Issues in Public Information Systems Development: The Impact of Regionalised Organisational Structure

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

By

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This thesis is dedicated to the memory of Simon Fox

Rest in peace mate, you are sorely missed.

Abstract

This thesis highlights the critical impact the effects of regionalised organisational structure and external political pressures have on the development of public sector information systems. Through the extension of a socio-technical systems (STS) model which encompasses these effects, a tool is provided for their investigation and evaluation in past and present information system (IS) developments. The foundations for this model were derived through an in-depth study of a large scale, national public IS development.

Despite a large volume of research into the development and implementation of information systems, a high incidence of failure of such projects is still observed. With information systems now commonly integrated into many facets of an organisation's business processes the costs and consequences of such failures can be far reaching. Given the additional scope and scale of many national public sector projects such consequences can be profound. While public sector IS failure has been studied in the literature, its focus is observed to be primarily that of an examination of e-government systems, neglecting the back-end (non-public facing) support systems. The focus of such studies is predominantly on the public's interface and interaction with these systems together with their adoption and acceptance by the public. This view is a valid contribution but it does not inform the literature on the full range of unique problems that can be encountered across a complete IS development lifecycle within the public sector.

Seeking to investigate these matters further, a collaboration was formed with a UK public body to facilitate the examination of the issues affecting the development and implementation of a national IS project. Onsite observations, interviews and document sampling were used across the development cycle to gather information from the perspectives of the stakeholders involved. The analysis of the data collected from this exercise highlighted a number of factors that were observed to have a significant effect on the project's ultimate failure. Examination of this analysis from an STS perspective allowed for the extension of an existing STS model. It was extended to encompass the significant adverse effects that an organisational regionalised structure and external political pressure placed on the development of public information systems.

Publications

Folkerd and Spinelli (2009) ‘User Exclusion and Fragmented Requirements Capture in Publicly-funded IS Projects’. *Transforming Government: People, Process & Policy*, 3(1), pp. 32-49

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Chapter 1
People and Technology

1.1 Introduction

The primary motivation driving this research is the desire to understand the developmental issues behind the exceptionally high rate of information system (IS) implementation failure that is highlighted in a wide range of studies across the literature, and in particular the very high rate of failure among public IS projects. In order to better understand the issues present within the IS development lifecycle this research starts with an examination of the recognised primary causes of failures within such projects together with an investigation of how existing literature examines and defines failure. This review highlights the predominantly technological and budgetary perspectives that are often adopted when examining the reasons behind a project's demise. Analysing this position further, this research illustrates the fact that such a perspective on IS failure presents a number of issues in the true understanding of such concerns. The underlying failure to recognise the inherently social nature of an IS development prevents an understanding of many of the true root causes of such failures. Organisational culture, internal business processes and individuals within an organisation are seen to make up a complex social system heavily impacted by the integration of an IS within an organisation.

Having isolated these failures to issues within each IS development's methodology, this study takes a whole lifecycle IS development perspective in its investigation of these issues and how they can influence the final outcome and viability of a system. Embracing the recognition of IS as an inherently complex social system,, a Socio-Technical Systems (STS) approach is adopted in the review of failed industrial and public projects within the literature. Existing STS models are examined and compared before a generalised model of an IS as a STS is adopted. Common problematic issues encountered during the development cycle within both industrial and public sector IS developments are then mapped onto this STS model to highlight system components affecting such issues. Within this analysis Public IS projects as a class are show to be particularly vulnerable to a number of factors affecting their development. As a result of their often large scale and complexity, their high visibility and their need to meet

politically driven time scales and demands (POST, 2004; Butler, 2004) and their need for increased engagement with the public as a stakeholder, many such problems face additional strains on their development. The addition of these factors, both internal and external to the main development, presents a number of challenges that must be overcome by developers in order to prevent such systems failing. Of note in this literature examination is the absence of literature examining the implementation of backend public information systems within the UK. While e-government systems have been studied extensively most reviews tend to focus solely on the perspective of the system's interaction with members of the public and the engagement issues surrounding e-government adoption. There is little literature providing a true investigation of the developmental issues surrounding the implementation of predominantly public sector back-end support systems which support internal processes but that have little or no direct interaction with members of the public both generically and within the UK.

Through a case study of a national public IS development this research examines the interaction between, people, processes, organisational structure and technology within the development cycle and it examines their impact on the successful systems design, implementation and uptake of IS within a in large public body. This study will highlight the profound effects the regional autonomous organisation seen in many UK public bodies have on the development of IS within this context and it will propose a new STS model to allow for their recognition and examination.

1.2 Background

With the now almost complete reliance of modern industries on the implementation and adoption of IS, which control nearly every facet of their organisation (Spathis & Constantinides, 2003; Buhalis, 2004; Kourouthanassis & Giagli, 2007) from finance and payroll through to manufacture and customer services, the importance of understanding the expectations placed on such systems and the way their development and interaction affect the host organisation has never been greater.

Given this reliance on the successful implementation of IS for the support of business processes it is perhaps surprising to learn of the high rate of IS implementation failure that is highlighted in the literature. In the review conducted by Taylor (2001), a study

of 1027 IS projects within the UK examining the satisfaction of an organisation with its project implementations, 897 (87.3%) of those questioned reported that their projects were deemed to have failed to some degree. With such high rates of partial and complete failure the costs to industry of failed IS are high, not only in terms of lost money, time and resources but also in terms of the negative effect on morale and organisational culture that a failed IS can have on its target organisation.

When examining existing literature on why such failures occur, a number of common themes emerge. Primary among these is the lack of a homogenous definition for IS failure (Sauer, 1993). The complexity presented by an information system's integration within an organisation coupled with the human factors involved in such a systems design and use, make a clear-cut definition very difficult to reach. Each stakeholder within a development will have their own perspective on the IS and a unique perception of its success and failure. As a result of this, existing research has fractured into a number of differing perspectives, each looking at failure differently. As is commonly remarked, many large scale public IS projects have failed or suffered difficulties as a result of issues within their development methodologies, stemming from the purely technical approach adopted in their execution, (Olphert & Damodaran, 2007; Clegg & Shepherd, 2007). Treating IS development as a purely technical concern ignores the social and organisational impact that implementing such systems can have, ultimately leading to failures throughout the development's progression. Noting this, this research adopts a STS approach in its examination of IS failure, mapping existing project studies onto a proposed STS model. This allows the identification of the nature of the issues that have caused public IS failure, highlighting the highly social components that have been ignored in existing developments.

1.3 Aims and Objectives

Through the use of a case study examining a national public IS development this research will seek to examine the many social, organisational and technological challenges involved in the development of large scale IS projects within the public sector together with how these issues interact across a project's lifecycle.

The objectives are:

1. To understand what negative factors are prevalent within the development of public IS
2. To investigate these factors as they occur within an ongoing public IS development and observe how these factors interact and affect the progress of the project
3. To generate a model based on these observations to allow for a more detailed analysis of such effects in past projects and their prediction in future public IS developments
4. To evaluate this model through an examination of secondary documentary data examining past and current public IS

1.4 Research Methodology

The research begins with a comprehensive and critical literature review, examining the strategic importance of IS within business and government today. It explores the meanings and reasons behind the high percentage of projects that are deemed to have failed and never reached full uptake within their host organisation, isolating these concerns to problems within the development cycle. Noting the gaps identified from this review and the problems already encountered in IS development, a case study is proposed as the basis for an examination of development issues within a national public IS project.

As discussed in Chapter 4, this research takes an interpretivist perspective, a common stance in projects examining the social nature of IS (Walsham, 1995; Orlikowski & Baroudi, 1991). A Grounded Theory methodological approach is taken in the examination of the problems faced in public IS development. Supporting this approach a case study method, explored in greater depth in Chapter 4, was adopted as the primary means of data capture. Ongoing thematic analysis of the data generated was undertaken during the study's progression to allow for the creation of a series of themes that were later used in the generation of the model proposed in this thesis before its evaluation against secondary data examining other public IS developments.

The case is the result of a collaboration formed with the National Police Improvement Agency (NPIA) to allow for the examination of the Police Portal, a national public IS

development underway within the UK police forces. In common with other Grounded Theory based case study examinations of large problem domains this case adopts an informed approach to the start of its study. A practice confirmed by (Eisenhardt 1989, Bourgeois & Eisenhardt, 1988) is that in the case of such large scales it is useful to have a series of non-binding themes to serve as a preliminary research agenda and provide an initial scope of inquiry which can be amended as the study progresses. For use in this case such initial themes were chosen from the literature review presented in Chapter 2. After an initial consultation and familiarisation with police forces and with the central development team within the NPIA, the initial themes identified from the literature review were refined from generic points to more specific concerns relevant to the Portal as highlighted from the familiarisation exercise and used as an initial research agenda to guide the case study. Proceeding force by force, the system implementations within four regional forces were examined and these themes were refined, confirmed or rejected as new data was collected. Qualitative data gathered from the studies were examined via an iterative thematic analysis approach, extracting patterns and themes as the data collection progressed.

Data collection occurred within both the development team and within regional forces, consisting primarily of semi-structured interviews, observation and document sampling. Interviews were conducted with staff at all levels of the organisation together with document sampling of relevant information as it was presented. Observations were conducted in conjunction with end-users to allow for firsthand study of the system in use in its real operational environment.

The themes developed from the analysis of this data were then synthesised back into the literature to establish a theoretical model exploring how the effects observed interact with each other and the core components of an IS together with how such effects could affect a development's progression. This model was then evaluated through its use in the analysis of secondary data examining a number of past and present public projects.

1.5 Thesis Overview

The next chapter provides a critical review of relevant literature for this research. First exploring the nature of IS failure, critical links to the IS development process are

highlighted. Such concerns are then explored and the many views taken by researchers in their analysis are considered, highlighting existing gaps within the literature. Chapter 3 outlines the details of a case study undertaken in partnership with the NPIA with the aim of filling these gaps in knowledge, outlining the details of the IS project to be studied. Chapter 4 outlines the methodological approaches applied in the examination of the problem domain. Chapter 5 presents the body of data from the Police Portal case study, outlining the systems and processes examined in addition to highlighting relevant themes emerging from the data. Chapter 6 presents the synthesis of this data into a coherent model allowing for an examination of the issues affecting public IS development within strongly regionalised national bodies. This model is then evaluated against secondary data of existing and past public IS projects and further refined. Chapter 7 concludes this work, identifies limitations presented in the conduct of this study and proposes areas of future work for consideration.

Chapter 2
The Anatomy of Failure

2.1 Introduction

This chapter seeks to examine the complexity inherent to the design and implementation of a modern large scale IS and in particular those which are operated in support of national public governmental bodies and initiatives. The nature of the modern IS and its complex integration into its organisational host is first examined identifying the needs of such systems and the criticality of their operation, the dependence on such systems across large corporations and governmental departments. The evolution of Public IS within the UK is then briefly examined.

The concept of failure within the domain of IS is then explored and shown to be ambiguous. The definition of IS failure is demonstrated to be significantly influenced by the organisational context of the failure and the view point of the stakeholders involved. Criticisms of the way existing industrial and public IS have been implemented are then examined and key problems identified within the development practices utilised in such systems. The chapter then adopts a Socio-Technical Systems (STS) perspective in the analysis of problematic areas within IS development. This is illustrated through the examination of past failed projects, highlighting key concerns and relating these back within the context of public IS development.

2.2 Strategic Role of Information Systems

The potential benefits of implementing information systems; increased efficiency, productivity, profitability, decreased costs and enhanced communication (Spathis & Constantinides, 2003; Buhalis, 2004), have acted as a primary driver for their adoption across a wide range of industries and applications. Accompanying this spread of IS there has been a transition from traditional standalone systems that concentrate on one very specific task within an individual business unit. Modern large scale pervasive IS are now more intertwined with critical core business processes across an organisation, resulting in a critical dependence on their proper operation (Kourouthanassis & Giagli, 2007).

The growth and technological progression of the internet into a viable platform can also be seen to have had a profound affect on the implementation and integration of information systems into the core business processes of organisations. The ease of communication afforded by online applications has led to information systems that have extended beyond the boundary of individual organisations. This has allowed organisational and governmental systems to horizontally integrate core functions, determining efficiency and economy of scales for the organisation and its users. An example of such integration is the UK's Directgov portal system (Cabinet office, 2010). Directgov acts as a central repository for citizens to access many government facilities and provides a range of services from non-interactive text advisories, such as the provision of guides explaining tax and foreign travel advice, to interactive services allowing direct online access for submitting applications for a driving licence or a passport.

As a result of these large integrated systems and the consequent sheer volume of data collected and stored across organisations and departments, the introduction of data mining techniques has allowed for the emergence of sophisticated strategic management systems providing a close to real-time view of the state of a business, (Davenport, 1998; Spathis & Constantinides, 2003). The sophistication and timing of this data in turn permits management to respond faster to changes on an operational, tactical and strategic basis than was previously possible with isolated systems and business units (O'Leary, 2004).

2.2.1 Public IS Evolution within the UK

Recognising the increasing success and potential of IS systems in the private sector there has been a concerted push by successive governments around the world to engage with IT and implement it within all levels of government. For the purposes of this examination public sector IS are divided into two categories, those restricted to back office functionality with no public engagement, and e-government systems that seek to allow electronic access and provision of services to citizens via the internet. Back office systems such as the NHS Program for IT (Clegg & Shepherd, 2007), CRAMS probation system (National Audit Office, 2001) and Passport Office systems (National Audit Office, 1999) were designed to increase the efficiency and effectiveness of the non-public-facing business processes of their host organisations,

seeking to improve the volume of transactions that could be handled and to allow a more accurate understanding of information processing within the organisation.

The term e-government was coined to describe the citizen-facing side of public IS. While the term itself has many definitions (Kaylor, Deshazo & Van Eck, 2001; Fang, 2002), e-government can be seen as the drive to embrace IS as a tool to improve communication, engagement, accessibility and service provision between a government and its citizenry. Such services can take many forms, from initial, small-scale, passive websites that provide information and forms, progressing to very large-scale, complex IS. These IS can be observed to be fully integrated with their back-office counterparts, providing full electronic case handling and service provision where entire business processes within government are encapsulated within the e-government IS and are restructured around this new central point of interaction (Cap Gemini & Ernst & Young, 2006).

Within the UK there has been a strong push from central government to ensure that all public services have at least some online presence, be that through static information or more engaged services (ODPM, 2003; Cabinet Office, 2005) with a more recent stronger drive both in the UK and globally to transform these initial offerings from mere information sites to strong interactive facilities, providing full service provision to the public (Layne & Lee, 2001; Cabinet Office, 2005). This requires much stronger integration with back-end IS within the host department. While many of these offerings have been centralised into the direct.gov portal, providing a central point of access to many core government services, the nature of service provision within the UK means that such centralised systems prove difficult to implement when certain services are provided at a regional rather than national level. Within the UK the provision of public services is commonly distributed amongst each of the constituent countries, with local and regional government being tasked with the delivery of many core services, (Olphert & Damodaran, 2007). This results in a complex organisational hierarchy that must be navigated and planned for when engaging in e-government service provision

2.2.2 Public Organisational Differences

Public organisations, like their private counterparts, exist to provide a service or product to the consumer, in most cases the citizens. However, public organisations are observed to differ strongly in structure, culture and motivation. These are factors that must be taken into account when considering the development of an IS within such an environment. The primary difference between the public and private sector can be seen as the controlling factors that have influence on the operation of the organisations. While private companies are subject to the control of the markets, be that via consumers, competition with rival companies or shareholders, public bodies are subject to political control by those in government along with the constraints of the prevailing political will and ideology, (Parker & Bradley, 2000). Many public bodies are observed to possess a more rigid and dominant organisational culture with a strong, defined hierarchy. Such structures are observed to promote adherence to stringent rules and procedures, discouraging innovation, sometimes leading to the self recognition of public organisations being described as risk-averse, (POST, 2003). This is in contrast to the often productivity and efficiency driven cultures that have arisen in the private sector as a result of market pressures to improve profitability, (Parker & Bradley, 2000). The roles of public bodies are commonly set down in legislation, often with significant specific, legal and statutory constraints which dictate their activities. This is in strong contrast to the more unrestrictive approach possible within the private sector, whereby companies are free to operate how they chose so long as they do not operate outside the law, (Murray, 1975).

Internal political pressures are also observed to be greater within public sector organisations. While the private sector has a clear goal of generating increased revenue, the mixed demands of public bodies catering to the wide range of needs of their citizens can result in a more blurred vision for the delivery of such services across the full range of citizen demands. This lack of concise guidance coupled with the more dominant organisational structure can lead to conflict when those within an organisation are unclear on its true goals or the method of their delivery, (Vigoda-Gadot & Kapun, 2005). In addition, while both public and private bodies experience external pressures from outside their organisation, within the private sector these pressures can be seen to be primarily competitive in nature. Competition within the public sector can be seen as a concern, (Vigoda-Gadot and Kapun 2005), as discussed

later in this chapter, however, external pressures resulting from political differences and public demands also place considerable load on a project's development.

Accountability and visibility are also seen as major differences between public and private bodies, (SCOT, 2003; Mulgan, 2000). Private sector organisations are ultimately accountable to their shareholders for the profitability of their businesses. However, public bodies are placed under more rigorous scrutiny with regards to their processes and policies. Public sector organisations operate under guidelines governing fairness, rationality and equal access to public services, (Mulgan, 2000), as well as freedom of information laws which compel government departments to reveal information that would remain confidential within the private sector.

2.2.3 Complexity versus Risk

While the increasing integration of IS is shown to provide many benefits to a host organisation, it also generates complexity, an additional effect on the core areas of the business that enhances the potential for IS failure. With the traditional model of IS implementation, whereby IS were implemented as standalone systems supporting a singular business process, an organisation would have limited potential for interruption to the core business, should one such system fail. The all-pervasive nature of modern IS, with many core organisational business processes encapsulated within a singular IS means that the potential for organisation-wide damage and disruption caused by the failure of an IS can present severe problems for the businesses adopting them (Charette, 2005; Davenport, 1998).

For mission critical applications, e.g. nuclear power plant control systems or emergency service control room functions, the immediate risk posed to human life by IS failure is extreme and obvious (Leveson, 1995). With more and more businesses and governments adopting increasingly complex information systems to manage their core business activities, their smooth operation is now key to their success. If large stock management or public services databases fail to live up to their specification entire organisations can lose time, money and alienate their customers and the public to their service offerings.

While small specific faults within an IS, such as intermittent crashes, can cause considerable detriment to the operators, both in terms of lost resources and impact on business processes, this is reduced by the limited impact of such faults. The true cost of IS failure may be more visible in the number of projects that suffer from a systemic failure of their development processes (Charette 2005) and the huge cost such failures represent to their host organisations. With the strategic role information systems now play within the modern organisation, the efficient, smooth implementation and management of such critical systems must be a priority (Galliers & Leidner 2003).

2.3 What is Failure?

Given the critical nature of such systems it is perhaps surprising to learn of the many examples of fully or partially failed information systems projects analysed throughout the literature. In the review conducted by Taylor (2001), a study of 1027 IS projects within the UK examining the satisfaction of an organisation with its project implementations, 897 (87.3%) of those questioned reported that their projects were deemed to have failed to some degree. This rate is reflected when examining failure on public and e-government projects specifically, (Heeks & Stanforth, 2007) where failure rates can be seen to range from a low of 60% (Gartner, 2000) to a high of 85% (Symonds, 2000). With such a high degree of failure when implementing information systems and the associated financial and organisational toll such failure can take, a critical understanding of the causes behind such failure is crucial in preventing them in the future. One of the primary problems when examining failure and attempting to gather statistics on its occurrence is the actual definition of failure, as no one single definition exists in the literature. (Lyytinen & Hirschheim, 1987).

