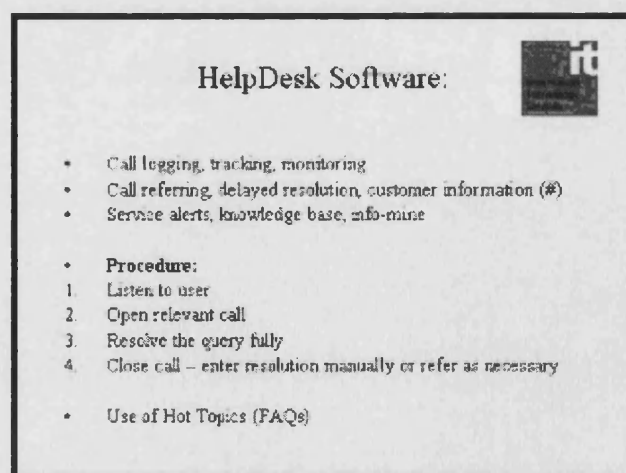
The purpose of this chapter (Chapter 7) is a twofold “micro” level analysis. Firstly, we must identify patterns of use of TP HelpDesk software in the IT Help Desk team in terms of call logging and collaborative working practices activities. Secondly, we must analyse the context of those patterns of use with reference to the synthesised theoretical framework incorporating the grammatical model of organisational routines (Pentland and Rueter 1994; Pentland 1995) and the practice lens structural perspective (Orlikowski 2000) developed in Chapter 3 by triangulating empirical evidence from a wide variety of sources as mentioned above. The purpose of the next chapter (chapter 8) is to relate our analysis of the working practices at the “micro” level of the IT Help Desk team to the wider context of IT Service Management at the “macro” level of the XYZ University department by analysing the end-to-end process of collection and utilisation of performance metrics based on the usage patterns of the TP HelpDesk software.

### **7.2. General Procedures and Training**

One of the most important contextual aspects in analysing how staff interact with the TP HelpDesk software was to consider the procedural context in which such interactions take place, both in terms of what the procedures are (as outlined in this section of this chapter) and the process and environment by which they are set out and facilitated or enforced (as outlined in a later section of this chapter). Similarly,

knowledge and experience of operation do not spontaneously appear in a vacuum, and are guided to a great extent by the provision and availability of training to staff, which made analysing training data integral to this study.

As has been shown in the previous chapter, Help Desk Advisors are recruited from the University's student population each year on a typical 30%-50% annual staff turnover. A few weeks before the start of academic year the newly recruited Help Desk Advisors receive initial induction training followed by a two or three weeks "shadowing" on-the-job training period whereby the new members of staff are added to the daily rota alongside more experienced staff. Help Desk Advisors continuing on from previous years are encouraged but not required to attend these training sessions. Newly appointed full-time members of staff receive the same initial induction as well as a variety of additional training as required by the role. The researcher had access to the presentation slides for every induction training session between 2001-2002 and 2005-2006 and found the majority of the slides including those pertaining to general procedures to be identical, with the exception of specifics such as contact details. The following slide from the 2005-2006 induction training session illustrates the role of the TP HelpDesk software in the general operating procedure as presented to new staff:



**Figure 23: Role of TP HelpDesk Software in IT Help Desk team's IT Support Process**

As can be seen, the initial induction training presents a fairly straightforward general operating procedure for IT Help Desk personnel. It is important to highlight, however,

that the very first training session that new staff receive places the activity of logging an end-user enquiry specifically as part of the overall activity of providing the end-user with a resolution to that enquiry. Call logging is mentioned in the context of tracking and monitoring of logged calls; call referring is mentioned in the context of a delayed resolution to the customer enquiry and issuing a call reference number for customer information. One can note, however, the prominence given to the use of Hot Topics, mentioned in the context of being set up to correspond to whatever the Frequently Asked Questions are received at the student IT Help Desk at that time.

All new members of staff in the IT Help Desk team are given a dedicated training session on the use of TP HelpDesk software and where procedures pertaining to the specifics of procedures change throughout the year, regular updates are sent out to all staff by email. The IT Help Desk team operates from a single open-plan office which not only facilitates ongoing communication between staff but allows them to work collaboratively. The following comment from a Help Desk Officer illustrates:

*[...] at the beginning of the year there is a training, sort of refresher training event for [student staff] and also [...] at any point [...] we can literally sit down with a member of staff and show them how the software operates, functions, and how they are meant to use it, within the framework of [XYZ university's] procedures [...]. And also by email the help desk manager would send out updates, instructions[...] saying for calls of type X please use this format or please enter this type of data and so on. And then because we work quite sort of collaboratively anyway as well throughout the shifts we will sort of assist each other with logging calls as well. [HDO1]*

### **7.3. Role of TP HelpDesk software in daily work**

A situated perspective analysis (Orlikowski 2000) calls for consideration to be given to the variety of contexts in which an organisational process or action take place. One of the first tasks in this research was therefore to get a sense for the scope of application and the importance attributed to the TP HelpDesk software as part of the normal daily operations of the team, albeit necessarily at an overview or a general impression level at the start.



As has been shown in the previous chapter, there are three levels of staff within the IT Help Desk team: Help Desk Advisors – front-line support, part-time staff recruited from XYZ University’s student population; Help Desk Officers – front-line plus operational supervision, full-time; and Help Desk Manager – service and staff management, full-time. Our research found a layering of responsibilities between the three staff levels: all three levels of staff carry out front-line support, Help Desk Officers also have operational supervision responsibilities, and Help Desk manager’s purview includes strategic service management and line management responsibilities.

Our research has found a similar differentiation of perception of the role of the TP HelpDesk software in the IT Help Desk team. For example, the following comment from a Help Desk Advisor broadly illustrates the role that TP HelpDesk software plays within the Student IT Help Desk team for the front-line staff:

*[Q] How big a role does the helpdesk software play in your work?*

*[A] Not a huge one in the sense that it is used in those specific cases where something is outside of the sphere of my responsibilities and outside the sphere of my capabilities, which I’d say it’s not the majority of the calls of the people that I have to deal with. And it is also a way for me to pass on problems but I don’t receive anything back from it, I am not one of the people who reassign calls that’s done by my manager or by permanent members of staff. So I would say that it’s taking probably 10 or 20 % of the time [HDA1]*

The following comment from a Help Desk Officer illustrates a greater degree of involvement of TP HelpDesk software in daily activities for those staff:

*Well, I certainly use it every day, when I am in the office here. It’s fairly substantial in that it underpins what we do when we are receiving calls and processing and dealing with them. Although actual usage doesn’t take up a great deal of our time overall, so I would say, I don’t know, something like 30% maybe of the time is spent either looking at existing calls and handling those, or logging incoming issues. [HDO1]*

It is useful at this point to introduce one of the early comments from the Help Desk Manager as a broad illustration of the general parameters setting out the role of TP HelpDesk software for the team for logging calls:

*[...] we log calls from students and we have hot topics set up [...] specific hot topic for phones, and a specific hot topic for coming in person. If it's a quick query we just use a hot topic, where [...] we resolve it first time [...]. If it's something which needs some involvement from another team, that's when it sort of gets logged properly, where you fill in all the details where you get their id number, contact details to get back to them, and then we pass it on to another team to have a look at [...] [HDMI]*

The choice of words used to describe two broad patterns of using TP HelpDesk software for logging calls was a strong indication of the direction this research was to take. The comments above show that calls which require attention from other teams “get logged properly”, as opposed to the practices relating to logging calls where involvement from other teams is not required. This statement was instructive in that it presented a clear analytical path that could be followed up in empirical data collection, in particular through verbal protocol analysis of descriptions of how different types of calls would get logged and semi-structured interviews illuminating the different reasons as to why different patterns of call logging may or may not be followed.

#### **7.4. Call logging technologies-in-practice**

Our literature review identified call logging at the first point of contact with an end-user as a crucial part of the ITIL Incident/Problem/Change methodology and a key aspect of the usage of ITSM software in organisations. Our analysis of the general procedures and training as given above has highlighted the importance attributed in formal procedures to the role of TP HelpDesk software in recording end-user support enquiries. The first task of this research was therefore to identify patterns of engagement with the TP HelpDesk software in terms of its call logging functionality as presented in Chapter 5.

### 7.4.1. Performative Aspect – Transaction Log Analysis

Having access to all 114,839 calls logged in the Help Desk software by the IT Help Desk team over 2002-2006 period, a simple transaction log analysis provided an interesting early insight – only a very small proportion of calls are logged using the generic “File → New → Call” functionality of TP HelpDesk software. The vast majority of calls logged by staff in the Student IT Help Desk team are created with the use of Hot Topic functionality of the software, as shown below.

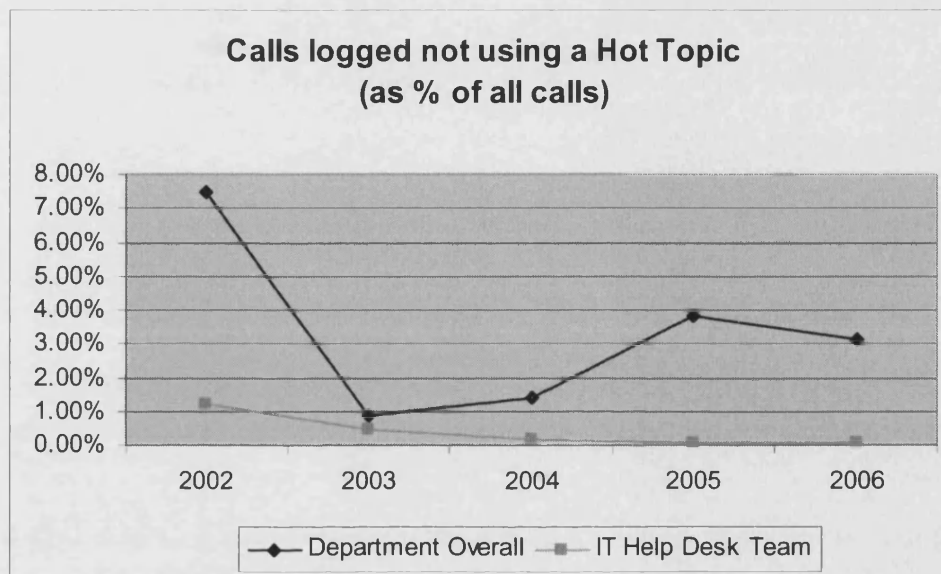
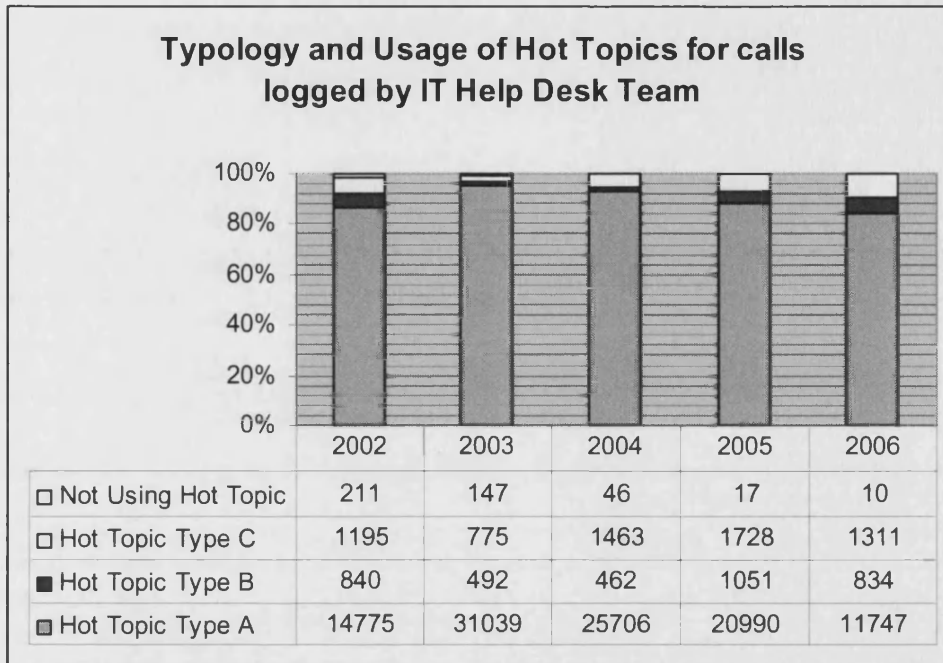


Figure 24: Call Logging Transaction Log Analysis - Use of Hot Topics

We have already outlined the generic Hot Topic functionality of TP HelpDesk software in Chapter 5, whereby a Hot Topic speeds up the process of logging a call by pre-populating certain information and actions from a pre-configured template. Similarly, our task analysis presented in Chapter 6 illustrated the three types of Hot Topic configuration in use in the IT Services department of XYZ University, as below:

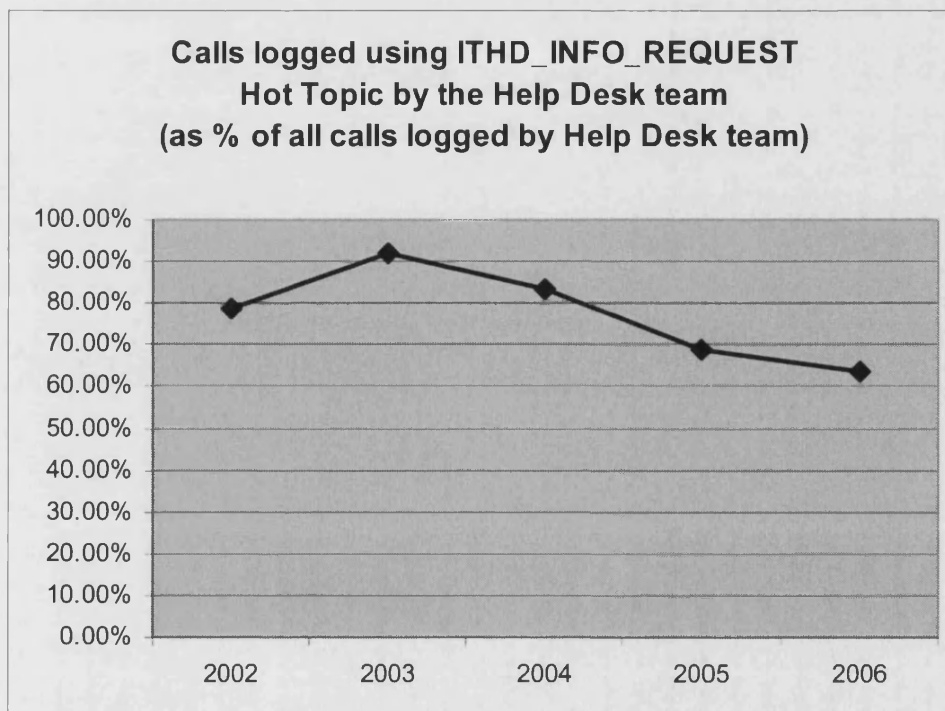
- A) No additional information is needed and the call is automatically closed
- B) Some additional information is needed and the call is automatically closed
- C) Some additional information is needed and the call is automatically re-assigned

Our transaction log analysis indicated that the vast majority of calls are logged using Type A Hot Topics, as illustrated in the following diagram:



**Figure 25: Call Logging Transaction Log Analysis - Typology of Hot Topics**

More specifically, more than half of 114,839 calls recorded by the IT Help Desk team are logged using a particular Hot Topic designated `ITHD_INFO_REQUEST`, as shown in the diagram below:



**Figure 26: Call Logging Transaction Log Analysis - Prevalent Hot Topic**

Our transaction log analysis allowed us to identify a distinct pattern of use of TP HelpDesk software in the IT Help Desk team as the dominance of Type A Hot Topics in general, and the ITHD\_INFO\_REQUEST Hot Topic in particular, as the most frequently used method of logging support calls. Having identified this distinct pattern, it was then possible to begin triangulating our analysis of the various sources of empirical data in order to understand the significance of this finding. In particular, the transaction log empirical evidence allowed the researcher to anchor the semi-structured interviews and other sources of data in the following questions as a useful starting point for subsequent discussion:

- Do you normally log calls using Help Desk software and how (using a Hot Topic or manually)?
- Which Hot Topics do you use for logging calls more often and why?
- What do you think of the Hot Topic call-logging functionality, does it help or hinder the use of Help Desk software?
- Do you think the Hot Topics' designations are suitable for your work practices with reference to the kinds of calls you log in the course of normal daily work?
- Can you change the design or designations of the Hot Topics to make them suite your work practices better?
- Could you give examples of the different ways of using (or not using) Help Desk software to log calls and explain why a particular course of action is chosen? What information do you log within a call in those circumstances?
- Could you give examples of specific actions you carry out to log calls using Help Desk software? Do (or would) other people use it in the same way?

#### **7.4.2. Ostensive Aspect – Operational Procedures**

Our analysis of the operational procedures and training documentation allowed us to obtain a more detailed understanding of the role of the ITHD\_INFO\_REQUEST Hot Topic in the standard work practices in the IT Help Desk team. As the following extract from a procedures intranet site illustrates, the ITHD\_INFO\_REQUEST is specified as a generic catch-all procedure, applicable to logging enquiries which are not specifically included in other categories of enquiries.


Icon	Issue Reference # to customer	Description
	N	<b>ITHD_INFO_REQUEST</b> - Information query: Use for everything that does not fall into categories below. No detailed call information is required.

Figure 27: IT Help Desk Team "Catch-All" Hot Topic Operational Procedure

A further interesting aspect of the call logging procedures is that TP HelpDesk software is not the only means of recording incoming end-user enquiries. Technical support analysts in the Student IT Help Desk team are sometimes instructed to use a handheld manual clicker counter tool (as shown on the right), for example at times of exceptional customer demand, such as during student registration periods. The counter simply increments the running total by 1 every time it is activated, and the total tally is noted at the end of the relevant monitoring period (e.g. a full day, or a particular shift). In this manner, our analysis revealed that the manual clicker counter tool was deemed equivalent to logging a call using the ITHD\_INFO\_REQUEST Hot Topic. Furthermore, our analysis demonstrated that whereas separate Hot Topics were set up for enquiries received from drop-in students, drop-in alumni, and telephone callers, the process of logging incoming enquiries using the manual clicker counter did not involve such differentiation.



### 7.4.3. Performative Aspect – Task Analysis

A detailed illustration of the functionality provided by various types of Hot Topics is presented in the previous chapter, nevertheless it would be useful at this point to visualise the process of logging calls by bringing together our analysis of the TP HelpDesk software artefact and task analysis of type A Hot Topics in particular. The following table reiterates our task analysis of Type A Hot Topics:

Hot Topic	Sequence of Actions
<b>Type A</b> (no additional information, call automatically closed)	<ul style="list-style-type: none"> <li>• Support analyst clicks corresponding icon</li> <li>• Call created</li> <li>• <u>All</u> information for main call window is pre-populated form template</li> <li>• Main call window <u>is not</u> shown to support analyst</li> <li>• <u>All</u> information for call closure window is pre-populated from template</li> <li>• Call closure window <u>is not</u> shown to support analyst</li> <li>• Call is automatically closed</li> <li>• Popup window showing call reference number shown to support analyst</li> </ul>

Figure 28: IT Help Desk Team Type A Hot Topic Operational Procedure

Therefore, clicking on one of the icons corresponding to a type A Hot Topic (such as the ITHD\_INFO\_REQUEST Hot Topic illustrated in the previous section) simply brings up the following screen confirming that a call has been successfully logged:

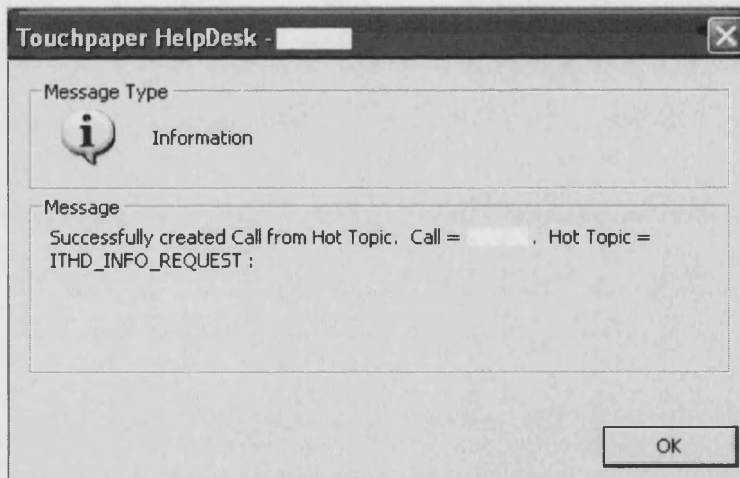


Figure 29: TP HelpDesk Software Common Call Closure Confirmation Screen

We have used the example of ITHD\_INFO\_REQUEST Hot Topic to illustrate the functionality of type A Hot Topics on the basis of its most frequent use by members of staff in the IT Help Desk team. ITHD\_INFO\_REQUEST Hot Topic. The other ones function in the same way, with only slight variation in terms of automatically recorded information. Our detailed analysis of the TP HelpDesk software artefact allowed us to further understand the nature of ITHD\_INFO\_REQUEST Hot Topic by reviewing the information pre-populated in the call as part of its template, including

the following elements: Date/Time stamp; IT Help Desk Support Analyst identifier; End user: generic XYZ\_USER record; and Call categories: INFO – GENERAL.

#### **7.4.4. Fire-and-Forget Call Logging**

The transaction log evidence illustrating the prominence of Hot Topics in the process of logging calls was strongly supported by the interviews with staff in the Student IT Help Desk team. For example, the following comment from a Help Desk Advisor illustrates a typical general reflection on the use of Hot Topics for logging calls:

*[Q] Do you usually log calls using “File → New Call” or hot topics?*

*[A]: Hot topics, I’ve never used file new call. [HDA2]*

Triangulating our analysis of transaction logs, operational procedures and elements of verbal protocol analysis in the semi-structured interviews we were able to confirm that Hot Topics in general, and the quick logging functionality of type A Hot Topics as play a crucial part in the daily use of TP HelpDesk software in the IT Help Desk team for the purpose of logging calls. Having thus been able to establish a preliminary identification of a pattern of usage, it was necessary to conduct a detailed analysis of the organisational context of that pattern.

##### **7.4.4.a. Facilities, Norms and Interpretive Schemes**

The Hot Topic functionality of the TP HelpDesk software was thus identified as a particular facility playing a part in as yet unidentified organisational routine enacted as regularised engagement with the Hot Topic quick logging functionality of the software artefact. Following our theoretical perspective, routines are embedded in an organisation and are specific to the context (Cohen, Burkhart et al. 1996) and occupy “the crucial nexus between structure and action, between the organisation as an object and organising as a process” (Pentland and Rueter 1994, p.484) thus representing institutionalised features of social systems. Although we had identified a Hot Topic functionality as a particular facility, such elements of technology are external to human action, as inscribed properties of a technological artefact these properties of technology cannot be conceptualised as structures. It was necessary therefore to conduct a much more in-depth analysis of this pattern of regularised engagement with the TP HelpDesk software in order to derive an understanding of the set of rules and



resources repeatedly enacted by agents which structure their ongoing interaction with that technology.

Semi-structured interviews served as a crucial foundation in our triangulation of empirical data relating to this pattern of engagement with TP HelpDesk software. For example, we have already outlined the fairly straightforward expected standard operating procedure as presented to members of the IT Help Desk team through training – listen to end-user, open call; resolve/action query; close/action call. The documentary evidence provided a strong indication of the formal norms of expected pattern of engagement with the TP HelpDesk software artefact. However, one of the anchor points in the semi-structured interviews with members of the IT Help Desk team provided a penetrating insight into how the formal norms are reinforced by the possibility of sanctions for non-compliance, as the following comment illustrates:

*[Q] And you consider a significant part of your job is logging calls as well?*

*[A]... it depends. Yes, I consider it a significant part of my work logging calls because I know that there is importance attached to it. I don't know – other colleagues of mine have been reprimanded for not logging the calls in particular shifts. So I don't want to be in that position. [HDA1]*

As we have demonstrated, the standard operating procedure, and thus expected pattern of engagement with the TP HelpDesk software indicated that every support enquiry should be appropriately logged. However, despite the possibility of sanctions for non-compliance, the individual member's of staff perception of the nature of the support enquiry was found to play an even more prominent part in the formation of this technology-in-practice.

The literature review presented in Chapter 2 highlighted the importance of “interpreting problem-solving” moves, such as “tell me”, “read me”, and “send me” fulfilling the purpose of reducing equivocality and noise in the end-user's description of their enquiry (Pentland 1995). Our research findings indicated that such moves in fact served a dual purpose. Firstly, these moves served the purpose of ascertaining the nature of that enquiry as a pre-requisite for technical problem-solving (Das 2003). Secondly, and of no less importance, these moves also served to evaluate that enquiry

with reference to the norms (operational priorities and procedures) concerning the logging of calls into the TP HelpDesk software.

The decision at the core of the evaluative process is quite simply whether a particular end-user enquiry should be logged at all, in other words – what qualifies as an enquiry to be logged using TP HelpDesk software? Framing the central premise of this evaluative process in this way during the interviews allowed for fascinating insight into the importance of interpretive schemes which serve to frame the formal norms and procedures. In fact, this aspect was very easy to overlook during the course of our data collection as it appeared as tacit knowledge held by interview respondents and largely taken for granted in their responses.

The following comments from an interview with a Help Desk Officer illustrate how this technology-in-practice was identified during the course of this research:

*[Q] So, are there any circumstances in which you would log some calls but not others, for example? Somebody popping their head through the door asking where the toilet is...*

*[A] Yes, that's true. Anything for a start that's not IT-related, actually related to, you know, the task that we deal with, so we wouldn't indiscriminately log every single case of someone who talks to us. [HDO1]*

Although the interview question was presented in a conversational manner, the response obtained from the interviewee suggested that in fact the underlying activity of logging an end-user enquiry as a call should be subject to much more investigation. The initial response indicated that the decision of whether to log an enquiry as a call at all may be largely dependent on whether the enquiry falls within the scope of the service provided to end-users. However, as the following elaboration from that Help Desk Officer illustrates, the routine nature of the assessment of what qualifies as an enquiry to be logged is highly context-bound, for example by the prevailing procedural norms:

*We wouldn't record someone coming to us on a first basis with a query that is not for our team. For example, we deal with undergraduates and taught post graduates so if a research student came along, or a member of staff dropped in and said "Oh, I need*

*something fixed on a machine in my room, we wouldn't [log it] – our procedure is not that we would log it there and say OK we'll record the call and assign it to your team. What we would actually do is say to the individual "Do you know who your IT team are? Here is the information for who they are.", and we would point them in the right direction and then obviously it would be the responsibility of that team to log whatever they need to log to meet their service level definitions. [HDO1]*

However, the procedural norms were found to be subject to considerable interpretation on part of the IT Help Desk staff. For example, comments from another Help Desk Officer highlight this assessment process is context-bound in particular by the interpretive schemes held by technical support analysts:

*[Q] Do you find people use it [TP HelpDesk software] in different ways?*

*[A] Well some people choose what they think needs logging, basically. I mean they may not log the fact they just gave the person an instruction leaflet to show them how to do something. But if they've got someone sitting down next to them and they are showing them something [on the PC], then they might, they'll probably think that's more worth logging. [HDO2]*

As the above findings demonstrate, not every enquiry received at the IT Help Desk qualifies as a call to be logged using TP HelpDesk software – some enquiries may not be logged as a matter of (understanding of) procedure, others as a matter of interpretation of the wider purpose call logging. However, investigating the matter of what qualifies as a call to be logged, our analysis of operational interpretation and strategic/operational orientation data revealed another interesting aspect of the assessment process.

When asked to reflect on the accuracy of call logging as a representation of actual workload some interview respondents reflected that a certain degree of discretion is required when assessing whether multiple interlinked enquiries from the same end-user should be treated as a single or multiple calls in TP HelpDesk software. The following comments from a Help Desk Advisor illustrate:

*[Q] if the same person was standing in front of you for 5 or 10 minutes, and asked you two or three completely separate questions in your area, would that be one call or would that be two calls?*

*[A]: I think this is something that has been discussed. I would think of it as one call. I know other colleagues of mine think that every question is a different call. And because we very often have people saying “Oh, by the way since I am here I might as well ask about this...” and then you end up with someone’s life story, this is my time and my work you are taking up time of my work, I might show that this was 5 calls...*

*[HDA1]*

The difference of opinion alluded to by the Help Desk Advisor was instructive, in that it pointed to the highly situated nature of the decision on part of technical support analysts on how best to represent their workload in the number of calls that they logged. Further evidence pertaining to this practice was found in the strategic/operational orientation data, particularly the minutes of monthly Operational Managers meetings (OMGM) dated 18/08/2005 and 20/09/2005. The historicity of this empirical evidence illuminated the longitudinal dimension of this aspect of discretionary aspect of the standard call logging working practice. The following extracts of the meeting minutes demonstrate the distinct change of policy.

*[OMGM digest – 18/08/2005]*

*Helpdesk – The group commented that 3,505 incidents recorded under [SLD-ITHD-1] need to be confirmed and explained. The number of incidents recorded exceeds the number of students joining the summer school and we need to ensure that our logging is accurate for the [University-wide Resource Allocation] review. Actions Required – [Help Desk Manager] to investigate and confirm the high number of incidents logged under [SLD-ITHD-1] and provide explanatory notes for the statistics.*

*[OMGM digest – 20/09/2005]*

*Helpdesk – with reference to the high volume of calls being recorded by the helpdesk staff [Help Desk Manager] commented that the current procedure is to record each query as a unique call. This means that a student with two different requirements for help in the same visit will be recorded as two calls. [Senior Managers] believed the figure to be too high and not representative of the number of students actually helped*

*at the helpdesk so it [was] asked that future student enquiries are recorded by 'visit' regardless of how many questions are asked. If that same student returns later then a new call is opened up. [Help Desk Manager] agreed and would record each visit, not each query.*

The enquiry assessment process outlined above was instructive in highlighting the importance of interpretive schemes relating to the representation of workload on part of front-line support analysts. A key finding arising from our analysis of interviews with members of the IT Help Desk team illustrated that we can accurately describe the technology-in-practice as **fire-and-forget** call logging. This description is deliberate and reflective of the attitude of the technical support analyst towards the end-user enquiry being logged whereby front-line staff enacting this technology-in-practice lacked feedback regarding the calls logged in this manner. The following comments from a Help Desk Advisor illustrate:

*[Q] What happens to the different kinds of information request calls that you log in the system as it were, where do they go?*

*[A]: Although I don't know much, I would be tempted to say that it's a black hole! ... They will be closed. I have no idea what happens to them, I believe they get [aggregated] and they just become part of reports [HDA1]*

Another Help Desk Advisor concurs:

*[Q] What happens to the calls which you log using ITHD\_INFO\_REQUEST or the other similar Hot Topics?*

*[A] Nothing! As far as I know someone looks at the total numbers but I don't know whether they actually use that information for anything. [HDA3]*

The fire-and-forget nature of this technology-in-practice is further illuminated through our analysis of the calculation of the Service Level reports on the basis of the statistics obtained from the TP HelpDesk software transaction logs. Our research found that the emphasis placed on the accurate aggregate numerical representation of the workload was much stronger than on qualitative differentiation of different types of enquiries. For example, the emphasis on the number of total enquiries received at the IT Help

Desk reflected on during the Operational Managers meeting as outlined above, provides a very strong indication of one of the two dominant interpretive schemes held by members of the IT Help Desk team.

#### **7.4.4.b. Moves, Subroutines, and Performances**

Having identified the recurrent pattern of engagement as predominant use of type A Hot Topics to log incoming enquiries, and the fire-and-forget nature of that engagement, we were in a position to illuminate several other findings arising from our empirical data. It became evident early on in our research that although the broad parameters of this technology-in-practice were readily identifiable, treating this technology-in-practice as a black-box was severely limiting in helping to understand the observed variations in the general pattern of enactment.

The conceptual insight afforded by our synthesised theoretical framework suggested that an organisational routine allows members to produce a variety of performances, and what we actually observe empirically is never the whole routine, but rather specific instances of it. Similarly, an organisational routine is not a single pattern, but, rather a set of possible patterns – enabled and constrained by a variety of organisational, social, physical, and cognitive structures – from which organizational members enact particular performances (Pentland and Rueter 1994). The grammatical model of organisational routines suggests that the situated quality of action in organisations extends beyond individual moves to include sequences of moves, often in chunks of behaviour which have themselves become largely routinised, but can nevertheless be nested together and recombined (March and Simon 1958).