One of the most basic approaches to this is to look at ways in which projects are judged to be successful. Many definitions exist for such a goal, Wateridge (1998) suggests that there are six key indicators by which the success of a project can be measured; meeting user requirements, achieving its purposes, making the users happy, meeting timescales and budgets and meeting quality standards. Arguably the failure to meet one or more of these success factors could then be presented as a degree of failure within the IS. Other researchers, however, argue against such a simplistic view of failure within information systems. They stipulate instead, the complexity of modern day systems and the number of stakeholders inherent in IS design mean

failure is subjective to the stakeholder who perceives the failure (Fortune & Peters 2005). Another approach argues for a three step performance assessment framework for the analysis of project failure, opting to observe the efficiency and delivery of the implementation process before going on to examine the more management centric views of cost and time Pinto & Mantel (1990). From this, the project team's judgement on the success or failure is sought before finally examining client satisfaction.

In contrast to these views both Lyytinen & Hirschheim (1987) and Sauer (1993) argue that the use of a generic term of 'failure' is too broad a label to apply to the complexities of an IS and instead opt to identify different classes of failure with their own specific definitions.

Failure Type	Description
Correspondence failure	A failure to meet predefined objectives. The system does not correspond to what was required.
Process failure	A failure to produce a system at all or a failure to produce it within reasonable budgetary and timescale constraints.
Interaction failure	A failure in the levels of use or degrees of user satisfaction.
Expectation failure	Inability of an IS to meet a specific stakeholder group's expectation.

Table 2.1 Adapted from Lyytinen & Hirschheim (1987) Failure Classification

The literature interprets the concept of IS failure in a multitude of ways and consensus on a single, clear, objective definition does not exist. An information system's integration within an organisation together with the inherent variability that human factors bring to the design, implementation and use make a clear-cut definition difficult to establish (Sauer, 1993).

It is suggested that many of the difficulties found in judging the success and failure of an IS are that such systems do not exist in isolation from the organisations in which they are implemented. Instead, both the organisation and the IS impact each other in differing way.

2.3.1 Public Systems Failure – the Technical Factor

From a public IS perspective, while each project has its own unique set of problems and constraints, an overall consensus has emerged in the literature when examining why many public systems experience such high levels of failure. Individual studies

differ in their conclusions, however the overriding view taken is that there is a consistent failure to select the correct development model for such projects together with a failure to appreciate the social nature of IS and their development within their host organisation (Olphert & Damodaran, 2007; Clegg & Shepherd, 2007)

Many of the public projects examined within the literature have taken a purely technological perspective when developing IS. Development is treated as a purely engineering pursuit, expecting the host organisation to adapt to the imposition of the IS with little regard for the social, organisational and cultural factors at play.

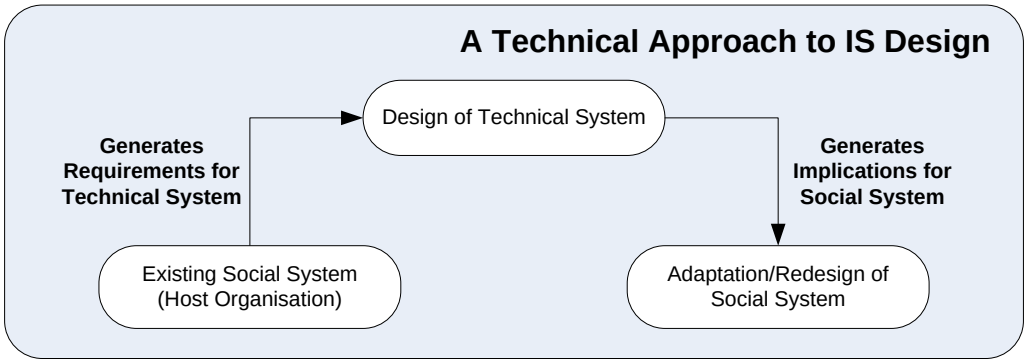

Figure 2.1 Technical Systems Design Approach (Adapted from Olphert & Damodaran, 2007)

This technical approach to systems development, as illustrated in figure 2.1 treats the IS and the organisation as isolated entities with no significant connections between them. It sees IS development as an engineering task with technological problems that must be solved and with the aim of developing a merely physical artefact (Olphert & Damodaran, 2007). The host organisation is expected to provide requirements for this technical exercise and then adapt itself to the resultant system without regard for the impact this may have on the social structures already in place. Social issues, involvement of users and the buy-in of those at all levels within an organisation are considered to be insignificant concerns, generated from an assumption that the organisation will always adapt to the developed IS.

2.4 A Socio-Technical Systems Approach in IS Development Examination

As shown in this section, the adoption of this technical approach, while common for developers coming from a purely engineering background, is now regarded within the literature as outdated and incompatible with the way in which IS should be developed.

A social understanding of the host organisation is now considered to be vital for the successful deployment of any complex IS (Berg et al., 1998). Acknowledging the aforementioned research, this work takes a Socio-Technical Systems (STS) perspective in the examination of key problem areas within IS development that have been shown to have a detrimental effect on a system's final implementation. STS theory argues that any 'work-system' or specifically in the case of this research an IS, is inherently a combination of the social and technological development, the people utilising the system and the organisational culture as a whole (Kling & Lamb, 1999). Recognising an IS as an STS and taking such an approach in its development requires active participation from all those affected within an organisation (Mumford 1993). As shown in Fig 2.2 the system is seen as co-developed along with its environment rather than simply being imposed upon it. No single aspect of the development can be treated in isolation from the other as all are directly linked. IS development is viewed as a process that must occur symbiotically between all components (Clegg, 2000), allowing them all to mature and develop at the same rate, influencing each other and permitting each to integrate without bias or force. Social factors and technical factors are considered equal.

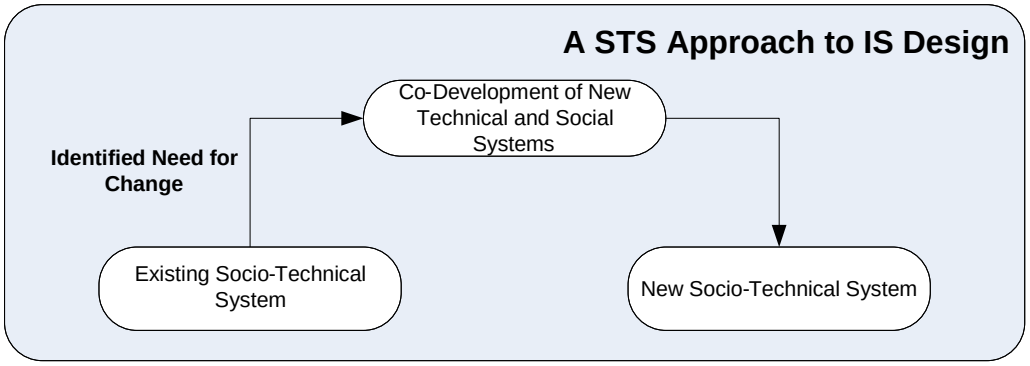

Figure 2.2 A STS Systems Design Approach (Adapted from Olphert & Damodaran, 2007)

Many models of Socio-Technical Systems have been proposed. Each of these models varies in the academic approach adopted in their creation, the number and relationship of their components and the degree of granularity utilised in their definition.

Wilson (2000) takes a personal interaction perspective in his interpretation of the of Socio-Technical Systems model, arguing that systems can be best perceived through the observance of individuals' interactions within the system. Placing the person at the

centre of his model, he defines eight core interactions, which in combination with the person form the core of the STS:

- Cooperation interactions (other people)
- Organisation interactions (structure, policy and roles)
- Logistics interactions (supply chain)
- Setting interactions (environment)
- Task interactions (goals of artefact use, loading)
- Interface interactions (hardware and software links with artefacts)
- Contextual interactions (society, finance, politics)
- Temporal and spatial interactions (remote agents)

Carayon & Smith (2000) take a Balance Theory approach in their description of Socio-Technical Systems. Such an approach examines the working conditions for individual actors within these systems and how positive and negative effects of the system's operation can be balanced in order to increase individual motivations. Differing from the Wilson (2000) model, each of the five core elements identified is seen to be interacting with each other rather than acting purely on the personal component of the system. The five components of the Carayon and Smith (2000) model are shown as:

- The Individual
- Tasks
- Tools and technologies
- Physical and social environment
- Organisational conditions

Lyytinen & Newman (2008) take a change perspective in their development of a STS model for information systems, highlighting critical components of an information system, which need to develop and change in synchronicity with each other in order to manifest good development results. Within their model four key components are identified:

- Technology (development tools and technical platform)
- Actors (users, managers and designers)
- Task (goals and deliverables)
- Structure (project organisation and institutional arrangements)

Differing from these generalised models the Office of the Deputy Prime Minister (ODPM), ODPM(2003) argues that a more specific and focused STS model is required when examining the issues concerning e-government developments at a local level. In their investigation of local e-government deployments they identify four key areas, each nested on top of the next:

- Technology
- Business Processes
- Working Practices
- Public Participation

Continuing this more specialised focus, Sittig & Singh (2010) differ from the more people-centred approaches illustrated above through their adoption of a technological approach to the examination of healthcare based IS. They present the argument that the technological aspects of systems within the healthcare context and the interaction of people with these components require more granularity and exploration than other STS models provide. They outline eight components of their systems model:

- Hardware and software
- Systems content
- Human-computer interface
- People
- Workflow and communications
- Organisational policies and procedures
- External rules, regulations and pressures
- System measurement and monitoring

As shown, there are many differing perspectives from which to consider the components and key features of a STS. With these, come differing views on the granularity that is adopted, how many components can be isolated and how they link and interact with each other. When examining IS development concerns as a whole, a more generalised STS model is required rather than those already described. While these models are valid for their examination of specific concerns within the contexts of their chosen perspectives the specificity of the scopes used in their creation limits their use when examining the generic developmental concerns from a wider perspective. For the purposes of the following sections investigation into the specifics of these concerns the more generalised Piccoli (2007) STS model has been adopted.

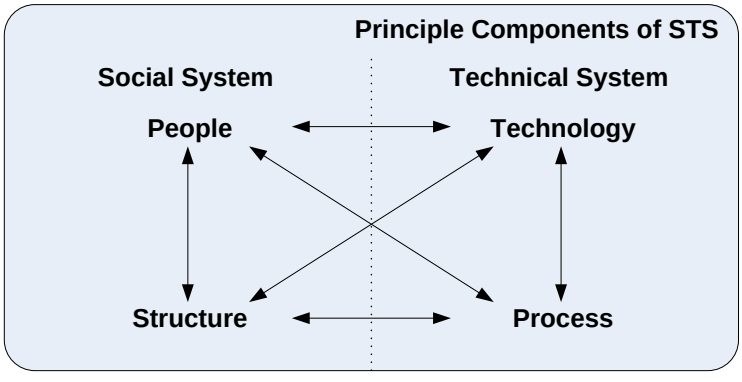

Figure 2.3 Principle Components of STS (Piccoli, 2007 pg 25)

In adopting this generalised model of a STS, as illustrated in fig 2.3, an IS is broken down into four principle components. *Structure* and *People* represent the social components of the IS and *Technology* and *Process* the technical components.

The *people* component represents the individuals and the groups involved in the use and development of an IS. It encompasses such stakeholders at all levels and degrees of involvement from end-users and managers to project leaders, developers and consultants. This component encompasses their skills, beliefs, attitudes, bias, and preconceptions and their willingness to use and work with the IS. In contrast with the approach adopted by Wilson (2000) the *people* component of this model is considered equal to all others rather than placed at the centre. With reference to public systems development, members of the public are considered, as will be discussed later, to have a considerable impact on such a system's design.

Structure encompasses the underlying design of the organisation, referring to its governance and internal political organisation. Structure affects the relationships between components together with how they communicate and interact. Of particular note, given the subject of this study, is the absence of a defined structural component within the ODPM(2003) model, of all the models examined it was unique in this fact. While the model recognises the need for increased communication across its components, a structural component is not seen to be significant within the local e-government domain. This is a view that will be challenged in the progress of this investigation.

Technology embodies the physical hardware and software chosen in the IS development. It represents the technological choices made and the reasoning behind these, together with the limitations such choice impose upon a development.

Process represents the underlying business processes within an organisation. It includes those embedded within the IS, those interacting with the IS and those processes that occur around the IS. Within both of the specialised models examined above (ODPM, 2003; Sittig & Singh, 2010), business processes are examined with increased granularity. Splitting these actions into more refined components highlights their importance and effects on the system in question. It will be observed that as a

result of the often devolved authority allowed in the regional implementation of national services, similar services are often provided through the adoption of radically different business processes.

Of note in the Piccoli (2007) model is the strong emphasis placed on the interaction of the individual components. The model contends that no one component acts in isolation and that any actions or changes in one component have a profound result on the others. Given the high degree of interconnectedness between these components it would be therefore reductionist, if not impossible, to examine concerns within the IS development lifecycle in isolation. As is stated, each component of the model should be considered of equal value and importance within the system.

2.4.1 An STS Perspective on Issues in IS development

An examination of problems encountered in existing industrial and public IS projects from a STS perspective allows the identification of the components at fault within the failing system and a better understanding of the relationships and knock-on effects such problems might generate. The next section examines existing literature on a number of common failures in IS development, both public and industrial. Following the discussion of the STS components above, the causes of problems within these projects are highlighted and indicatively mapped onto the adopted model, as shown in figure 2.4. This has been done in order to illustrate their perceived relationship with the social and technical sides of such systems.

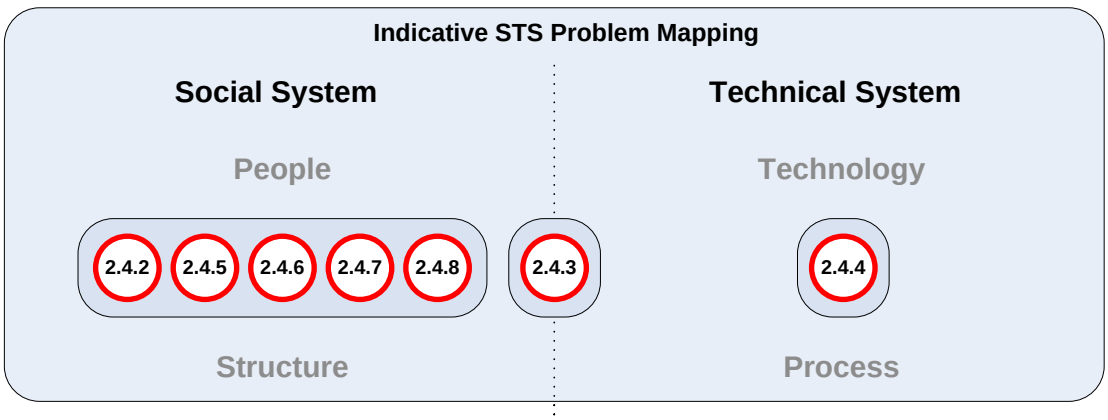

Figure 2.4 Indicative Problem Mapping within the STS model (Adapted from Piccoli, 2007)

2.4.2 Leadership, Management and Planning

As seen in a large number of previous examinations of IS failures a lack of clear leadership and business commitment coupled with indecisive management can be seen to have a considerable bearing on the final outcome of an IS project (Lederer & Sethi, 2003; Basu et al., 2002). As seen in the case study of Akkermans & Van Helden (2002) examining a partially failed Enterprise Resource Planning (ERP) system within the aviation industry, business commitment to IS development and a strong unified leadership are show as decisive indicators of a project's success or failure. Ultimately people are responsible for the control of the other components within a STS. As seen in this example, when the top management did not understand the motivation behind the IS implementation or did not see how it was of benefit to their organisation, other parts of the development were neglected. The involvement of key personnel, with specific domain knowledge, was restricted and the system's initial development was compromised as a result. Without the support of all layers of management within the organisation key requirements were missed.

In addition to the leadership and motivational roles that management play as a critical factor affecting the success or failure of a project, they also have a role in conjunction with the developers as core planners behind IS implementation. This can be expressed in both financial and organisational terms. Modern large scale IS developments are often long term, resource-heavy projects that require detailed planning to assess and mitigate risks that may occur during their development. The nature of a business' requirements from a given software project may change throughout its development as a result of external commercial pressures, costs may increase, legislation may change and availability of external resources may alter. Inability to adequately plan for such deviations can have a deleterious effect on the ongoing development of an IS, ultimately leading to its failure (Sauer, 1993). While cost overruns are a near universal occurrence in most business areas, the inherently dynamic nature of project development coupled with the use of innovative and sometimes untested new technologies leaves IS developments in considerable danger of exceeding the confines of even a well mitigated budget. The severity of these overruns can be seen in the many examples of failed public and private IS illustrated in Charett (2005) and Ewusi-Mensah & Przasnyski (1991) highlighting the large percentage of projects that, while

coming close to attaining near full functionality, are abandoned due to the financial strain placed on the commissioning organisation.

2.4.3 Failures in Requirements Capture

Strongly linked to the issues of poor management and planning are the failures in the requirements capture process leading to illogical or unrepresentative requirements for the IS to be implemented. Of particular note is the significant level of occurrence of this type of failure within Taylor's (2001) work, where such a concern was raised in over 70% of the 1027 projects studied. Directly linked to issues of poor management and leadership is that of a failure to adequately understand the business case and to define the scope for the project during the stage of requirements capture. Without a well defined scope, projects have no true focus around which to adequately examine and refine an accurate requirements specification. This is seen in the failed project case highlighted by Buschmann (2009), which observed a project's attempt to create a common platform to unify processes across three different logistics industries. In the definition of such a large project scope assumptions were made in respect of the similarities of function between these industries. These scoping assumptions were proved incorrect and this resulted in the generation of a large and conflicting requirements set that ultimately could not be reconciled.

A lack of proper stakeholder identification and engagement in the requirements capture process can also be shown to have a profound effect on the outcome of the development process. As seen in the initial stages of the Cambridge University CAPSA project, (Fortune & Peters, 2005) a failure to engage both the end users of the system and middle management responsible for the technical aspects of the system resulted in these groups demonstrating strong opposition. It was felt that the system was unrepresentative of the true needs of the organisation. CAPSA failed to provide many of the accounting functions requested by its end-users and presented an interface that was illogical and less efficient than the use of manual in-house systems.

Projects may have well scoped and defined requirements at their start, however organisations are dynamic entities, facing external pressures and changing needs that can impact the validity of the requirements which were captured at the start of the development process (Kiel et al., 1998). This requirements drift has a strong part to

play within IS failure. If such change processes are not managed and integrated well, the project being implemented, while meeting its original specifications, can fail as a result of no longer being representative of the business needs.

2.4.4 Process Modelling

Strongly linked to the issues of inadequate requirements capture is the failure to adequately understand and represent the business processes that will be encapsulated within such IS together with the system's interactions with its surrounding environment, otherwise known as process modelling. Adequate sociological understanding of the complex processes taking place within an organisation is crucial to the success or failure of an IS development. Without such knowledge high functioning systems are unlikely to be created, as can be seen in the study of Berg et al. (1998). This study of an electronic patient records system illustrates the importance of balance when attempting to formalise existing work processes within a written specification. Practices within an organisation rarely follow exactly the written procedures dictating their implementation, instead procedures and tools are often modified by users to better reflect their perceptions of the goals they wish to achieve (McCarthy, Wright & Cooke, 2004). Given that implemented processes may differ substantially from those envisaged in planned documentation, observations must be conducted rather than relying on existing documentation outlining the processes in place. Otherwise, systems may fail as a result of being based on false assumptions of how processes are performed.

Overly simplified representations of processes, once embedded within the IS, may hinder the end user. Berg et al. (1998) recite their experiences of a hospital in transition to a new electronic patient records system. Workers who were accustomed to a more dynamic work environment, where notes were taken on an *ad-hoc* basis, resisted attempts to formalise the traditional note taking process into a more rigid, structured system where preconfigured and pre-coded entries were mandatory. It was felt that such systems lost many of the subtle nuisances presented through free text input, potentially impacting the level of care provided to patients.