The task analysis presented in the previous chapter and the earlier sections of this chapter allowed us to identify a repertoire of moves which are conceptually the basic building blocks of the performative aspect of this technology-in-practice. Focusing our analysis specifically on the process of engagement with the TP HelpDesk software, the repertoire of moves was in fact found to be rather limited – exemplified by the five type A Hot Topics available to the IT Help Desk staff. However, our findings allowed us to identify two distinct variations of the fire-and-forget call logging technology-in-practice at the level of subroutines, and support analysts were

found to be frequently switching between them depending on particular circumstances.

Owing to the physical layout of the office a technical support analyst can multitask and in essence deal with a number of end-users at once, typically by asking the end-user whose enquiry requires demonstration to log on to the customer PC next to the support analyst, and in the meantime resolving a number of straightforward information enquiries from other drop-in or telephone enquiries. Similarly, at times a technical support analyst has to leave the office and attend to an end-user's enquiry at their PC, and be asked to resolve a number of other problems by different end-users on the way there and back. Circumstances such as those we have described can alter the working pattern of a particular support analyst at a given time, as the following comment from a Help Desk Officer illustrates:

*I mean we try to encourage all of our members to log as and when, so for accuracy of time of collection of data and things like that, but what you do find is that some find that their working pattern is such that they will be dealing with issues in a block, so perhaps they might work with a different user for a couple of hours, and then at the end of that period, they will then in a block log all the users they've seen, so they may have seen, you know, ten different people, and at the end of the two hours they then log one, two, three, four, five, six, seven, eight, nine, ten different calls one after the other. So, there is a difference there that some in their working pattern routinely log as soon as they are dealing with something, others will do a batch of tasks and then log that batch at the end. [HDO1]*

We were thus able to identify **prompt** and **batch** modes of operation pertaining to the **fire-and-forget** call logging technology-in-practice. The *prompt* mode of operation of this technology-in-practice refers to a strict sequential pattern of enactment whereby a call is logged having resolved the end-user's enquiry before proceeding to deal with the next end-user. The *batch* mode of operation of this technology-in-practice refers to a non-sequential pattern of enactment, typically exemplified as follows: a). end-user enquiry is received in person or via telephone; b). the enquiry is dealt with by providing a resolution; c). next end-user enquiry is received; d). the enquiry is dealt

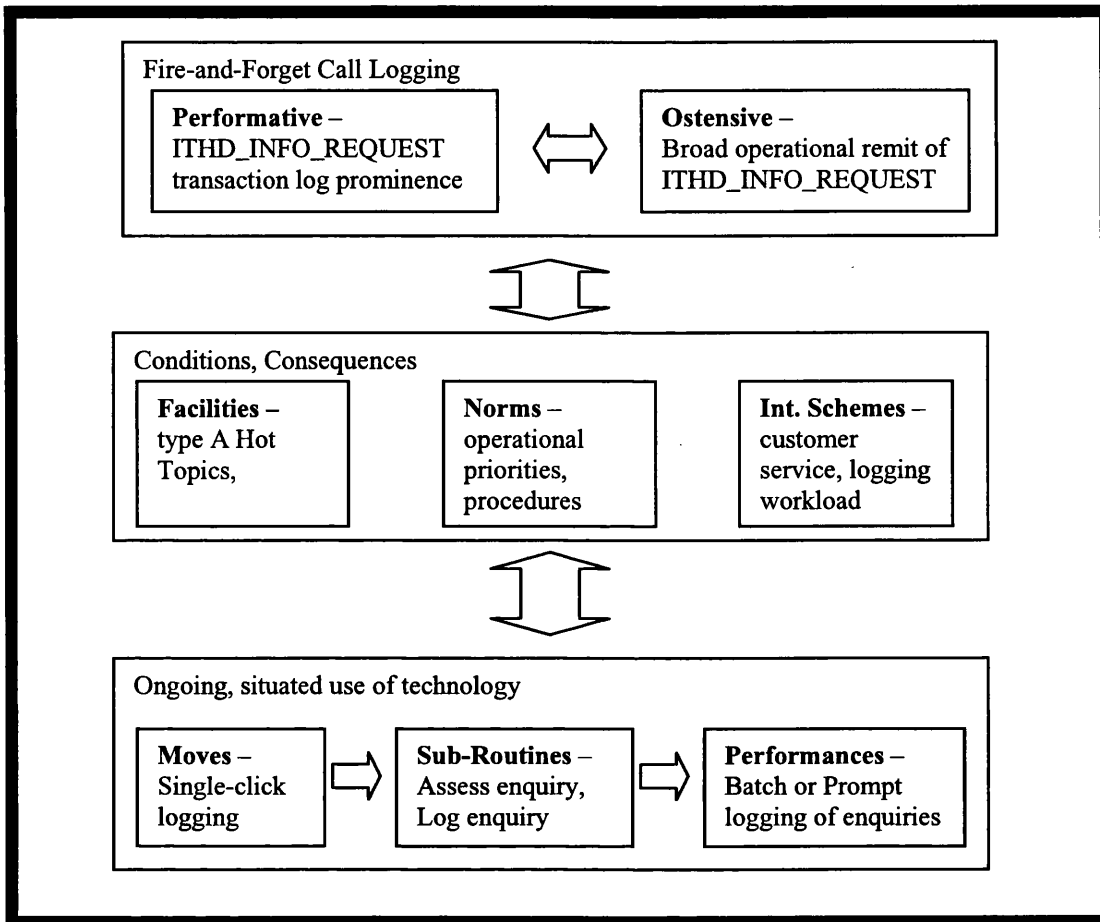
with by providing a resolution; ... and so on, until eventually ... e) the enquiries are logged using the manual clicker or a type A Hot Topics.

#### **7.4.4.c. Fire-and-Forget Call Logging – Summary**

As has been demonstrated, the overlapping nature of empirical data makes both analysis and presentation of findings a challenging endeavour for the researcher. The account presented in this and the following sections of this chapter offers an empirically and conceptually rich description of our analysis and findings. However, the reader may be interested in a simplified account offered in Appendix, illustrating a first-person account of the fire-and-forget call logging technology-in-practice from the perspective of a front-line technical support analyst, and relating the technology-in-practice to the conceptual constructs and the chain of empirical evidence representing those constructs.

A diagrammatic representation can help illustrate the findings and is an invaluable tool in facilitating the clarity of the narrative, although it should be noted that such attempts at representational clarity are made at the expense of somewhat simplifying the analytical constructs and giving examples (rather than exhaustive lists) of empirical evidence. The following diagram serves as a brief summary of the key empirical and analytical constructs developed and applied in the processes of identifying and analysing the fire-and-forget call logging technology-in-practice:





**Figure 30: Synthesised Theoretical Framework - Fire-and-Forget Call Logging**

Following Orlikowski (2000), the fire-and-forget call logging organisational routine can be classified as an “application” technology-in-practice - a case where users chose to use technology to augment their existing ways of doing things with some noticeable changes in technological properties and work processes but on the whole demonstrating reinforcement or enhancement to the structural status quo. We can best illustrate the various aspects of this routine with reference to the analytical process as outlined earlier in this chapter.

Our transaction log analysis allowed us to initially identify the facility of type A Hot Topic (e.g. ITHD\_INFO\_REQUEST) in a repeated pattern of engagement with the TP HelpDesk software as playing a prominent part in the performative aspect of as yet unidentified organisational routine. Our analysis of operational procedures allowed us to confirm the significance of the type A Hot Topic in the ostensive aspect of this organisational routine, as indicated by its wide operational remit. Our triangulated analysis of verbal protocol, semi-structured interviews, and operational

documentation highlighted the importance of the Hot Topic template and office layout as pertinent facilities; greater emphasis on overall numerical representation of workload and the perceived importance of prompt customer service as pertinent interpretive schemes; and the official procedures and sanctions as pertinent norms. Our task analysis identified single-click call logging as pertinent move repertoire, from which the technical support assess and log enquiry subroutines are constructed where TP HelpDesk software is used. The semi-structured interviews proved particularly instructive in facilitating further analysis of the subroutines and allowed us to characterise this organisational routine as a fire-and-forget technology-in-practice with reference to the prominent facilities, norms and interpretive scheme; and to identify its prompt and batch modes of performative aspect.

The composition of the fire-and-forget call logging routine, as particular moves constituting a sub-routine, chosen from a broader repertoire of moves available to the technical support analyst is presented below:

<b>Available Moves:</b>	<p>Assess Enquiry Subroutine:</p> <ul style="list-style-type: none"> <li>• Tell me (what the problem is)</li> <li>• Show me (what the problem is)</li> </ul> <p>Manual Logging Subroutine:</p> <ul style="list-style-type: none"> <li>• Click File → New Call</li> <li>• Enter End-user's name</li> <li>• Appropriately categorise the call</li> <li>• Type in call description</li> <li>• Close the call, type in call closure notes</li> </ul> <p>Single-Click Call Logging Subroutine:</p> <ul style="list-style-type: none"> <li>• Click appropriate Type A Hot Topic (bypassing manual logging steps)</li> </ul>
<b>Chosen Subroutines</b>	<ul style="list-style-type: none"> <li>• Assess Enquiry</li> <li>• Single-Click Call Logging</li> </ul>
<b>Performances</b>	<ul style="list-style-type: none"> <li>• Prompt mode of operation (assess enquiry followed by single-click call logging)</li> <li>• Batch mode of operation (several enquiries assessed and resolved followed by single-click call logging)</li> <li>➤ Both modes of operation characterised by fire-and-forget nature of enactment</li> </ul>

**Table 17: Fire-and-Forget Call Logging Routine Composition**

### 7.4.5. Limited-use call logging

As illustrated above, our findings indicated that technical support analysts undertake a process of assessment as to whether a particular end-user enquiry should be logged using TP HelpDesk software. Enquiries which are deemed as not qualifying for logging by virtue of norms (operating procedures) prevalent at the time do not get logged. However, our findings indicate that not infrequently end-user enquiries which do qualify to be logged according to operating procedures nevertheless do not get logged in TP HelpDesk software either.

Transaction log analysis presented above allowed us to identify the dominance of type A Hot Topics in the usage of TP HelpDesk software and to analyse the pattern of such usage identifying the fire-and-forget call logging technology-in-practice. However, the overview statistical analysis aggregating annual statistics on how the calls were logged was insufficient to illuminate the entirety of possible patterns of usage of TP HelpDesk software. A more detailed analysis of transaction logs revealed that there were some periods when the IT Help Desk was open for service and staffed by technical support analysts, and yet there were none, or very few calls logged during some shifts but much higher numbers of calls logged during the shifts immediately before or after. An example of such inconsistencies is shown in the table below which relates to one of the busiest periods – the 3<sup>rd</sup> week of the academic year in 2005-2006:

	<b>9.30-1</b>	<b>1-4</b>	<b>4-8</b>
<b>Monday</b>	80	81	94
<b>Tuesday</b>	115	207	128
<b>Wednesday</b>	161	184	<b>7</b>
<b>Thursday</b>	<b>19</b>	81	60
<b>Friday</b>	231	110	42
<b>Saturday</b>	32		
<b>Sunday</b>	38		

**Table 18: Transaction Log Analysis – Call Logging Inconsistencies**

At first glance, such variation in the numbers of calls logged using TP HelpDesk software could reflect the pattern of customer demand on the IT support service, some of the variation can reflect the batch mode of the fire-and-forget call logging technology-in-practice (e.g. majority of calls logged at the end of one's shift, overlapping the shift-count boundary), or indeed failure of the TP HelpDesk software and subsequent inability to log the enquiries. However, the interviews with technical support analysts, suggested that such variations are most likely indicative of another pattern of usage of TP HelpDesk software entirely. Therefore further analysis of the call logging organisational routines was conducted and allowed us to identify a **limited-use** call logging technology-in-practice, as outlined below.

#### **7.4.5.a. Facilities, Norms and Interpretive Schemes**

The variations in call logging from one shift to the next were instructive of the previously identified context-bound enquiry assessment processes whereby technical support staff interpreted the established procedural norms of quantitative representation of one's workload as evidenced by the HelpDesk Officer commenting on the fact that "*some [analysts] choose what they think needs logging [HDO2]*". However, our triangulated analysis demonstrated that enquiry assessment process and interpretation of what types of enquiries should be logged was not the only pertinent factor.

One of the dominant interpretive schemes related to call logging processes was found to be the perception by technical support analysts that logging quick calls (type A Hot Topics) was an administrative burden, and served no useful overall service-related purpose. Furthermore, this perception also suggests that logging calls using type A Hot Topics may not have been necessary to reflect the analysts' personal quality (and quantity) of work. The following comments from a Help Desk Advisor illustrate:

*I know we have to log calls, but to be honest most of the time I don't see the point. I guess it makes sense for things like software sales where there is money involved or you need [... to] give the student a reference number. But most of the time the questions are simple, and it doesn't seem to matter whether you log it or not. Sometimes we are reminded that all calls must be logged and then you do it better but after a while you just log a few calls two or three times during the shift as long as it is*

*roughly the same [as the number of students seen to] or sometimes forget to do it at all. I am not even sure they need to know the numbers so much, for example it doesn't seem to matter if you accidentally log a phone call as a personal visit. [HDA3]*

The quote above illustrates a different dimension to a previously outlined interpretive scheme whereby support analysts would assess whether a particular enquiry qualifies to be within the remit of that team's area of responsibility and therefore whether it should be logged in TP HelpDesk software. Here the wider purpose of logging enquiries is held in question by support analysts. This perception is indicated to be intimately linked to the perception of how the type A Hot Topic call-logging statistics are subsequently used, with the implication that quick call-logging may be largely irrelevant.

Furthermore, we have been able to analyse additional empirical evidence to illustrate the wider purpose of call logging as well as the notion of sanctions highlighted in the previous section. The following email from the Help Desk Manager notes the variation in call logging patterns, outlines the general procedure and message concerning call logging to the IT Help Desk team:

**From:** [HelpDesk Manager – HDM2]  
**Sent:** 29 April 2003 09:40  
**To:** IT Help Desk team  
**Subject:** [TP HelpDesk Software] logs

**Importance:** High  
Hi all,

One or two of you have asked me whether they can log their queries later (after forgetting to log them during the shift), and i have myself observed the general practice of either not logging queries, or logging them as a bunch every hour, or logging them in the wrong group. Some of you are doing it very well, but i thought it would be worth sending out a general reminder as to the purpose of [TP HelpDesk software] in keeping logs.

I would like to reiterate that what matters is how many queries are recorded DURING a particular shift. It is vital that the figures are accurate as that's how the budgets will ultimately be allocated, both by myself (in deciding how many people should be on during a particular shift) and overall (how much money the Help Desk will be given to spend on staffing).

I will use the continuous figures as well as a whole range of averages to complement my perception of how busy the IT Help Desk is to iron out any discrepancies, but i must have reliable figures to start with.

Regards,

[IT HelpDesk Manager]

As the above email demonstrates, the importance placed on accurate numerical records of end-user enquiries as recorded in TP HelpDesk software was quite clearly (and directly) communicated to the IT HelpDesk team. Interestingly, the non-uniform execution of call logging appears to be well-established within the IT Help Desk team. For example, the following comments from a different Help Desk Manager illustrate this aspect and relate appropriate (in their words “better”) execution of call logging more to the relative strength of enforcement of the formal procedure (norm), rather than the training (interpretive scheme):

*[Q]: Do you find everybody [in your team] tends to use [TP HelpDesk software] in largely the same way?*

*[A]: I tend to find that the people who've been here less time use it better... People who've been here longest seem to forget that sometimes. Which is interesting... But after a reminder they are [all] fine. [HDM1]*

Our research findings demonstrate that the issue of call logging process interfering with provision of support to end-users is prominent in the comments of interview respondents. A particular importance in this case is attributed to the physical layout of the Student IT Help Desk office, identified as another vitally important facility in the enactment of the fire-and-forget call logging technology-in-practice. As shown in the previous chapter, the IT Help Desk office was not really designed to accommodate more than a handful of people waiting to be seen to. When several end-users drop-in at once, technical support analysts feel under greater pressure to respond to the customer service expectations of their end-users. This pressure is expressed as the other dominant interpretive scheme held by members of the IT Help Desk team – namely the importance attached to providing prompt and effective technical support service, even if it is done at the expense of numerical representation of their workload.

This interpretive scheme became particularly evident as a blurring of spatial boundaries between the customers and the analysts, as the following comments from a Help Desk Advisor illustrate:

*It doesn't take very long but when you have a queue of 60 people going winding around the room and one is just behind the other, all there, just looking at your screen, I was getting the feeling that every second I took to maximise the software, click on a call, wait until it pops up the window [...], even that time you steal to click on this and press enter and you feel like people are thinking, well, what are you doing? I am here, the other person has left, what are you waiting for? [...] When the workload is really heavy, then this is the case sort of when you feel like it is interfering with the way you are trying to receive people and give them your full attention. [HDA1]*

#### **7.4.5.b. Moves, Subroutines, Performances**

Performances of the limited-use call logging technology-in-practice is characterised mainly by the absence of call logging moves in the technical support subroutines. This technology-in-practice is also categorised by the ad-hoc or perfunctory manner of single-click call logging not reflective of the real number of enquiries attended to. For example, our analysis of operational procedures introduced in section 7.2 highlighted a fairly straightforward basic pattern of operation: (a) listen to user, (b) open relevant call, (c) resolve the enquiry fully, and finally (d) close or refer that call. The limited-use call logging technology-in-practice is demonstrated by the absence of moves pertaining to steps (b) and (d) in the enactment of the basic operational procedure.

A complete performance enacting the limited-use call logging technology-in-practice thus accomplishes the primary purpose of provision of IT support to the end-user. However, it produces few, if any, logged calls that can be used for the measurement of operational performance against the Service Level Definitions. For example, the following comment illustrates:

*[Q] If logging calls interferes with your support work, do you think you are more likely to log a higher proportion of enquiries when it is quieter and a lower proportion of enquiries when it is very busy?*

*[A] You would tend to. I think this is the case for the majority of my colleagues and probably for me [...] but I make an effort to log them as consistently as possible.*

*[HDA1]*

### 7.4.5.c. Limited-Use Call Logging – Summary

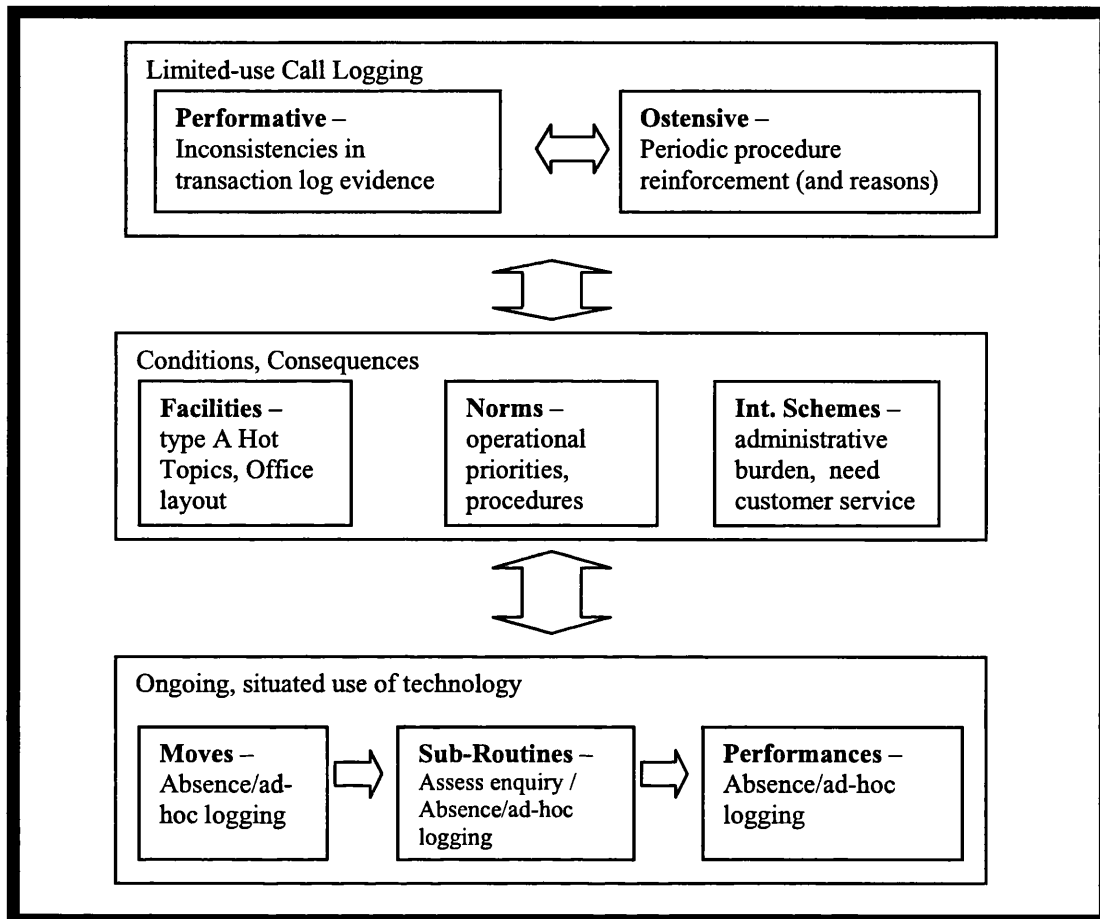
Following Orlikowski (2000), the limited-use call logging organisational routine can be classified as an inertia technology-in-practice, characterised by low interest in using the technology. Our transaction log analysis indicated that certain inconsistencies in the numerical representation of the IT HelpDesk team's workload as represented by the calls logged in TP HelpDesk software could not be explained simply by the prompt/batch variations of performances of the fire-and-forget call logging technology-in-practice or other factors (e.g. failure of TP HelpDesk software artefact). Interviews with technical support analysts allowed us to identify the limited-use call logging technology-in-practice which is characterised by ad-hoc or perfunctory manner of execution of single-click call logging.

Our in-depth interviews with technical support analysts further allowed us to identify the relationship between facilities, norms or interpretive schemes, as follows. One of the dominant interpretive schemes pertaining to the limited-use call logging technology-in-practice is one of perceiving the quick single-click call logging using type A Hot Topic as an administrative burden not achieving any useful service-related purpose. Another strong interpretive scheme is the emphasis on customer service and prompt resolution of end-users' technical support enquiries. These two interpretive schemes interact with the relevant facilities, including the physical layout of the IT Help Desk's team office which serves to reinforce the issues of service pressure at times of high demand, and the configuration of the type A Hot Topics which serve to reinforce the notion of administrative burden through the perception that no useful information actually gets logged.

These facilities and interpretive schemes counteract the formal norms of logging every call even when it is reinforced by appropriate messages from the IT Help Desk management highlighting the importance and the usefulness of logging every call. However, as we outlined above, the technical support analysts get very little direct personal benefit from quick call logging using type A Hot Topics and therefore whilst there may be overall service benefits as outlined by the IT Help Desk Manager, still perceive it as an administrative burden. The complexity of the relationship between the facilities, norms and interpretive schemes pertaining to the limited-use call



logging technology-in-practice is illustrated in a simplified form in the diagram below.



**Figure 31: Synthesised Theoretical Framework - Limited Use Call Logging**

The composition of the Limited Use Call Logging routine, characterised by the absence of, or only ad-hoc or perfunctory performance of Call Logging subroutines is presented below in the context of the repertoire of moves available to the technical support analyst:

<b>Available Moves:</b>	Assess Enquiry Subroutine: <ul style="list-style-type: none"> <li>• Tell me (what the problem is)</li> <li>• Show me (what the problem is)</li> </ul> Manual Logging Subroutine: <ul style="list-style-type: none"> <li>• Click File → New Call</li> <li>• Enter End-user's name</li> <li>• Appropriately categorise the call</li> <li>• Type in call description</li> <li>• Close the call, type in call closure notes</li> </ul> Single-Click Logging Subroutine: <ul style="list-style-type: none"> <li>• Click appropriate Type A Hot Topic (bypassing manual logging steps)</li> </ul>
<b>Chosen Subroutines</b>	<ul style="list-style-type: none"> <li>• Assess Enquiry</li> <li>• Absence of Call Logging subroutines</li> </ul>
<b>Performances</b>	<ul style="list-style-type: none"> <li>• Absence of, or ad-hoc Call Logging</li> </ul>

Table 19: Limited Use Call Logging Routine Composition

### 7.5. Collaborative Working technologies-in-practice

As outlined in Chapter 2, technical support work typically takes place in a context of distribution of competencies, functional specialisation and division of labour within the technical support team(s), and collective knowledgeable performances arising when a technical support analyst is unable to provide a resolution him/herself are an integral aspect of the technical support organisational routines (Pentland 1992). Early comments from interview respondents supported the importance of this aspect of the technical support process and very much highlighted the role of the TP HelpDesk software in collaborative working practices.

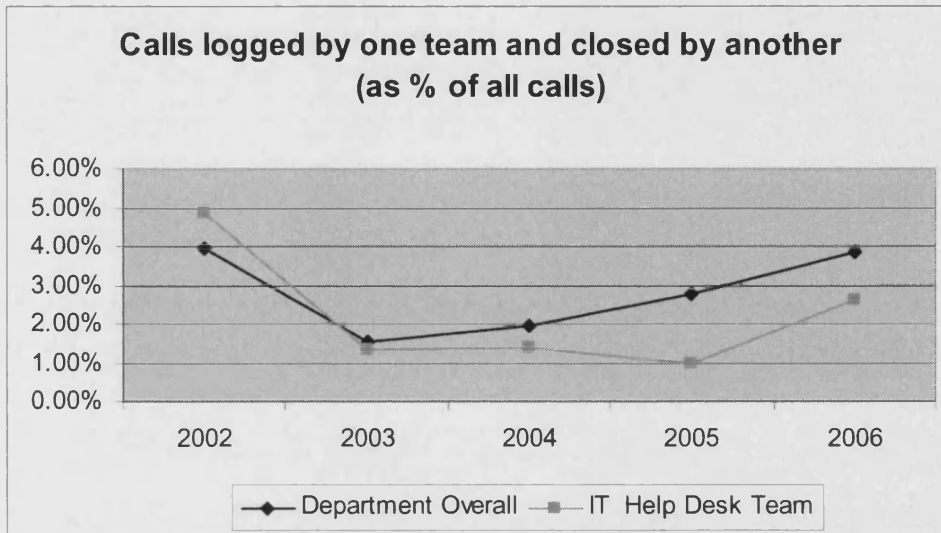
We have already highlighted how the overlapping nature of empirical evidence made difficult the analytical separation of the process of using TP HelpDesk software to log support enquiries and the process of actually providing IT Support for those enquiries. Similarly, although documentary evidence such as organisational procedures often showed a clear differentiation of the process of initial call logging from subsequent progressing of that call using TP HelpDesk software, interview respondents tended to treat both logging and collaborative working processes simply as aspects of the general IT Support process. Nevertheless, using the synthesised theoretical framework based on the grammatical model of organisational routines (Pentland 1995) and the

technologies-in-practice perspective (Orlikowski 2000) our research was able to identify a number of very interesting and well established organisational routines relating specifically to the role of TP HelpDesk software in the collaborative working practices taking place in the context of distribution of competencies, functional specialisation and division of labour among the different teams in the IT Services Department of XYZ University.

### **7.5.1. Performative Aspect – Transaction Log Analysis**

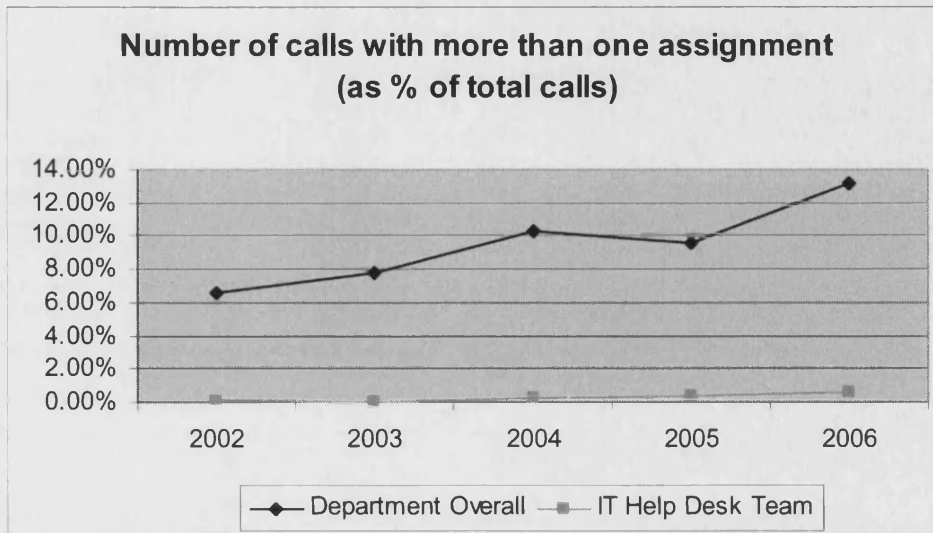
Our transaction log analysis of how calls are logged focused on calls logged within the Student IT Help Desk team included raw data concerning only calls logged by that team. However, transaction log analysis of collaborative work practices requires for the raw data to include calls logged by other teams in the IT Services department, thus presenting figures concerning the Student IT Help Desk team in context of overall departmental operations and focusing on the interaction between different analysts/teams.

A simple overview statistical analysis of 203,707 calls logged in the Help Desk software by technical support staff in the IT Services department over the 2002-2006 period (including 114,839 calls logged by the IT Help Desk team, as referred to earlier in this chapter) shows that the proportion of calls logged by one team but closed by another team is very low both for the Student IT Help Desk team and the department overall, as shown below. This indicates that the practice of transferring entire calls between teams (e.g. where a call is received by 1<sup>st</sup> line support “team A” and transferred for action and subsequent closure to 2<sup>nd</sup> line support “team B”) is relatively rare.



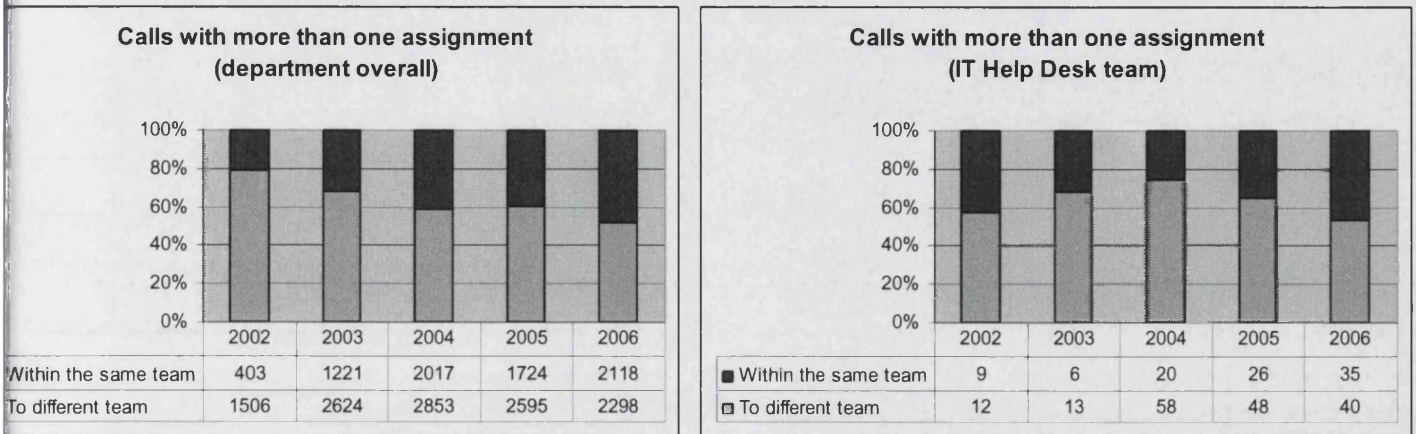
**Figure 32: Collaboration Transaction Log Analysis - Call Ownership**

Although transferring entire calls between teams is uncommon, we need to analyse what collaborative practices take place during the call's lifecycle. All calls logged using the TP HelpDesk software have at least one assignment – the initial assignment represents the initial responsibility for that call and is created automatically as shown by our task analysis. Therefore calls with more than one assignment indicate separate actions and/or points of responsibility within the same call. A drill-down transaction log analysis of our raw data demonstrates that only a small proportion of all logged calls have more than one assignment – virtually negligible for the Student IT Help Desk team, and low albeit rising over the 5 years for the IT Services department overall, as shown below. This indicates that the majority of calls are created with only one assignment, and either do not require collaboration to resolve them, or such collaboration is not reflected in the TP HelpDesk software.



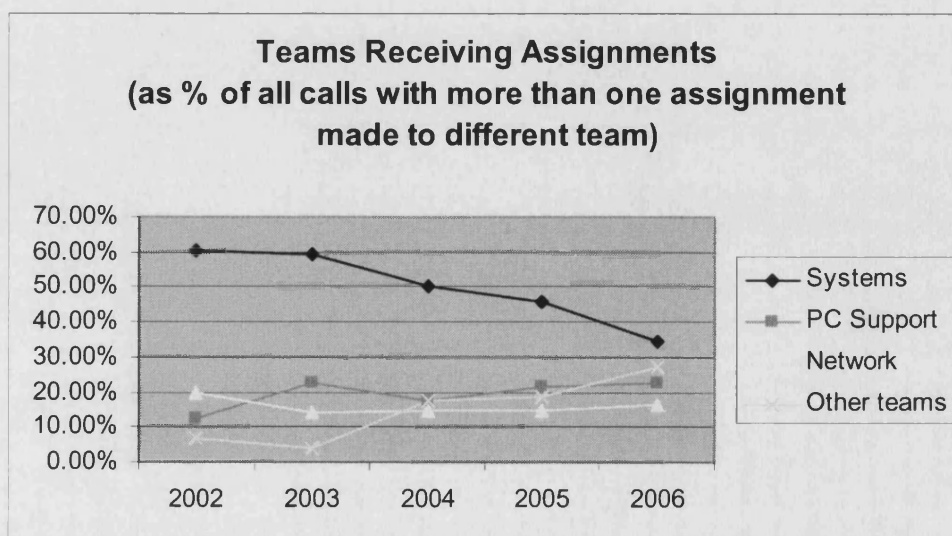
**Figure 33: Collaboration Transaction Log Analysis - Call Assignment**

We know that the practice of transferring entire calls between teams in TP HelpDesk software is uncommon and that very few calls include additional assignments. However, more detailed investigation is required regarding those calls which do include more than one assignment, thus indicating multiple points of responsibility within the same call. Our transaction log analysis shows that of all calls which have more than one assignment, more than half of the second and subsequent assignments go to a team different to the one which logged the call initially, as shown below. This indicates that whilst a technical support analyst logging the call may not as a matter of course require to include multiple points of responsibility for that call (or reflect such inclusion in TP HelpDesk software), where such action is necessary, over the 6-year period, the number of calls with a second a subsequent assignment has dropped from around 80% to around 50% for the department overall, and seems to hover at around 60-70% for the Student IT Help Desk team. It should be noted though, that for calls logged by the IT Help Desk team, the proportion of calls with more than one assignment represents an extremely low number, just 70-odd calls over the course of a whole year (in 2004, 2005 and 2006 as shown below) compared to thousands of calls logged during that year.



**Figure 34: Collaboration Transaction Log Analysis - Team Assignment**

This transaction log analysis indicates that a significant proportion of calls with more than one assignment represent collaborative work practices involving different teams, rather than multiple points of responsibility allocated within the same team. Further drill-down of the raw data allows us to conduct a transaction log analysis to examine which teams are on the receiving of assignments going outside of the team which logged the call. The following chart illustrates that most of such “outside” assignments are made to the Systems and PC Support teams and not, for example, within the cluster teams and/or the IT Help Desk team. This indicates that whilst the Systems and PC Support team seem to log very few calls of their own, they feature prominently in the collaborative working practices on the receiving end of calls logged by other teams, including the IT Help Desk team.



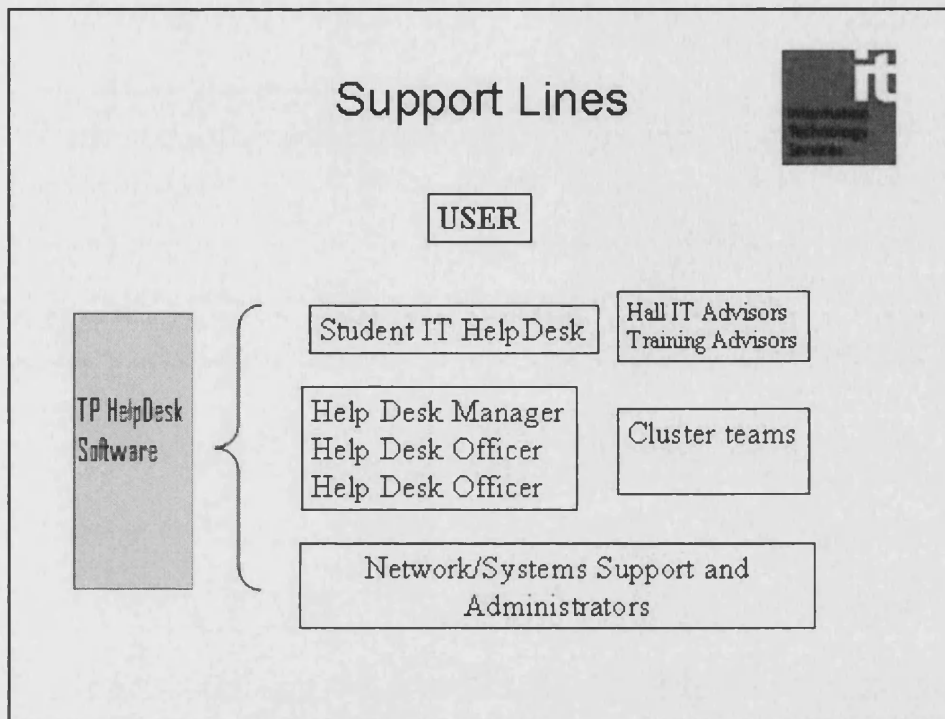
**Figure 35: Collaboration Transaction Log Analysis - Receiving Assignments**

In particular, the transaction log empirical evidence allowed the researcher to anchor the semi-structured interviews and other sources of data in the following questions as a useful starting point for subsequent discussion in a similar way to the anchor point relating to using Help Desk software to log calls:

- Do you normally refer calls using Help Desk software and how (manually or Hot Topics)?
- Which Hot Topics do you use more often to refer calls and why?
- What do you think of the Hot Topic call referral functionality, does it help or hinder the user of Help Desk software?
- Do you think the Hot Topics' designations are suitable for your work practices with reference to how and to whom you refer calls in the course of normal daily work?
- Can you change the design or designations of the Hot Topics to make them suite your work practices better?
- Could you give examples of the different ways of using (or not using) Help Desk software to refer calls and explain why a particular course of action is chosen?
- Could you give examples of specific actions you carry out to refer calls using Help Desk software? Do (or would) other people use it in the same way?

### **7.5.2. Ostensive Aspect – Operational Procedures**

We have already outlined how the training given to the new and continuing technical support analysts in the Student IT Help Desk team emphasises the role of call logging in general, and TP HelpDesk software in particular as part of the standard operating procedure for staff in the Student IT Help Desk team. Additionally, the following slide from the 2005-2006 induction training session illustrates the role of TP HelpDesk software in the overall IT Support structure, with the emphasis on its role also in linking multiple support groups and lines:



**Figure 36: Role of TP HelpDesk Software in Support Services Structure**

As can be seen, there are three IT Services contact points presented to the student end-users. The IT Help Desk is the primary focal point for receiving IT Support enquiries from XYZ University's students, although some students may encounter two other teams: Hall IT Advisors (part-time staff recruited from student population to provide live-in on-site support for students' own computers in Halls of Residence) and Training Advisors (part-time staff recruited from student population to conduct IT training sessions for students). Second-line support is provided by the full-time staff in the Student IT Help Desk team, and for specific software applications by Support Specialists within the cluster teams. Third-line support is provided by the Systems and Network Specialists. The TP HelpDesk software is given a very prominent role in the process in linking the three support lines.

Staying with this operational/strategic orientation empirical evidence we can use the following extract from the document "IT Help Desk Software: Brief Manual" published on the IT Services department's intranet for the IT Help Desk team in October 2004 to illustrate the procedures and training given to the technical support analysts in that team. The procedures are laid out in a similar manner to call logging – particular circumstances are accounted for, and a general catch-all Hot Topic is available for everything that doesn't fit in those particular circumstances. For



example, as shown below, enquiries pertaining to hardware failures in public computer areas should be logged using ITHD\_NET\_SUPPORT Hot Topic to be received by the PC Support team. Other than that, technical support analysts are instructed to use ITHD\_SUPERVISOR\_REF Hot Topic to fully document and escalate any enquiries that they are not able to deal with themselves:



Icon	Issue Reference # to student	Description
		<b>ITHD_NET_SUPPORT</b> - Hardware failure in public room: Select hardware type and fault in categories two and three. PC Support Team will receive the query.
	Yes	<b>ITHD_SUPERVISOR_REF</b> - Supervisor Referral: Use for anything that you are not able to deal with yourself. Detailed call information and categorisation is required so that [IT Help Desk Manager] can deal with query appropriately.

Table 20: Collaborative Working – Call Logging Procedures

### 7.5.3. Performative Aspect – Task Analysis

A detailed illustration of the functionality provided by various types of Hot Topics is presented in the previous chapter, nevertheless it would be useful at this point to visualise the process of logging calls by bringing together our analysis of the TP HelpDesk software artefact, task analysis of the generic collaborative working features of the software artefact, and task analysis of type C Hot Topics in particular.

Collaboration between several technical support analysts on a particular call is implemented in TP HelpDesk software in three basic ways. Firstly, the technical support analyst who receives the enquiry can give it away – transferring ownership of the call to someone else entirely by **reassigning** it, to use TP HelpDesk software terminology. Secondly, that technical support analyst may invite other analysts to participate in the resolution of that call by creating **additional assignments** within the same call. Assignments within TP HelpDesk software fulfil the function of co-ordination of problem-solving by documenting assignments, referrals, transfers or escalations (Pentland 1992) of calls within/between teams. Thirdly, particular actions outstanding on part of one or more technical support analysts can be indicated within the call as **action tracks**. Creation of such action tracks and assignments within a call

can be done manually by the technical support analyst logging the call, or preconfigured as part of a Hot Topic template, as in the case of type C Hot Topics. Various permutations of additional assignments and action tracks within the same call allow multiple support analysts and groups of analysts to work on the same call, documenting their actions as action track and assignment **notes**. Multiple assignments to different analysts/groups allow the call to accordingly appear on multiple **workload lists** for as long as those assignments remain open. TP HelpDesk software is configured such that all calls must have at least one assignment, whereas action tracks are entirely optional.

For example, the following screenshot illustrates a typical call, documenting an installation of a new PC for an end-user at XYZ University. The call contains three action tracks (left tab): “*First Response*”, “*CSR: Update Inventor...*”, and “*PCS: Contact user to ...*”, as well as two assignments: one to an analyst in the “*Gov&Geog*” cluster team, the other to the “*PC Support*” team. The call also includes a note “*Dear XXXXXXXX, ...*”.

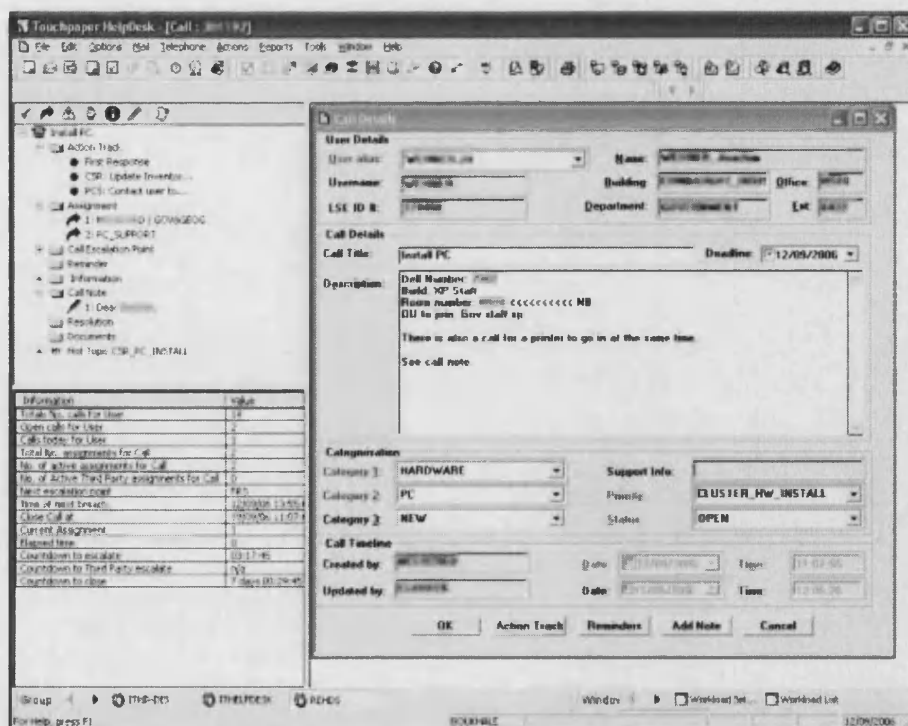


Figure 37: Collaborative Work Practices - Documentation of Call Progress

Documentation of collaborative work entails documenting the responsibility for the entire call, responsibility for individual actions within that call, and documenting

those actions and resolutions. TP HelpDesk software manual states that where the call details window (shown on the right tab above) is insufficient to document all the actions required to complete a call then action tracks can be used to reflect the individual tasks which must be completed before the call can be closed. Similarly, the manual states that a call can be assigned to more than one support analyst and/or group, and multiple assignments can be created when a single call encompasses several tasks which must be completed by different people. It is interesting to note that the distinction between action tracks and assignments as implemented within the TP HelpDesk software has been considered a peculiar design choice on part of the software vendor, as the following comments from the Academic Support Manager demonstrate:

*[A]: The action tracks and the assignments are subtly different. [...]I am not entirely convinced that that's particularly wise in terms of how the software is [designed]. It took me a long time to understand what the differences were between them and I think it would be more sensible that you see assignments and a progress track, [or] an action track as you know [it], as one and the same thing. Certainly how the software works in a much more like that way it's a bit of a [vendor-specific] thing I feel. I don't think it's that helpful, but then that might just be my previous experience.*

*[Q]: In actual fact I think they ship an add-on module for this called assignable action tracks ...*

*[A]: I think you are right, [in fact] I know you are right because they tried to sell it to us. That is the thing – you can't actually assign an action track the way it's set up, you have to create an assignment for that and I feel you can end up with a bit of a mess because you can also make notes on calls as well, if you want to, and you end up with a bit of a disparate lot of information and you almost don't know where to look.*

*[ASM]*

The difference between action tracks and assignments does not preclude exclusive use of either one or the other to subdivide a particular call into multiple tasks and/or multiple points of responsibility. However, the missing link between a task (action track) and a point of responsibility (assignment) as referred to above dictates that strict conventions on how calls should be formatted are required to keep disparate pieces of information together and help, rather than hinder the support analysts as they

work collaboratively on the same call. For example, TP HelpDesk software does not provide a way to link the three action tracks with the two corresponding assignments within the same call as illustrated above. However, the call in question has been formatted according to the agreed convention to make such links clear, as follows: a). the “*First Response*” action track always refers to the contact between the support analyst and the end-user at first contact, in this case the analyst in “GOV&GEOG” cluster team; b). the “*CSR: Update Inventory...*” action track indicates that any member of any cluster team (so identified by the prefix CSR) – but in this case the assigned analyst in “GOV&GEOG” cluster team – should update the inventory database; c). the “*PCS: Contact user to ...*” action track indicates that any member of the PC Support team (so identified by the prefix PCS) should contact that end-user to arrange a suitable time for a site visit; d). the main free-text Call Details field includes basic call details such as PC identifier, additional end-user contact details, etc. and has been structured by the analyst who logged the call in bullet-point form; e). the “*Dear XXXXXXXX, ...*” call note is directed at a particular analyst identified by first name (although is visible to all) and would typically contain free-text comments, possibly in an identical form to an email notification of assignment.

When logging a call using the generic “File – New – Call” functionality, once the mandatory fields are completed (e.g. Priority, Category 1, and Category 2) the TP HelpDesk software brings up an Assignment window, whereby the details of the analyst logging the call are pre-selected, thus allowing the option to click OK to accept the call as assigned to self, or change the assignment details to a different analyst/team, as shown in the screenshots below. However, some of the ambiguity in formatting calls so as to facilitate collaborative work can be achieved through pre-configuration using Hot Topic templates, such as Type C Hot Topics.

For example, as has been shown in the analysis of procedures in the previous section of this chapter, ITHD\_SUPERVISOR\_REF Hot Topic has a very wide remit, instructing front-line analysts to use this Hot Topic “... *for anything that you are not able to deal with yourself*”. The procedures further indicates that calls logged using this Hot Topic will be directed to the IT Help Desk Manager, who will require detailed call information and categorisation to be entered into the call information. Clicking on the icon corresponding to ITHD\_SUPERVISOR\_REF Hot Topic brings

up the Call Details screen with various fields already completed, although similarly to the ITHD\_SOFTWARE\_SALE Hot Topic discussed earlier in this chapter, for a call to be procedurally correctly completed end-user information, call title and call details information, as well as call categorisation must be entered. Once the call is created, an automatic assignment to the IT Help Desk Manager is set up, as shown in the screenshots below. Similarly, calls logged using another type C Hot Topic – ITHD\_NETWORK\_SUPPORT create an automatic assignment to the PC Support team and are used for reporting PC hardware faults.

The following table summarises our task analysis of collaborative work practices using TP HelpDesk software, triangulated from interviews with members of the IT Services department of XYZ University, the TP HelpDesk software manual, and analysis of TP HelpDesk software configuration.

Task	Task Sequence
Manually adding an action track to an existing call	<ol style="list-style-type: none"> <li>1. Right-click “action tracks” in left-hand pane of an open call, select “new action track”</li> <li>2. Enter appropriately formatted action track information, e.g. prefix task description with “CSR” for cluster teams, “PCS” for PC Support team, “SYS” for system team, “ITHD” for Student IT Help Desk team, or particular analyst name</li> <li>3. Ensure that a corresponding assignment is created</li> </ol>
Manually reassigning an existing call	<ol style="list-style-type: none"> <li>1. Right click on current active assignment to self in left-hand pane of an open call, select “reassign”</li> <li>2. Select appropriate analyst and/or group to whom the call is to be reassigned, enter notification message if necessary</li> </ol>
Manually creating an additional assignment to an existing call	<ol style="list-style-type: none"> <li>1. Right-click on “assignments” in left-hand pane of an open call, select “new assignment”</li> <li>2. Select appropriate analyst and/or group to whom an additional assignment is to be created, enter notification message if necessary</li> </ol>

Adding extra information to an existing call	Notes can be attached to: <ol style="list-style-type: none"> <li>1. Action tracks</li> <li>2. Assignments</li> <li>3. Entire Call</li> </ol> Extra info can be added free-text to call description
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**Table 21: Collaborative Work Practices - Task Analysis Summary**

The task analysis presented above demonstrates that although the TP HelpDesk software provides considerable flexibility in functionality to facilitate collaborative working – breaking down calls with action tracks, multiple assignments, multiple notes – a uniformly adhered to convention for formatting calls is vital. When calls are not “properly formatted”, possibly as a result of different analysts/groups making different choices in how to best represent pertinent information, the flexibility can get in the way of collaborative work efforts, as the comments above illustrate. Conversely, this very flexibility and the need for strict conventions has a somewhat surprising contrary effect on the use of various features of the software, as the following comments from the Academic Support Manager demonstrate:

*You can put notes all over the place, you might not see them when you open a call. Again, that’s to me things that stop someone recording notes, because if I record a note on a call and it’s quite possible that someone won’t even notice it when they look at the call, because it’s hidden away under an action track or assignment or a note somewhere, it’s just going to make me not bother. Because, you know – no one is going to see it, so why write it? [ASM]*

Similarly, it would be useful at this point to reiterate our task analysis of logging calls for automatic reassignment using type C Hot Topics:

<p><b>Type C</b> (some additional information required, call automatically reassigned)</p>	<ul style="list-style-type: none"> <li>• Support analyst clicks corresponding icon</li> <li>• Call created</li> <li>• <u>Some</u> information for main call window is pre-populated form template (e.g. call categories 1 and 2)</li> <li>• Main call window <u>is</u> shown to support analyst</li> <li>• Support analyst enters additional information as required (e.g. end-user ID)</li> <li>• Support analyst clicks OK on main call window</li> <li>• Call assignment information is pre-populated from template (e.g. assignee person and/or team, notification message)</li> <li>• Call is automatically inserted into the assignee’s workload list</li> </ul>
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**Table 22: Collaborative Working Practices - Task Analysis of Type C Hot Topics**

#### **7.5.4. Ostensive Aspect – Persistent Call Ownership**

Two of the most interesting findings arising from our transaction log analysis of collaborative working practices are that transferring entire calls between teams is relatively uncommon (“give the problem away”), and that very few calls have additional assignments (“get help”). Our analysis up to this point has helped to identify, but not to explain these findings. However, further interviews with members of staff in various teams of the IT Services department have helped to identify a number of ostensive aspects of this finding and analyse it in terms of a number of key norms and interpretive schemes.

One of the key norms pertaining to collaborative working practices in the IT Services department was the **persistent call ownership norm**. This norm refers to the practice of keeping the primary responsibility for the call unchanged once the call is logged. This norm focuses on the support team, rather than the individual technical support analyst who initially logged the call, and our findings indicate that this norm serves as a foundation for all intra-departmental collaboration, as the following comments from the Academic Support Manager demonstrate:

*The call still stays with the team, in the work list of the team that originally logged it. [...] it’s really a reflection of responsibility, that the person that logged the call, or rather I would say the team than the person, depending on how the team works, how they assign responsibility. But the team that logged it are responsible for dealing with*

*it, [and] in general we would expect them to keep track of it [...] if we pass it to one of our teams, systems or network, we would [keep track of it] [ASM]*

Our findings indicated that the persistent call ownership norm is intricately linked to both the facilities to which it bears relevance and the interpretive schemes pertaining to the particular circumstances. This was a very interesting finding as it illustrated the appropriateness of our situated analysis of the working practices and the intricate relationship between facilities, norms and interpretive schemes inherent in routinisation of organisational practices through repetition. The following illustration demonstrates this intricate relationship between norms, facilities and interpretive schemes.

Our transaction log analysis has demonstrated the prominence of ITHD\_NET\_SUPPORT and ITHD\_SUPERVISOR\_REF Hot Topics in collaborative work practices of the Student IT Help Desk team, and we can use both to illustrate this technology-in-practice. Both Hot Topics are independent of which member of the Student IT Help Desk team logs that call, and are based on a template where the initial call assignment is pre-configured – in the former case to the PC Support team, and in the latter case to the Help Desk Manager in the Student IT Help Desk team. Use of ITHD\_NET\_SUPPORT to report hardware faults directly to the PC Support team thus reinforces functional specialisation through enacting a call transfer with a change of call ownership from Student IT Help Desk to PC Support. Use of ITHD\_SUPERVISOR\_REF for any queries that front-line analysts are unable to deal with thus reinforces managerial or technical skills hierarchy through enacting a call escalation without change of ownership – the call remains solely within the Student IT Help Desk team's workload list. In the latter case, only on rare occasions, the Help Desk Manager may decide that call reassignment, for example to another department is more appropriate thus reinforcing domain boundaries or functional specialisation by enacting, respectively, a call referral or a call transfer with a change of overall ownership – the call would appear only on the assignee team's workload list. As shown by the transaction log analysis, in vast majority of cases, the Help Desk Manager would typically choose to create one or several additional call assignments, for example to the Systems team, thus reinforcing functional specialisation by transferring a call but crucially without a change of overall ownership – the Student



IT Help Desk team retains ownership although the call would be visible on both teams' workload lists, as the following comments from a Help Desk Officer demonstrate:

*In those cases the ownership still stays with us at the helpdesk because the user presented themselves to us to report the call, we then hold the ownership of that and then assign it where we see the technical need. But for example the follow-up would come through us, either the systems team would get back to us and we would refer back to the user, or if we waited for feedback from the user, the user would come to us to deliver feedback so we still remain the owner and the focal point. [HDO1]*

In fact, whilst the persistent ownership of a multiple-assignment call is an established norm restricting the range of collaborative work moves available to technical support analysts (such as being able to create additional assignments but not reassignments in a call), our research shows that this technology-in-practice is a good demonstration of the mutual feedback between norms (procedures) and interpretive schemes (opinions) on part of individual technical support staff. For example, the following comments from a different Help Desk Officer demonstrate compliance with the procedure in spite of a personally held opposing belief:

*[A]: Normally, when we refer a call, the call is actually left with us so that for that same reason that [so that] we can track it. We log it to the [appropriate] team, they do what they've got to do, but then they come back to us, and then we close the call, finished. So we can track it and see what's happening to it and we take ownership of it until the end.*

*[Q]: So when a call needs to be assigned do you create the assignments and action points for, for example the systems team, yourself?*

*[A]: Yes, we do. I don't like all that mind you, I can tell you that now.*

*[Q]: Why is that?*

*[A]: Because I think that when we assign it to another team, they should take ownership of it completely, they should be the ones who complete it, and they are the ones who should get in touch with the students because they know what they've done to resolve the problem. And I think that they should explain it to the student.*

*[Q]: Do I understand it right, the way it works now is that you retain ownership [...] of the call and you think the ownership should be with somebody else.*

*[A]: That's right. [HDO2]*

Persistent call ownership norm provides a tangible analytical link with the discretionary aspect of call logging working practices as presented earlier in this chapter, drawing on a similar interrelationship between the norms and interpretive schemes. Recall the comments from a Help Desk Officer, describing the standard operating procedure to refer the end-user to the appropriate support team, rather than log the enquiry and refer the call on behalf of the user: “*we would point them in the right direction and then obviously it would be the responsibility of that team to log whatever they need to log to meet their service level definitions*” [HDO1]. At the core of both norms lies the mutually accepted understanding that an end-user’s enquiry should be logged by the appropriate support team, combined with the interpretive scheme of limited knowledge of activities across functional or service provision boundaries, as highlighted in the Help Desk Officer’s comments above.

### **7.5.5. Fire-and-Forget Call Escalation**

At this point it seems that we have a fairly rich picture of how TP HelpDesk software is used for collaborative work within the IT Services Department of XYZ University. The training provided to new and continuing members of the team stresses the role of TP HelpDesk software specifically as part of the primary role of providing IT Support to end-users in terms of progressing calls in collaboration with other teams linking 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> lines of support. Transaction log analysis has demonstrated that very few calls get transferred in their entirety between teams; very few calls contain multiple assignments, and the overwhelming majority of additional assignments are “external” to the team which logged the call. Transaction log analysis also leads us to conclude that most of the call referral using TP HelpDesk software within the IT Help Desk team is done mostly through use of two specially designed Hot Topics. Analysis of operational procedures in particular showed the very wide remit of the ITHD\_SUPERVISOR\_REF Hot Topic which is designed to automatically assign the call to the Help Desk Manager and front-line support analysts in the Student IT Help Desk team are instructed to use it for “anything that you are not able to deal with yourself”.

Earlier sections of this chapter illustrated the prominence of type A Hot Topics in the process of logging calls and identified and analysed a fire-and-forget call logging technology-in-practice as illustrated by particular performances of single-click batch or prompt recording of enquiries most frequently using a generic ITHD\_INFO\_REQUEST type A Hot Topic. Our transaction log analysis of the collaborative work practices identified a similar prominence of type C Hot Topics in the process of recording collaboration within the IT Help Desk team – as escalation to the IT Help Desk Manager using ITHD\_SUPERVISOR\_REF type C Hot Topic, or to different teams in the IT Services department – as referral to the PC Support team using the ITHD\_NETSUPPORT type C Hot Topic).

Our task analysis of TP HelpDesk software call logging functionality has shown that logging a call by technical support analysts in the Student IT Help Desk team for transfer (e.g. ITHD\_NET\_SUPPORT) or escalation (ITHD\_SUPERVISOR\_REF) using type C Hot Topic presents the main call details screen with some details pre-populated from the respective template. Adding appropriate information such as end-user details, nature of enquiry, and call category and clicking OK creates the call with an automatically completed initial assignment to, respectively PC Support team, or the Help Desk Manager in the Student IT Help Desk team. In both cases the actual call (as represented by the main call details window) not only disappears from the immediate view of the technical analyst who logged that enquiry, but also as shown by our task analysis, does not require any more action on part of that analyst beyond communicating the call reference number to the end-user if appropriate.

Subsequently, one of the most established routinised collaborative working practices in the Student IT Help Desk team is the **fire-and-forget escalation** technology-in-practice. The *fire-and-forget* aspect of this technology-in-practice refers to the fact that once an enquiry is logged as a call, the front-line technical support analyst is no longer involved – the call has been automatically reassigned to the relevant team/person. This designation is also deliberate and reflective of the attitude of the technical support analyst towards the end-user enquiry being logged whereby front-line members of staff enacting this technology-in-practice tend to lack information feedback regarding the calls logged in this manner. For example, the following

comments illustrate that for front-line analysts, the routinised practice of escalating calls by means of the ITHD\_SUPERVISOR\_REF Hot Topic bears a distinct fire-and-forget character:

*[Q] So you've created a call using default supervisor hot topic, where does it go?*

*[A]: It goes into the workload list, and there it stays until it is either reassigned to another team, or closed by supervisor or by someone else. [...] I would expect for someone else to reassign it.*

*[Q]: How much involvement would you have with the workload list?*

*[A]: Not much. I would probably take a look at it if I get an email or [...] phone call or the person coming in saying well I came in two days ago and someone gave me this [call reference] number, so we would [...] try to see what kind of solution, [...] what has been done about it. [...] [It] might not even be in the workload list, it might be in the closed [calls list], just a past call.*

*[Q]: So, would that mean that somebody else is keeping a more active eye on the workload list, then [...] is your responsibility?*

*[A]: Yes. [HDA2]*

### **7.5.5.a. Facilities, Norms and Interpretive Schemes**

In *fire-and-forget escalation* technology-in-practice, technical support analysts follow the formal norms set out in the operational procedures outlined above, whereby TP HelpDesk software provides the conduit for collaborative work within the IT Services department. Technical support analysts interact with the type C Hot Topic facilities of the technological artefact in order to enact a performance of giving the enquiry away to other analysts, as described above. Enactment of this technology-in-practice draws on the structures of functional specialisation and hierarchy of authority within the IT Services department, mutually reinforced on an individual technical support analyst level by the dominant interpretive scheme of limited knowledge of technical process in other teams, insufficient remit to authorise a course of action, and/or insufficient knowledge of the organisational structure.