2.4.5 Communication

Spanning all of these issues is that of poor communication, which has an underlying role in many of the causes of failure outlined so far. Given the significance and impact of its contribution to these issues, poor communication can be seen as not only contributory to these failures but as an issue in its own right. The complex nature of IS development and the many individuals and groups involved in the development of an IS necessitate a high degree of co-ordination and communication between the individual groups, Schwalbe (2000). The nature of business processes as interfaces between individual units of an organisation's structure results from them being inherently communicative processes. Without adequate involvement of all those people involved in their operation there is a strong risk of user rejection (Krcmar & Lucas 1991). Inadequate communication between management and developers results in poor aims and objectives, inadequate communication between management and end users results in a lack of acceptance of incoming change and trust of the development team. Given the complex nature of such systems it is essential that adequate communication provision be made in order to ensure that people within all levels of an organisation can *'understand and accept the change* process'(Teo & Ang, 2001, pg462*)* and that internal processes and culture are allowed to adapt concurrently to the IS implementation and development within the organisation.

This is further complicated by the fact that many people's job functions are no longer isolated to one department. People now work across geographic, organisational and cultural boundaries (Friedman, 2005). The expansion of processes across these boundaries increases the likely number of stakeholders for a given project together with the needs and difficulties of communicating with this increasingly disparate stakeholder group. Ensuring the identification of all of these collaborations can present a difficult task to the system's developer. The increasing complexity of these systems and the expanding nature of the processes within them elevates the level of domain expertise needed to construct such systems and increases the need for communication and collaboration with those involved in controlling the underlying business processes (Carayon, 2006).

2.4.6 User Acceptance

User acceptance is also seen as a key problem in the development of IS. Given that it has been discussed above that user involvement is essential for the proper definition of requirements and the true understanding of business processes, user opinion of the final implemented system as the ultimate operators of that system has a strong bearing on its final fate. Resistance to change and rejection of an IS can be seen primarily as a result of users feeling a system is of no use or an active threat to them (Lucas 1984). The perceived usefulness and the ease of use of a system are key factors in its acceptance. Issues of user acceptance can also be drawn across the line of voluntary versus mandatory usage of such systems. Brown et al. (2002) conducted an examination of the case of HBC, a bank holding company, seeking to unify the software and hardware utilised across its network of affiliate banks. It was observed within this case that the mandatory implementation of IS may be seen by some users as a loss of control or power or the weakening of autonomy and, therefore, treated as a threat to be resisted rather than a system to be welcomed. From a public IS development perspective where the public may be the ultimate end-users of such systems, their acceptance and adoption of provided technology are observed to be problematic. As seen in numerous examinations of e-government adoption Belanger & Hiller (2006), Carter & Belanger (2005) and Hung, Chang & Yu (2006), privacy and trust are key factors in the acceptance or rejection of e-government services by the local population.

2.4.7 Public as a Stakeholder

Of particular interest within public information systems is the consideration of the public as a stakeholder in the IS development, be that as a direct stakeholder with access to the system, such as in e-government programmes, or a citizen whose data may be held in such a system. Olphert & Damodaran's (2007) study of three e-government projects highlights that clear and concise engagement with the public has a string of proven benefits, both in assisting the clarification and design of a system as well as acting as a strong catalyst for wider public adoption and trust. However this has proven to be a very difficult process for developers to manage. Principle among this difficulty is the undefined and wide demographic nature of the public when classed together as a single stakeholder. Each member of the public differs from the next, they come from different cultures and backgrounds, different socio-economic

situations and will have differing needs from an IS that is presented to them. Ultimately it is these divergent needs that have to be catered for when developing public facing IS. Adequately engaging with and capturing these needs is essential to develop a system that both reflects the needs of the public and allows them to feel empowered by the development process. ODPM (2003) provides an example of a local council which developed a credit card possessing system for online payment of council tax. While performing technologically to specification, there was no use or need for the system from the public as the cheaper direct debit system was already in heavy use. Without such public engagement, systems can be developed that only consider management's view of the problem, this can generate solutions for problems that may not actually exist. That said, actual efforts to engage with the public can also prove problematic. Many projects have found requirements elicitation from members of the public to be hard to manage and with limited success. As seen in (Damodaran et al., 2005), an examination of e-government implementation within six UK local authorities, the developers experienced considerable difficulty in maintaining engagement and eliciting requirements from citizens. Local authorities felt there was a lack of guidance and direction from a national level. As seen in the example of the NHS Programme for IT's (NPfIT) deployment of a national electronic patients records system (Cayton, 2006; Leigh & Evans, 2006), a lack of adequate public consultation and transparency when addressing issues of electronic patient records led to a public backlash. The public, fearing the spread of very personal data at a national level felt alienated and powerless to control their own information, resulting in considerable changes to the system already under design.

2.4.8 Political Environment

The political environment in which an organisation exists can also be shown to have significant negative effects on the implementation of IS, especially within in the public sector. As highlighted in (POST, 2003; Butler, 2004) public projects are often subjected to a higher visibility than their industrial counterparts together with politically driven and restrictive time scales. Large programmes such as the NPfIT can form substantial parts of a government's agenda (Clegg and Shepherd, 2007) and face considerable pressures to deliver on time and on budget. In addition, media pressure on politicians when projects go wrong or over budget can force them to close the projects down prematurely.

As seen in the Libra project, a national program to unify the IS of the UK Courts System, (Fortune & Peters,2005), the lack of a political mandate to force change is also a problem within Public IS development. While the implementing office in charge had the powers to force lower courts to adopt new technology they did not have a mandate to force the local courts to centralise and unify their business processes. This created a range of conflicts across the courts and stirred political resentment as courts felt their autonomy was threatened.

The internal political landscape within an organisation is observed to have a profound effect on the eventual outcome of the IS implementation. Subtle political manipulation by key actors within an organisation can hold the potential to either encourage others to participate in the development or to take the opposite position, seeking to derail progress if the actors within an organisation feel it is of little benefit to their political goals (Kling & Lamb, 1999). Recognition of these key actors at an early stage is an important step in harnessing their influence for the good of a project, ensuring that the benefits of a development are explained and using the influence of these actors to assist in the cultural changes that must happen alongside an IS development.

2.5 A Common Social Bias

In reference to figure 2.4 amongst the number of IS developmental issues examined in the execution of this review it is noted that the majority of such concerns are situated towards the social side of the chosen STS model. This corroborates strongly the concerns highlighted from the literature, (Olphert & Damodaran, 2007; Clegg & Shepherd, 2007), at the beginning of section 2.4 that many existing projects are taking a technical focus in their implantation of IS. The primary failure of the IS implementations discussed above is that of a failure to recognise the inherently human and social nature of information systems development and usage. Systems development in these examples was seen as a process to be completed in a very technically detached fashion, whereby the development of an IS is considered as a purely technical effort that is conducted in isolation from those that will eventually use such a system. Through a failure to recognise the complex social environment that modern information systems occupy, the many social factors present are sidelined or

ignored completely, resulting in a substantially increased chance of project failure. Principally the issues previously observed can be broken down into three main classes:

- A failure to adequately identify and communicate with all the relevant stakeholders within an organisation
- A failure to proactively engage all stakeholders fully in all stages of the development process
- A failure to fully understand the nature of the host organisation and control the political influences and bias present in many of the projects examined.

The criticality of the need for adequate communication between all parties and the benefits such communication brings are clearly illustrated in a number of studies. The link between the level of communication between parties and the final success of the project is clear. Increasing levels of communication have a profound effect on the probability of an information system's successful deployment (Keil & Carmel, 1995). Mistakes and misinterpretations can be caught at a much earlier stage of the development cycle, preventing the build up of invalid and erroneous requirements.

The problems encountered through a lack of end-user participation extend this need for adequate communication. While ensuring communication between stakeholders is shown to be an effective way to partially mitigate many of the failings identified, pro-active engagement of the end-users at all stages of an information systems development is an equally, if not more important, factor determining the success or failure of a given project. As identified in many of the concerns above, without this active engagement with, and involvement of the end-users, systems that are technically fit for purpose, meeting all the specifications often fail post implementation, as a result of rejection by the end users. Without the necessary engagement of such groups, the true purpose and need for an IS cannot be adequately explained leaving users feeling alienated and threatened. Through active engagement and integration with the development process, users can be made to feel like a part of a project, giving them empowerment and ownership over aspects of the project and greatly reducing the chances of rejection in the later stages of implementation (Gefen & Ridings, 2003; Wagner & Piccoli, 2007). In addition to this, the management of internal and external politics are also shown as key contributing factors in the failure

of information systems. With specific reference to Public IS development the external political pressures placed on a development can be severe and may lead to project disruption and abandonment.

2.6 Under-representative View of Public IS Development within the Literature

In the process of conducting this review it was noted that literature studying the development side of public IS implementation is sparse in comparison to its counterparts in the private sector. Whilst many studies of e-government information systems exist, the large majority of such studies focus their attention on problems occurring at the public interface with such systems and their adoption and use by citizens. There are few examples of studies that examine the specific problems and challenges faced when building general IS projects within the public sector environment across their entire development lifecycle. By their very nature e-government projects' primary focus is the reengineering of business processes and technology to reorganise communication with the public through a technological interface. As such, this will have ramifications for the development methodologies used in such systems. In addition many of the case studies reviewed adopt a post-failure approach in their examination of the problem domain, relying on historic accounts and second hand data rather than studying the failures as they occurred.

Back-end systems without a substantial public facing interface seem to attract less interest in the literature, and when they are studied, the focus is on the impact the system had within the organisation rather than lessons learnt from the development process. This is especially true when reviewing Public IS failure within the UK. While a limited number of high profile public IS failures are examined, it was noted that a number of failed projects examined by the National Audit Office (NAO) have gone unexamined within the literature to date. As a result, the literature is somewhat deficient of a true exploration of public IS development concerns, especially examinations of those public IS that are not so public facing in nature and which focus on the development of back end processes supporting a department's function rather than a specific focus on citizen engagement. With the exception of the ODPM model examining STS from a local e-government perspective (ODPM, 2003), there is a lack of a tailored STS model looking at the development of IS from a public organisation perspective and the specific characteristics and challenges faced.

2.7 Summary

This literature review has explored the history, growth and adoption of IS. It has illustrated the nature of the technologically-focussed methodological approach commonly adopted in their development. Through the adoption of a generalised IS STS model, the commonly observed causes of failure have been examined in light of the core components of such systems and found to be heavily clustered on the social side of the model. In the process of conducting the literature review it was noted that while many public systems have been studied within the literature, the majority of projects examined are that of e-government systems which an lack of investigation of the effects backend support systems have within public bodies. Recognising this gap, the next chapter sets out the details of a case study conducted in collaboration with the National Police Improvement Agency (NPIA) in the examination of factors effecting IS development a policing context.

Chapter 3
The Police Portal Project

3.1 Introduction

This chapter seeks to provide information on the public organisation and IS selected for examination within this study (UK Police and the Police Portal), to better equip the reader with knowledge of the target case before a discussion on the methodology implemented in this research is illustrated in Chapter 4. The reasons for this case's selection will be discussed before an in-depth examination of its purpose and operation, the motives behind its creation and the illustration of the context in which the chosen IS operates. The information provided within this chapter is the result of initial observation and document sampling conducted as part of this study.

3.1.1 Police Collaboration

In support of the aims of this study, a research collaboration was sought with a UK public body in the process of implementing one or more, large scale national information systems. This collaboration was designed to allow for a full examination of the process of systems development, observation of its progress and issues that occurred during such a systems development. The information gained from such a study would then be used later to expand upon existing public IS development knowledge. For the purposes of this study the National Police Improvement Agency (NPIA) in conjunction with the UK Police forces were selected as the primary public body participants. The NPIA was selected as it can be seen as a clear example of a government entity with a diverse IS environment with a wide selection of stakeholders, both within and external to the core organisation. The NPIA also presents a number of unique opportunities for the study of organisational factors in IS. Explored in greater depth later in this chapter, the hierarchical structure of the police in the UK is more granular and fragmented than other government divisions, with each of the 53 regional forces, to a large extent, existing as unique entities with their own organisational culture, and with sole control over their individual IT infrastructure. The NPIA mission is to provide critical national services, build capability across the police service, and provide professional expertise to police forces and authorities (NPIA, 2011) developing national information systems and standards,

but with the added constraint of a lack of executive authority over the 53 UK police forces. The NPIA faces considerable challenges, as it has no mandate to impose IT systems onto the forces and must work within the confines of such a heterogeneous organisational environment in order to implement its solutions. Consequently the forces' willingness and acceptance of proposed national IS developments can be seen to represent a significant factor in the ultimate success or failure of such systems. In addition, the issues of systems integration at this level become a serious concern. As explored in greater depth in the following sections, the independence of the individual forces has resulted in varied and individual IT infrastructure choices by each of the 53 forces. This results in a complex IT environment in which to implement a national scale IS as it must contend and be compatible with the many different underlying architectures at each force.

The diversity presented across each of the regional forces creates additional opportunities for a more in-depth examination of the issues under study. Given the unique geographic challenges, crime statistics and historical background of each force, a diverse range of organisational cultures, skill levels and degrees of actor buy-in and participation exist among forces.

This unique structure also serves to improve the validity of the resultant analyses. The independent autonomous structure of the forces provides the opportunity to observe the reaction of different organisations that, although sharing a common overall activity, policing, have different cultures, structure, processes and to some extent legacy systems in place. Such a situation allows for the collection of a larger volume of data across a wider range of organisational environments that would otherwise have been possible, improving the triangulation of emergent concepts across the forces and the organisational boundaries between NPIA and the individual forces. Common areas of concern can thereby be examined which provides a richer understanding of these areas from a number of different organisational perspectives and motives.

3.1.2 IS Selection

The IS selected as the primary focus of this study was the Police Portal. A suite of communication tools designed to improve engagement between police and citizens,

intelligence gathering and online reporting of non-urgent crimes. The case was selected for a number of reasons. The original project was in the mid to final design stages of development when first engaged by this study, permitting the research to follow it from this stage through to its ultimate implementation. It was a very large scale IS, covering many facets of the Police's organisational structure, it had interests from a large number of stakeholders, (local, regional, national, political and public), a common politically-driven motivation and it was to be deployed nationally. The project was initially funded from a central government grant, however forces refused to pick up the cost of the system once it was deployed and the Portal system in its initial incarnation was terminated. The NPIA with a new change of leadership, foreseeing this collapse, commissioned the creation of the ultimately abortive Portal 2, a new generation of Portal designed to replace the failing system. The requirements engineering stages of Portal 2 were conducted along side the final implementation of the original Police Portal system. This further study of Portal 2 allowed for the expansion of this examination into the requirements engineering stages of development and permitted all areas of the development cycle to be covered.

While ideally a large number of projects would have been chosen for examination in this study, time and access considerations place a constraint on the number of projects that could have been realistically selected for examination. As a result the Portal was chosen as it allowed for the most detailed evaluation of as much of the development lifecycle as possible and presented a complex national system that could be followed through different stages of development and implementation.

3.2 UK Police

The following sections will illustrate the organisational and control room environment within the UK Police and at the NPIA. Organisational structures and hierarchy will be highlighted and the interactions and relations between the various national governing bodies responsible for the implementation of policing in the UK will be discussed before the examination of the challenging IT environment across the UK Police forces.

3.2.1 Organisational Structure

While at a local county level the 53 Police Forces that make up the UK Police have a clear hierarchy with a chief constable in charge of a force, delegating responsibility to his or her subordinates, at a national level the oversight and governance of the forces and the responsibility for implementing national systems becomes opaque. Under the Police Act (1996) the Secretary of State (for the Home Department) represented by the Home Office has the power to set the long term strategic vision of policing within the UK. However in practice, these responsibilities fall to a coalition between the Home Office, as the representative of government and the Association of Chief Police Officers (ACPO), as the representative body of all the forces. The latter is chaired by the head of the Metropolitan Police, as the largest force in terms of population covered. While both have the power to suggest and recommend changes to the way policing is implemented at a regional level, each force is regarded as an autonomous entity and such change can only be implemented with the consultation and agreement of its chief constable. Each force is also responsible to its Local Police Authority (LPA), an elected group of local council members and private citizens responsible for the strategic vision of the force and ensuring policing meets regional needs.

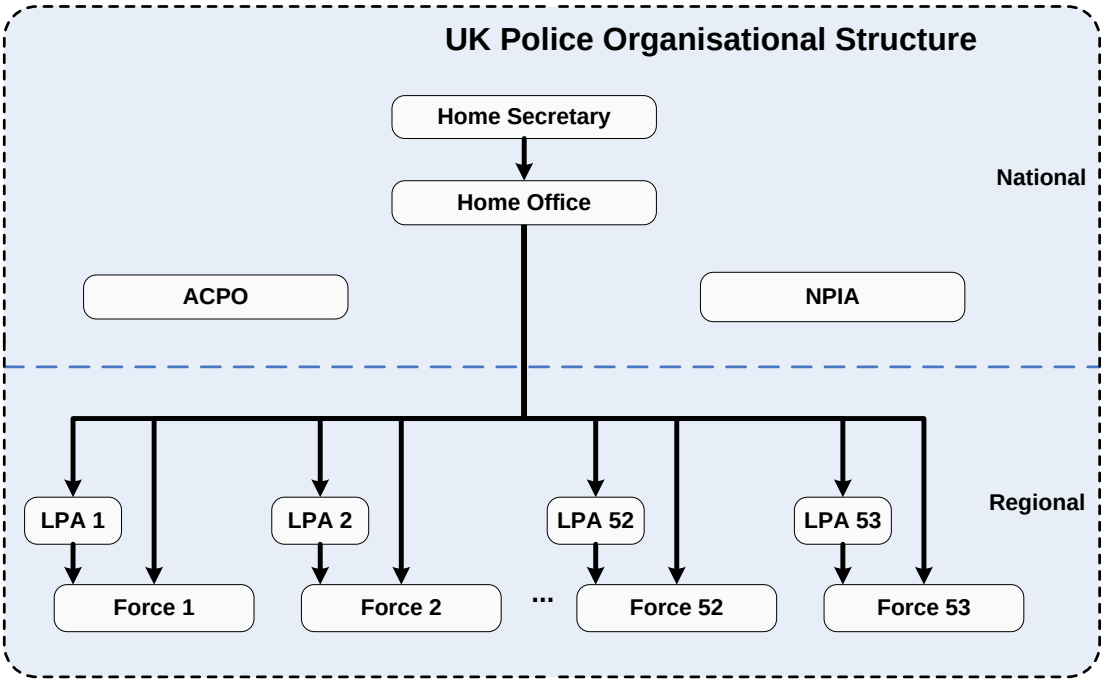

Figure 3.1 UK Police Organisational Structure

Sitting along side the Home Office and ACPO is the National Police Improvement Agency (NPIA), formerly the Police Information Technology Office (PITO), the established purpose of which is to provide expert advice to forces on information technology, information sharing and training across a wide range of law enforcement specialties. When requested by the Home Office or ACPO, it is tasked with the responsibility for the development of national IT systems for the police such as the Police National Database (PNC), IDENT1 (the national finger print database) or CJX, the Criminal Justice eXtranet. However, while it is responsible for the development of these systems, it has no mandate or legislative power with which to impose the adoption of these systems upon forces. It is up to the individual forces to cooperate with the development of systems as much or as little as they wish, and to decide how to implement the technology provided within their force.

3.2.2 IT Infrastructure

Coupled with this lack of ability to mandate change across forces is the absence of a homogenous IT environment within each individual force and at the national level. While the NPIA has the ability to coordinate the technology implemented for national projects on a national level it has no say over the IT systems purchased or implemented within each force. The near sovereign nature of each force, the unique crime situations present in each county, and their ability to independently select, design and implement IT infrastructure has resulted in a situation whereby nearly every force is running its own unique information systems, using differing hardware and software solutions to solve the different problems within each force. As such, it makes the development of any national solution difficult. The NPIA has to contend with a large number of disparate systems with which it will have to interact, all slightly differing from one force to the next.

Together with the national, politically driven initiatives for the development of policing systems, a number of forces seek to innovate and are often seen to be ahead of national political will, experimenting with new technologies at a local force level as they become available. This allows some forces to become test beds for technology that may later be considered for a national deployment. However, it can also lead to the political tensions identified later in this study, whereby forces feel that their innovations are manipulated and taken out of their control. In addition this can result

in forces feeling that technical specifications are too generic and not fit for their individual policing needs.

3.2.3 Organisational Priorities

Similar to the disparate IT setups present across the forces, are the organisational priorities established by each of the forces and the national bodies of ACPO, the NPIA and the home office. While all branches share the common goal of assisting in the reduction and prevention of crime, no formal unifying organisational aim is present. The Home Office agenda is set by politicians and as such is very fluid and dynamic, often generated in response to public opinion. ACPO, as a neutral, non-politically affiliated body, has a more isolated approach to the establishment of its goals and acts as a forum for all the heads of forces to establish UK wide policy that can benefit the majority of forces, as formed by consensus. The individual forces however are left to knot the differing priorities given to them at a national level, with their own regional and local priorities covering the types of crime most critical in their locality. There are considerable differences in these across all of the forces studied. With the exception of the Scottish forces, which stand alone as a group of forces that fully cooperate and align their resources and priorities as a national group, the remaining British forces can be seen to adopt varying degrees of cooperation and isolation in their approaches to policing. As highlighted in the Bichard Report (Bichard, 2004) and as observed during this study, individual forces are sometimes reluctant to engage with their neighbours; the gathering and sharing of information and intelligence across borders is noticeably difficult to achieve. This is often viewed as a result of institutional competition, conflict and a lack of homogenous business processes between forces.

3.3 Police Portal

As previously stated the project selected for study in the research was that of the Police Portal, a now redundant suite of communication tools implemented for the UK police service by the NPIA. The suite was developed for the purpose of allowing more efficient use of mobile, email and web-based communication technologies with the public, resulting in greater intelligence gathering abilities and a reduction of volume of calls for the reporting of minor crimes. It was based around 3 core systems, Online Crime Reporting, Public Message Broadcast and Content Management System,

which, when merged, formed what became known as the Police Portal. This study joined the Police Portal in its later stages of development and followed the system from this point throughout its implementation and rollout to a number of representative forces across the UK.

3.3.1 Police Portal Inception

The Police Portal arose as a result of a fundamental shift in the way policing was conducted in the UK. Prior to 2000 policing in the UK was conducted primarily in a reactive fashion, only responding to incidents after they had occurred. In 2000, Centrex, the organisation responsible for police training, published a document known as the National Intelligence Model (NIM) (NCIS, 2000). The NIM outlined a new business model for the conduct of policing within the UK, known as intelligence-led policing. With this new model policing would be pro-active, using intelligence gathered from numerous sources (e.g. the public and external agencies) to identify crime drivers and patterns, ultimately highlighting opportunity to preventing crime before it could occur.

In support of these aims the NPIA (known as PITO in 2000), was commissioned to investigate the ways in which information technology could be used as a driver for this new intelligence-led approach. As a result of this investigation, in 2001 PITO released the national e-policing strategic framework (Centrex, 2001). This document outlined the overall national strategy for the integration of information technology in support of the new intelligence-led business model and pushed for a citizen-centric approach in modern policing. The Police Portal, as it would later become known, formed one of the core initiatives outlined in this framework and with strong political backing the Portal's development was set as a priority for PITO.

While the concept of the Portal had existed on paper for a number of years the physical commissioning of the project occurred very quickly. In response to external events, primarily the bombings of public transport in London in 2005 and the resulting political pressure to better engagement with the public, the Portal was thrust to the attention of the NPIA. As a result of this external political pressure the development and lead-time on the Portal was considerably shorter than would be

expected for a project of this size and as a result had a significant impact on how the project developed.

3.3.2 Prior Systems

As a result of the each force's ability to decide its own infrastructure and local needs, a number of forces had recognised the need for increased communication prior to its arrival on the national agenda. This resulted in a mixture of forces developing their own versions of a portal system prior to the launch of the national Police Portal. The functionality of these regional systems varied considerably across the forces and in comparison to the Police Portal with some local functionality exceeding that of the national system. At the time of the Police Portal's inception a number of these systems had reached full implementation along with a number very far along the development process with forces having invested significant resources in their development. While the national Portal team were keen to examine these systems and learn from their development, a number of conflicts arose from these early efforts that are discussed in Chapter 5.

3.3.3 Police Portal Functionalities

As stated previously the functionality of the Portal can be divided into the three main services offered, Online Crime Reporting (OCR), Public Message Broadcast (PMB) and Content Management System (CMS). From the public facing side, all Portal functionality was presented to the user through a single website, police.uk as shown in figure 3.2.

Figure 3.2 Police Portal functionality as presented through police.uk

From the police perspective, operators interaction with the system was a more complex process whereby all three subsystems were treated as separate entities as illustrated in figure 3.3.

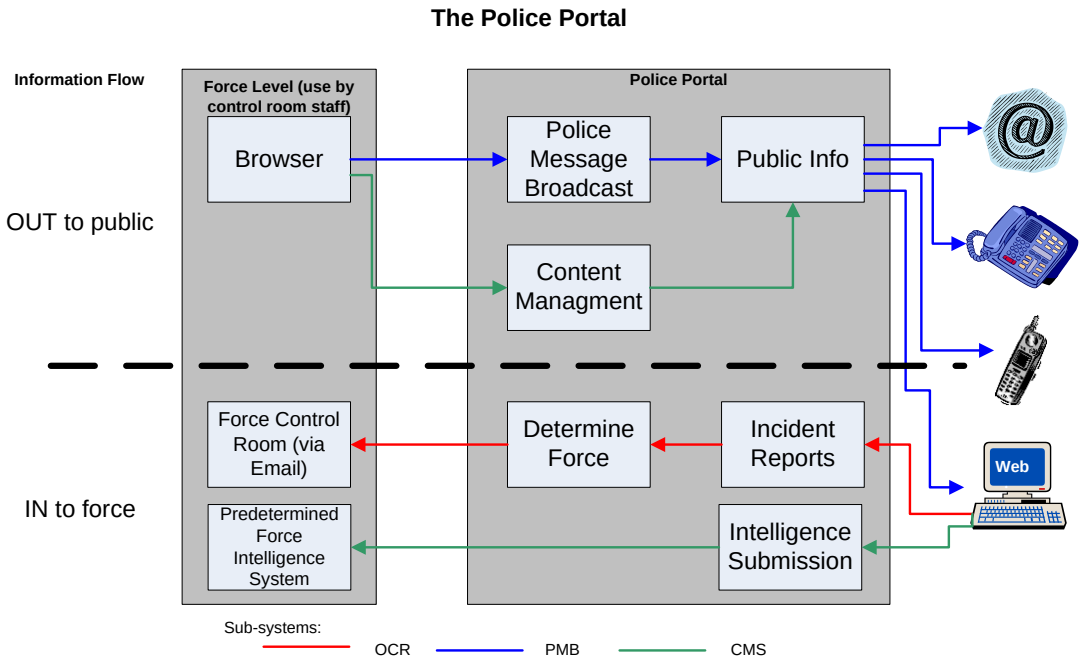

Figure 3.3 Police Portal functionality

Explained in more depth below figure 3.3 illustrates the interaction of the three Portal components. Police message broadcast and content management systems allowed for the outwards communication of information to the public via the Portal website, telephone, and email. Inward-bound communications arose from the online submission of crimes from the online crime reporting system and the public response to intelligence requests from the content management system.

- **Online Crime Reporting**

The OCR system, the most heavily used of the three systems, was designed with the intention of allowing members of the public to report non-emergency and hate crime through an online portal.

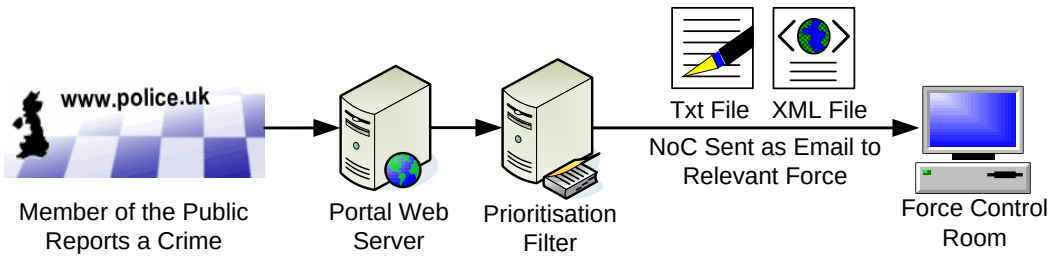

Figure 3.4 Online Crime Reporting System

As highlighted in figure 3.4 the OCR functionality was accessible through the Police.uk website and consisted of a series of on-line forms requesting details of the

crime and of the individual submitting the information. (e.g. name and contact address, address of crime, details of offence, time etc.). Examples of which are available in Appendix A. Once the user had submitted the form, the submission became known internally as a Notification of Crime (NoC). Upon submission the NoC was transferred to a priority filter system that analysed what had been entered and checked for keywords that were considered indicators of a more critical emergency, which should be transmitted / referred directly to a call centre with the email priority flag raised. The NoC was then scanned for its geo-code and sent via email to the command and control room of the geographically relevant force, after a copy had been stored in a central repository. The Command and Control within each force acts as the central locus of communication and command for operations within the force, handling both emergency and non-emergency communication with the public via the 999 and non-emergency number systems and communication with resources in the field. Each force control room received the NoC as an attachment to an email sent to an agreed inbox; if the NoC flagged any priority keywords the email would have been marked as having a priority status. The relevant force then transferred this information manually into its own crime systems and ensured contact with the member of the public within 3 working days from receipt of the NoC. NoCs were transmitted as attachments on an email containing both a plain text file for human usage and in an XML format for the forces to use if they wished to automate the integration of the NoC within their own crime systems.

- **Public Message Broadcast**

The PMB system was designed to equip the Police with an extensive and versatile tool for communicating with members of the public. Through the use of Email, SMS, Mobile Phone and Land Line telephony, the PMB system could be used to contact registered members of the public with information, news and alerts relevant to them.

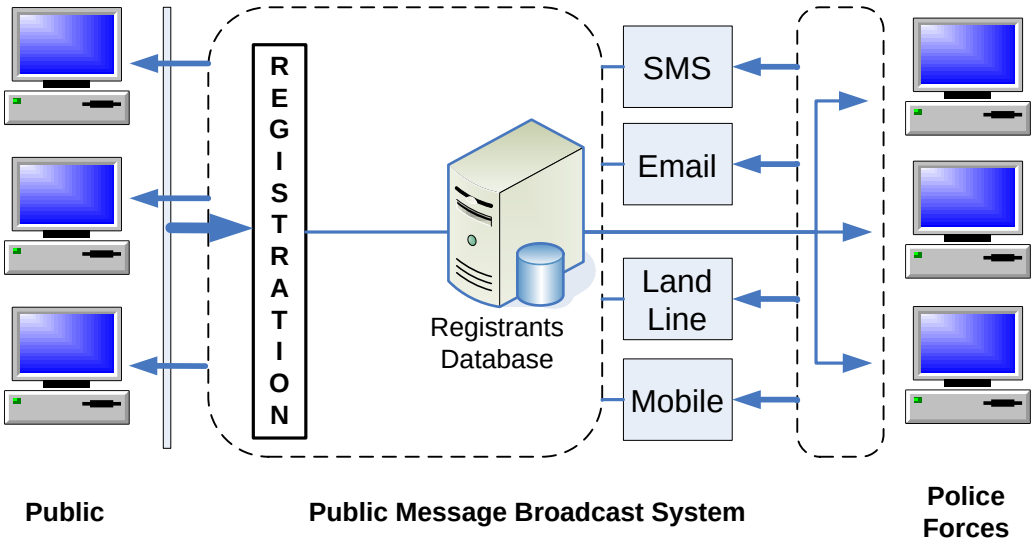

Figure 3.5 Public Message Broadcast System

PMB was operated on a voluntary opt-in basis whereby as shown in figure 3.5 users must initially register for the service in order for the police to be able to contact them. Registration was a simple process of filing in an online form which collected personal details such as name, age, address, occupation, ethnic background, preferred contact methods, along with relevant information the user would be interested to receive in respect of their journey to work or place of residence. When emergencies required it or when pubic events triggered the need to communicate with the public the PMB system was activated with the responsible officer within a force selecting a target demographic and message. A typical example of the SMS messages received from the Portal can bee seen below:

"From:88588
Bulletin 88 now available at 'www.police.uk' This bulletin contains specific information in relation to the 7th July Anniversary and reporting Hate Crime."
(A typical SMS messaged received by subscribers to the PMB system, sent 07/06/2006)

Additional examples of emails and text messages sent by the PMB system can be found in Appendix A. The detailed level of personal information collected was designed to allow effective communication with targeted groups (e.g. commuters to Liverpool street) and for rapid communication with large groups of people (e.g. in case of major incidents when information needs to be disseminated rapidly). All the

information submitted to the system was kept at a national and force level. PMB was also used for registered police personnel, allowing for them to be contacted in the event of emergencies or critical situations.

- **Content Management System**

The CMS system within the Portal was designed to support a number of separate applications. Its primary focus was the provision of a central interface for assisting the publication of information on both the internal Police intranet and allowing individual forces to publish public information on Police.uk as shown in figure 3.6.

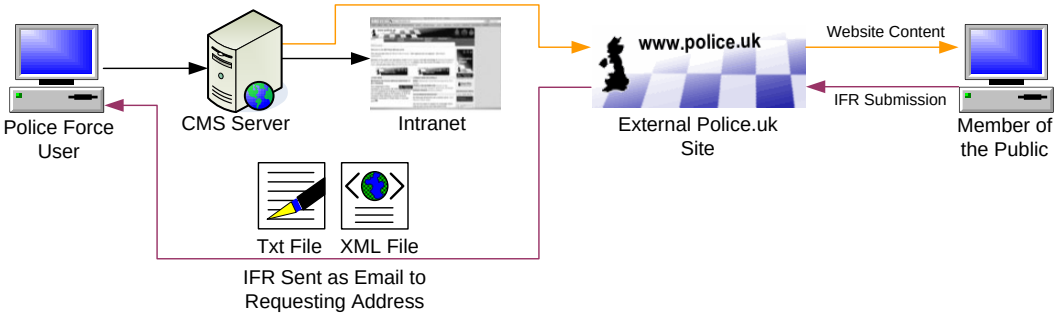

Figure 3.6 Content Management System

Internal and external changes to the websites were conducted through a centralised CMS web interface accessible to all authorised police personnel. The internal intranet was not accessible to the public and was principally designed to facilitate the rapid dissemination of information within and amongst forces. Prime examples observed were forces requesting identification of photos of suspects from other forces. The public side, published on Police.uk, was primarily seen as a route to publicise initiatives, provide information to the public and, in cases of emergency, provide reassurance and instructions to the civilian population. The system was also seen to be used in conjunction with the PMB system, allowing brief messages to be sent out to the public via PMB, referring to a broader set of information published on Police.uk via the CMS. In addition to this primarily outbound communication the CMS provided a route for the public to submit specifically requested information via police.uk to a relevant requesting officer. Known as the Information Request Form (IFR) system it was designed to allow the collection of intelligence from the public. Information submitted via these forms would then be emailed, as both a human readable text attachment and an XML file, back to the requesting force any time

intelligence was submitted by a member of the public it would later be fed into the force intelligence systems.

3.3.4 Portal Control Operating Environment

While the Portal's many functionalities were presented to the public in a single easy to reach place, the police.uk Portal, the back-end of its various components was integrated in a number of ways at regional force level. While the PMB and CMS systems were integrated across the forces at a department level, the OCR system, the most developed and utilised within the Portal, was fixed with its back-end systems feeding into the email inboxes of each of the 53 forces regional command and control rooms. While each force's control room is unique in its implementation and processes, commonalities in structures and procedures were observed across all of the forces examined. Core to this was the division of control room roles and duties into those of Call-Takers and Dispatch.

Call-Takers were seen to take on two primary roles within the control room environment. First, they act as the primary point of contact with the public, handling both emergency (999) and non-emergency calls. They record and enter details of crimes into the crime system when they are reported as being committed. Details of events are input into events systems when the public are making contact to provide the police with notifications of non-criminal events. Secondly, they provide Dispatchers with information relevant to crimes they are responding to by collecting background information from various information hubs within the police and local government in order to support the effective deployment of resources. Email, 999 calls, non-emergency numbers and the OCR were observed as the primary ways in which the Call-Takers were recording interaction with the public.

999 calls are routed from the national emergency call centres when the public or other emergency services request police assistance, emails and non-emergency numbers are published on each of the forces websites and were observed to be given a lower priority than emergency communications. OCR, as previously stated, came through to a separate prioritised email inbox within the forces observed. Dispatchers are charged with the coordination of police resources in the field and measuring the response and resources sent to an incident based on the information provided by the Call-Taker

together with the severity of the call. Both the Dispatcher and Call-Taker roles are fulfilled by staff on shift duties, ensuring that the control centre is manned 24 hours a day.

The level and methods of interaction between Call-takers and Dispatchers varied considerably from force to force. While Call-takers and Dispatchers were always observed to be physically separate within a control room in each of the forces studied, the degree of separation became the deciding factor in how they chose to communicate.

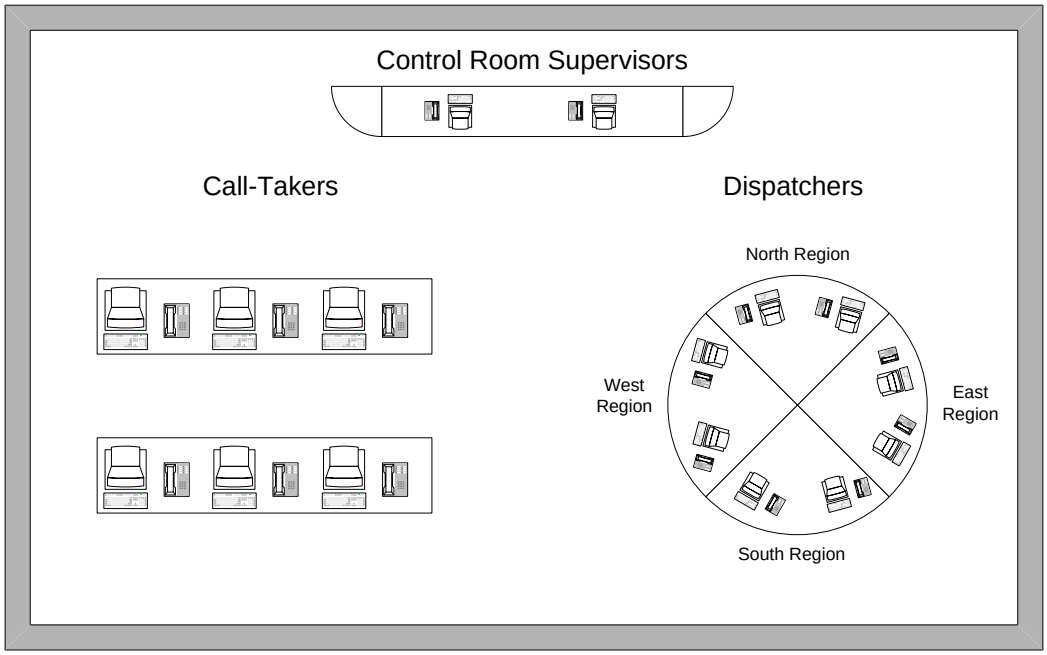

Figure 3.7 Typical Control Room Layout (From Field Work)

The typical layout observed across forces was the separation of Call-Takers and Dispatchers within the same physical control room as illustrated in figure 3.7 whereby Call-Takers and Dispatchers are physically separated within the same control room. While Call-Takers were grouped and responded to calls and emails as they came in without regard to the area of origin, Dispatchers were assigned geographic areas of responsibility and handled any events arising in those locations. Two control room supervisors of a rank of sergeant and inspector were always present in the control room, and served the role of ensuring the smooth running of the room, managing the

response to large scale events as they occurred and in the event providing authorisation for the use of armed response units.

While having differing roles within the control room, the Call-Takers and Dispatchers working desk environments were observed to be very similar, both between roles, and across the different forces studied. Despite every area studied having subtle variations in desk layout between forces, three key systems; AirWave/Telecoms access terminal, headset and dual screen setup were universal across the forces.