Our transaction log analysis has demonstrated the greater use of type C Hot Topics as pre-configured collaboration templates based on *initial assignments* over manual engagement with collaborative work facilities of TP HelpDesk software based on

*reassignments* and *additional assignment* facilities, although these manual collaborative work facilities are available to all levels of staff in the Student IT Help Desk team. The availability of a pre-configured initial assignment of a type C Hot Topic facility has an effect of encouraging fire-and-forget enactment on part of front-line analysts, even when contrary to the procedural norms. For these staff the limited awareness of organisational structure coupled with ambiguities inherent in initial problem diagnosis (Pentland 1995) in the context of structures of distributed technical expertise and functional/service specialisation can be a significant factor where a pre-configured generic assignment template provides an easy choice, as the following comments from a Help Desk Advisor demonstrate:

*[A] Although technically I believe I can reassign calls [myself] – I can put in just a plain supervisor call and then reassign it to the relevant team, my biggest anxiety is that I will assign it to the wrong team! [...] I just prefer to leave it to someone who knows the structures and responsibilities better.*

*[Q]: do you think you are expected to assign them yourself, manually, or do you think you are expected to filter everything through the supervisor level?*

*[A]: I remember a few emails being sent around urging us to reassign them and asking us to notify the manager if we don't know how to do it to let them know for that. So I was shown how to do it, I just don't do it! And I don't think that in general it is really expected [so] I think the majority of the part-time staff don't do it.*

*[Q]: Do you think it comes down to the expected level of expertise?*

*[A]: I think it comes down to the expected ... not expertise but knowledge of the organisation. [For example] it took me a year to start realising that this person X is in the network team, and these are the people in PC Support team, [etc] and it took me a year to really figure out the different structures, and now we have people that were recently hired, [and] I wouldn't expect them to know that.*

*[Q]: Would that not be part of the induction, or is there no kind of a list outlining the responsibilities?*

*[A]: No, I wouldn't say [it's just about] outlining the responsibilities. There are lists that show the different teams and the different people, but I wouldn't necessarily know [where to refer it] if I get a phone call from someone who is [in department X and supported by team X, having a problem with application Y supported by team Y, in location Z supported by team Z] – it really stresses me! [HDA1]*

Furthermore, our findings indicate that the procedure (norm) specifying the wide operational remit and pre-configured initial assignment of ITHD\_SUPERVISOR\_REF Hot Topic facility are not only deliberately designed to minimise the possibility of erroneous or unnecessary referrals to other teams by front-line analysts. Encouraging referral to the Help Desk Manager (or Officer) is also a filtering mechanism serving to address the issue of *limited knowledge interpretive scheme* which may arise for reasons other than the dominant structure of functional/service specialisation. The following comments from Help Desk Manager explain:

*[Q]: Do the first line analysts assign calls directly to, for example, the systems team?*

*[A]: No, it tends to get logged to the help desk supervisor [Manager or Officers] who then reassigns it to the systems team*

*[Q]: Why is that?*

*[A]: I think it's because sometimes it may be an issue that we know about that we've forgotten to pass on to the helpdesk team members, or it could be something that we know how to fix without having to pass it on. [HDM1]*

#### **7.5.5.b. Moves, Subroutines and Performances**

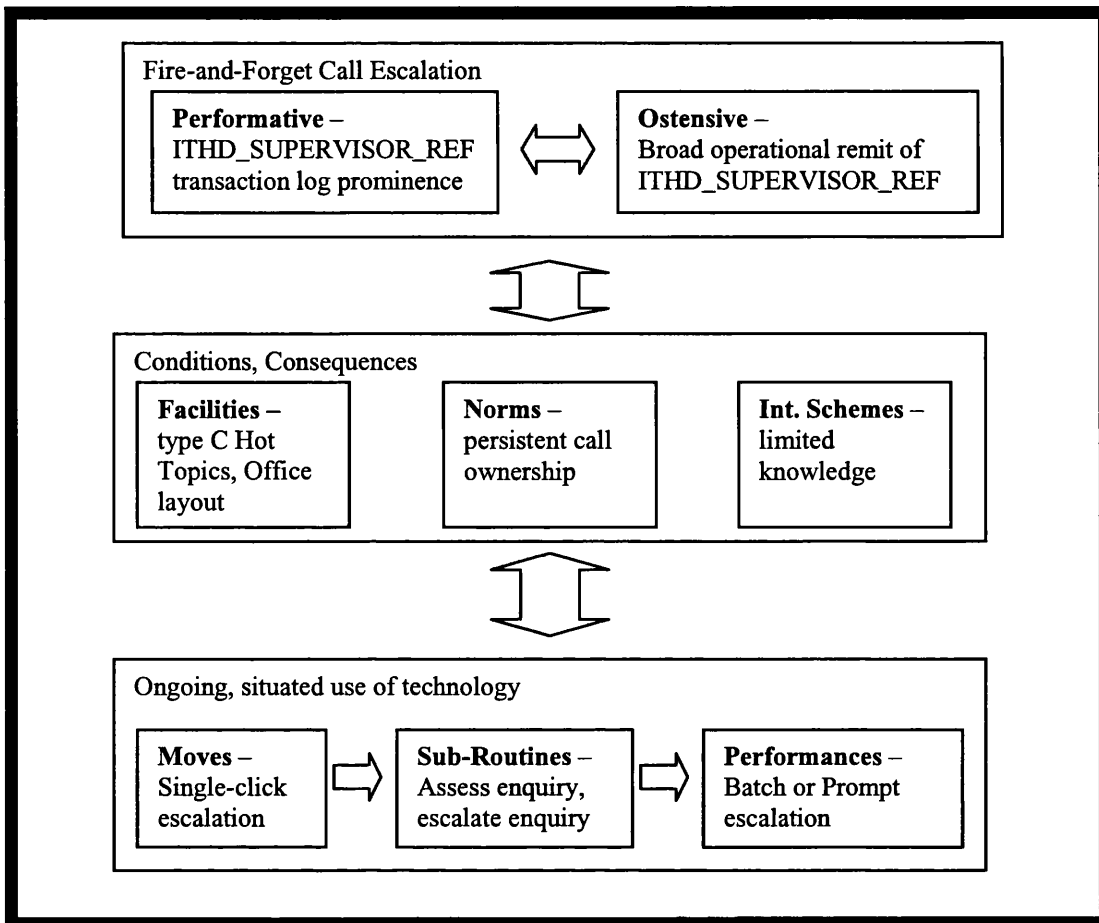
When placed in context of overall team operations, the *fire-and-forget escalation* routine applies to enquiries received from drop-in or telephone customer enquiries about an issue outside of the first-line analyst's area of expertise or authority. This technology-in-practice enacted within the Student IT Help Desk team is characterised by the use of ITHD\_SUPERVISOR\_REF and ITHD\_NETWORK\_SUP Hot Topics, both of which record the enquiry and immediately "give it away" by virtue of the pre-configured initial assignment move (Pentland 1992) – escalating it to the Student IT Help Desk Manager in the former case, and transferring it to the PC Support team in the latter case. Typical enquiries exemplifying this technology-in-practice might be a request by an end-user to change their email address (requiring authorisation from Help Desk Manager who then requests a number of specific actions from the Systems and other teams in the department), reporting a PC out of order following initial investigation by Student IT Help Desk staff (requiring technical follow-up by the PC

Support team staff), or indeed a service information request or perhaps a complaint (requiring a higher level of managerial authority).

Our research did not indicate any particular significance in whether this technology-in-practice is enacted in a prompt or batch pattern as per our analysis of the fire-and-forget call-logging technology-in-practice, although where circumstances demanded a batch pattern of execution and timely logging was not possible, technical support analysts tended to record pertinent details on a post-it note for subsequent logging using TP HelpDesk software. The *fire-and-forget escalation* technology-in-practice is made distinct by the pattern of its enactment by front-line technical support analysts in that once the enquiry is recorded and a call reference number is issued to the end-user, that call is picked up and progressed by the assignee staff and the front-line analyst who logged the call has no more involvement with that call, except the occasional instances whereby a progress update report may be requested by the end-user.

#### **7.5.5.c. Fire-and-Forget Call Escalation – Summary**

The following diagram serves as a brief summary of the key empirical and analytical constructs developed and applied in the process of identifying and analysing the fire-and-forget call escalation technology-in-practice.



**Figure 38: Synthesised Theoretical Framework - Fire-and-Forget Call Escalation**

As with the fire-and-forget call logging technology-in-practice, following Orlikowski (2000), the fire-and-forget call escalation organisational routine can be classified as an “application” technology-in-practice - a case where users chose to use technology to augment their existing ways of doing things with some noticeable changes in technological properties and work processes but on the whole demonstrating reinforcement or enhancement to the structural status quo. Similarly, we can best illustrate the various aspects of this routine with reference to the analytical process as outlined earlier in this chapter.

Our transaction log analysis allowed us to initially identify the facility of type C Hot Topic (e.g. ITHD\_SUPERVISOR\_REF) in a repeated pattern of engagement with the TP HelpDesk software as playing a prominent part in the performative aspect of as yet unidentified organisational routine. Our analysis of operational procedures allowed us to confirm the significance of the type C Hot Topic in the ostensive aspect of this organisational routine, as indicated by its wide operational remit. Furthermore,



triangulating our analysis of transaction logs with semi-structured interviews and verbal protocol analysis we were able to identify the persistent call ownership norm as a basis of our further analysis of the ostensive and performative aspects of this organisational routine. For example, technical support analysts thus engage with the facilities of pre-configured initial assignment templates of type C Hot Topics to maintain persistent ownership of their own enquiries, and prefer to respect service delineation boundaries by referring end-users directly to the appropriate team, rather logging the enquiries as calls and then reassigning those calls to the appropriate team in TP HelpDesk software. Similarly, our triangulated analysis of verbal protocol, semi-structured interviews, and operational documentation allowed us to characterise this routine as fire-and-forget escalation, enacting the structure of organisational separation of different teams based on either functional specialisation (i.e. technical vs. user services) and/or service delineation (i.e. within user services different teams support different groups of end-users). More specifically, the ITHD\_SUPERVISOR\_REF facility of pre-configured escalation to the IT Help Desk Manager served to facilitate the mutual reinforcement of the functional specialisation between the teams based on the persistent call ownership norm and the interpretive scheme of limited knowledge of the wider support service arrangement and service delineation.

The composition of the fire-and-forget call escalation routine, as particular moves constituting a sub-routine, chosen from a broader repertoire of moves available to the technical support analyst is presented below:

<b>Available Moves:</b>	<p>Assess Enquiry Subroutine:</p> <ul style="list-style-type: none"> <li>• Tell me (what the problem is)</li> <li>• Show me (what the problem is)</li> </ul> <p>Manual Escalation:</p> <ul style="list-style-type: none"> <li>• Click File → New Call</li> <li>• Enter End-user's name</li> <li>• Appropriately categorise the call</li> <li>• Type in call description</li> <li>• Select team/individual to whom the call is to be escalated</li> <li>• Enter notes accompanying the call escalation</li> </ul>
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	Single-Click Call Escalation Subroutine: <ul style="list-style-type: none"> <li>• Click appropriate Type C Hot Topic</li> <li>• Enter End-user's name</li> <li>• Type in call description</li> </ul>
<b>Chosen Subroutines</b>	<ul style="list-style-type: none"> <li>• Assess Enquiry</li> <li>• Single-Click Call Escalation</li> </ul>
<b>Performances</b>	<ul style="list-style-type: none"> <li>• Prompt mode of operation (assess enquiry followed by single-click call escalation)</li> <li>• Batch mode of operation (several enquiries assessed and resolved followed by single-click call escalation)</li> <li>➤ Both modes of operation characterised by fire-and-forget nature of enactment</li> </ul>

**Table 23: Fire-and-Forget Call Escalation Routine Composition**

### **7.5.6. Limited-use collaborative working**

Our analysis of training and procedures has demonstrated how operational procedures place TP HelpDesk software at the core of collaborative work practices in the IT Services department. However, our transaction log analysis as shown above, has demonstrated that very few calls have more than one assignment, opening a significant line of enquiry for our research. We have been able to account for the prevalence of type C Hot Topics among calls which do have more than one assignment by analysing the *fire-and-forget escalation* technology-in-practice described in the previous section. However, the low overall number of calls containing a record of collaborative work seems at its simplest to indicate that either very few enquiries received by the Student IT Help Desk team (and the IT Services department in general) require collaboration to be resolved, or that not all of that collaboration is recorded in TP HelpDesk software whether post-factum or on ongoing basis.

Subsequently, our research has sought to explore this “missing record” aspect of collaboration and based on multiple sources of empirical evidence we have been able to identify a **limited use – collaboration by alternative means** technology-in-practice. This technology-in-practice has been identified to possess two aspects – intra- and inter-team collaboration. The inter-team collaboration aspect references the finding of transaction log analysis which indicates that relatively few calls contain more than one assignment where that assignment is made to a team other than the

team which logs the call. Our in-depth examination indeed indicates that much of the inter-team collaboration is indeed not documented and that there exist a whole range of mutually interacting factors explaining this phenomenon. The intra-team collaboration aspect references two findings of our transaction log analysis. The first finding indicated that relatively few but not an insignificant number of calls contain more than one assignment where the second or subsequent assignment is made within the same team which logs the call. The second finding indicated that there is a sizeable proportion of calls which contain only one assignment, but are nevertheless closed by a different analyst than the one which logged the call initially. Similarly to our examination of inter-team collaboration, our analysis indicates that an even greater extent of the intra-team collaboration is indeed not documented and that there also exists a whole range of mutually interacting factors explaining this phenomenon.

### **Inter-team collaboration**

The inter-team aspect of the *limited use – collaboration by alternative means* technology-in-practice refers to the practice whereby technical support analysts “get help” or “give the problem away” with respect to members of other teams and enact the corresponding organising moves (Pentland 1992) not by utilising TP HelpDesk software in the first instance, but instead co-ordinate collaboration and problem-solving typically over the phone, less often by email. This routinised pattern of enactment describes inter-team collaboration and takes place over the phone in a number of circumstances, for example where the end-user’s enquiry is urgent, or where there are a number of enquiries pertaining to the same (suspected) underlying cause.

The following comments illustrate a Help Desk Advisor recalling a typical example of relating a single underlying problem resulting in several urgent end-user enquiries to the Systems team. A particular confluence of a whole variety of factors such as time of year, time of day, the urgency of individual end-user’s problems, availability of Systems Analyst, and the importance the Help Desk Advisor placing on immediate satisfactory resolution (and good customer service) had a bearing on that Help Desk Advisor taking a course of action where TP HelpDesk software was not used at all (and very nearly might have been used but only as a last resort):

*[A]: I remember one case where [an automatic technical process] failed so it expired a few people's [network] accounts, [and] four of them turned up in the office when I was alone, there was no one [else] and it was almost 5:30pm, around closing time ... [This] puts you in a really difficult position and it does make me feel like if I am there for them I am telling them that I can't help them and it has to be someone in the back office but no one picks up the phone and I feel like it exposes the organisation.*

*[Q]: So what did you do in that case?*

*[A]: Well, I did manage to find someone, and was really hard period for [Systems Analysts] – they had a lot of things to do [because] it was almost the beginning of term. I said "I am really sorry it has to be done because the people are here", [and] in the beginning it was just one person [but] then a second person came, [then] a third [all] with the same problem. I was just trying to speak to the [System Analyst] on the phone trying to understand if the next person coming through the door would have the same problem, so [as] I was dealing with [this] third person, the fourth person came in and I said "please, last person" [and the Systems Analyst] said "No, I can't do it [anymore]". Well, what am I going to say to them, you know? They were here they saw me dealing with three people, I can't just tell them "well I am sorry this guy said he can't do all".*

*[Q]: So what happened?*

*[A]: Well he did it in the end ...*

*[Q]: But suppose [the Systems Analyst] wasn't there and you would have had to make a note, for example, of the people's details or whatever, how would you have done that?*

*[A]: Well [then] I'd put it into [TP HelpDesk software] [HDA1]*

The practice of escalating a technical enquiry to the appropriate staff first by telephone and subsequently using TP HelpDesk software is fairly widespread, and is not confined to exceptional circumstances such as those described above. For example, one common practice is to "get help" (Pentland 1992) from a Systems Analyst in identifying the underlying root cause over the phone and subsequently "give the (particular) problem away" (Pentland 1992) using TP HelpDesk software. The following comments from a Help Desk Officer illustrate:

*It's actually fairly common that either we would contact someone first before assigning [...] In the case of several individuals reporting [problems] where what [...] they are reporting relating to the same root underlying cause [...] generally that becomes quite apparent quite quickly [...]. So you might even call directly first of all, personally to someone in the systems team involved in it to report the issue [...] saying "OK, we've got this student with such and such a thing we'll log it for you in [TP HelpDesk software] so that you can look at the details in due course". [...] Part of that is perhaps a culture thing rather than anything to do with the software.  
[HDO1]*

The interview data obtained by our research from a number of respondents in various roles indicated that the *limited use – collaboration by alternative means* technology-in-practice is not only a routinised pattern of behaviour but is also fairly wide-spread, and seems to work quite well in terms of customer service, correct identification of underlying causes of problems, and obtaining a quick resolution. In fact, our analysis of the longitudinal dimension of this technology-in-practice demonstrates that this routinised practice is a long-established one. For example, the following extract of the 7<sup>th</sup> December 2002 monthly Operational Managers General Meeting illustrates exactly this pattern of enactment:

*2002-12-07*

*[Systems Manager] highlighted that many of the calls to the System team are not logged, as the helpdesk staff tend to relay requests over the phone, therefore only longer calls that can not be instantly fixed tend to be logged. [Technical Infrastructure Manager] commented that this referral process was an acceptable mode of practice, as users' needs are met. We do need to consider how calls are recorded within [TP HelpDesk software]*

However, this practice of collaboration whereby initial contact is made via telephone and (if there is anything left to do) subsequently using TP HelpDesk software cannot be said to be encouraged by the technical support staff on the receiving end of such enquiries. Our transaction log indicated that the majority of calls with two or more assignments are directed to the systems team, and the following comments from a Systems Team Specialist put this technology-in-practice in a somewhat different light:

*I have learnt that I have to prioritise my work quite carefully, in order to meet the objectives that my role holds. To that end, [when] some people might call me directly, [...] I have a choice as to whether or not I can accept and try and resolve their problem or query at the first point of contact, or if it's more convoluted at least make a note of it and try and progress it through another person. Sometimes the fact that they've used the phone is indicative of either the urgency of the problem, so they do not wish to wait for the minor delays in presenting that problem through the [TP HelpDesk software], or they [just] don't feel like [using TP HelpDesk software]. So sometimes it is necessary to point out that phoning me directly is not appropriate for a particular sort of problem. [STS1]*

The *limited use – collaboration by alternative means* technology-in-practice may be said to make the role of a front-line technical support analyst easier by making problem-solving expertise and resolution to an escalation immediately available. However, where the rationale for utilising such practice is felt to have been abused, an interesting consequence of this technology-in-practice is a corresponding routinised “response” working practice as outlined by a Systems Team Specialist:

*[A]: In order to resolve a problem fully, I will need complete background and ideally a call created [within the TP HelpDesk software] because that creates a form of feedback and avoids things falling down through the cracks as we say. [...] And the other advantage of prioritising the helpdesk system is that it in capturing the information it will also present things to me that might well be useful for the resolution. An example – the main screen within [TP HelpDesk software], will actually tell me what the end-user's name is, who they work for, possibly some contact information, and also the technical information that I need to translate that action [...] and that means that I know exactly where to start my resolution process.*

*[A] And that to my mind is the primary advantage of the helpdesk system. Because that is my own personal philosophy, I would in practice endeavour to resolve calls within the [TP HelpDesk software] in terms of urgency, before I would start to address problems which have been sent to me merely by email.*

*[Q]: ... so you would effectively first deal with the calls where ...*

*[A]: ... the official channel has been employed. [STS1]*

### **Intra-team collaboration**

Our examination of multiple sources of data produced a number of interesting results concerning collaborative work practices, particularly as carried out within a team. Firstly, our analysis of how different analyst roles are configured within TP HelpDesk software indicated that all analysts are set up as “supervisors” in their respective teams, which means that they can view each other’s assigned calls in the team workload list. For example, under “normal” roles arrangement an analyst’s workload list only shows calls assigned to that analyst and/or the team, whereas the “supervisor” arrangement also allows that analyst to view calls assigned to other analysts in that team. Secondly, our task analysis has demonstrated that the majority of calls escalating end-user’s enquiries within the Student IT Help Desk team are logged using ITHD\_SUPERVISOR\_REF Hot Topic with an automatic initial assignment to the Help Desk Manager. However, subsequent analysis and interviews indicated that Help Desk Officers are also expected to pick up and action calls assigned in this way, and that this Hot Topic is used as a general escalation utility, rather than specifically to the Help Desk Manager. Thirdly, our transaction log analysis has demonstrated that calls logged by one person but closed by another is not an uncommon phenomenon, even where there is only one assignment indicated in TP HelpDesk software.

The intra-team aspect of *limited use – collaboration by alternative means* technology-in-practice refers to the practice whereby technical support analysts “get help” (Pentland 1992) from other technical support analysts in the same team to successfully resolve a problem without having to involve members of other teams. This routinised pattern of enactment describes intra-team collaboration in a number of circumstances, for example where the entire end-user’s enquiry falls within the boundaries of that team’s expertise and shared working space (e.g. adjacent desks) mitigates any asymmetry of processual knowledge or technical expertise as held by different members of the same team. Similarly, this pattern of enactment describes intra-team collaboration in more specific circumstances, for example where the end-user’s enquiry is of a generic nature so as not to require specialised processual knowledge and shared working space mitigates any asymmetry of technical expertise as held by members of co-located teams.

### **7.5.6.a. Facilities, Norms and Interpretive Schemes**

In *limited use – collaboration by other means* technology-in-practice, technical support analysts follow the formal norms set out in the operational procedures by contacting the relevant technical support analyst; however they do so over the phone (or email). The dominant interpretive schemes, such as limited knowledge of other functional areas, importance attached to immediate resolution of certain types of problems, have a strong bearing on the analysts choosing to firstly contact an appropriate colleague by interacting with the telephone facility, and only subsequently record the enquiry using a TP HelpDesk software collaborative work facility. This technology-in-practice is reinforced by the interpretive scheme that such pattern collaboration is welcomed by the receiving colleague, particularly in instances where the enquiry indeed relates to a common underlying cause such as a general system failure. However, this technology-in-practice is also made more specific by the interpretive scheme that such pattern of collaboration is not encouraged by the receiving colleague where circumstances do not justify it, and a more effective course of action would be to interact with TP HelpDesk software collaborative work facility in the first instance. Furthermore, our case study analysis of intra-team collaboration supports previous findings (Pentland 1992) where collaboration in the context of distributed technical expertise was found contingent on a variety of physical facilities, such as shared offices; norms such as only requesting “get help” from colleagues where the enquiry is suitable and reciprocity expected, and procedures, such as common working hours; and interpretive schemes of prompt customer service expectations.

### **7.5.6.b. Moves, Subroutines and Performances**

When placed in context of overall team operations the *limited use – collaboration by alternative means* routine applies to enquiries received from drop-in or telephone customers enquiring about an issue outside of the first-line analyst’s area of expertise or authority. This technology-in-practice enacted within the Student IT Help Desk team is characterised not by use of ITHD\_SUPERVISOR\_REF Hot Topic to record the enquiry and “give it away” immediately, but rather by utilising other facilities available to the first-line analyst such as telephone to “get help” from a colleague. Typical circumstances in which this technology-in-practice may be enacted include assisted identification and/or problem-solving of enquiries with a suspected single



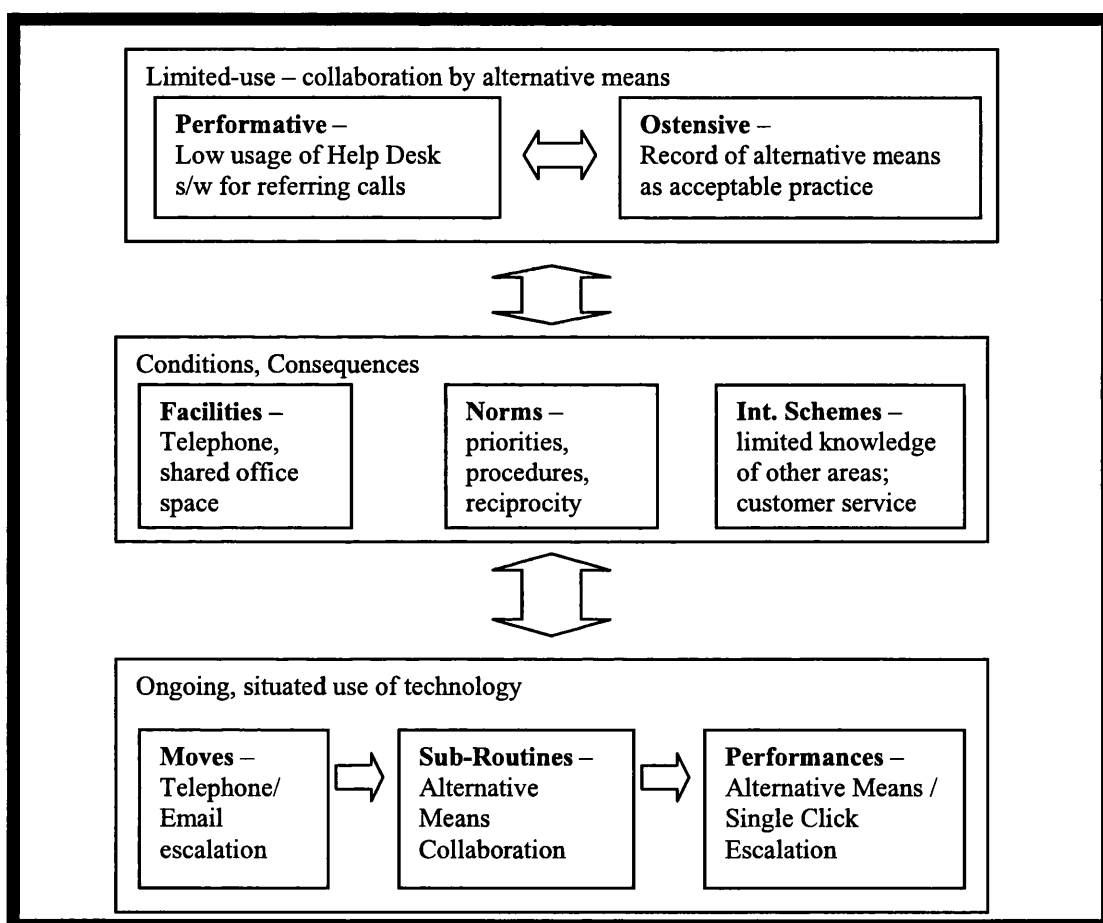
underlying cause, and/or enquiries considered urgent by the first-line analyst. The *limited use – collaboration by other means technology-in-practice* is made distinct by the pattern of its enactment by front-line technical support analysts in that once the enquiry is received, assistance from colleagues is sought first, and the enquiry may subsequently not be logged as a call in TP HelpDesk software, particularly if progressing the call requires to subsequently “give the problem away”.

### **7.5.6.c. Limited-Use Collaborative Working – Summary**

Similar to limited-use call logging, limited-use collaborative working organisational routine can be classified as an inertia technology-in-practice, characterised by low interest in using the technology (Orlikowski 2000). Our analysis of the operational procedures identified the formal norm that TP HelpDesk software should be used for referring calls to second line support specialists in other teams. However, our transaction log analysis strongly indicated that the practice of using the collaborative working features of TP HelpDesk software (as identified by our task analysis) was uncommon – just about 70 calls over the course of a whole year (in 2004, 2005 and 2006), compared to thousands of calls logged during the year. Interviews with technical support analysts both in the IT Help Desk team (which would typically initiate a collaboration request) and PC Support and Systems team (which are typically on the receiving end of collaboration requests) allowed us to identify the limited-use – collaboration by alternative means technology-in-practice, characterised by seeking information or assistance from colleagues is first done using email, telephone or in person in both inter- and intra-team collaboration.

Our in-depth interviews with technical support analysts further allowed us to identify the relationship between facilities, norms or interpretive schemes, as follows. A number of dominant interpretive schemes were explored, including limited knowledge of other functional areas and the emphasis on customer service and prompt resolution of end-users’ technical support enquiries. The limited-use – collaboration by alternative means technology-in-practice is characterised by pattern of enactment whereby the analyst chooses to firstly contact an appropriate colleague by interacting with the telephone (or other communication) facility, and only subsequently record the enquiry using a TP HelpDesk software collaborative work facility if the enquiry required a considerable amount of work on part of the receiving colleague. This

technology-in-practice is characterised by the structure of distributed technical expertise and collaboration is contingent on a variety of physical facilities, such as shared offices; norms such as only requesting “get help” from colleagues where the enquiry is suitable and reciprocity expected, and procedures, such as common working hours; and interpretive schemes of prompt customer service expectations. The complexity of the relationship between the facilities, norms and interpretive schemes pertaining to the limited-use – collaboration by alternative means technology-in-practice is illustrated in a simplified form in the diagram below.



**Figure 39: Synthesised Theoretical Framework - Limited Use Call Assignment**

The composition of the Limited Use Call Assignment routine, characterised by the absence of, or only ad-hoc or perfunctory performance of Call Escalation subroutines, substituted by Alternative Means Collaboration subroutine is presented below in the context of the repertoire of moves available to the technical support analyst:

<b>Available Moves:</b>	<p>Assess Enquiry Subroutine:</p> <ul style="list-style-type: none"> <li>• Tell me (what the problem is)</li> <li>• Show me (what the problem is)</li> </ul> <p>Manual Escalation:</p> <ul style="list-style-type: none"> <li>• Click File → New Call</li> <li>• Enter End-user's name</li> <li>• Appropriately categorise the call</li> <li>• Type in call description</li> <li>• Select team/individual to whom the call is to be escalated</li> <li>• Enter notes accompanying the call escalation</li> </ul> <p>Single-Click Call Escalation Subroutine:</p> <ul style="list-style-type: none"> <li>• Click appropriate Type C Hot Topic</li> <li>• Enter End-user's name</li> <li>• Type in call description</li> </ul> <p>Alternative Means Collaboration Subroutine</p> <ul style="list-style-type: none"> <li>• Telephone escalation</li> <li>• Email escalation</li> </ul>
<b>Chosen Subroutines</b>	<ul style="list-style-type: none"> <li>• Assess Enquiry</li> <li>• Alternative Means Collaboration</li> <li>• (Optional Subsequent Single-Click Escalation)</li> </ul>
<b>Performances</b>	<ul style="list-style-type: none"> <li>• Initial escalation made by alternative means (telephone or email) and subsequently escalated using TP Help Desk software</li> <li>➤ Characterised by subsequent Single-Click Escalation using TP Help Desk software if escalation requires considerable amount of work by receiving colleague</li> </ul>

## 7.6. Chapter Summary

This chapter has presented the findings and analysis of the “micro” level analysis of how performance metrics on the delivery of IT support service to the business are collected as a by-product of normal daily operations of an organisation’s IT Service Desk. Triangulated analysis of multiple sources of data, including transaction logs, documents, interviews, verbal protocol and task breakdown allowed us to identify and study the context of a number of distinct patterns of engagement with TP HelpDesk software by technical support analysts when logging and progressing end-user support calls. As has been shown, the extent and depth of the empirical data collected during this study makes concise presentation of the findings a rather challenging endeavour

for the researcher – for the purpose of clarity, the reader may be interested in a vignette (included in Appendix) showing the variety of empirical data and its interpretation forming the identification and composition of a call logging organisational routine in a different style of presentation.

Our analysis of training materials revealed a fairly straightforward procedure on how TP HelpDesk software is supposed to be used: Listen to user, Open relevant call, Resolve enquiry, Close/Refer the call which applies to all end-user enquiries. Our transaction log analysis of calls logged in TP HelpDesk software revealed a marked dominance of type A generic Hot Topic ITHD\_INFO\_REQUEST. Further analysis of procedures combined with task analysis revealed that this Hot Topic logs the end-user enquiry via a single mouse click automatically capturing the bare minimum of generic information from a pre-populated template and as well as the analyst/date-time stamp. Triangulating these findings using our analysis of in-depth semi-structured interviews and verbal protocol we highlighted the importance of the operational procedure as a norm reinforced by the possibility of sanctions for non-compliance. We also illuminated the assess-enquiry subroutine which served to evaluate the relevance of the general call logging procedure with reference to the particular enquiry; and highlighted the perceived importance of prompt customer service provision as a dominant interpretive scheme. We were thus able to identify the fire-and-forget call logging technology-in-practice so characterised due to the lack of feedback back to support analysts concerning the information collected in TP HelpDesk software concerning calls logged using type A Hot Topics. The fire-and-forget characterisation of this technology-in-practice was found to be accurate and reinforced by the mutual interdependence of the type A Hot Topic quick call logging facility, the formal operational norm that all enquiries are to be logged and the interpretive scheme of the expectation of prompt customer service whereby at busy times of the year when the IT Help Desk physical layout was unable to cope with the customer service demands placed on it the procedural pressure to log all calls was made easier by the fact that logging calls using type A Hot Topics is a matter of a single mouse-click. A simplified semi-sequential representation of the chain of evidence leading to the identification and characterisation of this technology-in-practice is illustrated in Appendix.

Further analysis of transaction logs allowed us to identify seeming inconsistencies in the numbers of calls logged, for example over 50 in one 3-hour service shift and none in the subsequent service shift. We were able to relate these apparent inconsistencies to an interpretive scheme which characterised quick logging of calls as an administrative burden and serving no useful purpose as demonstrated by the lack of feedback on the captured information back to the support analysts who logged those calls. Further interviews with technical support analysts facilitated our identification of the limited-use call logging technology-in-practice, so characterised due to the non-logging of end-user support requests in TP HelpDesk software. In general, our findings indicated that the fire-and-forget and limited-use technologies-in-practice were distinct regularised patterns of engagement with TP HelpDesk software as pertains to logging end-user enquiries, and support analysts switching between the two practices based on the reinforcement of call logging norms through regular reminders on procedure, and counteracting the purposeless administrative burden interpretive scheme by references to the use of call-logging statistics in budgeting and staffing allocation decisions by members of the IT HelpDesk operational management team.

Our analysis of the training materials and procedures highlighted the prominent role of TP HelpDesk software in facilitating collaboration between different technical support analysts through referring calls within and between teams. Our transaction log analysis of calls logged in TP HelpDesk software indicated that the practice of transferring entire calls between teams is uncommon and only a small proportion of the calls indicate multiple points of responsibility, but where so indicated the additional points of responsibility are directed at members of a different team to the one that logged the call initially. Our transaction log analysis also revealed a prominence of type C Hot Topics (e.g. ITHD\_SUPERVISOR\_REF) which automate the process of logging a call with an automatic assignment/escalation to a 2<sup>nd</sup> line support team or to the team manager. Triangulating our analysis of transaction logs and operational procedures and training with analysis of semi-structured interviews and verbal protocol allowed us to identify a persistent call ownership norm of keeping primary responsibility for the call unchanged once it is logged. This norm was found to be prevalent across the teams in the IT Services department, and reinforced by the interpretive scheme of limited knowledge of activities across functional or service

provision boundaries. Our task and transaction log analysis of calls logged in TP HelpDesk software allowed us to identify a fire-and-forget call escalation technology-in-practice whereby a call is either immediately automatically referred to the HelpDesk supervisor who will subsequently progress the call to the appropriate team, or immediately automatically referred to the appropriate team for enquiries of certain clearly defined types. Further interviews with technical support staff and task analysis of the TP HelpDesk software artefact confirmed the characterisation of this technology-in-practice as fire-and-forget in that once the call is logged and automatically escalated the logging support analyst has little information about and usually no involvement with that call.

Further analysis of the configuration of the Service Level Management reports demonstrated the largely binary (strict pass/fail) and numeric (% of) nature of the performance metrics. This finding, combined with triangulated empirical evidence from semi-structured interviews allowed us to identify and analyse the reverse chronological prioritisation technology-in-practice pertaining to the progressing of non-automatically closed calls in TP HelpDesk software. Our analysis of operational procedures highlighted the norm of expectance of true chronological prioritisation of calls whereby calls are dealt with in the order that they are received (barring emergencies), since the Service Level Definitions applicable to calls logged in the IT Help Desk team do not differentiate between urgent and non-urgent enquiries. However, our triangulated analysis revealed the practice of attending to calls which haven't breached their service level ahead of those older calls which have already breached their service level. The interpretive scheme of binary numerical representation of performance indicated that reverse chronological prioritisation leads to an indication of better performance in the Service Level Management reports, since those reports are based on a simple count of the number of calls not meeting their Service Level, rather than by how much time the Service Level was breached in those calls.

Our transaction log analysis revealed a surprisingly low number of calls with a record of collaborative working through the use of Assignments or Action Track collaboration features of TP HelpDesk software. Subsequent triangulated analysis demonstrated that in fact much of the inter- and intra-team collaboration is conducted

without (or with limited) use of TP HelpDesk software, but involves email, telephone or even personal communication. For example, our analysis of documentary evidence such as minutes of meetings show a record of a pattern of escalating an enquiry to a functional specialist in a different team initially by phone for a quick resolution and using TP HelpDesk software if the enquiry was likely to take longer. Similarly, we have been able to identify the practice of getting help from members of the same team without the use of TP HelpDesk software where the shared working space (e.g. adjacent desks) were found to mitigate any asymmetry of processual knowledge or technical expertise as held by different members of the same team.

The following chapter (Chapter 8) discusses these findings and relates the “micro” level analysis of the technologies-in-practice presented in this chapter to the more general “macro” level pertaining to the usage of performance statistics arising from the daily use of TP HelpDesk software. Chapter 8 also outlines the theoretical and methodological contribution of the research presented in this thesis and highlights avenues for further research.

## **CHAPTER EIGHT – DISCUSSION AND CONCLUSIONS**

### **8.1. *Chapter Introduction***

The purpose of this chapter is to present a discussion of the findings and analysis developed in the earlier chapters in light of the theoretical, methodological and practical contributions made by the research presented in this thesis. Discussion of the findings and analysis is based on the Literature review presented in Chapter 2, Theory review and development of synthesised theoretical framework in Chapter 3, Research Design presented in Chapter 4, TP HelpDesk software artefact feature and capabilities analysis in Chapter 5, Preliminary Findings concerning the research site context and configuration of the TP HelpDesk software at the research site in Chapter 6, and in-depth analysis of the findings presented in Chapter 7. This chapter begins with a discussion of the findings, and review of the theoretical, methodological and practical contributions made by this research and its limitations. This chapter concludes by outlining the limitations of this study and recommendations for future research.

### **8.2. *Discussion of findings***

The research presented in this thesis posited the goals of identifying patterns of use of TP HelpDesk software in terms of call logging and collaborative working practices activities and analysing the contextuality of those patterns in order to illuminate the capture of data pertaining to the performance metrics. Our triangulated analysis based on multiple and varied sources of empirical data allowed us to paint a picture of the typical operation of the IT Help Desk team with relatively rich contextual detail. On one hand, this picture illustrates a fairly straightforward expected pattern of service execution as presented by the general procedure and training – listen to end-user, open call, resolve/action query, close/action call. On the other hand, we have been able to identify and analyse a whole range of routinised patterns of both call logging and collaborative work practices, enacted differently by different groups of staff in different circumstances. We are now in a position to relate the “micro” level analysis conducted in this research with a number of important “macro” level implications for the emphasis placed on the performance statistics with reference to the defined Service Levels as one of the vehicles for promoting mutual understanding between the business and IT. More specifically, we are now in a position to outline the complex



relationship underpinning the Service Level Reports and ongoing practices by which operational performance data is collected as a passive by-product of the patterns of use of TP HelpDesk software.

### **8.2.1. Review of identified organisational routines**

It is appropriate at this point to briefly review the particular organisational routines during the course of our research. Chapter 7 presents the “micro” level analysis of how performance metrics on the delivery of IT support service to the business are collected as a by-product of normal daily operations of the Student IT Help Desk team of the IT Services Department of XYZ University. Triangulated analysis of multiple sources of data, including transaction logs, documents, interviews, verbal protocol and process tasks allowed us to identify a number of distinct patterns of engagement with TP HelpDesk software by technical support analysts and study those patterns using our synthesised theoretical framework developed in Chapter 3 by making specific references to the prominent modalities of facilities, norms and interpretive schemes. For example, our analysis of call logging organisational routines allowed us to identify fire-and-forget and limited use call logging technologies-in-practice. The fire-and-forget call logging technology-in-practice is represented by the performances of single-click call logging move, arranged in batch or prompt sequence sub-routines as part of the technical support repertoire of problem-solving, organising and interpretation moves (Pentland 1992; Pentland 1995; Das 2003). Calls logged in this manner automatically record a bare minimum of information (e.g. date/time, support analyst) about the enquiry based on a pre-configured template. This recurrent pattern of engagement with TP HelpDesk software artefact is illuminated through the formal norms reinforced by the possibility of sanctions, expressed as operational procedures that all enquiries must be counted, and interpretive schemes, made apparent by the lack of feedback on the usefulness of data once a particular enquiry is logged through interaction with the quick call logging facility of TP HelpDesk software. The limited-use technology-in-practice is represented by the performances which do not include call logging moves as part of technical support process even though the formal norm specifies that enquiries of that type should be logged. This recurrent pattern of non-engagement with TP HelpDesk software artefact is illuminated through the interpretive scheme suggesting that in the absence of evidence of its usefulness, fire-and-forget logging calls is an administrative burden. Our findings indicate that the call

logging formal norm and “administrative burden” interpretive scheme are in constantly shifting balance, and that technical support analysts do switch between fire-and-forget call logging and limited use technologies-in-practice following training sessions or reminders on procedure which serve to reinforce the formal norm.

Our analysis of the collaborative working organisational routines allowed us to identify fire-and-forget escalation, and limited use technologies-in-practice. The fire-and-forget escalation technology-in-practice is represented by the performances of single-click referral of enquiries to other teams based on a pre-configured template. This recurrent pattern of engagement with TP HelpDesk software artefact is illuminated through the formal norms, expressed as operational procedures which delineate areas of functional responsibilities for various teams, informal norms of persistent call ownership once an enquiry is logged, and interpretive schemes of limited knowledge of activities across functional or service provision boundaries, and no further involvement with a call once it is logged for another team’s attention. The limited-use collaborative working technology-in-practice is represented by the performances which do not include collaborative working moves engaging the action track or assignment facilities of TP HelpDesk software but achieve the required collaboration through the use of alternative means such as telephone, email or personal communication. This recurrent pattern of non- (or limited) engagement with TP HelpDesk software is illuminated through the interpretive scheme of expedient customer service whereby “quick” get help assistance is first sought through alternative means mitigating any asymmetry of processual knowledge or technical expertise as held by different technical support analysts, and only recorded in TP HelpDesk software if the enquiry is deemed to require more substantial involvement from a specialist.

### **8.2.2. Service Level Management Reports**

Our analysis of documentary evidence collected at the research site indicated that Service Level performance metrics was an important standing item on the agenda of the monthly Operational Managers General Meeting (OMGM), appearing on all 56 extracts of meeting minutes available as empirical data for this research. The OMGM includes all operational managers and team leaders as outlined in our description of

the IT Services Department organisational structure in section 6.2 of this thesis, and includes a number of standing items of the agenda (such as SLD reports, health and safety, report on actions from the previous meeting, and actions required for next meeting) as well as any other operational issues and communications items which require confirmation from or notification to the Operational Managers Group.

The SLD reports as presented to OMGM include a 5 months' historical breakdown of performance statistics obtained by querying the data held in TP HelpDesk software in a similar way as outlined for the IT HelpDesk team in the previous section of this thesis. The operational managers are requested to comment on the statistics, for example by explaining why some SLDs may have been breached, or by providing a narrative on any trends. For example, we have already outlined how the IT HelpDesk Manager was asked to comment on an unusually high number of calls logged by the IT HelpDesk team in the summer of 2005 (OMGM 18/08/2005) and made a recommendation to record one call per person rather than per enquiry (OMGM 20/09/2005), as outlined in detail in section 7.4.4.a of this thesis. Similar comments and narratives can be found in every record of OMGM made available for this research.

As outlined in earlier sections of this thesis, the Service Level Management reports at IT Services department of XYZ University are designed using an industry standard third party software tool called Crystal Reports, which provides both the "engine" component for connecting directly to the back-end database and processing the SQL query and the "front-end" component for presenting the query results in an appropriate manner – often including graphs, cross-tabulation, and so on. In fact, the process by which management reports are produced is exactly the same as the process by which transaction log data was extracted from the backend database for our analysis performed during the course of this research. We have been able to access the raw reports which form the basis of performance metrics information at the base of Service Level Management reports. By analysing the raw reports from the point of view of data capture we have been able to identify the key data elements and query constructs underlying each of the reports, thus affording an invaluable insight into the particular aspects of software functionality on which those reports rely to produce management information.

The following table recalls the Student IT Help Desk team's Service Level Definitions, as was published on the IT Services Department's website during the time of this study. Furthermore, for each SLD, we have added short description of how the data is obtained and evaluated from the back-end database. The structure of the back-end database which holds the raw data on which the SLD metrics are evaluated is very complex and the reports rely on sophisticated SQL queries providing multiple levels of drill-down selection and link multiple tables. It is therefore more appropriate to omit the actual SQL statements, table and field names and table relationship structures in favour of short description of the data extraction algorithm by means of which the relevant metrics are obtained and calculated.

Service Level Identifier	Service Level Definition (SLD) and Data Extraction Algorithm
SLD-ITHD-1	All queries first heard within 10 minutes of an individual joining the queue (exceeded in peak times such as registration period). → Count total number of calls recorded by Student IT Help Desk during the period, calculate proportion of calls where waiting time drop-down field is completed as "<10 minutes"
SLD-ITHD-2	85% of queries are resolved at first response → Count total number of calls recorded by Student IT Help Desk team during the period, calculate proportion of calls where elapsed business time between call open and close is less than 45 minutes.
SLD-ITHD-3	Problems which cannot be resolved are referred to appropriate staff in IT Services who will be asked to provide a resolution within 1 working day → Count the number of calls recorded by Student IT Help Desk team during period which contain an additional assignment to another team, calculate proportion of calls where elapsed business time between assignment open and close is less than 8 hours.
SLD-ITHD-3-OLD (superseded by above)	Problems which cannot be resolved are referred to appropriate staff in IT Services, who will be asked to respond within 3 working hours. → Count the number of calls recorded by Student IT Help Desk team during period which contain an additional assignment and action track for another team, calculate proportion of calls where elapsed business time between action track open and close is less than 3 hours.
SLD-ITHD-4	Requests for increased disk space allocations processed and the user notified within one working day. → Count total number of calls recorded by Student IT Help Desk team during the period which are categorised as ACCOUNT / HSPACE / QUOTA INCREASE, calculate proportion of calls where elapsed business time between call open and close is less than 8 hours

SLD-ITHD-5	<p>90% of software available under the student software purchase scheme held in stock.</p> <p>→ Count total number of calls recorded by Student IT Help Desk team during the period which are categorised as HELPDESK / SW-SALES /*, Count total number of calls recorded by Student IT Help Desk during the period which are categorised as HELPDESK / SW-RESERVATION /*, calculate proportion of SW-RESERVATION / SW-SALES less than 90%</p>
SLD-ITHD-6	<p>Email enquiries are responded to within 3 working hours of receipt.</p> <p>→ Count total number of calls recorded for Student IT Help Desk team during the period by analyst AUTOEMAIL, calculate proportion of calls where elapsed business time between FIRST_RESPONSE action track open and close is greater than 3 hours</p>

**Table 24: Service Level Definition and Calculation**

Service Level performance evaluation reports fall into two broad categories – those identifying a type of enquiry and calculating a proportion (ITHD-SLD-1, ITHD-SLD-2, ITHD-SLD-5); and those identifying two points in the call lifecycle and calculating the elapsed business time (ITHD-SLD-3, ITHD-SLD-4, ITHD-SLD-6). As above, it should be noted that SLDs designated above as SLD-ITHD-3 and SLD-ITHD-3-OLD relate to the work that other teams in the department carry out on calls owned by the Student IT Help Desk team. Most of the end-user facing teams in the department have similar SLDs, which are grouped by team who owns the call (e.g. Student IT Help Desk team) and broken down by teams which carry out the work (e.g. Systems or Network teams assigned specific tasks on calls owned by the Student IT Help Desk team).

Additionally, management reports can be set up to serve other purposes than formal SLD evaluation, for example by providing the foundation for ad-hoc requirements for management information. As the reporting engine Crystal Reports connects directly to the back-end database there exists a potential to create one-off or regular reports based on any piece of data contained in the back-end database. For example, the following comment from Help Desk Manager illustrates such additional ad-hoc reports:

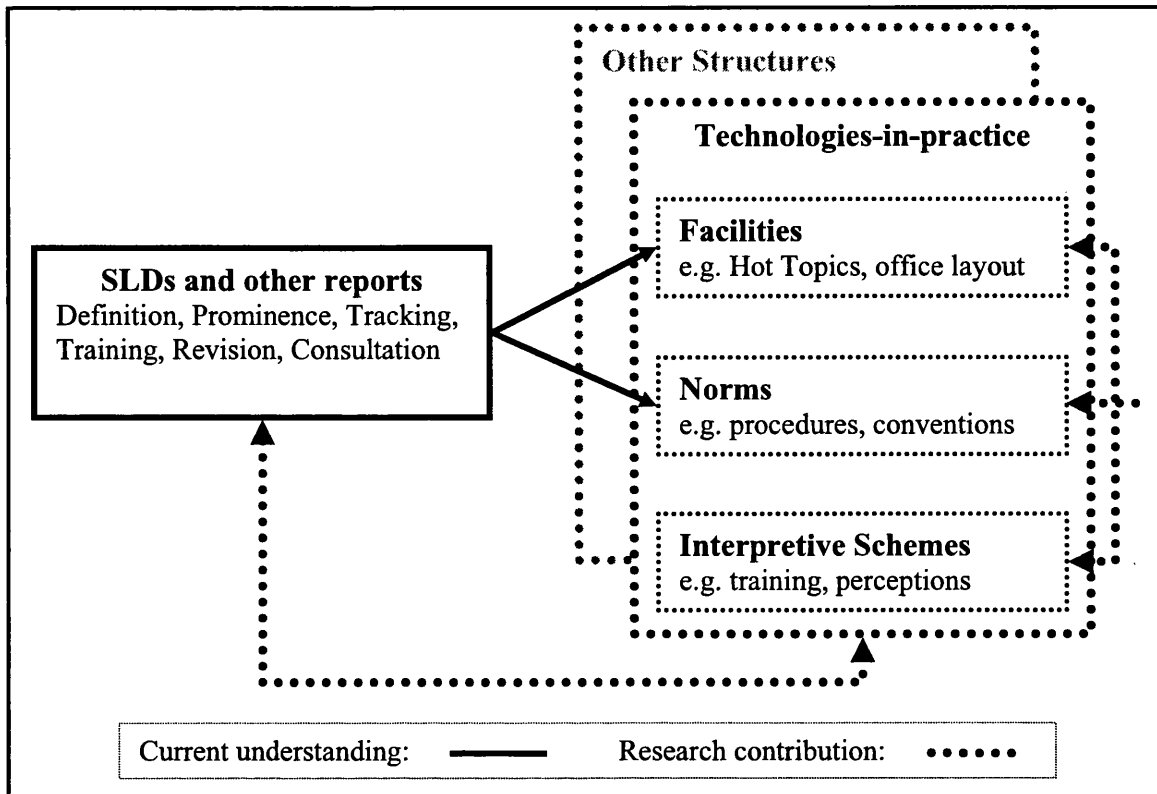
*It's quite useful to see for example how many calls get logged at a certain time of day in a certain shift, so it's quite useful to see what happens on the evening shift which is 4 till 8 or the weekend shift, because obviously that sort of thing can have a big impact on whether we actually stay open for those days and for later on the evening.*

*If it looks like we are not getting anything in, then can we justify being open?*

*[HDM1]*

### **8.2.3. SLDs and technologies-in-practice**

As outlined earlier, the findings of our research presented in Chapters 5, 6 and 7 describe and analyse a range of routinised patterns of both call logging and collaborative work practices, enacted differently by different groups of staff in different circumstances. Our analysis clearly demonstrates that the relationship between the “micro” level processes of collection of performance metrics on the delivery of an organisation’s IT support service as a by-product of normal daily operations of an organisation’s IT Service Desk, and the “macro” issues of IT governance with an emphasis on an optimal mix of IT organisational structure and ITIL processes is much more complex than achieving a suitable fit between organisational structure, culture, processes and configuration of the software artefact (c.f. McKeen and Smith 2003; Bruton 2004). Analysis presented in this thesis demonstrates that the regularised patterns of use of HelpDesk software are collective context-dependent phenomena, not determined by the training and operational procedures, but rather representing enactments of social structures re-constituted in recurrent engagement with technology and mediated by the prevailing facilities (including but not limited to the properties of the technological artefact), norms (including but not limited to the operational procedures), and interpretive schemes (including but not limited to the provision of training). This complex relationship is depicted in a necessarily simplified form in the diagram below, specifically highlighting the contribution made by the research presented in this thesis:



**Figure 40: Relating "macro" and "micro" - Research Contribution**

Before we re-examine the specific implications of the complexity of this relationship between the “micro” and “macro” levels based on our analysis of the empirical findings presented earlier in this thesis, it is appropriate at this point to introduce further empirical evidence to illuminate the complexity of this relationship.

We have already outlined the importance and prominence of the teams’ SLD reports at the monthly Operational Managers General meeting (OMGM). For practical reasons of access to the research site the research presented in this thesis does not conduct a longitudinal analysis of the formation of technologies-in-practice. Nevertheless it does strongly benefit from a historicity of perspective afforded by access to the archival records of the minutes of OMGM for the entire 2002-2006 period also covered by the transaction log analysis conducted by this study. It has been very valuable to note the number, frequency and nature of the references to the accuracy of recording SLD performance metrics throughout the vast majority of the 2002-2004 minutes of OMGM which relate to the start of usage of TP HelpDesk software at IT Services department of XYZ University in early 2002.

For example, the minutes of the July 2002 OMGM recorded the following:

*[IT Help Desk Manager] reported a slow response in resolving an account mix up with [another team] under [another team under SLD-ITHD-3]. It was felt that there is a greater frequency of these calls that are not being recorded in the statistics; investigation will take place as to how these calls are being assigned within [TP HelpDesk software].*

Similarly, the minutes of the August 2002 OMGM recorded the following:

*[IT Help Desk Manager] reported that the increased number of calls recorded under [SLD-ITHD-1] reflected a more thorough recording practice during July. In the past straightforward queries have not been logged using [TP HelpDesk software].*

Skipping ahead to the minutes of the January 2003 OMGM, we can see that:

*[IT Help Desk Manager] reported that the SLDs were an accurate reflection of December, with a 50% reduction of calls due to the holiday.*

However, the minutes of the February 2003 OMGM show that:

*[IT Help Desk Manager] reported that the helpdesk has been reassigning calls to the Network and Systems teams [instead of creating additional assignments]; this is the reason for no data being recorded under [SLD-ITHD-3]. [User Services Manager] requested that referred calls remain assigned to the [IT HelpDesk team and additional assignments are created for other teams].*

Interestingly, the minutes of March 2003 OMGM highlight the following:

*[IT Help Desk Manager] reported that the referrals are not being accurately reported using the current Crystal Report. [IT HelpDesk Manager and several other members of OMGM] will be meeting to update and review the current SLD reports.*

The April 2003 OMGM minutes highlight a different aspect:

*[IT Help Desk Manager] highlighted that the original method for recording [older version of SLD-ITHD-5] software reservation sales was flawed; therefore a more appropriate system has been developed. Due to this change the group agreed that the target should be increased to 'one working day or a date agreed with the user' [i.e. SLD redefined]. This new target will allow the Helpdesk Team an appropriate*



*amount of time to respond to special orders requiring a large number of CD-ROMs to be burnt.*

The minutes of May 2003 OMGM again confirm that SLD reports are (largely) accurate and that last month's correction is now operational:

*[IT Help Desk Manager] reported that the proposed changes to the software sales SLD have been implemented. [IT Help Desk Manager] commented that the low rate of incidents reflects a quiet month and some under recording due to the delayed implementation of the new [TP HelpDesk software] build.*

However, the minutes of June 2003 OMGM highlight a different problem:

*[IT Help Desk Manager] reported that [ITHD-SLD-3] is still not reflective of calls referred by the helpdesk [to the Systems team]. [Systems team manager] confirmed that he felt that this SLD is not reflecting the amount of calls referred to the Systems Team.*

The minutes of July 2003 show that the difficulties in recording and reporting on some of the SLDs persist:

*[IT Help Desk Manager] reported that the help desk is still very busy handling summer school student enrolment and enquiries. Unfortunately many calls have not been logged in [TP HelpDesk software] because of a problem with the software during enrolment. [IT Help Desk Manager] commented that he still feels that the referrals to the Systems Team are not accurately recorded. [IT Help Desk Manager and Systems team manager] will discuss the recording of these referrals. [IT Help Desk Manager] reported that the failure to meet the software reservation SLD [earlier version than presented in section 8.2.2 of this thesis] related to one single incident, resulting in 0%. [User Services Manager] commented that this was not a sensible SLD if one incident results in a failed target. [IT Help Desk Manager] reported with the installation of the new stock control software a more appropriate SLD could be developed. [IT Help Desk Manager] reported that [SLD-ITHD-6] was still under construction whilst the [TP HelpDesk software] email plug in module is configured. This is the basis of one of the summer projects.*

The August 2003 OMGM shows improvement in some areas, but not others:

*IT Help Desk SLDs have been grouped incorrectly in the Crystal reports for some time; this has been noted and will be rectified historically. The group agreed that software sales will now be recorded as a number of sales with an indication of how many items were not immediately available to the user [i.e. the new version of SLD presented in section 8.2.2 of this thesis].*

Skipping ahead, September 2003 OMGM illustrates that:

*[IT Help Desk Manager] reported that the reports have been updated to include all [IT Help Desk team groups], and that the figures are more representative. Reporting on [SLD-ITHD-3] has been suspended until the difficulties with the recording have been remedied. [IT Help Desk Manager] commented that [SLD-ITHD-5] has been changed to all software held in stock, and asked the group to set and agree a percentage target. The group felt that it is difficult to set a percentage target, due to the variations in software sales. The group agreed to pilot a 90% availability target.*

Following that, November 2003 OMGM records:

*[IT Help Desk Manager] reported that the large numbers of enquiries under [SLD-ITHD-1] and [SLD-ITHD-2] relate to the reports now including [all IT Help Desk groups, rather than one]. In addition, [IT Help Desk Manager] stressed the importance of logging calls to all members of helpdesk staff [presumably in a format similar to the one presented in section 7.4.5.a of this thesis]. The poor results under [SLD-ITHD-5] relate to difficulties with obtaining the master CDs [used for production of CDs for over-the-counter software sales]. This is a temporary difficulty, and an improvement is expected in next month's figures.*

And finally, December 2003 OMGM reports that:

*[IT Help Desk Manager] reported that the referrals under [ITHD-SLD-3] now better reflect reality, although the report is still under review. Software sales have picked up during November, as master disks have been sourced. The monitoring of this SLD will be reviewed next year, with the new stock control system.*

However, skipping ahead to February 2004, OMGM minutes show that:

*[IT Help Desk Manager] reported that figures under [SLD-ITHD-2] illustrate the calls referred to [a 3<sup>rd</sup> party department outside of IT Services] for account renewals,*

*and a response taking in excess of the 45 minutes target time. Software sales were affected by the number of students making advanced reservations for the McAfee V7. [SLD-ITHD-4] still needs further investigation, as it appears some requests for additional disk space are not being included within the report.*

Similarly, OMGM in March 2004 shows that:

*[IT Help Desk Manager] reported that the help desks are still handling a large number of support requests under [ITHD-SLD-2], and the 45 minute target is often missed because of those calls referred outside of the team. [IT Help Desk Manager] commented that the increased figures under [ITHD-SLD-4] reflect an improvement in the method of logging calls within [TP HelpDesk software].*

May 2004 OMGM records the last entry concerning the accuracy of recording data for SLDs (except for the “one student – one call” issue dated August/September 2005 and illustrated in section 7.4.4.a of this thesis):

*[IT Help Desk Manager] reported that the missed targeted for [SLD-ITHD-5] software sales was due to an academic informing students they will need to use a specific application for an assignment. If the team was alerted to this in advance, additional stock could be made to cover peak demand. The group suggested it might be possible to create software lists for courses with the introduction of the reading list management software in the Library. [IT Help Desk Manager] commented that [SLD-ITHD-2] is actually a measurement of how many calls are resolved immediately at the helpdesk, any referred calls always fall outside of the 45 minute target. The target will be reworded to give a target of 85% of requests resolved on a first visit to the helpdesk.*

From May 2004 to the end of 2006 OMGM (last data available to this study) minutes of the meetings show comments concerning team’s operational performance as measured against SLDs, but not commenting on the accuracy of SLD recording processes, as shown in the following extract of November 2004 OMGM:

*[IT Help Desk Manager] reported that October has been very busy [October includes the first few weeks of the academic year and is always one of the busiest times of the year as illustrated by our transaction log analysis], and is now accurately recorded within the statistics.*

It is important at this point to reflect on the following three aspects of the research presented in this thesis. Firstly, it is not an objective of this to assess the accuracy of the Service Level Management reports in terms of reflecting the workload or the progress of particular enquiries. Nevertheless, careful triangulated analysis of our findings indicates that certain assumptions are made in the definition of Service Levels and these assumptions relate to the availability of the required data and the possibility of capturing that data as a by-product of daily IT Help Desk operations using TP HelpDesk software to log and progress calls. Secondly, the research presented in this thesis does not conduct a longitudinal analysis of the formation of technologies-in-practice for practical reasons of limited access to the research site. The research presented in this study was conducted during early-2006 and although the historicity of perspective was afforded by the transaction log analysis and documentary analyses as illustrated above, the volume of empirical data from other sources relating to the 2002-2005 period was insufficient to comprehensively triangulate and conduct a longitudinal analysis of findings. Thirdly, similar comments concerning the difficulty of recording and representing the operational workload are made by most of the operational managers present at the meetings during the period highlighted in comments by the IT Help Desk Manager presented above. Nevertheless, according to our findings and as illustrated in section 6.2 of this thesis, the IT Services department of XYZ University, and the additional comments served to inform our perspective on the overall status of the use of TP HelpDesk software within the department. Keeping in mind, the three aspects of the research presented in this thesis as highlighted above, the historicity of some of the available data allows us to make the following informed judgements.

Firstly, the empirical evidence available to this study suggests that the process of establishing Service Level Definitions and corresponding operational statistics is at least not straightforward. Based on the historical data available to this study, it took the IT Help Desk team of XYZ University about 2 years from implementation of TP HelpDesk software across the IT Services department and initial articulation of the SLDs to arrive at the appropriate balance between what should be recorded (i.e. how service levels are defined) and how it should be recorded (i.e. the process of data collection and representation).

Secondly, the comments on this process as presented above reflect a mutual feedback relationship between what should be recorded (SLD), how it can be recorded (appropriate facilities in TP HelpDesk software), and how it can be reported on (extracting and interpreting data from TP HelpDesk software). It does not appear to be a simple matter of defining an SLD and then measuring performance against it, as the evolution of definitions of SLD-ITHD-3, SLD-ITHD-4, SLD-ITHD-5 and SLD-ITHD-6 indicates.

Thirdly, we can perhaps at this point conduct a limited triangulation of the archival documentary evidence presented above with the transaction log analysis presented in section 7.4.1 of this thesis and semi-structured interviews conducted during mid-2006. Our transaction log analysis illustrated a slight increase in the proportion of calls logged by not using a Hot Topic during 2003-2006 period and a corresponding reduction in the proportion of calls logged using the generic ITHD\_INFO\_REQUEST Hot Topic over the same period. The decline in the prominence of the generic ITHD\_INFO\_REQUEST can be accounted for by the implementation of additional type A Hot Topics which function in the same single-click-log-and-close way but are based on a slightly different template. For example, the ITHD\_TELEPHONE\_RESOLV, ITHD\_SUMMER\_INFO, and ITHD\_SUMMER\_REG Hot Topics indicate that the call logged through fire-and-forget technology-in-practice related specifically to an enquiry received by telephone, or related to a Summer School information enquiry, or related to a Summer School account registration enquiry respectively. In fact, the following comments from a Help Desk Officer relate to the usage of additional type A Hot Topics:

*[Q] Have you got enough hot topics to adequately deal with the different kinds of calls?*

*[A] Broadly speaking there are a couple of issues with hot topics, one is that some of the issues that we deal with in the course of the academic year may only arise for part of a term, for example, but they will be quite intense within that period, so we may have a hot topic for particular event, like the beginning of term, beginning of the academic year account creation issues; lots of new students coming in, new accounts being created [...] So you have a hot topic for that which is, I would say even crucial*

*for that period, but then given that there is a limited number of available hot topics, you would then have to look at later in the year, whether you then reuse those slots and those hot topics.*

*[Q] So you swap them in and out?*

*[A] Swap them in and out – yes. [...] Looking for example at the screen that we have at the moment [...] we have two [Hot Topics] currently which were assigned for summer school related issues [and] haven't [yet] been reconfigured for other use. So it means at the present time of course we are not really using those at all but within 4-5 months time they will [again] become probably among our most hotly used of the hot topics. [HDO1]*

However, the comments from a Help Desk Advisor presented in section 7.4.5.a of this thesis “[...] it doesn't seem to matter if you accidentally log a phone call as a personal visit [HDA3]” indicate that the different type A Hot Topics are nevertheless implicated in the same fire-and-forget and limited-use call logging technologies in practice as outlined in section 7.4 of this thesis.

### **8.3. Research contributions**

An interpretive study can make a contribution to knowledge by developing new concepts, applying well known theory in a new or unique way, offering rich insights into human social and organisational aspects of information systems development and application, or contradicting conventional wisdom (Myers 1997). The research presented in this study makes a number of specific contributions to the field of Information Systems as discussed in the following sections of this chapter.

#### **8.3.1. Position with respect to established research**

Chapter 2 offers an overview of the literature on Business-IT alignment, IT governance, IT Service Management (ITSM) and Information Technology Infrastructure Library (ITIL). Our review found that although there are a number of significant academic publications discussing the wider issues of strategic Business-IT alignment and IT governance, to date there has been relatively little academic discussion about the practices of IT Service Management and the de-facto standard offered by the ITIL framework, despite the prominence of ITIL and ITSM in the Information Technology Services industry (Hendricks and Carr 2002; Forrester 2005;

Forrester 2006; Fry 2006; ITIL-Central 2006; OGC 2006). The research presented in this thesis is not only based on and makes extended use of concepts from IT Service Management industry and IT Infrastructure Library, but also suggests that there is a gap in the current understanding of the “micro” factors pertaining to the day-to-day running of IT Services by analysing how performance metrics on the delivery of IT support service to the business are collected using IT Service Management software as a by-product of routine operation of an organisation’s IT Service Desk.