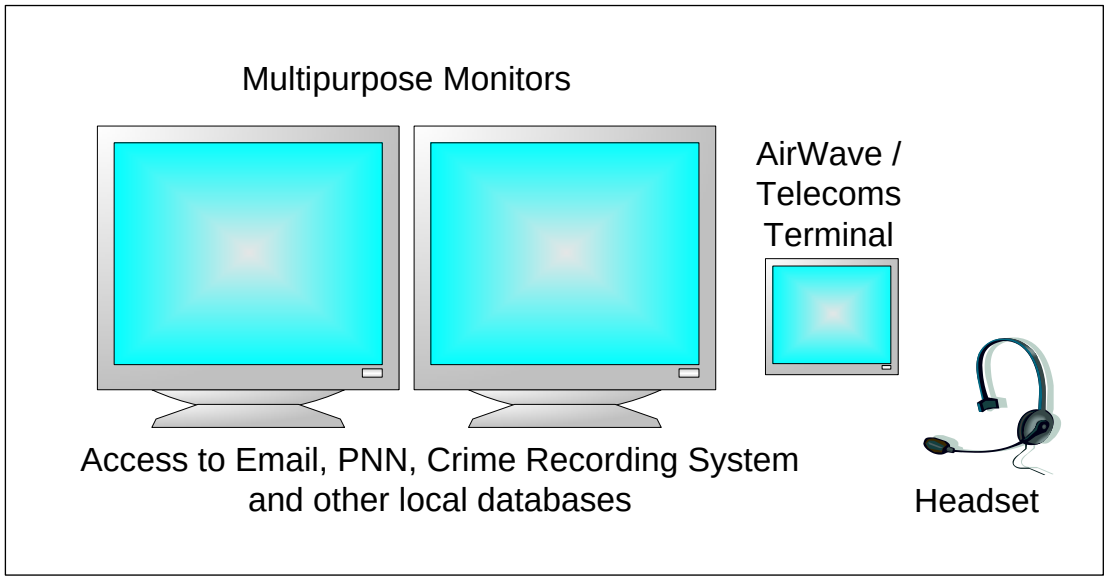

Figure 3.8 Typical Operators Desk Environment

The AirWave system is a secure, highly resilient, wireless digital communications network deployed around the UK to facilitate communication between the emergency services and public safety organisations. It is utilised by the UK police forces as their primary method of communication with resources while they are in the field. Within the control centre the AirWave/Telecoms access terminal acts as the controller's primary access point into this system, allowing them to establish contact with any resources in the field, and vice versa for any Police resources to contact the control centre when in need. In addition, this terminal acts as a regular telephone, allowing the user quick access to make standard telephone calls, and presenting them with a quick call list of relevant council/emergency contact numbers. For Call-Takers this terminal also acts as the primary point for incoming emergency calls.

While the dual display setup for interacting with the computer systems was common across all the forces, the nature of the displays and the systems the operators have to work with varies considerably across the forces. As stated earlier in this chapter each force has been free to implement its own technological solutions to problems faced and it is at this point that such differences become clear. Each force has five key systems in common that control room staff must have access to:

- A crime system for recording crimes as they are reported
- An events system for recording notifications from the public
- Access to the Police National Computer (PNC) for vehicle and criminal background checks
- Geographical Information Systems (GIS) that provide localisation and mapping data on coordinates or locations provided
- Email

Each of the forces studied had its own method of implementing these systems in terms of the software and hardware chosen and the level of integration between each of these systems. With the exception of the PNC all the above systems are isolated and specific to the force in question, not allowing for the data sharing among forces. While there are some forces that share the same crime/event recording software these are very few in number and of those forces studied all had their own bespoke systems. This has resulted in a unique Graphical User Interface (GUI) approach to each crime and events system's design, one force opting for a touch screen approach as their primary input method, with others preferring a more standard type-and-click GUI. The PNC system represents one of the oldest national systems amongst the forces, given its roots as a computer system created in 1974, its primary method of interaction was that of a command line interface. This was sometimes operated in stark contrast to the more modern GUI approaches adopted by the crime systems. In two of the forces studied PNC was still used in its traditional command line style, treated as a separate application and used independently when needed by a Call-Taker. In the other two forces it was observed that PNC had been integrated into the crime recording systems and its command line interface hidden from the user, offering seamless integration, search and transfer of the data into the crime system when

needed. Such integration was seen as beneficial as it prevented the repetition of tasks across a number of systems and allowed for the automatic entry of data from the PNC into the crime systems.

3.4 Summary

Ultimately while the Police Portal was an incredibly versatile and flexible new tool for the UK Police its true worth and utility were never realised. While many appreciated the value it brought, its development was beset by a diverse range of problems that ultimately led to a critical lack of support from the forces. As a result of many of the same problems that affected the original Police Portal system, the Portal 2 collapsed towards the end of its requirements engineering stages. Forces were left to develop their own bespoke portal applications as needed.

This chapter has provided the reader with background information on the organisations and IS case under study in this research. It has highlighted the complex organisational hierarchy present within the UK Police and outlined the Police Portal's functionality, operation and limitations. Chapter 4 presents a discussion of the methodological choices made in the execution of this research and how these were implemented within the case to allow for a full exploration of the issues surrounding the Portal Case's design and implementation.

Chapter 4
Methodological Research Approach

4.1 Introduction

The aim of this chapter is to illustrate the methodological approach applied in the conduct of this research. It begins with an introduction to the overall research aim in order to facilitate the explanation of the methodological and ontological choices made. Following, the study's overall design is outlined, highlighting the stages adopted in this investigation. The chapter also provides the rationale that has driven planning in each individual phase.

4.1.1 Ontological Perspective

As stated previously, the primary outcome of this thesis is a greater understanding of the social and organisational problems effecting IS development within the public sector. In common with many studies which examine social issues within IS, this research adopts an interpretivitst viewpoint in its execution, recognising the complex, context-dependant properties of such situations and their subjective character (Orlikowski and Baroudi, 1991; Walsham, 1995).

4.2 A Grounded Theory Approach

As a result of the lack of literature surrounding the specific public IS development environment and with relevance to this study the police environment in particular, a deductive approach to the examination of the problem domain could be seen as impractical. As seen in other IS investigations of new problem domains (Sarker, Lau & Sahay, 2001) an inductive approach is best adopted in such situations to allow for an organic understanding of the problem domain. This understanding is based on the inputs and experiences of those under study without being guided by preconceptions present in such deductive approaches. While secondary data alone could be used in examining the stated research aim, much of the existing published work on the examination of developmental issues takes a post-project failure evaluation perspective and tends to focus on individual, specific problems within the development process. This results in a wealth of literature that is relevant but very narrowly focused on specific areas within a development and which does not always

follow the evolution of such problems continuously throughout the progress of the development cycle.

With this in mind, as seen in a number of studies investigating issues within the IS development process (Coleman & O'Connor, 2007; Hansen & Kautz, 2005), a Grounded Theory methodology has been chosen. As first proposed by Glaser & Strauss (1967), this provides a number of advantages over the traditional deductive approaches taken by many of the papers examined in the literature. Through the adoption of an inductive logic approach a Grounded Theory methodology permits the systematic discovery and generation of theory from data and practice, in contrast to the *a priori* theory generation of deductive methodologies. This, when combined with an iterative case study approach, as adopted here, enables the ongoing generation of theory and exploration of concepts as they arise. Such a flexible approach is essential in the study of social and organisational factors, where the relationships between actors involved are often complex, dynamic and unpredictable and where many of the factors involved are unique to the host organisation.

4.3 Case Study Design

Complementing the implementation of a wider Grounded Theory methodological perspective is the adoption of a case study approach for the acquisition of data in this study as observed in many previous IS studies (Carver, 2004; Dingsøyr, 2002), which also adopt a Grounded Theory methodology. While a number of techniques have been proposed in the execution of case studies within a Grounded Theory methodology, this study has chosen to adopt the informed approach as proposed by (Eisenhardt, 1989; Bourgeois & Eisenhardt, 1988). Recognising the scope and scale of modern case study investigations, this approach allows for the generation of initial and non-binding themes by which to guide the investigation. These themes serve not to generate theory but as an initial defining scope within which to base the investigation. While examined in greater detail in the next section of this chapter, the iterative approach taken within the case-study methodology is tailored to allow for the structured and progressive generation of theory as the case study proceeds (Gersick, 1988; Yin, 1994).

As discussed in Chapter 2 many of the case studies investigating issues within IS development in general and within public IS specifically, take a post-failure evaluation approach in the analysis of the problem domain. While a valid and common approach to the evaluation of these factors, the post-failure approach may fail to capture information that was present at the time when events were occurring.

Actors' opinions can become coloured over time, bias and organisational politics can skew the resultant information gained from interview, and a large percentage of the data collection must be acquired through secondary sources. This can result in a limited view of the problem domain based on perspectives and opinions that may not be truly representative of real issues at the time of their occurrence and may provide a less complete understanding of the reasons behind the problems within public IS development.

With this in mind, as shown in Chapter 3, this research has as its subject a public IS project still in development. This allows for a full exploration of the development cycle and the examination of the social and organisational factors affecting the development process. Through the observation of an ongoing project throughout all stages of its development, many of the issues identified in a purely post-event evaluation approach can be avoided. The IS development can be examined as it proceeds along its lifecycle, providing the opportunity to adjust the research direction as new factors and relationships are identified and recognised. This gives a more thorough insight into the causes of such issues as they arise. In addition this approach provides the researcher with multiple perspectives on the issues occurring, both as they happen and post-event, reducing the bias that can be introduced when using a purely retrospective approach, and permitting the cross comparison of actors' views as they change over time.

It could be argued that at the beginning of the implementation of such an approach the researcher is unaware of the ultimate success or failure of the IS development. While this is a valid criticism, it is held that all IS will suffer from some issues within their development and the adoption of such an approach will provide a more in-depth view of these problems. This will enable a more thorough exploration of problems in public

IS, regardless of the project's ultimate success or failure than would be allowed by a purely post-event approach.

4.4 Overall Study Design

The following sections will outline the overall study design. Figure 4.1 provides an overview of the structure adopted in pursuit of the stated research aim. The overall structure of this study can be broken down into three main stages of research.

- Initial Theme Generation & Familiarisation

Establishes the researcher familiarisation with the target IS problem domain and helps to determine an initial research agenda.

- Data Collection and Theme Evolution

Examines the approaches adopted in the main body of data collection for this study, the reasoning behind force selections, the processes of thematic analysis and the evolution of the research agenda as the study progressed.

- Theme Set Finalisation and Synthesis

Examines the consolidation of all the information collected into a final list of themes highlighting concerns identified from all areas of data collection and their synthesis with existing literature to suggest solutions to the research questions posed.

Each of these stages will be reviewed in order, discussing each of the individual tasks encompassed within each stage as illustrated in figure 4.1. Each stage will be discussed and its purpose outlined before the individual tasks in each stage are discussed in detail and their contribution to the progress of this study demonstrated.

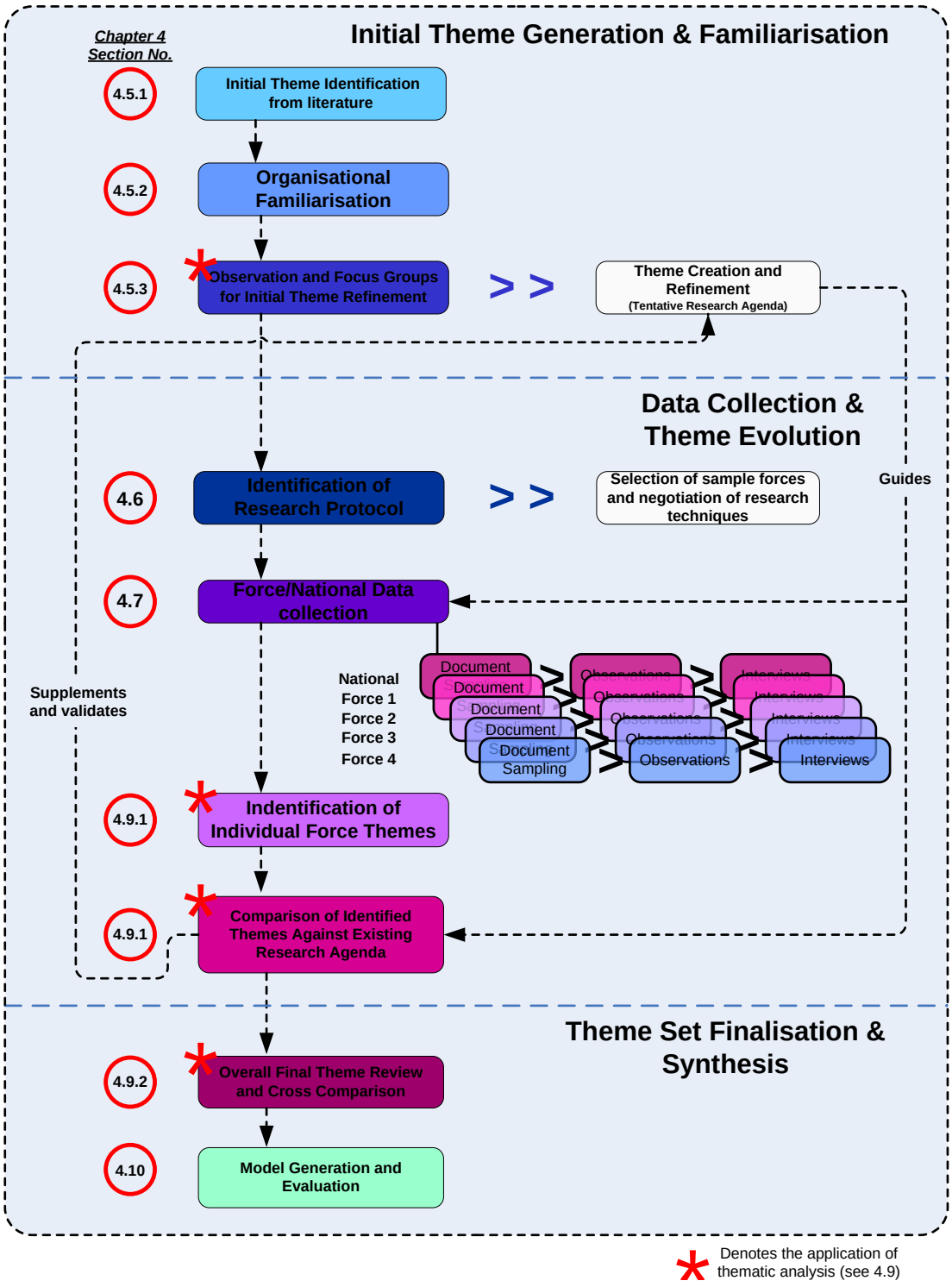

Figure 4.1 Methodological Structure

4.5 Initial Theme Generation & Familiarisation

This stage concerns the initial generation of themes to guide the study research agenda and the preliminary investigation and initial site visits to allow a more in depth understanding of the organisation and IS under scrutiny. In accordance within the informed approach adopted in this case study, prior to any engagement with the target

project initial themes were selected from the literature review to act as an initial research agenda. A period of organisational familiarisation was then conducted in order to understand the target project and its operational environment. This preliminary examination allowed for the initial generic themes identified from the literature to be redefined, making them more representative of the observable issues within the Police Portal development.

4.5.1 Initial Theme Generation

Starting with a generalised view of the problems encountered during IS development, the literature review conducted in Chapter 2 highlighted a number of key problem areas observed in the execution of IS projects, both in industry and within the public sector. The most common of these problem areas were adopted as the initial starting themes:

- Poor leadership and planning
- Failures in requirements capture
- Lack of public consultation

These themes served to guide the research agenda in the initial stages of the Police Portal investigation.

4.5.2 Organisational Familiarisation

With these initial themes in place, the researcher began a period of organisational familiarisation within the Portal development team and with the forces. Starting with little specific knowledge of the Portal and the operational environment of the Police, this stage was designed to familiarise with both the operational police environment, internal and external business processes, and to serve as an initial starting point to focus the main data collection stage. Informal visits to three police forces were conducted to observe the overall business processes in place within each force, with specific focus on control room operations, IS/IT development and command structures (The internal formal and informal command hierarchy found amongst officers and staff). They also served to: 1. familiarise the researcher with domain jargon, 2. allow observation of the relationships between personnel and, 3. Permit the researcher to become familiar with the development processes adopted in house

within the NPIA. Given the exploratory nature of this stage, no formal data recording took place other than the researcher's notes

4.5.3 Observation and Focus Groups for Initial Theme Refinement

Once the researcher was familiar with the operations and processes within the Police and had gained sufficient operational knowledge of the Portal system, observations and focus groups were conducted to refine the initial generalised themes into Portal specific areas of investigation so as to form the initial research agenda for the main empirical data collection phase of this research. This stage focused on working with the forces and development team to identify existing technological and social issues within the development. Initially non-participant observation of the development team's meetings was used to form a view of how the Portal was progressing and to highlight any areas of initial concern. Focus groups were then conducted with the forces and with the development team to gain a deeper understanding of these issues.

The issues identified from this exercise were then compared to the initial themes extracted from the literature. Section 4.9 outlines the processes adopted in the analysis of the data collected from the observations and focus groups and how themes were extracted from the this data. These refined themes, while serving to direct the initial case study investigation, represent only the first stage in establishing the true research agenda. Throughout the iterative process of data collection and analysis, this agenda was altered and refined as themes were found to be irrelevant or in need of modification as new areas requiring exploration were identified.

4.6 Data Collection & Theme Evolution

This stage represents the main body of data collection executed within this study and the ongoing process of iterative thematic analysis conducted alongside this collection. It highlights the continual refinement of the research agenda that acted to guide further force visits and investigations with the development team.

4.6.1 Identification of Research Protocol

Upon completion of the initial research agenda, negotiations began with the forces and amongst the development team in order to secure access to a full examination of the Police Portal's implementation. In total four forces and the development team

within the NPIA were selected for participation in the data collection process. Within the NPIA a core set of the development team was identified. This included developers who were external contractors to the NPIA, seconded officers who were responsible for the development and management of the project together with those responsible for its roll out and implementation. This team will henceforth be referred to as the 'development team'. Selection of the forces was conducted to collect the most representative set of data available that examined the Portal's implementation. In conjunction with the development team, the forces which were selected were chosen to allow a representative cross section of:

- Force Size
- Current State of Portal Implementation
- Volume of Public Submission to the Portal System
- Geographic Diversity

In conjunction with the development team a decision was made to select four police forces to be involved as the primary participants in this study. While ideally all 53 forces would have been included, the time constraints placed on this research and the depth of study required to produce accurate qualitative information describing the phenomena present within each force limited this scope to four.

Force A covers a large geographic area encompassing both rural and urban populations. It has a medium sized work force and a strongly developed Portal implementation receiving a below average volume of Portal submissions.

Force B is a relatively small force, covering a large, predominantly rural geographic area. As a result of its size it has a relatively simplistic although efficient implementation of the Portal with a low volume of submissions.

Force C covers a relatively small metropolitan area with a high population density. It has a large work force and a limited implementation of the Portal receiving medium levels of submission.

Force D is a mid sized force, both in terms of geographic area covering a wide range of rural and urban centres, and in terms of officer numbers. It has a strongly developed Portal system receiving a higher than average number of submissions.

Each force was visited at least once, with such visits often over a period of days. Participants at each force were chosen to form a generally representative view of the Portal's usage and effect. While there were subtle differences in the selection of staff across each force due to differing control room and staffing organisation, a consistent set of staff roles were consulted as discussed further in the individual data collection sections below. Data collection was further complicated by the stringent security controls in place within the police environment in general and more so in the command and control rooms. With few exceptions, photography and voice recording was strictly prohibited in many of the forces examined, thereby forcing the use of diagrammatic depiction of the operating environment. Interviews, when conducted, were not allowed to be recorded and verbatim transcripts prohibited. Detailed notes for each interview were kept, highlighting key points brought up and interview subjects were asked to verify the accuracy of the notes at the conclusion of the interview. Document sampling was again restricted due to the confidential and classified nature of many of the documents identified. While physical access to these documents was often permitted and the documents were allowed to be included in the analysis, their physical reproduction in the appendices of this work was not allowed, and as such the data contained within these documents has been surmised in a way to protect the original source.

4.7 Data Collection

Data collection proceeded in two parallel strands. The investigation of concerns within the development team proceeded as an ongoing process throughout the conduct of this study, informed by problems encountered within the forces. Individual forces were examined in turn. Data collection techniques were agreed both with the NPIA for the examination of the development team and with the individual forces involved before each study commenced. The primary techniques adopted are discussed below.

4.7.1 Document Sampling

Document sampling was chosen as one of the primary methods of data collection as it allows for the collation and examination of formally documented procedure and policies within an organisation (Bryman & Bell, 2007). The primary aim of document sampling in this study was to gather supporting evidence of witnessed procedures, historical documents outlining areas of the Portal's development and regulatory documentation governing areas of its implementation. These were then compared to statements made by participants during the interviews and other data collected to either support their views or highlight disparities between documented procedure and those occurring in the field (Yin, 2003). Where such disparities existed themes were generated for the theme sets discussed in 4.9.

Document sampling was employed with the development team and at the four forces during the duration of this study. The Portal development team was asked to provide documentation surrounding a number of areas of the Portal's Systems:

- Policies and Frameworks guiding the Portal's initial inception
- Development procedures used in the Portal's creation
- Training materials for users of the Portal's various components
- Legislative documentation regarding legal issues around the Portal's use
- Documentation highlighting the organisational and managerial structures present within policing in the UK

At a force level, the individual forces were asked to provide documentation regarding their implementation of the Portal System and supporting documents examining business processes in place within each force before and after the Portal's implementation.

Document sampling was conducted at all stages of the data collection process and served two primary purposes. It enabled cross comparison of theoretical planned models of business development with the actual facts of the implementation of systems in the field and provided valuable information and familiarisation with individual details of a force's implementation prior to the force visit.

4.7.2 Interviews

Interviews were selected as a method of directly eliciting information from those involved in the Portal's development, implementation and use. For this study a semi-structured interview was selected because they grant flexibility in the interrogation of the interviewee (Bryman & Bell, 2007). A Semi-structured approach in this instance offered benefits over a freeform or fully structured interview method by allowing predefined topics to be discussed and explored with the interviewee while allowing the flexibility to explore these issues in more depth than a structure interview would permit. Such an approach also enables the interview to explore new areas that are identified during the process of the interview and elicit a wider and more complete understanding of the problem domain in question.

Interviews were conducted with the development team and within the forces, across a wide range of subjects and staff, as themes were identified. This ensured exploration of these themes at a deeper level than document sampling would allow on its own. At a development team level interviews were primarily conducted amongst the Portal development team and their seconded officers. These interviews examined the processes and procedures adopted in the development of the Portal, the organisational structure within the NPIA and the political and social relationships between the development team, between the NPIA and the development team and their wider relationship with regional forces.

Interviews were conducted at each force visit to better understand individuals' reactions to the systems being considered and to enable a greater familiarity of the complex interpersonal relations within each force. Interviewees were selected to ensure a representative distribution of participants. While not restricted to this following list, a core of organisational personnel were interviewed across each force

- Chief Officer in the force (where permitted)
    - Functional head of the force, ultimately responsible for force's reaction to the Portal's implementation and their level of engagement with the NPIA.
- Senior officer in charge of command and control

    - Responsible for command and control operations in general with authority to amend internal business processes.
- Control room supervisor (One or Two within each force)
    - Responsible for day to day control room operation and the quality of data handled during each shift. Direct line manager of end users of the Portal and mindful of the effects new systems have on their operational staff.
- Portal operator within the control room (One or Two dependant on Force)
    - End users responsible for the operation of the Portal within forces and the transfer of data from NoC submissions to the crime systems in force.
- Dispatcher (One or Two dependant on Force)
    - Those responsible for the management of police resources currently deployed in the field. Acting off information submitted from the Portal.

Outside of this list when it was felt that more information could be provided by another member of force staff due to their roles or responsibilities such staff were invited to participate in the interview process.

The interviews lasted no more than 30 minutes and sought to elicit the interviewees' opinions on a number of the themes identified during the progression of the study. Interviews topics differed based on the roles and responsibilities of the interview but remained consistent across forces when interviewing those in comparative roles. At forces a core set of questions to be examined were identified from the initial theme generation and refined as the research progressed with the research agenda being updated to reflect the inclusion of new information. When new themes emerged from analysis or particular areas of concern were identified within a force, interview topics were added to examine these areas in greater depth. Within the development team, interviews were performed from an initial set of questions which were generated prior to each interview in order to ensure that the conversations were guided to examine the concerns in question.

As a result of the stringent security concerns, the recording of interviews was prohibited. Field notes were taken as interviews progressed, recording the information

offered by the interviewees. At the end of each interview these were reviewed by both parties to ensure that the information was a true and accurate reflection of the interview process and that no bias or misconceptions had been introduced during the note taking process.

4.7.3 Observations

Observations were used as a tool to examine and capture tacit knowledge of the Portal's usage within the control room environment. Although all Portal operators were interviewed, it was possible that differences between their perceived actions and their actual actions may occur. Observations also allow for the capture of everyday interactions with other members of staff and other systems that the operator may not be aware of or that they regard as too common sense to raise unprompted as an issue during interview. Observation in conjunction with the interview process allowed for an understanding of the true implementation of the Portal within forces and permitted an exploration of the variance between the intended implementation as planned by the development team and within the forces, and the actual implementation on the ground. Development team meetings were observed in a purely non-participatory form in order to better understand the relationships and dialogue between team members and to identify where development progress differed from documented examples

Within the forces, observations were conducted with the aim of examining four main components of the Portal's effects on its environment:

- Interaction between users of the Portal system
- Interactions between user and the Portal
- Interaction between users and ancillary systems
- Interaction between the Portal and ancillary systems

Using Gold's (1958) classification of the observer roles, the observations of the Portal operators were subdivided into two main stages. Firstly, the researcher took the role of a non-participant or 'complete observer' whereby no interaction with the user was initiated. The user was observed performing their normal tasks without interruption from the observer so that activities could be observed without interference in the

normal flow of work. This allowed the capture of events as they proceeded with notes taken highlighting issues observed that required clarification for the later stages of observation. Once satisfied that all relevant information had been captured the observation moved to an 'observer-as-participant' approach, engaging with the user and asking them to describe their activities as they progressed and clarify actions where these were felt to contradict existing information held by the observer or where the users actions were unexpected or new. Many observations were then followed up by a semi-structured interview to address any issues observed and reduce the risk of misinterpretation of the operators' actions during observation. Within the development team non-participant observation was used in developer meetings to map and track the progress of the Portal and to highlight any issues with the ongoing development. Follow-up interviews were often conducted post-observation to clarify any issues that arose at these meetings.

4.7.4 Bias Control

Within this research a number of steps were taken to ensure the impact of bias on the study was minimised. The forces chosen to take part in this study were selected in conjunction with the NPIA to be representative of the target systems' usage in terms of volume and in the case of the Police Portal, type of Portal submission, existing IT infrastructure and geographical location. Interviews were conducted with a large cross section of the Portal operation staff spanning, age, gender, rank and responsibility. On an individual force basis, participants in this study were assured that all data collected were anonymous and guarantees were in place that information gathered would not be fed back to the individual forces involved, reducing the fear of repercussions if participants were to give negative feedback. Where applicable the duplication of interviews and observations was performed across a number of individuals conducting the same task to account for the individual bias of those participating. On a force by force basis, triangulation of the data collected across all the forces was performed to spot those themes common to many against those that were unique to the force in question.

4.8 Data Analysis

For this study thematic analysis was chosen as the primary technique used in the collation and analysis of the data collected. Thematic analysis was selected for two

principle reasons, the overwhelmingly qualitative and social nature of the information collected and its strongly associated use in conjunction with a Grounded Theory approach (Crabtree & Miller, 1999). Thematic analysis has a proven history as a methodology assisting in the interpretation of a wide range of qualitative data types, with extensive use across a large number of academic fields (Boyatzis, 1998). Coupled with its ability to be used in an iterative manner in the generation and understanding of themes and narratives in data, this approach is often used together with a Grounded Theory approach, as adopted here.

Such an approach was adopted in the transformation of the data collected through the interviews, observations and document sampling conducted throughout the execution of this study. Rather than adopting a single monolithic data collection stage followed by analysis, this research conducted data analysis iteratively throughout. As highlighted in figure 4.1, new themes emerging from the ongoing investigation served to refocus the research agenda allowing for them to be investigated in greater depth and for their examination within forces and the development team where necessary.

4.9 Analysis Structure

Within the three main stages of the methodological structure, a number of analytical processes were conducted, see Figure 4.2.

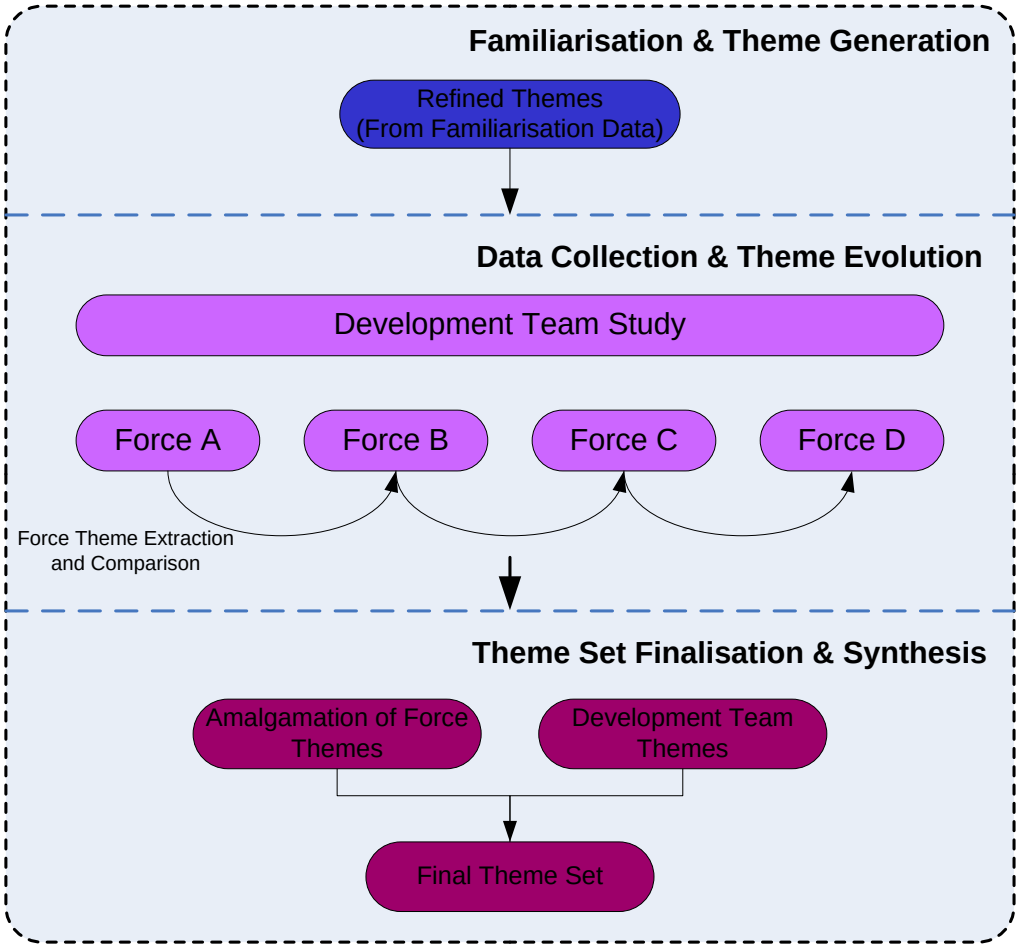

Figure 4.2 Analysis Structure

As stated is section 4.5.3 within the Familiarisation & Theme Generation stage the initial themes obtained from the literature review were revaluated in the context of the organisational familiarisation undertaken in order to tailor these initial themes to be more specific to the Portal development. Data from meeting observations and focus groups were analysed in order to extract common themes that reflected issues within the development, the initial themes were then compared to these. Where commonalities were found or issues from the literature were believed to be present but not necessarily brought up in the preliminary meetings, these were highlighted and retained as part of the theme set for the main investigation.

4.9.1 Theme Identification and Comparison

In concert with the data collection approach the analysis of data generated within the main body of the Data Collection & Theme Evolution stage proceeded in two parallel strands. Analysis within the development team study was conducted as an ongoing

process as new information was collected and the research agenda modified as new themes emerged. Force data were analysed upon completion of the study within that force. Upon completion of each data collection stage the gathered information was collated. The evidence was parsed looking for issues affecting the social and organisational aspects of the system or highlighting areas where technological development methodologies might have been in use. From these, a set of themes representing the views expressed and the researcher's observations were compiled. Within the forces these themes were then evaluated against those derived from previous forces and those amalgamated within the evolving research agenda. Themes no longer deemed relevant were removed and new emergent themes added to allow for further exploration as the research progressed. Within the development team the research agenda was modified as new themes emerge from the collected data and reviewed as completed force studies highlighted new areas to be investigated within the development team.

4.9.2 Overall Final Theme Review and Cross Comparison

As the research neared the end of its data collection phase the themes generated from the individual force themes were triangulated to form a representative view of the problems encountered across all of the forces studied with themes shown to be isolated to an individual force removed. These were then evaluated against the themes observed within the development team to provide a final theme set representative of the issues observed across the entire breadth of the targeted IS and its host organisation.

4.10 Model Generation and Evaluation

In Chapter 6 the problems emerging from this final theme set are discussed in the context of wider literature concerning the issues identified within the analysis, with these themes then being used in the generation of an expanded STS model which illustrates the difficulties identified in this study. This proposed model is then evaluated in the context of secondary data that examines additional past and present public IS projects and is confirmed against the findings of this evaluation with amendments made to the model where necessary.

4.11 Summary

This chapter has outlined the grounded inductive case study approach adopted in the execution of this research. The case study used in the progress of this research has been identified and the iterative approach and methodological choices behind its design and execution explained. In the next chapter, data and observations from the case study will be outlined, analysed and the final theme set documented.

Chapter 5
Situational Outline and Analysis

5.1 Introduction

This chapter provides a detailed explanation of the body of data collected in line with the methodology presented in Chapter 4 highlighting problems encountered within the Portals development. In order to familiarise the reader with the issues encountered, the chapter begins with an informal account of the situation encountered within the Portal development before proceeding with an in-depth examination of the themes resulting from the progression of the analysis will be presented.

5.2 Outline of the Portal's Development and Implementation

As stated in Chapter 4, the main body of data analysis was conducted in the process of theme extraction from interviews, observations and by comparison to documents collected. As a result of the complexities of the various problems with the Portal development that were identified from this, together with the scale of the implementation, an informal narrative commentary of this data is first presented. Its purpose is to provide the reader with background information on the problem domain before the formal themes resulting from the data are examined in section 5.3.

5.2.1 Portal Implementation Differences

The functionality and implementation of the Portal, which is presented in Chapter 3, illustrated the technically simplistic nature of the features that were being implemented. However, a number of difficulties arose when examining the Portal's physical implementation within the control room. The lack of any homogenous IT infrastructure presented a number of issues for the development team when considering the best way to integrate the Police Portal into the control room's existing systems and processes. Ultimately a compromise was reached. In an ideal world the information submitted via the Police Portal would have automatically been integrated into the relevant force's crime system and an operator notified, however no such universal crime system exists. Many of the forces operate their own custom built systems for recording crime, each with its own specifications, unique APIs and storage schemas. None of the four forces examined shared a crime system with any

other. As a result of this, the development team decided that individually designing and catering for each force's crime system was too complex, costly and would have taken too long to achieve. Instead, email was chosen as the simplest manner in which to relay the information to each force. The Portal submission was attached as a text file, or NoC as referred to previously, and sent directly to a nominated inbox at each force. This NoC was then manually input into the crime system by a control room operator. Recognising that this was a less than ideal solution, an XML file containing identical information in a marked-up form was included in each email. This would allow each force, if they should choose, to develop a system to automatically import the XML NoC into their crime system. However, during the lifetime of the Police Portal no force studied chose to implement this option.

While the addition of a new stream of emails to the command and control environment may seem trivial and nonintrusive at first, the introduction of the Portal system initiated a series of profound and unexpected changes within the control room environment. A lot of training was provided for those using the PMB and CMS side of the Portal's implementation but very little was provided for those utilising the OCR system as it was assumed that each force would be able to cope with a new stream of emails. In fact, an entirely new and uniquely structured stream of information was being introduced into an already 'information heavy' environment, creating its own monitoring and usage requirements. With varying degrees of instruction and communication from the core development team, each force had to decide how best to integrate the Portal NoC emails into its existing business processes. This resulted in very different handling procedures across the forces in this study. Many forces ultimately adopted similar processes for the entry of NoC data into their crime systems, however the differing technological abilities of the forces lead to stark differences in the way NoC information was tracked from arrival, handled and input into the crime system. The level of involvement of the core Portal development team and the differences in training across the four forces were also very apparent in the varying degrees of knowledge or lack thereof on how the Portal system operated, of the priority and keyword systems and how errors in the system were handled.

In both forces A and D the Portal inbox was monitored 24/7 by a single designated Call-Taker from each shift, who handled NoC requests as they came in, in addition to

their normal duties. Information was transferred from the NoC text files by manually retyping it into the force's crime system. From this point it was processed as any non-urgent crime coming in over the phone would be. The operators were asked why the use of a copy and paste function was not employed in the transfer of the data. Responses indicated that because the information arriving in the NoC was so different, both in format of the data and order of the fields from their existing CMS GUI, they found manual re-entry to be the only viable method for inputting data from NoC into the CMS. It was observed that this need to manually duplicate all the information in the NoC placed considerable extra burden on the operators and consumed a large portion of their working time. In addition, errors made in the transposition of information from NoCs to crime system were observed to be commonly made. While many were caught by the Call-Taker in the process of data entry some where not, this issue was raised by the command centre supervisors when stating that it was common to find typographical errors in NoCs that had been transposed in this fashion. Within Force A, these errors were complicated further by their inefficient email configuration, where by the operator had many additional email inboxes to monitor. Operators in both forces stated that they had had no formal training in understanding the Portal's NoC submissions other than to copy the information into the CMS. They were unaware of the priority filter system or the existence of raised priority messages that could indicate an emergency, treating them the same as non-emergency requests and inputting them into the system with no increased level of urgency. The Portal inbox at Force A was also seen to suffer from an issue of 'spam' as referred to by the Call-Takers, whereby the forces information bureau would forward any requests for information they could not answer to the command and control room via the Portal's inbox, clogging the system and distracting operators from real NoCs.

In Force B the monitoring of the Portal inbox was the responsibility of the control room duty manager and was monitored on a 24/7 basis, being kept open minimised on their display and NoCs being transferred into the CMS as soon as they arrived. Given the similarity in layout between the NoC format and that of their CMS GUI the operators stated that copy and paste was the preferred method of inputting data into the CMS. The operator was well versed in the Portal's operation and understood the purpose of the priority system, with clear procedures in place for dealing with flagged

NoCs through immediate contact with the submitter. However, the operators did comment that they found the online submission forms for the Portal on the public side, cumbersome and complex to navigate. They suggested that plain email was a better solution to the problem from the public's perspective.