Chapter 2 offers an overview of the current academic literature on IT support processes, noting the development of the contributions made in understanding its problem-solving aspects (Das 2003) based on information processing theory (Newell and Simon 1972); organising problem-solving in the context of distribution of competencies and functional specialisation (Pentland 1992) based on practice theory (Bourdieu 1977); interpreting problem-solving in the context of fundamental information asymmetry between the end-user and the technical support analyst (Pentland 1995) drawing on practice theory (Bourdieu 1977) and situated action analysis (Suchman 1987); and the documentation and knowledge-management aspects of technical support work (Markus 2001). Our review found that whilst the conceptualisation of the technical support work has been rich in its understanding of the aspects and organisation of the various processes, the academic discussion tended to focus on the somewhat abstract notion of technical support without a firm grounding in a practical process framework. The research presented in this thesis draws together the academic understanding of technical support work and the practitioner/industry understanding of the processual framework (ITIL) in which technical support work takes place.

Our literature review presented in Chapter 2 highlighted the importance attributed to contextual factors from both the practitioner and academic sides of the discussion. For example, we noted the commonly held understanding in the ITSM industry that Business-IT alignment is a fusion of strategy, structure, and culture dimensions (McKeen and Smith 2003), the customisability of ITSM software built in by vendors specifically to address the contextual idiosyncrasies of local implementations (Bruton 2004). Similarly, we explored the current understanding that technical support work exhibits a distinctly organisational nature, with work patterns being contingent on

contextual factors (Pentland 1992; Pentland 1995), including the use of structuration theory (Giddens 1984) to suggest that technical support work can be analysed in terms of physical, ritual and competence structures (Pentland 1992) as ongoing accomplishments, embodying the unacknowledged conditions and unintended consequences of action (Giddens 1984). However, our review also highlighted a gap in the current understanding of the relationship between the “macro” (governance) and “micro” (contextuality and structuration) factors affecting IT Support processes.

Having identified a number of gaps in the literature as outlined above, the research presented in this thesis develops a relatively unproblematic conceptual point of departure into a number of significant theoretical contributions. Our review notes the emphasis placed on the Service Level Agreements and IT Services performance metrics as a major vehicle for promoting mutual understanding between the business and IT at the “macro” level as well as its role as the guiding principle organising the IT Support processes at the “micro” level. Moreover, our literature review highlights the conventional wisdom held in the ITSM industry that interpretation and validity of performance metrics relies on consistent use of the metrics collection tool; and suggests that the appropriate object of this research should be the routinised nature of particular patterns of engagement with HelpDesk software as part of call logging and collaborative working practices, which would allow for collection of operational performance data as a passive-by-product of daily operations. The research presented in this thesis makes a contribution by calling attention to the specific process by which ITSM software is implicated in both the “micro” and “macro” level processes through the collection of performance metric data as part of regularised patterns of engagement with HelpDesk software in call logging and collaborative working aspects of technical support work.

Chapter 5 presented a description of the architecture and functionality of the TP HelpDesk software artefact, which makes a significant contribution to knowledge for two reasons. Firstly, it is generally necessary to avoid taking the technological artefact for granted or considering it unproblematic once built and installed by giving central theoretical significance to the context, the discreet processing capabilities of the artefact or simply conceptualising it as a dependent variable object of research (Orlikowski and Iacono 2001). Secondly, and more specifically, the modern ITSM



software platforms including TP HelpDesk software include a number of optional functionality modules and a toolset for making vendor-supported customisations of data, interface, and process flows. Explicit description of the TP HelpDesk software presented in Chapter 5 makes a break with treating the technological as a discreet black-box entity and introduces the reader to the conceptualisation of this artefact as almost consisting of two separate software products: the generic out-of-the-box product and the product which has been deployed within a particular organisation.

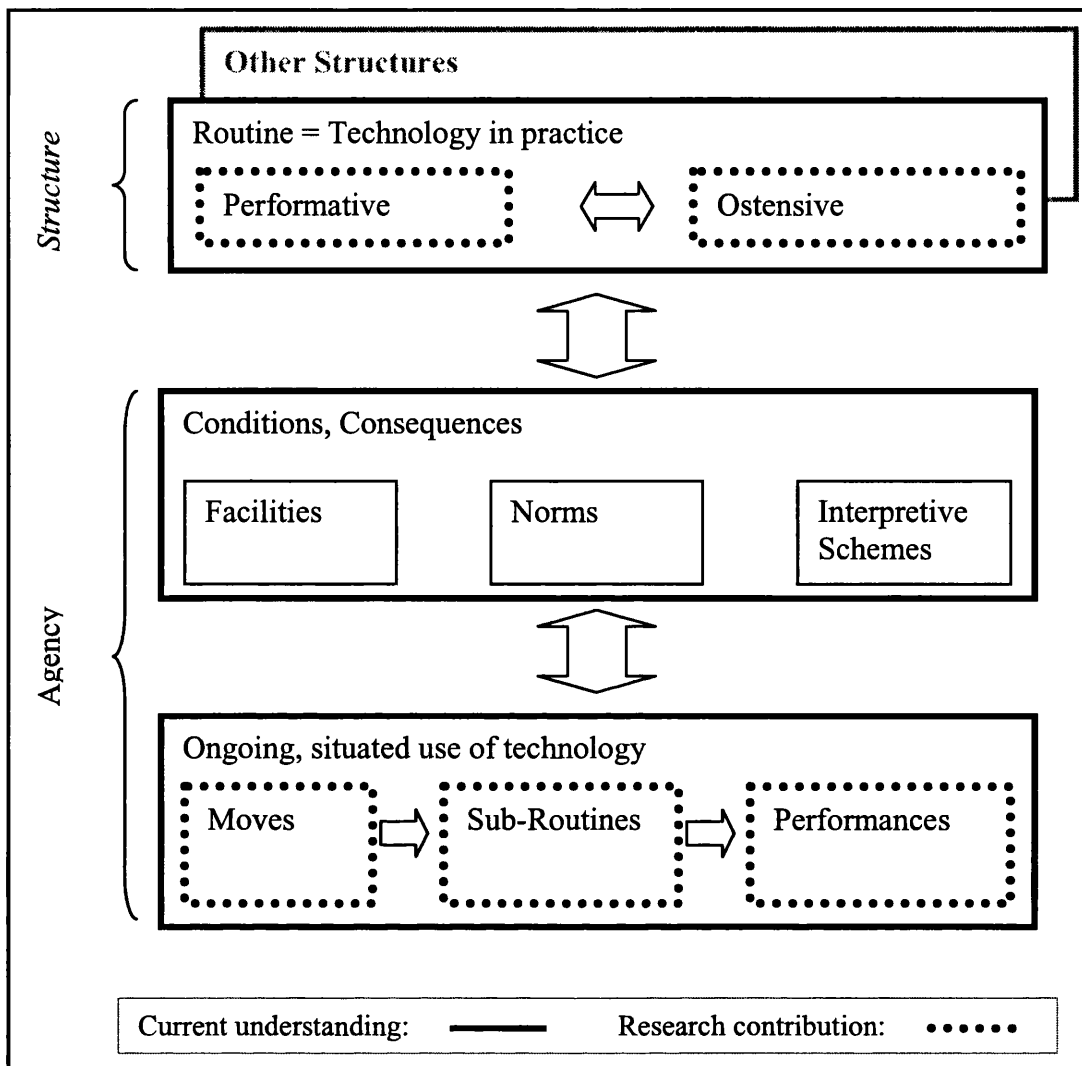
### **8.3.2. Theoretical Contributions**

The major theoretical contribution of the research presented in this thesis is developed in Chapter 3, which presents a thorough review of the theoretical perspectives on organisational routines, structuration theory, and the role of the technological artefact in terms of structuration theory. The research presented in this thesis constructs a new analytical framework based on the practice lens model of technology (Orlikowski 2000), grammatical model of organisational processes (Pentland 1995), and the conceptualisation of organisational routines as a duality of ostensive and performative aspects (Feldman and Pentland 2003) as outlined below.

The practice lens model of technology focuses on how recurrent engagement with a given technology "...constitutes and reconstitutes particular emergent structures of using the technology" (Orlikowski 2000, p.421), however it never defines recurrent/habitual use. As a consequence, the practice lens model is reduced to making only generalised statements concerning recurrence of engagement, and suffers from a lack of conceptual and operational definition of ongoing situated use of technology. The synthesised analytical framework developed in Chapter 3 suggests applying the insights afforded by the grammatical model of organisational processes (Pentland 1995). Identifying the specific moves pertaining to the organisational process offers more potential for identifying and analysing specific instances of engagement with specific facilities of technological artefact in those moves (e.g. single-click logging move involving type A Hot Topic facility); as well as evaluating the recurrent nature of organisational process by reference to the specific sub-routines identifying particular performances of organisational routines.

Furthermore, the practice lens model of technology seeks to identify stabilisation of technologies-in-practice in a structure, defined as repeatedly experienced, personally ordered, and edited version of the technological artefact (Orlikowski 2000). However, this definition suffers from a lack of conceptual and operational definition as it includes elements of both cognition/perception and execution. The synthesised analytical framework developed in Chapter 3 suggests applying the insights afforded by the conceptualisation of organisational routines as a duality of ostensive and performative aspects (Feldman and Pentland 2003). Identifying the performative aspect of an organisational routine as specific performances offers more potential for analysing the ostensive aspect of that organisational routine for example by juxtaposing the evidence of codified ostensive aspects of organisational routines (e.g. operational procedures or training specifying how to log calls) in a set of circumstances with the actual performances carried out in those circumstances (e.g. the particular performance of logging a call).

The following diagram summarises in a simplified form the synthesised theoretical framework developed in Chapter 3 of this thesis and illustrates the theoretical contributions made to the original practice lens model of technology (Orlikowski 2000):



**Figure 41: Theoretical Contribution - Synthesised Theoretical Framework**

The synthesised theoretical framework allows this research to also make a number of contributions to the current theoretical understanding of organisational routines. Our treatment of the process of collecting operational performance data from the perspective of organisational routines allows us to empirically support the current theoretical debates on patterns and recurrence of organisational routines – whether they are mindless or effortful; whether they are collective or individual; what they are constituted of; the extent of their contextuality and path dependence; and finally their effects within the organisation.

Firstly, our analysis of the process of collecting operational performance metrics data allowed us to confirm the existence of a number of regularised working practices and patterns of engagement with the technological artefact at our research site. Identification of regularities in social agency was made possible through the

decomposition of particular sets of behaviours – “subroutines” into their constituent parts – “moves”, thus grounding the analytical treatment of the working practice in specific (directly or indirectly observable) instances of behaviours. The grammatical model of organisational routines (Pentland 1995) as employed in our research, and the resulting richness of empirical evidence supports the usefulness of such approach in contrast to the more traditional perspectives which tend to treat the routines as black-boxes without mapping the internal structure of those routines (Pentland and Feldman 2005).

Secondly, the analytical distinction between performative and ostensive aspects of organisational routines (Feldman and Pentland 2003) have proved instructive in allowing us to effectively use diverse sources of empirical evidence within the overarching conceptual framework of the duality of structure and agency. For example, our analysis of transaction log evidence suggested a number of performative regularities in organisational processes – i.e. specific actions carried out by particular people in particular circumstances (Pentland and Rueter 1994). These findings could subsequently be triangulated using evidence of the ostensive aspect of the routines – codified as organisational procedures and instruction manuals, which those people used to guide, account and refer in relation to their actions as a way of legitimising their behaviour (Feldman and Pentland 2003) both retrospectively (Weick 1995) and a priori (Nelson and Winter 1982) thus in turn creating, maintaining and modifying that ostensive aspect. This study is an example of how the analytical distinction between the performative and ostensive aspect of the organisational routine can prove to be a very effective way of triangulating empirical evidence in the form of transaction logs, operational procedures, and semi-structured interviews.

Thirdly, our research was able to support calling into question whether routines are mindless and automatic or whether they are more appropriately characterised as “effortful accomplishments” (Pentland and Rueter 1994; Becker 2004). Our findings indicate that some evidence of the ostensive aspect of organisational routines (e.g. operational procedures) is indeed referenced by people as an event schema with categorisable stimulus cues and action rules (Ashford and Fried 1988) as outlined in section 3.2.3 above. However, other evidence of the ostensive aspect of organisational routines (e.g. semi-structured interviews) strongly suggested that the operational

procedures undergo interpretation as an integral part of the enactment of technology-in-practice. More specifically, the event schemas represented by procedures appeared to be reflexively evaluated for their validity and usefulness as pertaining to a particular set of circumstances and over time by actors engaging in actions following those procedures. One of the theoretical and methodological strengths of the research presented in this is the very systematic nature of tracing the facilities, norms and interpretive schemes implicated in the process of enactment of an organisational routine, and their effect on that process of reflexive evaluation of the event schema. Our findings not only support the argument that “mechanistic decision making does not necessarily diminish the opportunities for genuine, deliberate choice” (Winter 1985, p.109), but also illuminate in great detail just the complexities of how organisational routines are sets of possible patterns – “...enabled and constrained by a variety of organizational, social, physical and cognitive structures – from which organizational members enact particular performances” (Pentland and Rueter 1994, p.491)

Fourthly, the findings of our study offer an interesting insight into the collective and processual nature of organisational routines. Prior research has recognised that organisational routines are collective phenomena (Nelson and Winter 1982, p.73) and involve multiple actors (Feldman and Pentland 2003), but that routines can be disrupted when participants in a routine start ‘acting in a manner that is more individual than collective’ (Weick 1990, p.579). The findings of our study demonstrate that whilst on the whole, the technical support analysts in the IT Help Desk team engaged in similarly characterised working practices allowing us to group those performances as examples of the same routine, there have been occasions when the organisational routine was reinforced (through a reminder on operational procedures) in individual cases. Some previous research has suggested that routines guarantee the regularity and predictability of individual behaviour necessary for collective action (Amin and Cohendet 2004, p.27). However, such examples of the reinforcement of the ostensive aspect of organisational routines in terms of a “desired” event schema set out by management, and our previous point concerning ongoing reflexive evaluation of such event schemas in terms of their validity and usefulness support our counter argument that in fact routines are emergent phenomena

and cannot by themselves guarantee the regularity or predictability of action based on a particular event schema.

Our findings indicate that routines are indeed collective contextual phenomena and do appear to embody organisational memory in that they express both the cognitive and coordination dimensions of a routine - "routines embody the successful solution to problems solved by the organization in the past. They are retrieved and executed whenever the organization faces a problem resembling one already solved" (Paoli and Prencipe 2001, p.12). However, our research demonstrates that the locus of attention should be on the emergent nature of organisational routines in the context of collective action whereby the individual members receive and interpret a stream of incoming messages from other members and the environment" (Nelson and Winter 1982, p.100). As such, organisational routines are not necessarily stable phenomena embodying experience of solutions to problems resolved in the past. In fact, earlier sections of this thesis have demonstrated how the ongoing process of (re-)enactment of organisational routines is indeed subject to contextual influences and in turn influences the context in which such (re-)enactment takes place, thus representing an evolving embodiment of organisational memory.

Finally, previous research has suggested that organisational routines can provide stability (Becker 2004, p.659) and that as long as a routine gives satisfactory results, no conscious cognitive problem-solving is triggered to find another way of achieving the task (March and Simon 1958) – thus providing a baseline for assessing changes and organisational learning (Postrel and Rumelt 1992). Our findings indicate that this is indeed true at an individual level, however careful attention needs to be paid to the organisational (collective, social) level at which the analysis takes place. For example, the research presented in this thesis demonstrates that organisational processes (such as collection of operational performance metrics data) are collective phenomena designed to address a particular objective (such as better organisational management). However, when such organisational processes are analysed from the perspective of organisational routines one finds that different contextual factors take precedence for different individuals and groups of individuals in the formation and emergent nature of that organisational routine. For example, our analysis has clearly showed that some of the front-line technical support analysts continuously engaged in reflexive

evaluation of standing operational procedures and saw little evidence that their continued engagement in an organisational routine (e.g. logging calls) was indeed addressing the objective envisaged for that organisational process (e.g. making meaningful use of the call logging data). Our research therefore demonstrates that organisational routines cannot provide organisational stability by and of themselves – the duality of structure and agency interacting through the modalities of facilities, norms and interpretive schemes at multiple individual and group levels within the organisation is a much more complex phenomenon.

### **8.3.3. Methodological contributions**

The major theoretical contribution of the research presented in this thesis is the development of the synthesised analytical framework which serves to clearly define the key analytical concepts concerning recurrent engagement with technology. The development of this synthesised analytical framework makes two significant methodological contributions to IS research. The first contribution relates to the application and operationalisation of theoretical concepts to empirical research. The second contribution relates to the specific methodological choices guiding the collection and analysis of empirical data.

This thesis developed a strong conceptual and operational definition of recurrent use of technology as sequences of specific moves, organised into sub-routines which make up a performance – a unitary execution of organisational routine. Where the practice lens model of technology offered little guidance on identification of recurrent engagement with a technological artefact, the synthesised theoretical framework makes a more explicit statement regarding the appropriate unit of analysis as well as a method for characterisation of organisational routines. The importance of this methodological contribution cannot be underestimated as research need no longer be guided by somewhat abstract references to habitual use. This thesis demonstrates how specific operational definitions can be applied in an instructive, rather than prescriptive fashion, applying the principles of hermeneutic circle and contextualisation to the idiographic data points from various sources in order to progressively derive a more abstract and generalised understanding of the whole.

The strong operational grounding of theoretical constructs does not explicitly define the choice of data collection and analysis techniques. In fact, the research presented in this thesis makes a strong methodological contribution by effectively triangulating both quantitative and qualitative evidence and statistical and hermeneutic analysis to produce a very rich case-study building an integrated narrative around the major data points (Yin 1981). For example, transaction log evidence was used to initially identify and define the major data points, which were analysed by triangulating evidence from qualitative textual data, in the forms of transcribed semi-structured interviews (including verbal protocol), notes taken during or immediately after informal conversations, and archival records. The research presented in this thesis aimed to account for the actions observed, rather than present a description, however “thick” (Guba and Lincoln 1996), and triangulation of empirical evidence from multiple sources afforded the unique possibility to progressively redefine existing and identify new data points (including data points uncovered by different modes of analysis of transaction log data) by application of the principles of dialogical reasoning, multiple interpretations, and contextualisation.

#### **8.3.4. Practical contributions**

The research presented in this thesis makes a number of significant practical contributions to the established understanding of Business-IT alignment by enriching the perspectives offered in practitioner and academic literature on the subject. More specifically, this research conducted a detailed analysis of the “micro” factors pertaining to the day-to-day running of IT Services by focusing on the patterns of use of HelpDesk software in call logging and collaborative working processes, which form the core of ITIL service delivery and support Incident and Service Level Management framework. This research identified a number of patterns of use of HelpDesk software in call logging and collaborative working processes, and analysed the context of those regularised patterns of engagement with reference to the prevailing facilities, norms and interpretive schemes.

The major practical contribution of this research is that it offers a much deeper understanding of the contextuality of working practices than the current level of industry recommendations on achieving a suitable fit between organisational structure, culture, processes and configuration of the software artefact (c.f. McKeen



and Smith 2003; Bruton 2004). Analysis presented in this thesis demonstrates that the regularised patterns of use of HelpDesk software are collective context-dependent phenomena, not determined by the training and operational procedures, but rather representing enactments of social structures re-constituted in recurrent engagement with technology and mediated by the prevailing facilities (including but not limited to the properties of the technological artefact), norms (including but not limited to the operational procedures), and interpretive schemes (including but not limited to the provision of training). The research presented in this thesis thus illuminates a number of important implications as regards to the recurrence of patterns of use of HelpDesk software, embedding the use of HelpDesk software in call logging and collaborative working practices in a routinised nature, and the amenability of the regularised patterns of use of HelpDesk software to endogenous and exogenous change.

Consistency of use of HelpDesk software as a pre-requisite for collection of accurate (or at least consistently inaccurate) operational performance metrics as a basis for promoting a greater understanding between the business and IT presupposes a recurrent and predictable pattern of engagement with the software artefact in a range of circumstances. Our analysis demonstrates that recurrent patterns of use of HelpDesk software should be understood as organisational routines, which are social, rather than individual in nature. The social nature of organisational routines suggests that a particular routine “is not single pattern but, rather, a set of possible patterns – enabled and constrained by a variety of organizational, social, physical and cognitive structures – from which organizational members enact particular performances” (Pentland and Rueter 1994, p.491). For example, our analysis of call logging practices clearly demonstrated that even given the same operational procedures and the possibilities of sanctions for non-compliance technical support staff in the same team engaged in a variety of regularised patterns of use of HelpDesk software, such as prompt and batch fire-and-forget, and limited use call logging. In fact, reminders on operational procedures, and even specific statements as to the purpose of particular forms of call logging, produced only temporary convergence in patterns of use between the technical support analysts, in time diverging again as guided by the process of structuration and balance between available facilities, norms and interpretive schemes.

Furthermore, by breaking down organisational routines into their constituent parts our analysis was able to illuminate how the individual components of a routine, such as moves are implicated in the process of structuration. For example, the fact that only a bare minimum of information was captured as passive by-product of single-click call logging had a bearing on the interpretive scheme which suggested that the accuracy of the total number of logged calls was more important than the timeliness of the logging resulting in calls being logged as batches at the end of a shift and thus counting towards the next shift's operational statistics. This in turn had a bearing on the degree of reliance that could be put into the accuracy of the operational statistics, and subsequently only reinforced the interpretive scheme. This would suggest that an attempt to change or create a regularised practice should pay attention to the mutual feedback relationship between facilities, norms and interpretive schemes and not be limited to establishment of procedure and training.

#### **8.4. *Limitations of this study and recommendations for future research***

The research presented in this thesis made a number of significant contributions to the theory, methodology and practice of Information Systems. However this research was necessarily limited in scope, and such limitations should be explicitly acknowledged in order to indicate directions for future research.

As social and collective processual phenomena organisational routines can be adopted, but more recently acquired routines can be expected to unravel if the collective sense-making process is disturbed (Weick 1990; Weick 1993). The research presented in this thesis does not specifically address the longitudinal dimension of organisational routines and its implications for stability or endogenous change, however the dynamics of divergence and convergence of call logging practices in response to periodic reinforcement of the formal norms of operation indicate that organisational routines can be conceptualised as a cognitive and coordinatory embodiment of organisational memory retrieving and executing successful solutions to problems solved by the organisation in the past (Paoli and Prencipe 2001, p.12). Stability has an important effect within organisations as it provides a baseline for assessing changes and learning (Postrel and Rumelt 1992). Organisational routines

can provide stability (Becker 2004, p.659), and stability gives rise to predictability, which in turn aids co-ordination (Nelson and Winter 1982).

The research presented in this thesis posited the goals of identifying patterns of use of TP HelpDesk software in terms of call logging and collaborative working practices activities and analysing the contextuality of those patterns in order to illuminate the capture of data pertaining to the performance metrics. Methodological choices should be commensurate with research objectives (Silverman 2001) and therefore a within-case analysis of an in-depth interpretive case-study was undertaken in order to explore the complexities of the local context and circumstances of the use of technological artefact. The case study spans a period of 5 years in terms of the scope of empirical data such as transaction logs and documentary evidence made available to the researcher. However, for practical reasons access to the research site was limited to only a few months and thus the study benefits from a historicity of perspective, but does not constitute a longitudinal analysis. A future study would benefit from using the synthesised theoretical perspective developed in this study and applying it in a longitudinal analysis to explore the formation, stability and capacity of change characteristics of organisational routines.

The synthesised theoretical framework developed in Chapter 3 of this thesis extends the original practice lens model (Orlikowski 2000) by conceptualising technologies-in-practice as organisational routines analysed in terms of their ostensive and performative aspects (Feldman and Pentland 2003), and in terms of the moves, subroutines and performances constituting those organisational routines (Pentland 1995). This framework continues to conceptualise technology as on the one hand an identifiable, relatively durable entity with material and cultural properties that transcend the experience of individuals and particular settings; and on the other hand acknowledging that use of technology involves a repeatedly experienced, personally ordered and edited version of the technological artefact, being experienced differently by different individuals and differently by the same individuals depending on the circumstances. Whilst technology does have a virtual status and its effects are instantiated through its contact with human agents, there is a strongly argued view that technological artefacts are standing possibilities (Searle 1995) to act one way or another, and represent a reified and embodied organisation of knowledge and experience

(Kallinikos 2002, p.2) which define a particular domain, and organise knowledge and social experience within that domain.

The research presented in this thesis describes the architecture and functionality of the TP HelpDesk software artefact in order to avoid taking the it for granted or considering it unproblematic once built and installed (Orlikowski and Iacono 2001). The TP HelpDesk software artefact is also incredibly interesting as it includes a number of optional functionality modules and a toolset for making vendor-supported customisations of data, interface, and process flows, and is thus readily amenable to local circumstances of use and cannot be treated simply as a black-box. However, it was outside the scope of this study to theorise on the nature and malleability of the technological artefact in terms of “identifying the extent to which situated acts are instances (i.e., situated expressions) of a more general logic embodied in technology (i.e., physical properties of artefacts, or forms of embodied knowledge) or shaped by contingencies other than technological (e.g., beliefs, local relations, institutions)” (Kallinikos 2002, p.5). Therefore, a future study would benefit from explicit theorising on the extent to which the artefact supports and encourages customisation in terms of its cognitive organisation, as well as the social dimension of the process of negotiation and continued customisation of the artefact to local context of implementation.

Our literature review highlighted an important body of literature concerning documentation of problem-solving for the purpose of knowledge reuse (c.f. Markus 2001) to improve the transfer of product- or service-related knowledge between technical support analysts (Bose and Sugumaran 2003). As outlined earlier, the research presented in this thesis focused on the aspects of capture of data pertaining to the performance metrics (i.e. statistical data) as a passive by-product of daily operations and capture of knowledge-related data (i.e. documented information) was therefore outside the scope of this study. However, our findings indicated at least two promising areas for further study, focusing on the role of the HelpDesk software artefact as pertaining to the nature of the data to be collected, and the process of its collection.

Firstly, our research indicated that technical support analysts did indeed act as shared work producers (Markus 2001), working together in homogenous or cross-functional teams and recording incident resolution data for later own reuse. Our research came across a large variety of raw declarative (what was done), procedural (how it was done), rationale (why it was done), and analytic (how it can be done better) information. However, such information was prone to equivocality (message with more than one meaning), noise (e.g. message altered in transit), and use of indexical expressions (where meaning is apparent only in context of reference) (Pentland 1995). Anecdotal evidence suggested that interpreting the recorded information was less of a problem due to the pervasiveness of reciprocity of perspectives and shared expertise between the different support analysts including common jargon and terms of reference. However, recording that information was more problematic due to the design of the TP HelpDesk software artefact. As demonstrated in an earlier section of the thesis TP HelpDesk software provided considerable flexibility in documenting free-text information – attaching notes to action tracks, assignments, calls themselves, and call closure details. Our interviews and verbal protocol analysis demonstrated that the variety of choices on where to store such information was a deterrent to recording such data as one could not be certain where to look for it again. Recording categorised data was also a problem due to the scope and overlapping nature of incidents which made categorisation based on a fixed list more difficult. Anecdotal evidence even suggested that the “Software – Access” category was initially occasionally used to record problems concerning access to any software package, rather than problems concerning the Microsoft Access software package, although this misunderstanding was corrected first with training and subsequently by simply renaming the category.

Secondly, our findings indicated the pervasiveness of limited use – collaboration by alternative means technology-in-practice which has an important implication for the capture of knowledge related information. Our findings indicated that documenting information required upstream investment of time and effort when the downstream information retrieval rewards were unclear (Grudin 1988; Ackerman 1994). Our research did not specifically focus on the content of collaboration taking place between technical support analysts, although peripheral evidence suggested that both intra- and inter-team limited-use technologies-in-practice involved “quick question” seeking-information moves as well as “get help” seeking-action moves.

The research presented in this thesis explored a number of elements which may be applicable to other situations. However, following the interpretive perspective, the generalisability of this research is expressed in terms of principles, concepts, heuristics, or perspectives which may be useful for improving future actions (Walsham 1995). For example, our thorough twofold “micro” level analysis explored patterns of use of TP HelpDesk software in the IT Help Desk team in terms of call logging and collaborative working practices activities; and analysed the context of those patterns of use based on the synthesised theoretical framework by triangulating empirical evidence from a wide variety of sources. Future research can use the synthesised theoretical framework developed in this thesis and follow our methodological example to similarly identify and analyse the context of knowledge producing and knowledge sharing working practices in the context of IT Support service provision and possibly other similar spheres of application.

Thirdly, one of the major theoretical contributions made by the research in this thesis is the development of a synthesised theoretical framework addressing a number of criticisms of the original Practice Lens Structural Model of Technology (Orlikowski 2000). The synthesised theoretical framework offers both analytical clarity and empirical guidance in the collection and analysis of data in field research. However, as all theories and models it cannot capture every aspect of complexity of the real world, and future research should consider combining the insights afforded by this framework with other theoretical perspectives. For example, the synthesised theoretical framework has been a very effective analytical tool to highlight the emergent nature of organisational routines, and the ongoing interrelationship between the ostensive aspects of a particular routine (e.g. operational procedure) through the modalities of facilities, norms and interpretive schemes to the specific performances of that routine. As our research has highlighted the operational procedures which (partly) constitute the event schema to which individuals can refer and guide their performances are of utmost importance in the constitution of organisational routines. However, it is beyond the scope of this study to fully illuminate the process by which such operational procedures are established and sustained, and it is not certain that the synthesised theoretical framework as developed in this thesis would alone be sufficient to expose the complexities of that process.

For example, one could reasonably argue that Actor-Network theory (Callon 1986; Latour 1987) or the Circuits of Power framework (Clegg 1989) would be better placed to address the locality of political aspect of negotiation and sustainability of operational procedures within organisations, although it remains the argument of this thesis that Structuration Theory (Giddens 1976; Giddens 1979; Giddens 1984) is a more appropriate analytical tool to illuminate the broader aspects of duality and recursive influence of structure and agency implicated in enactment of organisational routines. Future research could look to promote greater synergy between these approaches, for example by continue to follow calls (Walsham 1993) to use Structuration Theory as meta-theory and Actor-Network theory as a more detailed methodological and analytical device highlighting the role of and interactions between stakeholder groups (e.g. Walsham and Sahay 1999) in negotiating and sustaining organisational routines emergent through continued (re-)enactment as technologies-in-practice. Furthermore, the synthesised theoretical framework, suitably adapted to illuminate a longitudinal perspective, could serve as a practice lens on the process of institutionalisation of organisational practices , which “does not end with the diffusion of rationalized practices (Meyer and Rowan 1977) ... but is sustained and given meaning and direction through its capacity to constitute distinctive forms of actorhood ... contingent on the socio-cognitive means by which ideas are elaborated and rendered solid and durable” (Hasseldblah and Kallinikos 2000, p.701)

Lastly, one needs to ask the question: where next for ITSM? Our literature review has highlighted that the issues of Business-IT alignment, IT governance, and ITSM processes have been developed into a perspective on maturity of an organisation’s IT infrastructure and services, whereby the IT is a strategic business partner with metric linkage and collaboration on business processes. In fact, our literature review has shown that the issue of control over IT function’s processes has largely been solved through the establishment of internationally recognised best-practice governance and management frameworks (e.g. ITIL, COBIT), and the purpose of IT governance is now to move beyond organisational structure to “relationship architecture” examining whether a particular governance arrangement encourages the IT employees to understand the business, typically through daily interaction, or if they are shielded from the business units (Schwartz and Hirscheim 2003). Our research illustrates that

whilst the issue of control and alignment of IT processes to the business has been addressed through the best-practice frameworks, the actual implementation of that control on the ground in a particular organisation, for example from the perspective of operational performance metrics information, is far from solved, and this much is generally confirmed in frameworks such as ITIL and COBIT themselves. Our findings indicate that even the suggested flexibility of ITSM software as a means of empowering “the end-user organisation” to achieve a better fit between organisational processes and their representation in the ITSM software artefact do not necessarily guarantee more consistent collection of operational performance data as a stepping stone to greater degree of control that can be exerted over the organisational processes. The focus on the micro-level processes, as illustrated by the research presented in this thesis, will remain a large part of an organisation’s efforts to promote such “relationship architecture” as the success of (or lack thereof) inter-penetration of business and IT functions and understanding takes is revisited by organisations, practitioners and academics alike and it is the details of how such inter-penetration is established, carried out and sustained that will determine the success of an organisation’s IT strategy.

## **8.5. Conclusion**

As discussed in section 1.2, the research presented in this thesis set out two primary objectives: a) to identify the prevalent IT Support working practices with reference to the technical support organisational processes, the ITSM software artefact involved in those processes, and the service level definitions and measurements reflecting operational performance of those processes; and b) to analyse these working practices with reference to the immediate and wider organisational context of those processes. Both of these objectives have been achieved, and a number of contributions to knowledge have been made.

The contributions made by this thesis include a) identification of prevalent IT support working practices as organisational routines our research site; b) development of a synthesised theoretical framework for studying the role of technological artefact and organisational context from the perspective of organisational routines; c) conduct of an interpretive case-study with effective triangulation of analysis based on both quantitative and qualitative empirical data; and d) application of the synthesised



theoretical framework to develop a holistic understanding of the interrelationship of working practices, technological artefact, and immediate and wider organisational context from the perspective of IT support working practices as organisational routines. As discussed in section 8.4, the analysis and findings presented in this thesis have additionally laid the foundation for a number of promising directions for future research.

## APPENDIX 1: ALTERNATIVE ILLUSTRATION



### **A1-1. Fire-and-Forget Call Logging First-Person Narrative**

As has been shown, the extent and depth of the empirical data collected during this study makes concise presentation of the findings a rather challenging endeavour for the researcher. Therefore, for the purpose of clarity, the reader may be interested in the following vignette (or perhaps more of a collage) collating examples from a variety of data sources including multiple interviews to provide a descriptive narrative guiding the reader through a typical enactment of the fire-and-forget call-logging technology-in-practice identified during the course of our research.

This vignette is written from the first-person perspective of front-line part-time IT Help Desk Advisor (i.e. full-time XYZ University student employed on a part-time basis) paraphrasing quotes obtained during the interviews as well as extrapolating perceptions and events from other sources of empirical data as presented fully in Chapter 7.


#### **First-Person Narrative: Fire and Forget Call Logging**

Arriving for another two back-to-back 3-hour shifts at the IT Help Desk for 9.30am I wonder what the day will hold in store for me. It is early in the academic year, but the mad rush of the University registration period is over, so we probably won't get endless queues of students who have forgotten their network passwords over the summer (which can only be reset by us at the IT Help Desk). On the other hand, new students probably haven't got used to our IT setup yet, so we may get the odd number of basic questions for each of which we already have a leaflet at the ready. Anyway, arrive, sit down, logon to my staff PC, wait for our admin software (for password resets) and TP Help Desk software to load automatically, and I am ready to face the day. At least I have a more experienced advisor on duty today as well, so I won't be dealing with everything alone.

Almost immediately there is a string of people popping their heads through the door and asking how to get their laptops connected in the Library. "Pick up the yellow leaflet, information is on the back" I respond, and keep clicking the  mark icon on TP Help Desk software for each person. In the middle of all that, we get a new member of academic staff asking how to set up their IT account. "You need to visit your cluster team office in another building" I respond, and click that same  icon.

- *Hey, why did you log that as well?* – asks my colleague
- *Why not?* – I respond
- *This member of staff will go to their cluster team, let them log his problem*
- *Well – I respond – while I was helping him I couldn't have been helping anyone else who may have had a problem for us to deal with, so I might as well log it myself too. I did the work after all, might as well have something to show for it!*

My colleague doesn't respond right away and he is busy for a while helping a student log on to the "customer" PC and show him some problem with their email box. I keep bouncing off those quick "leaflet" enquiries as before – luckily we are well stocked with leaflets for most questions. Several minutes later, my colleague must have answered four or five different questions by now, as I overhear his customer saying "Oh, and another thing" with alarming regularity. Eventually they are done, and there is a brief pause – it's 10am and the lectures are about to begin so we can catch a breather.

- *You got someone's whole life story again, didn't you?* – I ask
- *Yep* – he says leisurely and clicks that  icon
- *You know, if that was me I'd have logged 5 calls for that* – I say
- *Didn't you see the email from the manager the other day?* - He responds – *It's "one person – one call" world out there from now on.*
- *That doesn't sound like a good plan. If it's a different question it's a different call, isn't that how it used to work?*
- *It did* – he responds – *but someone up there evidently didn't believe we got more queries than there are students*


... There is a pause in conversation while we ponder that thought ...


- *Well, on the bright side at least someone is looking at those numbers* – I say – *I was beginning to wonder!*
- *Back in the day they used to publish the numbers of calls each of us logged during a shift* – says my colleague – *they don't do it any more so I'd say so long as you are about right on the total number that's probably OK*

We are interrupted as a group of students walks in. Seeing that I've got everything under control my colleague disappears to get us coffee. As the law of probabilities dictates, as soon as he is out of earshot I've got a queue of people so long it stretches outside the door. The office is pretty poorly laid out in that it can't hold more than 3 or 4 people waiting, and I find myself multitasking at full steam – I've become something of an expert at IT Support triage following my induction although back then I was shadowing someone more experienced whereas now I have to do it all myself. 10 minutes later my colleague returns with coffee. By the look on my face he can see he missed quite a party, but we

discuss it in typically nonchalant terms:

- *The usual rush?* – he asks
- *Yes, same old story ... nothing new* – I respond
- *Don't forget to log them* – he reminds me

To be frank I had forgotten to log those enquiries as they were coming in – to triage the incoming enquiries I got up from my desk and was intercepting them at the door answering questions and dispensing leaflets. Nobody had to be logged on to the customer PC to be shown something and I never got back to my desk once I got up. I click the  icon six or seven times. That must be about right. And it's not like we are recording the students' names anyway – one call is exactly like any other. On that thought...

- *Wouldn't it be better to log students' names so that we know who they are and what they wanted?* – I ask
- *We kind of know what they wanted* – my colleague responds – *you are supposed to click the new laptop Hot Topic for laptop queries and not the  one like before*
- *I must have missed that email* – I say – *but that makes sense, that's virtually all we get this time of year. In July it's all about alumni email accounts, I expect they'll set one up for that then!*
- *That's right.* – my colleague says – *But imagine how long it would take us to log their names for every little thing – we'd never get anything done!*

It's 10:15am and we've got more than 5 hours still to go. The conversation draws to a close and we wait for something new to happen as we don't have any customers for the next 10 minutes... Finally the working day is over. I must have logged dozens of enquiries today, just like I did yesterday. I never heard back about yesterdays' calls so there is no reason to suspect anything will be different this time around.

**Table 25: Appendix - Fire-and-forget Call Logging First Person Account**

## **A1-2. Chain of Evidence**

As can be inferred from the above first-person account, a number of sources of empirical data were triangulated to collate analysis into a consistent narrative. A traditional “chain” of evidence is thus difficult to present without distorting the iterative process of analysis through triangulation, which is perhaps more suited to being perceived as something of a “web” of evidence. Nevertheless, the reader may be interested in a simplified collation of examples of the empirical data supporting the identification and characterisation of the call logging and collaborative work technologies-in-practice presented in a semi-sequential form for convenience of presentation<sup>1</sup> below and as an illustration of the investigative process undertaken during the course of this research:

<sup>1</sup> At this point for clarity of presentation interview data is presented in terms of answers to questions faced by the researcher, i.e. as an aggregation/generalisation of questions/answers during the interviews illuminating specific points of interest

**Transaction Log Data  
[PERFORMATIVE ASPECT,  
PERFORMANCES]**

- How are calls logged most often? – Type A Hot Topics
- Which particular Hot Topics are used most often? – ITHD INFO REQUEST

**Interview Data (General)  
[TRIANGULATION]**

- How do you log calls? – Using Hot Topics, not manually [PERFORMATIVE, MOVES]
- Why do you log calls? – Important part of the job. Also colleagues reprimanded for not logging calls [OSTENSIVE, INTERPRETIVE SCHEMES]
- Could you give examples of how you log calls? – Verbal protocol of step-by-step illustration for single call [MOVES]
- Do you repeat this process for every enquiry? – No, first you assess the enquiry [SUBROUTINE]: some calls do not get logged at all; in some circumstances calls are logged promptly, in other circumstances in batches [PERFORMANCES]
- Why would calls not be logged at all? – If they belong to other teams [NORMS], or if there are too many customers and logging takes too long [INT. SCHEMES]

**Transaction Log Data  
[PERFORMATIVE ASPECT,  
PERFORMANCES]**

- Are calls logged consistently over time and/or by different people? - No, there are clear gaps which cannot at first be explained in variations in number of incoming enquiries

**Task Analysis Data [MOVES]**

- How can calls be logged? – Manually (several moves) or using Hot Topic “templates” [FACILITIES]
- What are the different kinds of templates? – type A, B and C,
- What differentiates the types of Hot Topic templates? – Amount and detail of information in call

**Documentary Data (Procedures)  
[OSTENSIVE ASPECT, NORMS]**

- Should calls be logged? – All calls should be logged depending on nature of enquiry following appropriate procedure
- What are the appropriate procedures? – Generic “Info” call – ITHD\_INFO\_REQUEST; Generic “Referral” call – ITHD\_SUPERVISOR\_REF

**Documentary Data (SLD reports,  
OMGM minutes) [OSTENSIVE  
ASPECT – INT. SCHEMES]**

- How is use made of call-logging data? – Data is mostly used in aggregated numerical form, rather than qualitatively differentiating types of enquiries

**Interview Data (Follow-up)  
[TRIANGULATION]**

- What information do you log in those calls? Bare minimum, a basic timestamp
- Why is that? – only reasonably accurate numeric representation is required [INT. SCHEME]
- Do you know of any follow-up to the calls you log? – No, it’s a black hole! [INT. SCHEME]

**Interview Data (Follow-up)  
[TRIANGULATION]**

- Why don’t some people log calls (consistently, or at all)? Because they perceive it as an administrative burden, and think their role is to help customers and not spend time logging calls when that information is not used anyway [INT. SCHEME]

**Table 26: Appendix - Call Logging Technologies-in-Practice Chain of Evidence**

<p><b>Transaction Log Data</b> [PERFORMATIVE ASPECT, PERFORMANCES]</p> <ul style="list-style-type: none"> <li>➤ How are calls referred most often? – Type C Hot Topics</li> <li>➤ Which particular Hot Topics are used most often? – ITHD SUPERVISOR REF</li> </ul>	<p><b>Task Analysis Data [MOVES]</b></p> <ul style="list-style-type: none"> <li>➤ How can calls be referred to other technical support analysts? – Manually (several moves) or using type C Hot Topic “templates” [FACILITIES]</li> <li>➤ What differentiates the different type C Hot Topics? – The type of information (Actions/Notes) and the team/analyst receiving the call</li> </ul>
<p><b>Interview Data (General)</b> [TRIANGULATION]</p> <ul style="list-style-type: none"> <li>➤ How do you refer calls? – Using Hot Topics, not manually [PERFORMATIVE, MOVES]</li> <li>➤ Could you give examples of how you refer calls? – Verbal protocol of step-by-step illustration for single call [MOVES]</li> <li>➤ Why do you refer calls? When I don’t know how or am not authorised to do something.</li> <li>➤ Do you have much involvement with the call once it has been referred? No. [INT SCHEME]</li> </ul>	<p><b>Documentary Data (Procedures)</b> [OSTENSIVE ASPECT, NORMS]</p> <ul style="list-style-type: none"> <li>➤ How should calls be referred? – All calls should be referred using TP Help Desk software</li> <li>➤ Broad operational remit of ITHD_SUPERVISOR_REF Hot Topic for referral of calls</li> </ul>
	<p><b>Transaction Log Data</b> [PERFORMATIVE ASPECT, PERFORMANCES]</p> <ul style="list-style-type: none"> <li>➤ How many calls get referred using TP Help Desk software? Not very many at all</li> </ul>
	<p><b>Interview Data (Follow-up)</b> [TRIANGULATION]</p> <ul style="list-style-type: none"> <li>➤ Do you often use TP Help Desk software to refer calls within the team? No [MOVES]</li> <li>➤ Why not? Colleagues are located in the same office [FACILITIES] and it is OK to simply ask [NORM, INT. SCHEME]</li> <li>➤ Do you often use TP Help Desk software to refer calls outside the team? Sometimes. The procedure is to use TP Help Desk s/w to refer a call [NORM] and it is better to give customer a reference number [INT. SCHEME]. However, when the enquiry is urgent and/or quick and/or I am not certain as to the course of action I should take I would telephone the assignee first or instead [PERFORMANCE]</li> </ul>

**Table 27: Appendix - Collaborative Working Technologies-in-Practice Chain of Evidence**

## BIBLIOGRAPHY

- Ackerman, M. S. (1994). "Definitional and contextual issues in organisational and group memories." Proceedings of the 27th Hawaii International Conference on System Sciences (HICCS) 4: 191-200.
- Adolf, R., S. Grant-Thompson, et al. (1997). "What leading banks are learning about big databases and marketing." McKinsey Quarterly 3: 187-192.
- Agarwal, R. and V. Sambamurthy (2002). "Principles and models for organizing the IT function." MIS Quarterly Executive 1(1): 1-16.
- Aitken, I. (2003). Value-driven IT Management. Oxford, Butterworth-Heinemann.
- Alavi, M. and D. E. Leidner (2001). "Review: Knowledge Management and Knowledge Management Systems: Conceptual foundations and research issues." MIS Quarterly 25(1): 107-136.
- Alvesson, M. and K. Sköldberg (2000). Reflexive Methodology: New Vistas for Qualitative Research. London, Sage Publications.
- Amin, A. and P. Cohendet (2004). Architectures of knowledge: firms, capabilities, and communities. Oxford, Oxford University Press.
- Anderson, J. R. (1993). "Problem-solving and learning." Psychological Science January: 35-44.
- Annett, J. and K. D. Duncan (1967). "Task Analysis and Training Design." Occupational Psychology 41: 211-221.
- Annett, J., K. D. Duncan, et al. (1971). Task Analysis. London, HMSO.
- Apte, U. M. and R. O. Mason (1995). Global outsourcing of information processing activities. The Service Productivity and Quality Challenge. P. T. Harker. Dordrecht, Kluwer Academic Publishers: 169-202.
- Archer, M. (1990). Human Agency and Social Structure: A Critique of Giddens. Anthony Giddens: Consensus and Controversy. J. Clark, C. Modgil and J. Modgil. Basingstoke, Falmer.
- Ashford, B. E. and Y. Fried (1988). "The mindlessness of organisational behaviours." Human Relations 41: 305-329.
- Avgerou, C. (2000). "IT and organizational change: An institutionalist perspective." Information Technology & People 13(4): 234-262.
- Babacus, E. and W. G. Mangold (1992). "Adapting the SERVQUAL scale to hospital services: an empirical investigation." Health Services Research 26(2): 767-786.
- Babakus, E. and G. W. Boller (1992). "An empirical assessment of the SERVQUAL scale." Journal of Business Research 24: 253-268.
- Baets, W. (1992). "Aligning information systems with business strategy." Journal of Strategic Information Systems 1(4): 205-213.
- Bain, P. and P. Taylor (2000). "Entrapped by the 'electronic panopticon'? Worker resistance in the call centre." New Technology, Work and Employment 15(1): 2-18.
- Barley, S. R. (1988). On Technology, Time, and Social Order: Technically Induced Change in the Temporal Organization of Radiological Work. Making Time: Ethnographies of High-Technology Organizations. F. A. Dubinskas. Philadelphia, PA, Temple University Press.
- Barnard, C. I. (1938). The Functions of the Executive. Harvard University Press, Cambridge, MA.



- Becker, M. C. (2004). "Organizational routines: a review of the literature." Industrial and Corporate Change **13**(4): 643-677.
- Benbasat, I., D. K. Goldstein, et al. (1987). "The Case Research Strategy in Studies of Information Systems." MIS Quarterly **11**(3): 369-386.
- Benbasat, I. and R. Weber (1996). "Research Commentary: Rethinking "Diversity" in Information Systems Research." Information Systems Research **7**(4): 389-399.
- Bennett, K. H. (1991). "Automated Support of Software Maintenance." Information and Software Technology **33**(1): 74-85.
- Benson, J. K. (1973). "The Analysis of Bureaucratic-Professional Conflict: Functional versus Dialectical Approaches." Sociological Quarterly **14**: 376-394.
- Benson, J. K. (1983). "Paradigm and Praxis in Organizational Analysis." Research in Organizational Behavior **5**: 33-56.
- Berliner, P. F. (1994). Thinking in Jazz: The Infinite Art of Improvisation. Chicago, IL, University of Chicago.
- Berry, L. L. (1983). Relationship Marketing. Emerging Perspectives on Services Marketing. L. L. Berry, G. Shostack and G. Upah. Chicago, American Marketing Association: 25-28.
- Berry, L. L. and G. Linoff (1997). Data Mining Techniques. New York, Wiley.
- Bhaskar, R. (1979). the Possibility of Naturalism. Brighton, Harvester.
- Bijker, W., T. Hughes, et al. (1987). The Social Construction of Technological Systems. Cambridge, MA, The MIT Press.
- Bijker, W. E. (1995). Of bicycles, bakelites, and bulbs: Towards a theory of sociotechnical change. Cambridge, MA, The MIT Press.
- Blair, D. C. (1984). "The management of information: basic distinctions." Sloan Management Review **26**(1): 13-23.
- Blau, P. (1955). The Dynamics of Bureaucracy. Chicago, University of Chicago Press.
- Bloem, J., M. van Doorn, et al. (2006). Making IT governance work in a Sarbanes-Oxley world. Hoboken, New Jersey, John Wiley & Sons.
- Bloomfield, B. P., R. D. Coombs, et al. (1992). "Machines and Manoeuvres: Responsibility Accounting and the Construction of Hospital Information Systems." Accounting, Management and Information Technology **2**(4): 197-219.
- Boddy, D. (2000). "Implementing interorganizational IT systems: lessons from a call centre project." Journal of Information Technology **15**: 29-37.
- Boland, R. J. and U. Shultze (1996). From Work to Activity: Technology and the Narrative of Progress. Information Technology and Changes in Organizational Work. W. J. Orlikowski, G. Walsham, M. R. Jones and J. I. DeGross. London, Chapman & Hall.
- Bolton, R. N. and J. H. Drew (1991). "A multistage model of customers' assessment of service quality and value." Journal of Consumer Research **17**: 375-384.
- Bourdieu, P. (1977). Outline of a Theory of Practice. New York, Cambridge University Press.
- Boren, M. T. and R. Judith (2000). "Thinking Aloud: Reconciling Theory and Practice." IEEE Transactions on professional communication **43**(3): 261-278.
- Bose, R. and V. Sugumaran (2003). "Application of knowledge management technology in customer relationship management." Knowledge and Process Management **10**(1): 3-17.
- Bourdieu, P. (1977). Outline of a Theory of Practice. New York, Cambridge University Press.
- Bourdieu, P. (1990). The Logic of Practice. Stanford, CA, Stanford University Press.

- Breathnach, P. (2000). "Globalisation, information technology and the emergence of niche transnational cities: the growth of the call centre sector in Dublin." Geoforum **31**: 477-485.
- Broadbent, M. (1998). Leading governance, business and IT processes: the organizational fabric of business and IT partnership, Findings Gartner Group, document #FIND-19981231-01.
- Brown, J. S. and P. Duguid (1998). "Organizing Knowledge." California Management Review **40**(3): 90-111.
- Bruton, N. (2004). Managing the IT Services Process. Oxford, Butterworth-Heinemann Ltd.
- Bryant, C. G. A. and D. Jary (1991). Giddens' theory of Structuration: A Critical Appreciation. London, Routledge.
- Bryant, C. G. A. and D. Jary, Eds. (1997). Anthony Giddens: Critical Assessment. London, Routledge.
- Bryant, C. G. A. and D. Jary (2001). The Contemporary Giddens: Social Theory in a Globalizing Age. Basingstoke, Palgrave.
- Buchanan, D., D. Brody, et al. (1988). Getting in, Getting on, Getting out, and Getting back. Doing Research in Organizations. A. Bryman. London, Routledge.
- Burrell, G. and G. Morgan (1979). Sociological Paradigms and Organizational Analysis. London, Heinemann.
- Buttle, F. (1996). "SERVQUAL: review, critique, research agenda." European Journal of Marketing **30**(1): 8-32.
- Callon, M. (1986). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. Power, Action and Belief: A New Sociology of Knowledge. J. Law. London, Routledge & Kegan Paul.
- Carayannis, E. G. (2005). Fostering Synergies between information technology and managerial and organisational cognition: the role of knowledge management. Knowledge Management: Critical Perspectives on Business and Management. I. Nonaka. London, Taylor & Francis: 141-162.
- Carman, J. M. (1990). "Consumer perceptions of service quality: an assessment of the SERVQUAL dimensions." Journal of Retailing **66**(1): 33-35.
- Castells, M. (1989). The information city. Oxford, Basil Blackwell.
- Cater-Steel, A., M. Toleman, et al. (2006). Transforming IT Service Management - the ITIL impact. 17th Australasian Conference on Information Systems, Adelaide, Australia.
- CCTA (2000). Best Practice for Service Support. Norwich, Central Computer and Telecommunications Agency.
- Chandrasekaran, B. (1983). "Towards a taxonomy of problem solving types." AI Magazine **4**(1): 9-17.
- Chandrasekaran, B. (1986). "Generic tasks in knowledge-based reasoning: High-level building blocks for expert system design." IEEE Expert **1**(3): 23-30.
- Chandrasekaran, B., T. R. Johnson, et al. (1992). "Task-structure analysis for knowledge modelling." Communications of the ACM **35**(9): 124-137.
- Christopher, M., A. Payne, et al. (1991). Relationship Marketing. Oxford, Butterworth-Heinemann.
- Chua, W. F. (1986). "Radical Developments in Accounting Thought." The Accounting Review **61**(4): 601-632.
- Ciborra, C. and O. Hanseth (2000). Introduction: From Control to Drift. From Control to Drift - The Dynamics of Corporate Information Infrastructures. C. Ciborra. Oxford, Oxford University Press.

- Clark, J. (1990). Anthony Giddens, Sociology and Modern Social Theory. Anthony Giddens, Consensus and Controversy. J. Clark, C. Modgil and J. Modgil. Basingstoke, Falmer.
- Clegg, S. (1989). Frameworks of Power. London, SAGE.
- Cohen, I. (1989). Structuration Theory: Anthony Giddens and the Constitution of Social Life. Basingstoke, Macmillan.
- Cohen, M. D. (1991). "Individual learning and organizational routine: emerging conditions." Organization Science 2: 135-139.
- Cohen, M. D. and P. Bagdayan (1994). "Organizational routines are stored as procedural memory: Evidence from a laboratory study." Organization Science 5: 554-568.
- Cohen, M. D., R. Burkhart, et al. (1996). "Routines and other recurring action patterns of organisations: contemporary research issues." Industrial and Corporate Change 5: 653-698.
- Cohendet, P. and P. Llerena (2003). "Routines and incentives: the role of communities in the firm." Industrial and Corporate Change 12(2): 271-297.
- Corea, S. (2006). "Mounting effective IT based customer service operations under emergent conditions: Deconstructing myth as a basis of understanding." Information and Organization 16: 109-142.
- Cotton, D. and K. Gresty (2006). "Reflecting on the think-aloud method for evaluating e-learning." British Journal of Educational Technology 37(1): 45-54.
- Craib, I. (1992). Anthony Giddens. London, Routledge.
- Cronin, J. J. J. and S. A. Taylor (1992). "Measuring service quality: a reexamination and extension." Journal of Marketing 56: 55-68.
- Crosby, P. B. (1979). Quality is Free. New York, McGraw-Hill.
- Crotty, M. (1998). The Foundations of Social Research: Meaning and Perspective in Social Research. London, Sage.
- Culnan, M. J. (1983). "Chauffeured versus end user access to commercial databases: the effects of task and individual differences." MIS Quarterly 7(1): 55-65.
- Currie, W. and B. Galliers (1999). Rethinking Management Information Systems: An Interdisciplinary perspective. Oxford, Oxford University Press.
- Daft, R. L. and N. B. Macintosh (1981). "A tentative exploration into the amount of equivocality of information processing in organisational work units." Administrative Science Quarterly 26: 207-224.
- Dahlbom, B. and L. Mathiassen (1993). Computers in context: The philosophy and practice of systems design. Cambridge, MA, MCC Blackwell.
- Das, A. (2003). "Knowledge and Productivity in Technical Support Work." Management Science 4: 416-431.
- Davenport, T. H., D. W. De Long, et al. (1998). "Successful Knowledge Management Projects." Sloan Management Review 39(2): 43-57.
- Davenport, T. H. and L. Prusak (1998). Working Knowledge. Boston, Harvard Business School Press.
- Day, G. S. (2000). "Managing marketing relationships." Journal of the Academy of Marketing Science 28(1): 24-31.
- DeCock, C. and T. Rickards (1995). "Of Giddens, paradigms and philosophical garb." Organization Studies 16(4): 699-704.
- Denning, S., D. Hoiem, et al. (1990). "The value of thinking-aloud protocols in industry: A case study at Microsoft Corporation." Proc. Human Factors Soc. 34th Annu. Meet.: 1285-1289.
- Denzin, N. K. (1989). Interpretive Interactionism. London, Sage.

- DeSanctis, G. and M. S. Poole (1994). "Capturing the complexity in advanced technology use: Adaptive structuration theory." Organization Science 5(2): 121-147.
- Diaper, D. and N. Standon (2003). The Handbook of Task Analysis for Human-Computer Interaction. London, Lawrence Erlbaum Associates.
- DiMaggio, P. J. and W. W. Powell (1983). "The iron cage revisited: Institutional isomorphism and collective rationality in organisational fields." American Sociological Review 48: 147-160.
- Dosi, G., R. R. Nelson, et al. (2000). Introduction: the nature and dynamics of organisational capabilities. The nature and dynamics of organisational capabilities. G. Dosi, R. R. Nelson and S. G. Winter. Oxford, Oxford University Press: 1-22.
- Dosi, G., D. Teece, et al. (1992). Toward a theory of corporate coherence: some preliminary remarks. Technology and Enterprise in a historical perspective. G. Dosi, R. Giannetti and P. A. Toninelli. Oxford, Clarendon Press: 185-211.
- Douglas, S. P., S. C. Craig, et al. (1981). "Protocols in consumer research: Problems, methods and uses." Research in Marketing 5: 29-58.
- Dretske, F. I. (1983). Knowledge and the Flow of Information. Cambridge, MA, MIT Press.
- DuBois, D. and V. Shalin (2003). Describing Job Expertise Using Cognitively Oriented Task Analyses. Cognitive Task Analysis. J. M. Schraagen, S. F. Chipman and V. L. Shalin. London, Lawrence Erlbaum Associates: 41-56.
- Dyer, J. H. and H. Singh (1998). "The relational view: cooperative strategy and sources of interorganizational competitive advantage." Academy of Management Review 23: 660-679.
- Eisenhardt, K. (1989). "Building Theories from Case Study Research." Academy of Management Review 14(4): 532-550.
- Ellis, C. and A. Bochner (2000). Autoethnography, Personal Narrative, Reflexivity. Handbook of qualitative research, 2nd edition. N. Denzin and Y. Lincoln. Thousand Oaks, Calif., London, UK, Sage Publications.
- Ericsson, K. A. and H. A. Simon (1984). Protocol Analysis: Verbal Reports as Data. Cambridge, Massachusetts, MIT.
- Fay, B. (1987). An Alternative View: Interpretive Social Science. Intepreting Politics. M. T. Gibbons. New York, New York University Press: 82-100.
- Feeny, D. F. and B. Ives (1997). Information Technology as a basis for sustainable competitive advantage. Managing IT as a Strategic Resource. L. P. Willcocks, D. F. Feeny and G. Islei. Maidenhead, McGraw-Hill.
- Feeny, D. F. and L. P. Willcocks (1998). "Core IS Capabilities for Exploiting Information Technology." Sloan Management Review 39(3): 9-21.
- Feldman, M. (2000). "Organizational Routines as a source of continuous change." Organization Science 11(6): 611-629.
- Feldman, M. S. and B. T. Pentland (2003). "Reconceptualising organizational routines as a source of flexibility and change." Administrative Science Quarterly 48(1): 94-118.
- Fernie, S. and D. Metcalf (1998). (Not) Hanging on the Telephone: Payment Systems in the New Sweathshops, Center for Economic Performance, London School of Economics.
- Fitzgerald, B. and D. Howcroft (1998). "Towards Dissolution of the IS Research Debate: From Polarisation to Polarity." Journal of Information Technology 13(4): 313-326.

- Fontana, A. and J. H. Frey (2000). Interviewing. Handbook of Qualitative Research. M. K. Denzin and Y. S. Lincoln. Thousand Oaks, California, Sage.
- Forrester (2005). Not All ITIL Processes Are Created Equal. T. Mendel and A. Parker, Forrester Research.
- Forrester (2006). Trends 2006: New Generation For Service Desks. ITIL, ITSM, And New Product Releases Drive Improvements, Forrester Research. C. Gliedman.
- Foucault, M. (1977). Discipline and Punish: the Birth of the Prison. London, Allen Lane.
- Franz, C. R. and D. Robey (1984). "An investigation of user-led systems design: rational and political perspectives." Communications of the ACM 27(12): 1202-1209.
- Frenkel, S. and L. Donoghue (1996). Call Centres and Service Excellence. University of New South Wales, Center for Corporate Change Paper no. 066.
- Fry, M. (2006). Top Ten Reasons Organizations are Unsuccessful Implementing ITIL.
- Gans, N., G. Koole, et al. (2003). "Telephone call centers: tutorial, review, and research prospects." Manufacturing & Service Operations Management 5(2): 79-141.
- Gartner (2005). The Functional Requirements of IT Service Desk Tools are Shifting. K. Brittain, Gartner RAS Core Research Note G00126865.
- Gartner (2006). Forecast: IT Operations Management, Worldwide, 2005-2010. R. Contu, Gartner Research: G00138422.
- Gersick, C. J. G. and J. R. Hackman (1990). "Habitual routines in task-performing groups." Organizational Behaviour and Human Decision Processes 47: 65-97.
- Giddens, A. (1976). New Rules of Sociological Method. Cambridge, Polity.
- Giddens, A. (1979). Central Problems in Social theory. Basingstoke, Macmillan.
- Giddens, A. (1984). The Constitution of Society. Cambridge, Polity.
- Giddens, A. (1991). Structuration Theory: Past, Present and Future. Giddens' Theory of Structuration: A Critical Appreciation. C. G. A. Bryant and D. Jary. London, Routledge: 201-221.
- Giddens, A. (1993). New rules of Sociological Method. Cambridge, Polity.
- Ginsberg, A. and J. A. C. Baum (1994). Evolutionary processes and patterns of core business change. Evolutionary Dynamics of Organizations. J. A. C. Baum and J. V. Singh. Oxford, Oxford University Press: 127-151.
- Glasser, B. G. and A. Strauss (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research. New York, Aldine Publishing.
- Glazer, R. (1997). "Strategy and structure in information-intensive markets: the relationship between marketing and IT." Journal of Market Focused Management 2(1): 65-81.
- Goffman, E. (1981). Replies and Responses. Forms of Talk. E. Goffman. Philadelphia, University of Pennsylvania Press: 5-77.
- Golden-Biddle, K. and K. D. Locke (1997). Composing Qualitative Research: Crafting Theoretical Points from Qualitative Research. Thousand Oaks, California, Sage Publications.
- Goria, N. (1991). "Techniques for Application Software Maintenance." Information and Software Technology 33(1): 65-73.
- Grant, R. (1996). "Towards and knowledge-based theory of the firm." Strategic Management Journal 17: 109-122.
- Greeno, J. G. and J. L. Moore (1993). "Situativity and symbols: Response to Vera and Simon." Cognitive Science 17(1): 49-60.