As a result of the way in which the processes for handling non-urgent crime in Force C were structured and the issues surrounding its use of a different email client to other forces, (an email client which lacked significant functionality), the implementation of the Portal within this force was seen as particularly time-consuming, burdensome and duplicative by those using the system. As a result of misgivings about the security of the Portal infrastructure as a public facing internet application and concerns over viruses and hacking attempts, Force C chose to implement the Portal mailbox with a partial client side air-gap between systems. In this setup there were two PCs side by side for the Portal's use. The sole purpose of one of the PCs was that of an email client no link to any other of the forces systems, this PC received the incoming NoCs. The other PC was a standard Call-Taker's terminal. Any incoming NoCs from one PC had to be manually retyped by the Call-Taker into the crime system on the other. The Portal inbox was monitored 24/7 by a given Call-Taker on their shift alongside their own personal inbox. The Call-Taker was again not given any formal training on the NoC system and was unaware of the prioritisation systems as a result of their use of an email system that did not understand prioritisation flags. In addition to this, a process of duplication of logs from the CMS was observed to take place. Within force C once non-urgent crime was entered into the CMS, the information was passed onto a relevant Operational Command Unit (OCU) for follow up. With normal telephone calls the incident was logged on the CMS and then left to the OCU for resolution. However, with NoC submissions a duplication process was observed whereby once the CMS log had been raised the original NoC text file was printed out and faxed to the relevant OCU as well as being kept as a hard copy that was filed in the control room, with the electronic copy being stored in their email client. None of the staff in the control room were aware of the reasons for this duplication; the same was true of the senior officer in charge of the command centre. It was suggested it was a process that had evolved from when the Portal was first implemented and had just been followed since then. The duplication of NoCs and the manual re-entry across the air-gap presented a considerable workload for the Call-Takers assigned to the duty.

As state previously Force D and Force A's implementations had significant similarities. One area of note at Force D was the method of tracking which NoCs had been processed. While none of the other forces had implemented methods for tracking the progress of a NoC and its entry into the CMS other than using the read or unread markers within their respective email clients, Force D edited the subject line of each NoC to reflect its CMS reference number and its current status as it progressed through the system. This system was observed to make the tracking of NoCs much easier than at other forces, and the addition of this data meant that shift supervisors from other shifts were immediately able to indentify what NoCs needed to be progressed further.

5.2.2 Business Process Effects of the Portal

While the Portal itself was seen by a number of forces as valuable tool and brought a new and modern channel for gathering information from the public, its implementation was observed to induce a number of problems within the forces. The most obvious of these was the effect the Portal system had on the existing business processes within the host force and of particular note the arduous processes observed within Force C, the duplication of all work both on the PC and then again manually printed and faxed. As stated by a number of the control room commanders, one of the principle problems was the lack of training provided by the Portal system. Because of its implementation primarily as an email message it was treated as a simplistic system that didn't need much explanation. This was seen to result in forces trying to integrate this new information source into their infrastructure as best they could. As the system was new and forces were unaware of the popularity the system might gain with the public together with the number of emails that they may receive, the forces treated the Portal as a system from which they expected a low volume of communications. In all forces observed this assumption led to the Portal's input being added onto an operator's already busy workload and often in a sub-optimal manner, increasing the stress on the operators. This was particularly evident in forces with high Portal NoC submission volumes where the Call-Takers remarked they were under considerable strain keeping up with the volume of NoCs in addition to their other duties. This *ad-hoc* implementation of the Portal by the forces, with little planning, was seen to result in visibly skewed and stressed business processes that were often prone to errors. This was compounded by the lack of any formal GUI uniformity across the forces. The

standard NoC template in use across all forces was seen as a source of constant frustration by Call-Takers. While ultimately viewed as part of the job of monitoring the Portal inbox, many users expressed dissatisfaction with the need to retype all the information from the NoC into the crime system and often asked why such an email couldn't have been tailored to each force's needs. With the exception of Force D, these errors were observed to be compounded by shift change, when new operators took over the monitoring of the Portal inbox and were not able to ascertain the state of NoC that had already been read (a number of NoCs being overlooked on one occasion).

Adding to this confusion was the lack of formal training covering the NoC system. While the CMS and PMB systems had well structured training regimes, it appeared there was an assumption that the simplicity of the email system meant that no formal training was required. This was observed to have a number of knock-on effects. From a business process perspective the lack of training led to erroneous assumptions of how the Portal operated by those tasked to implement it within force. As seen in Force C with the implementation an air-gap to provide additional security where none was required, placing additional burden on the Call-Takers operating the system within force. From the Call-Takers' perspective this lack of training resulted in a number of observed problems. It was commonly remarked by Call-Takers in all the forces studied that they did not fully understand how the system operated, why the NoCs arrived in the format they did, and what some of the mark-up provided meant. This lack of understanding and control over the system lead many participants to express frustration and a feeling of helplessness, especially those forces dealing with high NoC volumes. Outside of this frustration was the point that operators in three quarters of the forces examined were not aware of the priority function of the Portal. This keyword system was designed to alert the operator to NoCs that contained phrases which may indicate that an immediate response was needed for these. With such little understanding of the meaning of such a critical system it is possible that such NoCs could go unattended for at least an hour before being checked. In addition, unexpected events were seen to cause significant interruption to those using the Portal system. Issues such as NoCs being accidentally routed to the wrong geographic force presented forces with issues they had not formally encountered before and had no processes in place to deal with. Often the chain of command for dealing with NoC

submissions was unclear and many operators were unsure how to deal with such situations.

The difficulty in poor quality submissions was also seen to be a problem by those using the system. While in the traditional synchronous modes of communication (e.g. telephone) the Call-Takers could request all the information they needed to progress a case through the CMS systems, ensuring that all fields were filled in and all information was valid, this was not the case with the Portal NoC submissions. Portal submissions were often incomplete or vague, while the system did require mandatory fields to be filled in by the submitter, they were often filled with invalid information, or the data provided was not enough to progress the case. The asynchronous nature of email meant that the Call-Takers were left to try and contact the submitter to clarify information before entering a number of NoCs into the system. In the forces where processes did not allow for the tracking of progress of NoC, this was seen to place an additional burden on the Call-Takers as they had to keep track of those NoCs that needed more information before entry, as it was often hard to reach the submitter at the time of the NoCs entry into the CMS.

5.2.3 Force Cooperation

Force opinion and the degree of cooperation with the Portal development were also seen to differ greatly. Each force had its own opinion on the usefulness, effectiveness and value of the service. Whilst all forces recognised that the system provided a valuable extra channel for communicating with the public, the degree to which they embraced the system differed significantly. From the interviews conducted, the degree of this support was observed to hinge on five factors:

- The degree of consultation and involvement of the force in the system's development
- Trust and attitude towards the NPIA
- The degree of agreement between the force's individual priorities and requirements and those of the Portal
- Whether or not the force had developed their own local portal system prior to the inception of the national project.
- The force's enthusiasm to adopt new technologies

This last factor was observed to be a generally isolatable, which was more a product of the engrained culture within the force. Depending on the degree to which they were prone to taking risks on innovative technology or risk averse, the first three factors were seen to exist in a complex relationship with each other. The amount of consultation with the individual forces was seen to vary greatly. Those forces that had not been as involved in the consultation stated that they felt left out from the system. It was felt that even though the benefits of the Portal were clear in some respects, they viewed the system as being imposed on them rather than as a product of constructive discussion and development. This degree of consultation is also linked to alignment of the forces' priorities with those of the Portal project. The forces which had been consulted and had had the opportunity to contribute to the system's development felt able to shape it more to their own needs. However, those forces which were marginalised, risk averse or which did not participate were more of the opinion that the need for the system was not actually present. While these forces welcomed the additional contact such a system provided, they did not feel that it was tailored to the unique needs and demands of their force's geographical area and crime makeup.

A key issue in willingness to adopt the Portal, which came across in interviews with the forces and with the development team, was the existence of prior portal systems within a force. While forces that had no such existing system were left to judge the Portal based on its own merits, those forces that had innovated and deployed their own portal systems prior to the national Police Portals inception were seen to have strongly polarised views about the new national system. These views were observed to come about as a result of how the forces had been approached and how their existing systems had been appraised. The forces which had developed their own systems had invested significant amounts of time and resources in producing them so they felt that their systems accurately reflected the needs at that force. Those forces whose systems' aims congruently matched those of the national system were enthusiastic supporters. However, the forces whose existing systems either exceeded the national system's capabilities, or whose functionalities were overlooked in the consultation stages, were seen to be significantly more hostile to the national development. Such was the extent of feeling that one of the forces studied actually continued to run their portal system in parallel to the national system.

5.2.4 External Political and Development Team Issues

At a national level the effects of the implementation of the Portal were seen to cause widespread issues across a number of business areas and across all the stakeholder groups involved. It was stated by those within the development team that the complex organisational structures, ambiguity of responsibility and the inherently political nature of many of the pressures placed on the police by external political forces and internal organisational political agendas all presented challenges to the system development environment.

Competition for and ambiguity over control and leadership were noted between a number of groups throughout the duration of this study, all having an observable detrimental effect on the systems implementation. Starting at the highest level, the often vague relationships observed between the Home Office, ACPO and the NPIA in respect of to the Portal Project were observed to affect the motivation and buy-in of those lower down in the chain of command. Unlike other large IS projects developed by the NPIA the Portal projects lacked a single ACPO officer to act as its 'champion'. Such an officer would have allowed the forces to perceive ownership and leadership of the project. While the idea of a national Police Portal had been around for a number of years before its creation, growing organically as the forces foresaw a need for one, external terrorist events prompted the Home Office to respond. The degree of its response and the intense pressure it placed on the Portal was often seen as a key factor involved in many of the issues described above. As part of its plans it pursued the accelerated development of the Portal from initial ideas to implementation within a critically short space of time. A time period often brought up by the NPIA development team in conversation. It was often noted that the Portal's development had been artificially advanced and the pressures from the national bodies had reduced consultation that would otherwise have been conducted. Funding of the Portal at a national level was also one of the prime reasons for its downfall, while the Home Office and ACPO had agreed to fund the initial development costs of the Portal to bring the project to implementation, no agreement could be made to meet the running costs of the system after implementation. With both national bodies stepping back, the individual forces were asked to contribute to funding, engendering additional hostility towards the project.

Internal to the NPIA were the issues between the central NPIA management and the development team of the Portal. The core architectural development of the Portal system was outsourced to an external company but a sizable staff remained within the NPIA to coordinate the project's development, liaise with forces and manage the rollout of the system. Complements and praise for the external contractors were often observed with them typically being described in conversation as experts in their field. The NPIA members of staff, however, were often concerned with a delicate political balancing act: The internal organisational structure of the NPIA was observed to be highly politicised, with a number of the leadership figures having strong and sometimes conflicting views, opinions and plans. This lead to comments that a number of decisions were politically influenced rather than being what was the best fit for the Portal project.

The NPIA staff team was also observed to be in a constant state of flux, people joining and leaving was a common occurrence. This constant change in team members, many being seconded from forces, resulted in a NPIA staff team that had very different levels of understanding and interests in the system that was being implemented. Specific knowledge was often observed as being compartmentalised in one individual staff member, resulting in confusion or delays if that staff member was absent or away on force visits.

The development team was frustrated by the lack of cooperation from some forces and the forces were frustrated by a perceived inability on the part of the NPIA to create a balanced system which was representative of the needs of their force. As remarked by one of the development team, this was seen as a "double edged sword" for the project. Some people were unwilling to work with the project as it was seen as excluding the views of some forces, while the NPIA couldn't get the views of those forces as they were unwilling to cooperate. This was further complicated by the matter of the wildly different IT infrastructures across the forces. As seen a number of times throughout this chapter, these difficulties caused considerable problems for the Portal team. Without having the power or resources to effect universal changes to IT systems at the forces it was necessary to pick the lowest common compatible denominator, email. Given the severe time constraints of the project, the different crime systems and the complexity of implementing a new template for each force the

NoC came into being as the rigid entity it was. These issues were compounded by the greatly differing organisational cultures across the forces. While some of the forces studied were observed to be very progressive in their beliefs about the benefits of IT, the sharing of information and cooperation, a number of the forces were reluctant to embrace the incoming change for a selection of reasons.

Many of these issues arose from the differing leadership styles of the chief constables of each force. As stated previously with the exception of the Scottish forces, the leadership of many forces can be seen to act in with an isolationist view with varying degrees of consideration or engagement with forces around them and when dealing with the implementation of a national system, these issues were observed to create considerable tension amongst the development team. In an attempt to bridge this divide a number of the NPIA staff members on the development team were seconded officers from varying forces around the country, providing valuable in-the-field knowledge and insight for the Portal's development. These officers provided more informal channels into individual forces, easing some of the development process.

Moving from these internal organisational issues, the development team within the NPIA also suffered from a lack of representation of their largest stakeholder by numbers, the public. The citizenry, for whom the Portal was ultimately built, had limited involved in the development of the IS. With such a diverse range of external 'customers', understanding and responding to their needs was seen as a large task and sometimes viewed as secondary to the views of the police themselves. The Portal system was ultimately viewed as a success by the public, judging from the high demands placed on the system in areas where its functionalities had been well advertised. However the lack of any detailed formal consultation lead to a number of unexpected usage scenarios. The sheer volume of NoCs submitted in some areas surprised the development team and overwhelmed the operators at a force level. Different usage scenarios were generated by members of the public and companies (that were not originally considered in the use case of the Portal). NoCs on classes of crime that were never intended for submission via the Portal often confused and slowed down business processes, which had not been designed to cope with the volume or class of information submitted.

5.3 Analysis

Analysis of the collected data will now be presented. As described in Chapter 4, the initial themes generated to guide the preliminary research agenda will first be discussed, examining how these choices were made and where literary synthesis occurred. The evolution of the emerging research themes is then evaluated as the analysis progresses, highlighting how new themes have become apparent or changed over the course of the research. An analysis of the issues experienced at each force is first presented before all force themes are cross-compared to produce a map of themes that are representative across a majority of forces studied. Themes identified from the investigation of the development team are then explored before being combined with the cross force themes to generate the final representative theme set covering issues identified across the development cycle.

Within this analysis the central themes identified within the data have been given a number (Theme 1, Theme 2). Within these central themes, sub-themes (labelled in the format Theme 1a, Theme 2a) are presented to provide a more granular view important issues encountered within the main themes.

5.4 Initial Theme Generation and Refinement

As illustrated in Chapter 4 the literature review lead to the adoption of a number of initial themes that were identified as problematic within IS development. Acting as a base for the preliminary familiarisation exercise the three most common themes from the literature were selected to form the basis for the initial research agenda to guide the investigation. These three were:

Initial Theme 1	
Label	Poor leadership and planning
Definition	Project lacks leadership or direction. Project management fails to adopt appropriate methodologies or support decisions made. Confrontational approach to implementing the given IS.

Initial Theme 2	
Label	Failures in requirements capture
Definition	Requirements capture incomplete, stakeholder opinions and needs do not reflect the project specification produced or bias introduced into the requirements capture process.

Initial Theme 3	
Label	Lack of public consultation
Definition	Inadequate consultation with members of the public. Their needs of such systems are not established and they are not actively encouraged to engage with the development or use the system post implementation.

Table 5.1 Initial Themes

Following the initial familiarisation phase of the study and the observations and focus groups examining issues within the Police Portal development itself, this list was refined and discussed within the context of the Portal's development. Previously excluded concepts were reintroduced when deemed necessary and new themes added to form the starting point of the main body of the investigation.

Revised Initial Theme 1	
Label	Poor leadership and planning
Definition	Initial tensions observed between the goals of the Home Office and ACPO and their implementation within the NPIA.

Revised Initial Theme 2	
Label	Failures in requirements capture
Definition	Requirements capture incomplete, stakeholder opinions and needs do not reflect the project specification produced or bias introduced into the requirements capture process. *At this early stage of investigation sufficient evidence has not been obtained to either confirm or contradict this statement.*

Revised Initial Theme 3	
Label	Variable level of cooperation from forces (Organisational Structure)
Definition	Given forces' independent nature there are greatly differing levels of cooperation from forces for the Portal project

Revised Initial Theme 4	
Label	Lack of public/end user Consultation
Definition	Developers highlight that there was little public involvement in the design of the Portal system, it is apparent not all users of the system have been consulted.

Revised Initial Theme 5	
Label	Difficult regulatory environment
Definition	Both PITO/NPIA and forces are constrained by current legislation and regulations governing their operation and ability to handle and manipulate data. Placing constraints on the methods used to store and transmit information.

Table 5.2 Revised Initial Themes

From the familiarisation exercise within forces and the focus groups that were conducted, tensions were observed to be present at various levels within the development with a lack of clear leadership being expressed. The lack of participation and engagement from many of the forces was observed and misgivings were raised by forces in respect of their view of the NPIA. It was also apparent that so far little attempt had been made at a full consultation with the public. Significant regulatory burdens were also seen to be present at both the forces and NPIA.

All three initial themes were carried over into the refined theme list. While failures in requirements capture were not identified from the initial familiarisation exercise they could not be actively excluded and as such the theme was left in place. Two additional themes were added based on evidence of the regulatory environment placing constraints on the development team and the variable levels of cooperation experienced from each force.

5.5 Theme Evolution

As stated in the analysis design, these refined initial themes were used as the basis for the preliminary research agenda for the main body of the Portal investigation. While non-binding they provided insight and initial areas of investigation for the examination. Theme evolution was divided into two linked processes, the examination of the Portal at a force level and within the development team.

5.6 Force Themes

The following sections outline the elicitation of themes from data collected at the force investigations, drawing on interviews, observations and comparisons against planned procedures gathered from document sampling. The themes identified from individual forces are first discussed before their triangulation into representative theme set covering all the forces studied. Force themes focus on the issues encounter as relevant to the Call-Takers and force level staff. Analysis in the wider context of the development is conducted in the later sections of this chapter.

5.6.1 Force A

Force A is a medium sized forced covering a large area. Among the forces studied, it was widely seen to be the most proactively engaged with the Portal's delivery. While

at a control room level they felt there was a lack of support from the commissioning and developing team, at a management level the force could clearly see the benefits the Portal could offer them. Consequently Force A actively dedicated resources to promoting the system usage within its communities. From an examination of the data collected from Force A three key primary themes emerged:

Force A Theme 1	
Label	Stress caused by additional workload created by the Portal
Definition	Implementation of Portal has introduced new work flow patterns that were observed to place increased stress on the system operator. Implementation of the Portal has increased the volume of information to an operator above a level they felt comfortable managing.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Force A Theme 1a	
Label	Frustration at data entry method and integration
Definition	Users felt frustrated by the complexities of transfering the NoC data manually into the crime system and raised issues regarding the lack of an appropriate NoC format compatible with the force legacy system. They expressed concerns over the lack of integration of the Portal system with existing systems.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Table 5.3 Force A Theme 1

Theme 1 identifies the commonly reported effects of additional stress placed on the Call-Takers responsible for the Portal's operation within the command and control rooms. As shown in the observations it was often remarked that the Call-Takers had to invest significant amount of additional time in managing the Portal system to the detriment of their other work. Due to a combination of the volume of new information that operators had to manage, in addition to their existing duties, the lack of integration of the NoC emails with existing systems and the need to copy and paste data in a different format to the crime system, additional stress was placed on operators by the Portal.

Force A Theme 2	
Label	Lack of engagement in the development
Definition	Users felt the system has been forced upon them and that they did not have the ability to raise concerns and complaints to a higher level.
Derivation	Direct response from Call-Takers during interview.

Table 5.4 Force A Theme 2

Theme 2 leads on from the stress that was placed on the Call-Takers and was observed on a number of occasions to compound this. In interviews with the Portal operator it was stated that whilst feeling stressed by the new system they also felt limited in their ability to affect change to their situation. The role had been given to them and they felt they had to act without being able to voice their concerns.

Force A Theme 3	
Label	Lack of training availability
Definition	Individuals felt that they did not receive appropriate training on the Portal system. Supervisors expressed concerns regarding access to training of their team members.
Derivation	From interviews at both a management and operational (control room) level and observations during call-handling operations.

Force A Theme 3a	
Label	Lack of awareness
Definition	Individuals were unaware of essential parts of the Portal's implementation. Call-Takers had poor understanding of the prioritisation flags system, and management lacked strategic knowledge of how the system operates at a national level or the process by which NoCs reach the force.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Force A Theme 3b	
Label	Perception of Portal as being implemented in an ad-hoc rather than planned fashion
Definition	Individuals express dissatisfaction at the perceived ad-hoc nature of the implementation of the Portal.
Derivation	From interviews at both a management and operational level.