- Gregson, N. (1989). On the ir(relevance) of Structuration Theory in empirical research. Social Theory of Modern Societies: Anthony Giddens and his Critics. D. Held and J. B. Thompson. Cambridge, Cambridge University Press.
- Griffiths, J. R., R. J. Hartley, et al. (2002). "An improved method of studying user-system interaction by combining transaction log analysis and protocol analysis." Information Research 7(4).
- Gronroos, C. (1993). Toward a third phase in service quality research: challenges and future directions. Advances in Services Marketing and Management Vol 2. T. A. Swartz, D. E. Bowden and S. W. Brown. Greenwich, CT, JAI Press.
- Grudin, J. (1988). Why CSCW applications fail: problems in the design and evaluation of organisational interfaces. Proceedings of the Conference on Computer Supported Cooperative Work, New York, Association for Computing Machinery.
- Grudin, J. (1996). Evaluating Opportunities for design capture. Design Rationale: Concepts, Techniques & Use. T. P. Moran and J. M. Carroll. Mahwah, NJ, Laurence Erlbaum: 453-470.
- Guba, E. G. and Y. S. Lincoln (1996). Effective Evaluation. San-Francisco, Jossey Bass.
- Hannan, M. T. and J. Freeman (1989). Organizational Ecology. Cambridge, MA, Harvard University Press.
- Harding, S. (1987). Is there a feminist method. Feminist Methodology. S. Harding. Bloomington, Indiana University Press.
- Hardy, C., N. Phillips, et al. (2001). "Reflexivity in organization and management theory: A study of the production of the research 'subject'." Human Relations 54(5): 531-560.
- Harré, R. (1983). "Commentary from an Ethnographic Standpoint." Journal for the Theory of Social Behaviour 13(1): 69-73.
- Hasseldblah, H. and J. Kallinikos (2000). "The Project of Rationalization: A Critique and Reappraisal of Neo-Institutionalism in Organization Studies." Organization Studies 21(4): 697-720.
- Heiner, R. (1983). "The origin of predictable behaviour." American Economic Review 73: 560-595.
- Hekman, S. (1990). Hermeneutics and the Crisis of Social Theory: A critique of Giddens' Epistemology. Anthony Giddens, Consensus and Controversy. J. Clark, C. Modgil and J. Modgil. Basingstoke, Falmer.
- Hendricks, L. and M. Carr (2002). ITIL: Best Practice in IT Service Management. The Guide to IT Service Mngement. J. van Bon. London, Addison-Wesley: 131-150.
- Hewitt, C. (1986). "Offices are open systems." ACM Transaction Office Information Systems 4(3): 271-287.
- Hirshleifer, D. and I. Welch (1998). A rational economic approach to the psychology of change: amnesia, inertia, and impulsiveness. Anderson Graduate School of Management, UCLA.
- Hochstein, A., G. Tamm, et al. (2005). Service-Oriented IT Management: Benefit, Cost and Success Factors. European Conference on Information Systems (ECIS), Regensburg, Germany.
- Hodgson, G. M. (1997). "The Ubiquity of Habits and Rules." Cambridge Journal of Economics 21(6): 663-684.
- Hodgson, G. M. (2001). How Economics Forgot History: The Problem of Historical Specificity in Social Science. London, Routledge.

- Huber, G. (1991). "Organisational Learning: The Contributing Processes and the Literatures." Organization Science 2(1): 88-115.
- Hughes, E. C. (1971). The Sociological Eye. Chicago, IL, Aldine-Atherton.
- Hughes, J. and S. Parkes (2003). "Trends in the use of verbal protocol analysis in software engineering research." Behaviour & Information Technology 22(2): 127-140.
- Iacobucci, D., K. A. Grayson, et al. (1994). The calculus of service quality and customer satisfaction: theoretical and empirical differentiation and integration. Advances in Services Marketing and Management Vol 3. T. A. Swartz, D. E. Bowden and S. W. Brown. Greenwich, CT, JAI Press: 1-68.
- Ioannides, S. and K. Nielsen (2007). Economics and the Social Sciences: Boundaries, Interaction and Integration. Cheltenham, Edward Elgar Publishing.
- ITIL-Central. (2006). "In A Nutshell: A Short History of ITIL." from <http://itsm.fwtk.org/History.htm>.
- Ives, B., M. H. Olson, et al. (1983). "The measurement of user information satisfaction." Communications of the ACM 26(10): 785-793.
- Johnson, P. and J. Duberley (2003). "Reflexivity in Management Research." Journal of Management Studies 40(5): 1279-1303.
- Jones, M. (1999). Structuration theory. Rethinking Management Information Systems: an Interdisciplinary Perspective. W. Currie and B. Galliers. Oxford, Oxford University Press: 103-135.
- Jones, M. and H. Karsten (2003). Review: Structuration Theory and Information Systems Research. Cambridge University, Working Paper Series, Judge Institute of Management.
- Jones, M. R. (2000). The moving finger: The use of social theory in WG8.2 conference papers, 1975-1999. Organizational and Social Perspectives on Information Technology. R. Baskerville, J. Stage and J. I. DeGross. Dordrecht, Kluwer Academic Publishers: 15-31.
- Jones, M. R., W. J. Orlikowski, et al. (2004). Structuration Theory and Information Systems: A Critical Reappraisal. Social theory and philosophy for information systems. J. Mingers and L. Willcocks. Chichester, J Wiley: 297-328.
- Jones, S., S. J. Cunningham, et al. (2000). "A transaction log analysis of a digital library." International Journal on Digital Libraries 3(2): 152-169.
- Jordan, E. and L. Silcock (2005). Beating IT risks. Chichester, England, J. Wiley & Sons, Ltd.
- Kallinikos, J. (2002). Reopening the Black Box of Technology Artifacts and Human Agency. Twenty-Third International Conference on Information Systems, Barcelona, Spain.
- Kallinikos, J. (2004). Farewell to constructivism: technology and context-embedded action. The social study of information and communication technology: innovation, actors and contexts. C. Avgerou, C. Ciborra and F. Land. Oxford, Oxford University Press.
- Kelly, S. (1997). Data Warehousing in Action. New York, Wiley.
- Kettinger, W. J. and C. Lee (1997). "Pragmatic Perspectives on the Measurement of Information Systems Service Quality." MIS Quarterly 21(2): 223-240.
- Kettinger, W. J. and C. C. Lee (1995). "Perceived service quality and user satisfaction with the information services functions." Decision Sciences 25(5): 737-766.
- Kimmel, A. J. (1998). Ethics and Values in Applied Social Research. Newbury Park, California, Sage.
- King, J. L., V. Gurbaxani, et al. (1994). "Institutional factors in information technology innovations." Information Systems Research 5: 139-169.

- Kirwan, B. and L. K. Ainsworth (1992). A Guide to Task Analysis, CRC Press.
- Klein, H. K. and M. D. Myers (1999). "A set of principles for conducting and evaluating interpretive field studies in information systems." MIS Quarterly 23(1): 67-94.
- Kling, R. and S. Iacono (1989). "The institutional character of computerized information systems." Information Technology & People 5(1): 7-28.
- Knights, D. and D. McCabe (1998). "What happens when the phone goes wild?: staff, stresses and spaces for escape in a BPR telephone banking work regime." International Journal of Management Studies 35(2): 163-195.
- Knott, A. M. and B. McKelvey (1999). "Nirvana efficiency: a comparative test of residual claims and routines." Journal of Economic Behaviour and Organisation 38: 365-383.
- Koestler, A. (1967). The ghost in the machine. London, Hutchinson.
- Kuhn, T. S. (1970). The Structure of Scientific Revolutions. Chicago, Chicago University Press.
- Kurth, M. (1993). "The limits and limitations of transaction log analysis." Library Hi Tech 11(2): 98-104.
- Kutner, S. and J. Cripps (1997). "Managing the customer portfolio of healthcare enterprises." The Healthcare Forum Journal 4(5): 52-54.
- Kuusela, H. and P. Paul (2000). "A Comparison of Concurrent and Retrospective Verbal Protocol Analysis." The American Journal of Psychology 113(3): 387-404.
- Kvale, S. (1996). Interviews: An introduction to qualitative research interviewing. Thousand Oaks, Sage.
- Kwon, W. and T. J. Lee (1994). "Measuring service quality in Singapore retail banking." Singapore Management Review 16(2): 1-24.
- Lacity, M. C. and L. P. Willcocks (2001). Global information technology outsourcing: in search of business advantage. Chichester, Wiley.
- Langlois, R. N. and P. L. Robertson (1995). Firms, markets and economic change. London, Routledge.
- Latour, B. (1986). The powers of association. Power, Action and Belief. J. Law and P. Kegan. London, Routledge.
- Latour, B. (1987). Science in Action: How to Follow Scientists and Engineers Through Society. Milton Keynes, Open University Press.
- Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. Shaping Technology/Building Society: Studies in Sociotechnical change. W. E. Bijker and J. Law. Cambridge, MA, MIT Press: 225-258.
- Latour, B. (1996). Social Theory and the Study of Computerized Work Sites. Information Technology and Changes in Organizational Work. W. J. Orlikowski, G. Walsham, M. R. Jones and J. I. DeGross. London, Chapman & Hall.
- Laudon (1985). "Environmental and institutional models of system development: a national criminal history system." Communications of the ACM 28: 728-740.
- Lawrence-Lightfoot, S. and J. Hoffman Davis (1997). The art and science of portraiture. San Francisco, Jossey-Bass.
- Layder, D. (1987). "Key issues in structuration theory: some critical remarks." Current Perspectives in Social theory 8: 25-46.
- Lee, A. (1991). "Integrating Positivist and Interpretive Approaches to Organizational Research." Organization Science 2(4): 342-256.



- Lee, A. (2004). Thinking about Social Theory and Philosophy for Information Systems. Social theory and philosophy for information systems. W. L. P and J. Mingers. Chichester, John Wiley & Sons: 1-26.
- Lee, A. S. (1994). "Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation." MIS Quarterly 18(2): 143-157.
- Lee, A. S., R. L. Baskerville, et al. (1995). Judging Qualitative Research in Information Systems: Criteria for Accepting and Rejecting Manuscripts. Proceedings of the Sixteenth International Conference on Information Systems, Amsterdam.
- Leidner, R. (1993). Fast food, fast talk: service work and the routinization of everyday life. Berkley, University of California Press.
- Levinthal, D. and J. G. March (1981). A model of adaptive organizational search. Decisions and Organizations. J. G. March. Oxford, Basil Blackwell: 187-218.
- Levitt, B. and J. G. March (1988). "Organisational learning." Annual Review of Sociology 14: 319-340.
- Linstead, S. (1994). "Objectivity, reflexivity, and fiction: Humanity, inhumanity and the science of the social." Human Relations 47(11): 1321-1345.
- Louis, M. R. (1991). Reflections on an interpretive way of life. Reframing Organisational culture. P. J. Frost, L. F. Moore, M. R. Louis, C. C. Lundberg and J. Martin. London, Sage: 361-365.
- Luftman, J. (2005). "Key Issues for IT Executives 2004." MIS Quarterly Executive 4(2).
- Luftman, J., R. Kempaiah, et al. (2006). "Key Issues for IT Executives 2005." MIS Quarterly Executive 5(2).
- Luftman, J. and E. R. McLean (2004). "Key Issues for IT Executives." MIS Quarterly Executive 3(2).
- Luthans, F. and T. R. V. Davis (1982). "An Idiographic Approach to Organizational Behaviour Research: The Use of Single Case Experimental Design and Direct Measures." Academy of Management Review 7(3): 380-391.
- Lyons, W. (1988). The Disappearance of Introspection, MIT Press.
- Lytard, J. F. (1991). Phenomenology. Albany, State University of New York Press.
- Lyytinen, K. and R. Hirscheim (1987). "Information systems failures - a survey and classification of the empirical literature." Oxford Surveys in Information Technology 4: 257 - 309.
- Machlup, F. (1980). Knowledge: Its Creation, Distribution and Economic Significance. Princeton, NJ, Princeton University Press.
- Marcela, R. and I. Middleton (1996). "The role of the help desk in the strategic management of information systems." OCLC Systems & Services 12(4): 4-19.
- March, J. G. (1994). The evolution of evolution. Evolutionary Dynamics of Organizations. J. A. C. Baum and J. V. Singh. Oxford, Oxford University Press: 39-49.
- March, J. G. and J. P. Olsen (1976). Ambiguity and Choice in Organisations. Oslo, Universitetsforlaget.
- March, J. G. and J. P. Olsen (1989). Rediscovering institutions - the organizational basis of politics. New York, The Free Press.
- March, J. G. and H. A. Simon (1958). Organizations. Oxford, Blackwell.
- March, J. G. and H. A. Simon (1986). Organizations. New York, Wiley.
- Markus, M. L. (1983). "Power, Politics and MIS Implementation." Communications of the ACM 26(6): 430-444.

- Markus, M. L. (2001). "Toward a Theory of Knowledge Reuse: Types of Knowledge Reuse Situations and Factors in Reuse Success." Journal of Management Information Systems **18**(1): 57-93.
- Markus, M. L. and T. Connolly (1990). Why CSCW applications fail: problems in the adoption of interdependent work tools. Proceedings of the Conference on Computer-Supported Cooperative Work, New York, Association for Computing Machinery.
- Marr, D. (1982). Vision: A Computational Investigation into the Human Representation of Visual Information. San Francisco, CA, W. H. Freeman.
- Marshall, J. N. and R. Richardson (1996). "The impact of telemediated services on corporate structures: the example of branchless retail banking in Britain." Environment and Planning **28**: 1843-1858.
- McDonald, M. H. B. (1996). "Strategic Marketing Planning: Theory, Practice and Research Agendas." Journal of Marketing Management **12**(1-3): 5-28.
- McKeen, J. D. and H. Smith (2003). Making IT happen: critical issues in IT management. Chichester, John Wiley & Sons Ltd.
- Meyer, J. W. and B. Rowan (1977). "Institutionalized organizations: formal structures as myth and ceremony." American Journal of Sociology **83**: 340-363.
- Miles, M. B. (1979). "Qualitative data as an attractive nuisance: The problem of analysis." Administrative Science Quarterly **24**(4): 590-601.
- Miles, M. B. and A. M. Huberman (1994). Qualitative Data Analysis. London, Sage.
- Mingers, J. (2001). "Combining IS Research Methods: Towards a Pluralist Methodology." Information Systems Research **12**(3): 240-259.
- Minkler, A. P. (1993). "The problem with dispersed knowledge: firms in theory and practice." Kyklos **46**: 569-587.
- Monteiro, E. (2000). Actor-Network Theory and Information Infrastructure. From Control to Drift. C. Ciborra. Oxford, Oxford University Press.
- Monteiro, E. and O. Hanseth (1996). Social Shaping of Information Infrastructure: On Being Specific about the Technology. Information Technology and Changes in Organizational Work. W. J. Orlikowski, G. Walsham, M. R. Jones and J. I. DeGross. London, Chapman & Hall.
- Morgan, G. (1981). "Paradigms, Metaphors and Puzzle Solving in Organisation Theory." Administrative Science Quarterly **25**(4): 605-622.
- Morrow, R. (1994). Critical Theory and Methodology. Thousand Oaks, CA, Sage.
- Muller, N. J. (1999). "Managing Service Level Agreements." International Journal of Network Management **9**: 155-166.
- Myers, M. D. (1997). Interpretive Research in Information Systems. Information Systems: An emergent Discipline. J. Mingers and F. E. Stowell. London, McGraw-Hill: 239-266.
- Nelson, K. M., S. Nadkarni, et al. (2000). "Understanding Software Operations Support Expertise: A Revealed Causal Mapping Approach." MIS Quarterly **24**: 475-507.
- Nelson, S. G. and R. R. Winter (1982). An evolutionary theory of economic change. Cambridge, MA, Harvard University Press.
- New, C. (1994). "Structure Agency and Social Transformation." Journal for the Theory of Social Behaviour **24**(3): 197-205.
- Newell, A. and H. A. Simon (1972). Human Problem Solving. Englewood Cliffs, NJ, Prentice-Hall.
- Nielsen, J. (1993). Usability engineering. Cambridge, MA, AP Professional.
- Nisbett, R. E. and T. D. Wilson (1977). "Telling us more than we know: Verbal Reports on mental processes." Psychological Review **84**(3): 231-241.

- Nonaka, I. (1994). "A Dynamic Theory of Organisational Knowledge Creation." Organization Science 5(1): 14-37.
- OGC. (2006). "ITIL Glossary of Terms, Definitions and Acronyms." Retrieved 14/07/2006, 2006, from <http://www.get-best-practice.biz/glossary.aspx?product=glossariesacronyms>.
- Orlikowski, W. J. (1992). "The Duality of Technology: Rethinking the Concept of Technology in Organizations." Organization Science 3(3): 398-427.
- Orlikowski, W. J. (1995). *Evolving with Notes: organisational change around groupware technology*. Cambridge, MA, Center for Information System Research, Sloan School of Management, MIT.
- Orlikowski, W. J. (2000). "Using technology and constituting structures: A practice lens for studying technology in organisations." Organization Science 11(4): 404-428.
- Orlikowski, W. J. and J. J. Baroudi (1991). "Information Technology in Organizations: Research Approaches and Assumptions." Information Systems Research 2: 1-28.
- Orlikowski, W. J. and D. Gash (1994). "Technological frames: making sense of information technology in organizations." ACM Transactions on Information Systems 12(2): 174 - 207.
- Orlikowski, W. J. and C. S. Iacono (2001). "Research Commentary: Desperately Seeking the "IT" in IT Research - A Call to Theorizing the IT Artefact." Information Systems Research 12(2): 121-134.
- Paoli, M. and A. Prencipe (2001). *The relationships between individual and organizational memory: exploring the missing links*. mimeo, SPRU.
- Parasuraman, A., V. A. Zeithaml, et al. (1985). "A Conceptual Model of Service Quality and its Implication for Future Research." Journal of Marketing 49: 41-50.
- Patel, N. V. (2004). *An emerging strategy for e-business IT Governance*. Strategies for Information Technology Governance. V. Grembergen, Idea Group Publishing.
- Patrick, J. (1999). *Training*. Introduction to Work and Organizational Psychology: A European Perspective. N. Chmiel. London, Blackwell Publishing: 100-125.
- Patton, M. Q. (1990). Qualitative evaluation and research methods. Newbury Park, CA, Sage.
- Peachey, H. and D. Hall (2005). Knowledge Management and the leading IS journals: an analysis of trends and gaps in published research. 38th Hawaii International Conference on System Sciences, Hawaii, USA.
- Pearce, M. (1997). "The true science of marketing." Marketing 3: 187-192.
- Peck, H., A. Payne, et al. (1999). Relationship marketing: Strategy and Implementation. Oxford, Butterworth Heinemann.
- Pels, D. (1995). "Have We Never Been Modern? Towards a Demontage of Latour's Modern Constitution." History of Human Sciences 8(3): 129-141.
- Pentland, B. T. (1992). "Organizing moves in software support hot lines." Administrative Science Quarterly 37: 527-548.
- Pentland, B. T. (1995). "Grammatical models of organizational processes." Organization Science 6(5): 541-556.
- Pentland, B. T. (1995). "Read me what it says on your screen: The interpretive problem in technical service work." Technology Studies 2(1): 50-79.
- Pentland, B. T. and M. S. Feldman (2005). "Organizational routines as a unit of analysis." Industrial and Corporate Change 14(5): 793-815.

- Pentland, B. T. and H. H. Rueter (1994). "Organizational Routines as Grammars of Action." Administrative Science Quarterly 39(3): 484-510.
- Peppers, D., M. Rogers, et al. (1999). The One to One Fieldbook. New York, Currency Doubleday.
- Perrow, C. (1967). "A framework for the comparative analysis of organizations." American Sociological Review 32: 194-208.
- Peters, T. A. (1993). "The history and development of transaction log analysis." Library Hi Tech 11(2): 41-66.
- Peterson, R. (2003). Information strategies and tactics for information technology governance. Strategies for information technology governance. W. Van Grembergen. Hershey (PA), Idea Group Publishing.
- Pilkington, R. M. (1992). Intelligent Help: Communicating with Knowledge-Based Systems. New York, Oxford University Press.
- Pinch, T. J. and W. E. Bijker (1987). The social construction of facts and artifacts. The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology. W. E. Bijker, T. P. Hughes and T. J. Pinch. Cambridge, MA, MIT Press: 17-50.
- Pine, B. J., B. Victor, et al. (1993). "Making mass customisations work." Harvard Business Review 71: 108-119.
- Pitt, L. F., R. T. Watson, et al. (1995). "Service Quality: A Measure of Information Systems Effectiveness." MIS Quarterly 19(2): 173-187.
- Pitt, L. F., R. T. Watson, et al. (1997). "Measuring Information Systems Service Quality: Concerns for a Complete Canvas." MIS Quarterly 21(2): 209-221.
- Polyani, M. (1962). Personal Knowledge: Toward a Post-Critical Philosophy. New York, Harper Torchbooks.
- Polyani, M. (1967). The Tacit Dimension. London, Routledge and Keon Paul.
- Poole, M. S. and G. DeSanctis (1990). Understanding the Use of Group Decision Support Systems: The Theory of Adaptive Structuration. Organisations and Communication Technology. J. Fulk and C. Steinfeld. Beverly Hills, California, Sage.
- Postrel, S. and R. Rumelt (1992). "Incentives, routines, and self-command." Industrial and Corporate Change 1: 397-425.
- Pressley, M. and P. Afflerbach (1995). Verbal Protocols of Reading. Hillsdale, NJ, Erlbaum.
- Reed, M. I. (1995). The Action/Structure Debate in Organizational Analysis. Conference on Structuration Theory and Organizations, Paris, France.
- Reichheld, F. (1996). The Loyalty Effect: The Hidden Force behind Growth, Profits and Lasting Value. Boston, Harvard Business School Press.
- Reichheld, F. and W. E. J. Sasser (1990). "Zero Defections: Quality comes to services." Harvard Business Review 68(Sept-Oct): 105-111.
- Remedy. (2006). "Ask Malcolm: HelpDesk Questions and Answers." 2006, from [http://www.remedy.com/promotions/ask\\_malcolm/HelpDesk\\_A.html#Q1](http://www.remedy.com/promotions/ask_malcolm/HelpDesk_A.html#Q1).
- Ribbers, P. (2002). "Designing Information Technology Governance Processes: Diagnosing Contemporary Practices and Competing Theories." Proceedings of the 35th Hawaii International Conference on System Sciences (HICCS).
- Richardson, R. and J. N. Marshall (1996). "The growth of telephone call centres in peripheral areas of Britain: evidence from Tyne and Wear." Area 28: 308-317.
- Rigby, D. K., F. Reichheld, et al. (2002). "Avoid the four perils of CRM." Harvard Business Review 80(2): 101-109.

- Rip, P. D. (1980). The informational basis of self-reports: A preliminary study. Advances in Consumer Research. J. C. Olson. Ann Arbor, MI, Association for Consumer Research.
- Robey, D. (1996). "Research Commentary: Diversity in Information Systems Research: Threat, Promise, and Responsibility." Information Systems Research 7(4): 400-408.
- Rose, J. (1998). Evaluating the contribution of structuration theory to the information systems discipline. 6th European Conference on Information Systems, Aix-en-Provence.
- Rust, R. T. and A. J. Zahorik (1993). "Customer satisfaction, customer retention and market share." Journal of Retailing 69(2): 193-215.
- Ryals, L., S. Knox, et al. (2000). Customer Relationship Management (CRM): Building the Business Case. London, FT Prentice Hall.
- Ryals, L. and A. Payne (2001). "Customer Relationship Management in Financial Services: Towards Information-Enabled Relationship Marketing." Journal of Strategic Marketing 9(1): 3-27.
- Saldana, J. (2003). "Dramatising data: A primer." Qualitative Enquiry 9(2): 218-236.
- Saleh, F. and C. Ryan (1992). "Analysing service quality in the hospitality industry using the SERVQUAL model." Services Industries Journal 11(3): 324-343.
- Sambamurthy, V. and R. W. Zmud (2000). "Research commentary: the organizing logic for an enterprise's IT activities in the digital era - a prognosis of practice and a call for research." Information Systems Research 11(2): 105-114.
- Sanderson, P. M. (1990). "Verbal Protocol Analysis in three experimental domains using SHAPA." Proc. Human Factors Soc. 34th Annu. Meet., 2: 1280-1284.
- Schank, R. C. and R. P. Abelson (1977). Scripts, plans, goals and understanding: an enquiry into human knowledge structures. Hillsdale, NJ, Erlbaum.
- Schryer, C. F. (1993). "Records as Genres." Written Communication 10: 200-234.
- Schutz, A. (1967). The Phenomenology of the Social World. Evanston, Ill, Northwestern University Press.
- Schwartz, A. and R. Hirschheim (2003). "An extended platform logic perspective of IT governance: managing perceptions and activities of IT." Journal of Strategic Information Systems 12(3): 129-166.
- Scott, S. V. (2000). Lived Methodology: A Situated Discussion of 'Truth and Method' in Interpretive Information Systems Research. Department of Information Systems, London School of Economics and Political Science, Working Paper Series.
- Scott, W. (1995). Institutions and Organisations. Thousand Oaks, CA, Sage Publications.
- Searle, J. (1995). The Construction of Social Reality. London, Penguin.
- Selznick, P. (1948). "Foundations of the Theory of Organisations." American Sociological Review 13: 25-35.
- Sevon, G. (1996). Organizational imitation in identity transformation. Translating Organizational Change. B. Czarniawska. New York, Walter de Gruyter.
- Sewell, W. H. (1992). "A Theory of Structure: Duality, Agency and Transformation." American Journal of Sociology 98(1): 1-29.
- Silverman, D. (2001). Interpreting Qualitative Data. London, Sage Publications.
- Simon, H. A. (1947). Administrative Behaviour. New York, The Free Press.
- Simon, H. A. (1955). "A Behavioural Model of Rational Choice." Quarterly Journal of Economics 69: 99-118.
- Simon, H. A. (1976). From substantive to procedural rationality. Method and Appraisal in Economics. S. J. Latsis. Cambridge, Cambridge University Press.

- Soh, C., S. S. Kien, et al. (2000). "Cultural Fits and Misfits: is ERP a Universal Solution." Communications of the ACM **43**(3): 47-51.
- Stacey, R. D. (1996). Complexity and creativity in organisations. San Francisco, Berret Koehler.
- Stein, E. W. and V. Zwass (1995). "Actualizing Organizational Memory with Information Systems." Information Systems Research **6**(2): 85-117.
- Stene, E. (1940). "An approach to the science of administration." American Political Science Review **34**: 1124-1137.
- Stinton, I. (1996). "Helping the help desk." International Journal of Productivity & Performance Management **45**(1): 30-32.
- Subramanyam, R. and M. Krishnan (2001). Business value of IT-enabled call centres: and empirical analysis. Proceedings of the 22nd International Conference on Information Systems, New Orleans, USA.
- Suchan, T. A. and C. A. Brewer (2000). "Qualitative methods for research on mapmaking and map use." Professional Geographer **52**(1): 145-154.
- Suchman, L. (1987). Plans and Situated Action. Cambridge, UK, Cambridge University Press.
- Suchman, L. (1995). "Making Work Visible." Communications of the ACM **38**(9): 56-65.
- Szulanski, G. and S. G. Winter (2002). "Getting it right the second time." Harvard Business Review **80**(62-71).
- Taylor, P. and P. Bain (2000). An Assembly line in the head: work and employee relations in the call centre. Technology, organizations and innovation (III). D. Preece, I. McLoughlin and P. Dawson. London, Routledge: 1815-1838.
- Taylor, P. and P. Bain (2004). "Call centre offshoring to India: the revenge of history?" Labour & Industry **14**(3): 15-38.
- TouchPaper (2006). The Consolidated Service Desk – Touchpaper featuring Gartner.
- Trauth, E. M. and B. O'Connor (1991). A study of the interaction between information technology and society: an illustration of combined qualitative research methods. Information Systems Research: Contemporary Approaches & Emergent Traditions. H. E. Nissen, H. K. Klein and R. Hirscheim. Amsterdam, Elsevier Science Publishers.
- Tyre, M. J. and W. J. Orlikowski (1994). "Windows of opportunity: Temporal patterns of technological adaptation in organizations." Organization Science **5**(1): 98-118.
- Van Dyke, T. P., V. R. Prybutok, et al. (1999). "Cautions on the use of SERVQUAL measure to assess the quality of information systems services." Decision Sciences **30**(3): 877-891.
- Van Grembergen, W. (2002). Introduction to the Minitrack: IT Governance and its mechanisms. Proceedings of the 35th Hawaii International Conference on Systems Sciences (HICSS).
- Van Maanen, J. (1988). Tales of the Field. On Writing Ethnography. Chicago, University of Chicago Press.
- Ventola, E. (1987). The Structure of Social Interaction: A systematic approach to the semiotics of service encounters. London, Printer.
- von Hayek, F. A. (1945). "The use of knowledge in society." American Economic Review **35**: 519-530.
- Walsh, J. R. and G. R. Ungson (1991). "Organizational Memory." Academy of Management Review **16**(1): 57-91.
- Walsham, G. (1993). Interpreting Information Systems in Organizations. Chichester, Wiley.

- Walsham, G. (1995). "The emergence of interpretivism in IS research." Information Systems Research 6(4): 376-394.
- Walsham, G. (1995). "Interpretive case-studies in IS research: nature and method." European Journal of Information Systems 4: 74-81.
- Walsham, G. (1997). Actor-network theory and IS research: current status and future prospects. Proceedings of the IFIP TC8 WG 8.2 international conference on Information systems and qualitative research, Philadelphia, Pennsylvania, United States.
- Walsham, G. and C. K. Han (1991). "Structuration Theory and Information Systems Research." Journal of Applied Systems Analysis 17: 77-85.
- Walsham, G. and S. Sahay (1999). "GIS for District-Level Administration in India: Problems and Opportunities." MIS Quarterly 23(1): 39-66.
- Ward-Dutton, N. and N. Macehiter (2005). On IT-business alignment.
- Weaver, G. R. and D. A. Gioia (1994). "Paradigms lost: incommensurability vs. structurationist inquiry." Organization Studies 15(4): 565-590.
- Weick, K. E. (1979). The Social Psychology of Organising. New York, Random House.
- Weick, K. E. (1990). "The vulnerable system: an analysis of the tenerife air disaster." Journal of Management 16: 571-593.
- Weick, K. E. (1993). "The collapse of sensemaking in organizations: the Mann-Bulch disaster." Administrative Science Quarterly 38: 628-652.
- Weick, K. E. (1995). Sensemaking in Organizations. Thousand Oaks, CA, Sage.
- Weick, K. E. (1998). "Improvisation as a mindset for organizational analysis." Organization Science 9: 543-555.
- Weick, K. E. (1999). "Theory construction as disciplined reflexivity: trade offs in the 90s." Academy of Management Review 24(4): 797-810.
- Weiss, H. M. and D. R. Ilgen (1985). "Routinised behaviour in organisations." Journal of Behavioral Economics 14: 57-67.
- Wilmott, H. (1981). "The Structuring of Organizational Structure: A Note." Administrative Science Quarterly 26(3): 470-474.
- Wilson, H. N., E. Daniel, et al. (2002). "Factors for Success in Customer Relationship Management (CRM) Systems." Journal of Marketing Management 18(1-2): 193-219.
- Wilson, H. N. and M. H. B. McDonald (1996). E-Marketing: Improving Marketing Effectiveness in a Digital World. London, FT Prentice Hall.
- Winter, S. G. (1964). "Economic "natural selection" and the theory of the firm." Yale Economic Essays 4: 225-272.
- Winter, S. G. (1975). Optimization and evolution in the theory of the firm. Adaptive Economic Models. R. Day and T. Groves. New York, Academic Press: 73-118.
- Winter, S. G. (1985). The case for "mechanistic" decision making. Organizational Strategy and Change. J. M. Pennings. San-Francisco, CA, Jossey-Bass: 99-113.
- Winter, S. G. (2003). "Understanding dynamic capabilities." Strategic Management Journal 24: 991-995.
- Wittgenstein, L. (1958). Philosophical Investigations. New York, Macmillan.
- Woolgar, S. (1991). Configuring the user. A sociology of monsters: essays on power, technology an domination. J. Law. Keele, Sociological Review Monograph: 57-102.
- Woolgar, S. (1991). "The turn to technology in social studies of science." Science, Technology and Human Values 16(1): 20-50.

- Woolgar, S. and K. Grint (1991). "Computers and the Transformation of Social Analysis." Science, Technology and Human Values **16**(3): 368-378.
- Wortuba, T. R. and P. K. Tyagi (1991). "Met expectations and turnover in direct selling." Journal of Marketing **55**: 24-35.
- Yin, R. K. (1981). "The Case Study Crisis: Some Answers." Administrative Science Quarterly **26**(1): 58-65.
- Yin, R. K. (2003). Case study research: design and methods. Thousand Oaks, California, Sage Publications.
- Zack, M. H. (1999). "Managing codified knowledge." Sloan Management Review **40**(4): 45-58.
- Zarnekow, R. and W. Brenner (2003). A product-based information management approach. Proceedings of the 11th European Conference on Information Systems (ECIS 2003), Naples, Italy.
- Zollo, M. and S. G. Winter (2002). "Deliberate learning and the evolution of dynamic capabilities." Organization Science **13**: 339-351.
- Zuboff, S. (1988). In the Age of the Smart Machine. New York, Basic Books.
- Zucker, L. G. (1987). "Institutional theories of organizations." Annual Review of Sociology **13**: 443-464.