Table 5.5 Force A Theme 3

Theme 3 examines issues from a slightly more abstract level and reflects concerns from responses at the Call-Takers and management level during interview. In general the management of the force was very keen and active in its engagement with and deployment of the Portal. However, the management's general knowledge of how the system operated at a national level and Call-Takers awareness of important areas such as prioritisation flags was considerably lower than would be expected. Key to this was the apparent lack of training on the Portal system itself. While the PMB and CMS parts of the Portal system came with extensive training the OCR side of the Portal was deployed with little information provided to those responsible for its implementation and use at a force level. Managers reported that they implemented the system as best they could, given the information supplied to them. This lack of a shared strategic

plan from the NPIA development team ultimately resulted in negative perceptions from the Call-Takers when it was felt the system was cumbersome in its operation.

5.6.2 Force B

Force B was the smallest of the forces studied, in terms of both its physical size and population under its jurisdiction. While overall its management had no issue in adopting the Portal system, their involvement with and promotion of the system was limited. Unique to this force was the higher level of knowledge Call-Takers and operators had of the system, with each being aware of how the system operated at a national level and how the prioritisation system functioned. Within Force B four key themes emerged from the data collected:

Force B Theme 1	
Label	Frustration at data entry method and integration
Definition	Users felt frustrated by the complexities of having to transfer the NoC data manually into the crime system and raise issues with the lack of an appropriate NoC format. The express concerns over the lack of integration of the Portal system with existing systems.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Table 5.6 Force B Theme 1

Theme 1 again highlights the frustration that Call-Takers felt when moving data from the NoCs to the force crime systems. Users at Force B didn't feel as though the system was adding additional stress to their workload due to the small number of NoCs submitted on a daily basis, however the lack of formatting consistent with their crime systems and a need for manual re-entry was remarked on a number of times as being a key area of concern for the Call-Takers

Force B Theme 2	
Label	Perceived lack of communications with national Portal team
Definition	Individuals felt isolated from the Portal's national operators with little avenue for communication with them over how the system operates or a means to report issues, concerns or errors in the system.
Derivation	Direct response from management during interview.

Table 5.7 Force B Theme 2

Theme 2 echoes the need for communication with the NPIA Portal development team. Expressed at both a Call-Taker and management level, when NoCs arrive by error that

are destined for adjacent forces there was little avenue to communicate this fault other than by forwarding the NoC to the relevant force. Officers felt there limited options for providing feedback to the main development team.

Force B Theme 3	
Label	Imposed system usage
Definition	Individuals felt they are using the system because it has been given to them and they have been told to use it rather in contrast to an active willingness to integrate the Portal into their organisation.
Derivation	From interviews at both a management and operational level.

Table 5.8 Force B Theme 3

Theme 3 originates from opinions expressed by the Call-Takers. Staff at a managerial level have a generally neutral opinion of the Portal, adopting it as it provides benefit with little cost or effort on the force's part, yet the Call-Takers express a different opinion. Prior to the Portal's implementation at Force B, the force already operated a system whereby members of the public could email reports of non-urgent crime directly to the control room. On a number of occasions it was expressed that given that this system was in use they did not see the need for the implementation of the Portal as well.

Force B Theme 4	
Label	Public facing site overly complex
Definition	Individuals felt that the public interface of the police Portal was overly complex and confusing for members of the public to use.
Derivation	From interviews with Call-Takers.

Table 5.9 Force B Theme 4

Theme 4 leads on from comments made by the Call-Takers regarding the imposition of the Portal system over that of the prior email reporting functionality. Call-takers expressed frustration that the public interface of the Police Portal at police.co.uk was overly complicated. It was remarked a number of times that the system requested too much information from the public and that the Call-Takers regarded the process as ineffective due to the long process of information input required for the NoC submission.

5.6.3 Force C

Force C, a metropolitan force, was paradoxical in its use of the Portal system. While the staff at both Call-Taker and management level seemed keen to embrace the system

internally, their physical implementation of the Portal expressed a misunderstanding of its mode of operation and presented a number of challenges to those using the system. Four key themes were identified from the data collected from Force C

Force C Theme 1	
Label	Lack of training availability
Definition	Individual felt that they have not been properly trained in the use of the system or expresses concern that their staff had not had adequate opportunity to train on the system.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Force C Theme 1a	
Label	Lack of awareness
Definition	Individuals' were unaware of essential parts of the Portals implementation. Call-Takers had poor understanding of the prioritisation flags system, and management lacked strategic knowledge of how the system operates at a national level or the process by which NoCs reach the force.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Force C Theme 1b	
Label	Inappropriate duplicative implementation of system
Definition	Business processes implemented to support the Portal were not fit for purpose and redundant to accommodate a perceived system reliability problem.
Derivation	Document sampling and observations.

Table 5.10 Force C Theme 1

Theme 1 shows that again limited training and communication with regards to the features and functionality of the system presented issues in its use at a force level. Of particular note at Force C is theme 1b. While all forces examined up to this point had difficulties arising from the way they implemented the Portal to their understanding of the system, the method of implementation adopted by Force C was conducted in a redundant way, having significant effects on the efficient use of the Portal system within the force.

Force C Theme 2	
Label	Stress caused by additional workload
Definition	Implementation of Portal has introduced new work flow patterns that are observed to place increased stress on the system operator. Implementation of the Portal has increased the volume of information to an operator above a level they were comfortable managing.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Force C Theme 2a	
Label	Frustration at data entry method and integration
Definition	Users felt frustrated by the complexities of having to transfer the NoC data manually into the crime system and raise issues with the lack of an appropriate NoC format. They expressed concerns over the lack of integration of the Portal system with existing systems.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Table 5.11 Force C Theme 2

Theme 2 again recognises issues within the force over the manual transfer of NoCs between systems and the poor format of the attachments relative to the crime systems. While this theme was observed to also emerge as a result of the particularly inefficient method of implementation within this force, it is treated as a theme in it own right due to the high volumes of NoCs submitted to this force. During interview it was highlighted that it was a combination of both NoC volume and the processes that had to be followed that led to the stress felt by the Call-Takers.

Force C Theme 3	
Label	Novel systems usage
Definition	Unexpected business use of the Portal system greatly increasing NoC submission rates.
Derivation	Document sampling and interviews with Call-Takers.

Table 5.12 Force C Theme 3

Theme 3 is of particular note in Force C as it led to a very significant rise in the volume of NoCs submitted via the Portal system. Unlike other forces where primarily members of the public used the Portal, in Force C the primary users were businesses reporting crime, commonly damage to property and street furniture that they owned. The Portal was never intended for this use and its fervent adoption by business was not anticipated by either the forces or the development team.

Force C Theme 4	
Label	Unwillingness to cooperate
Definition	The force has acted in an isolationist way not willing to cooperate with other forces on certain matters. The force acted to keep control of its resources within its boundaries and has limited national control and interaction.
Derivation	Discussions with staff, Observation, Interview.

Force C Theme 4a	
Label	Misunderstanding of PITO/NPIA role
Definition	Failure to understand the role of PITO as a national body. Mistrust over their true intentions.
Derivation	Discussions with staff, Observation, Interview.

Table 5.13 Force C Theme 4

Theme 4 was exhibited not just through formal means but also casual conversations. Within this force there was an isolationist view that the force could better control its resources. There was also a barrier to the acceptance of PITO as a poor reputation based on past projects had developed of PITO/NPIA within the force.

5.6.4 Force D

Force D was among the most innovative and able to cope with the implementation of the Portal system. A medium sized force with average technical abilities, it successfully coped with the implementation of the Portal despite not having a full understanding of the system itself. NoC submission rates were very low in comparison to other forces and the low demand on the Call-Takers time allowed the development of coping mechanisms to ensure the integrity of data submitted via the system. Four key themes were identified in the data from Force D:

Force D Theme 1	
Label	Frustration at data entry method and integration
Definition	Users felt frustrated by the complexities of having to transfer the NoC data manually into the crime system and raise issues with the lack of an appropriate NoC format. They have expressed concerns over the lack of integration of the Portal system with existing systems.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Table 5.14 Force D Theme 1

Theme 1 highlights the common issues with the transfer of data from NoC to crime system. Raised by management and Call-Takers, it was identified as the primary area of criticism by those involved in Portal operations at Force D.

Force D Theme 2	
Label	Lack of awareness
Definition	Individuals' were unaware of essential parts of the Portals implementation. Call-Takers had poor understanding of the prioritisation flags system, and management lacked strategic knowledge of how the system operates at a national level or the process by which NoCs reach the force.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Table 5.15 Force D Theme 2

Theme 2 again highlights the lack of awareness the Call-Takers and managers had over the Portal's operation and the meaning of priority flags. It was regularly observed in interviews that there was a lack of understanding over the Portal system as a national project and how NoCs made it to the force.

Force D Theme 3	
Label	Novel systems usage
Definition	The force had implemented novel mechanisms for controlling data flow through the Portal system.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Table 5.16 Force D Theme 3

In spite of these difficulties Force D stood out among the other forces for its ability to adapt and respond to the challenges cause by the lack of training and information about how the system operated. Through the use of modified subject line manipulation and internal inbox monitoring at both the Call-Taker and control room supervisor levels, Force D took control of the incoming NoC data, managed it and structured its flow in an effective way, allowing for considerably reduced stress on the operators.

Force D Theme 4	
Label	Lack of proactive cooperation
Definition	The force has acted to keep control of its resources within its boundaries.
Derivation	Discussions with staff, Observation, Interview.

Force D Theme 4a	
Label	Misunderstanding of PITO/NPIA role
Definition	Failure to understand the role of PITO as a national body. Mistrust over their true purpose and intentions.
Derivation	Discussions with staff, Observation, Interview.

Table 5.17 Force D Theme 4

A lack of proactive cooperation with others and a poor engagement with PITO was also found at Force D. Again those in charge were found to hold a more isolationist attitude to the way in which their force controls its resources.

5.6.5 Force Data Amalgamation

Upon completion of the force studies the themes generated from each force were triangulated and merged into a coherent set of views representative of the problems encountered amongst the forces. From this, five common themes were identified and are discussed below:

Cross Force Theme 1	
Label	Poor business processes result in stress caused by additional workload
Definition	Implementation of Portal had introduced new work flow patterns that were observed to place increased stress on the system operator. Implementation of the Portal had increased the level of information flow to an operator above a level they were comfortable managing.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Cross Force Theme 1a	
Label	Frustration at data entry method and integration
Definition	Users felt frustrated by the complexities of having to transfer the NoC data manually into the crime system and raise issues with the lack of an appropriate NoC format. They expressed concerns over the lack of integration of the Portal system with existing systems.
Derivation	From observations examining Call-Taker operations and post observation interviews.

Table 5.18 Force Cross Force Theme 1

While the level of stress placed on the operators at each force was variable based on their chosen implementation methodology, a universal theme was the expression of dissatisfaction at the need for manual re-entry of the data from the NoC into the crime system and the very different formatting of the NoC to the input fields on the system. At every force it was observed to result in operators having search for the field in the NoC before entering it into the crime system, rather than having the NoC fields ordered in the same order and progression as the crime system in use within that force. Looking from a wider cross force perspective the themes of Stress caused by additional workload, and 1b from Force C (Inappropriate Duplicative implementation of system) have been merged. While distinct both can be seen to have their roots in a lack of strategic understanding of the Portal's operation and how this would merge

with business processes at the forces. The adoption of a 'one size fits all' approach in the implementation of the Portal system resulted in inefficient business processes that placed additional undue stress on those using the system.

Cross Force Theme 2	
Label	Perceived lack of communications with national Portal team
Definition	Individuals felt isolated from the Portal's national operators with no avenue for communication with them over how the system operates or a means to report issues, concerns or errors in the system.
Derivation	Direct response from management during interview.

Table 5.19 Force Cross Force Theme 2

Many forces expressed discontent at the lack of communication with the national team. Each force had its own reasons for the need to communicate, however all but one felt that when they attempted to do so the access to the central team was often inconsistent. For this final force cross-comparison, Force A, Theme 2 has been partially merged into this theme. While a desire for better communication with those higher up the chain of command was a common to many the active feeling of isolation was only truly expressed by those within Force A. as a result the communications aspect of this theme were kept and feelings of isolation removed.

Cross Force Theme 3	
Label	Unwillingness to cooperate
Definition	The force acted in an isolationist way not willing to coordinate with other forces on certain matters. The forces acted to keep control of its resources within its boundaries and resisted national control and interaction.
Derivation	Discussions with staff, Observation, Interview.

Cross Force Theme 3a	
Label	Misunderstanding of PITO/NPIA role
Definition	Failure to understand the role of PITO as a national body. Mistrust over their true intentions.
Derivation	Discussions with staff, Observation, Interview, Document Sampling.

Table 5.20 Force Cross Force Theme 3

Theme 3 recognises a wider institutional issue of mistrust and problems with sharing within the police community, as highlighted by Bichard (2004). With the exception of a minority of forces, degrees of institutional isolationism were common throughout the UK police forces. Individual forces were viewed as reluctant to engage with each other and could view the implementation of large system on a national scale as

attempts to control their operations and for resources to be taken out of their jurisdiction. This, coupled with a generally poor reputation of PITO/NPIA within forces, exacerbated the lack of buy-in from the forces.

Cross Force Theme 4	
Label	Lack of training availability
Definition	Individuals felt that they have not been properly trained in the use of the system or expresses concern that their staff had not had adequate opportunity to train on the system.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Cross Force Theme 4a	
Label	Lack of awareness
Definition	Individuals' were unaware of essential parts of the Portals implementation. Call-Takers had poor understanding of the prioritisation flags system, and management lacked strategic knowledge of how the system operates at a national level or the process by which NoCs reach the force.
Derivation	From interviews at both a management and operational level and observations during call-handling operations.

Table 5.21 Force Cross Force Theme 4

Theme 4 embodies the desire across the forces to have more information and training on the Portal system. While all the forces recognised the simplistic nature of the email system they often underestimated the impact of either the volume of information it would create, the reliability of the system and the substantial added value that the Portal functionalities could deliver in conjunction with other legacy systems. It was observed that this lead to mixed and strong feeling of frustration amongst users and a lack of awareness of key features directly responsible for highlighting issues of life-saving importance. This frustration resulted in a negative perception of the Portal system, which at times was emotional rather than substantiated.

Cross Force Theme 5	
Label	Novel systems usage
Definition	Unexpected usage of the Portal system outside of its original expected usage and design parameters.
Derivation	Document Sampling, Observation, Interviews.

Table 5.22 Force Cross Force Theme 5

Theme 5 highlights the issue of novel systems usage at all levels. While the development of the Portal itself was well controlled, once implemented at a force level the NPIA/PITO had little control over its day-to-day operation. As a result, both

forces and the public were left to utilise the system in the best way they could individually engineer. This mode of operation resulted in a number of unexpected system uses, both positive and negative, that had an impact on how the system affected the forces studied. Theme 5 encompasses both Theme 3 from Forces C and D.

Cross Force Theme 6	
Label	Variability between forces
Definition	Strong differences in the resources, technologies and processes employed within each force.
Derivation	Document Sampling, Observation, Interviews.

Table 5.23 Force Cross Force Theme 6

Theme 6 emerges from the wider examination of all of the forces as a whole, the autonomous nature of the forces, able to decide their own internal business processes and choose technological systems they implement has resulted in a wide variance between each force. As a result of the unique circumstances faced by each force in terms of operational priorities, crime and population demographics and the differing resources available to each force the systems implemented differ considerably across each force with none of the forces observed sharing similar processes for implementing the same task. Each force has its own variant on the requirements needed for the Portal system, something the one-size-fits-all approach of the implementation has failed to adequately address.

From Force B both Theme 3 (Imposed System Usage) and Theme 4 (Public facing site overly complex) were dropped as there was no evidence to support these themes outside Force B. While it could be argued that Force B Theme 4 has some similarity with the general Theme 4 as highlighted in the final cross comparison, the primary influencing factor in force B was brought by the Call-Takers as end users more than at a senior force level as shown in Forces C and D.

5.7 Development Team

Running alongside the iterative investigation of the Portal implementation within the forces was the ongoing investigation into the Portal's national development with the NPIA development team. Investigations within the development team were conducted in parallel with force visits to allow for the direction of the development team investigation to be partially guided by themes emerging from the forces as they were

studied. This allowed issues at forces to be examined within the development team environment, exploring any root causes for these issues in order to provide a wider picture of how the Portal's development had progressed and why. The themes that emerged from the data collection, interviews and observations of the development team are detailed below:

Development Team Theme 1	
Label	External political influence
Definition	National bodies and political figures are seen to be exerting pressure on the Portal's development. Short deadlines or attempts to steer the course of the project for political benefit were observed.
Derivation	From observations at and interviews at a development team level.

Table 5.24 Development Team Theme 1

From the beginning of the Portal's inception it has been observed that there were intense time and political pressures exerted upon the Portal's leadership and on the development team to deliver a workable Portal product within an incredibly short space of time. This rush placed unrealistic time constraints on the development, leading to compromises and assumption that are discussed latter in this section, and which significantly contributed to the problems seen in the Portal's development. As a result of this rush the Portal project was never accurately defined. While initial specification of the project was provided in the e-policing framework (Centrex, 2001), the scope of this proposal was adopted without sufficient re-examination of situational changes since its design.

Development Team Theme 2	
Label	Poor awareness of force makeup
Definition	Development team took a one-size fits all approach to the implementation of the Portal at a force level failing to take into account the unique makeup of each force.
Derivation	From observations and interviews at a development team and force level.

Development Team Theme 2a	
Label	Poor force relations
Definition	Divergent attitudes and approaches in interaction with the forces lead to the exclusion or bias of stakeholders. Fostering resentment or negative perceptions amongst other stakeholder groups.
Derivation	From observations and interviews at a development team and force level.

Development Team Theme 2b	
Label	Failure to establish adequate communications
Definition	Development team fail to establish adequate avenues of communication with the forces.
Derivation	From observations and interviews at a development team and force level and document sampling at a development team level.

Development Team Theme 2c	
Label	Regional innovation
Definition	Forces had developed their own portals prior to the inception of a national system. A lack of involvement in the national Portal's design or a feeling that the national system was somehow inferior to their own introduced a barrier to cooperation.
Derivation	From interviews at force and development team level.

Table 5.25 Development Team Theme 2

One of the principle issues raised by the development team and observed in the progress of the Portal's design was the lack of adequate engagement and communication with the large number of forces within the UK. The regionalisation of the forces presented significant challenges to the development team. The autonomy granted to the forces resulted in 53 distinct entities, each with its own distinct needs and requirements. Some elements of policing and the data needed by forces are universal. However, the autonomy and varying priorities, crime and population demographics within each force resulted in a wide disparity in the technology and business processes that were implemented. This was seen to greatly fragment the problem domain. Each force having its own opinion on the functionalities of such a system resulted in the need to reconcile a large number of differences. The development team's failure to reconcile the impact this would have and the need for adequate communication lead to a situation where forces were alienated as they felt their needs were not being represented. It had significant repercussions on requirements capture and implementation planning, as highlighted in Theme 3.

The principle underpinning Theme 2 is that of a lack of understanding of the organisational culture that exists within the UK Police. This represents a failure to

recognise the intricacies of the regionalised inter-force relations together with how they view their national governing bodies and the effects the variations observed across forces would have on the development process. Many of the issues at a development team level, and to some degree at the forces, were observed to be rooted in the regionalised structure and autonomy granted to each force. National bodies such as the NPIA were often viewed with a degree of mistrust and seen as acting to take away power from forces. As highlighted in the Bichard report (Bichard, 2004), with the exception of a small number of forces, many were seen to act to isolate themselves and their resources, despite the presence of national policies such as the National Intelligence Model (NCIS, 2000), which state that forces should share information and intelligence. Each force acts autonomously not just from an IT/IS perspective but across the large range of their business processes. This has lead to a community environment where other forces and national bodies can sometimes be treated as 'the competition'. Forces were reluctant to commit additional resources to an unproven technology and, with the differing systems in place, the development team was forced to compromise.

Such difficulties were further exacerbated by the limited communications established with the forces. The large number of forces present within the police presented a difficult challenge in terms of the organisation of formalised frequent communications channels. The use of seconded officers was seen as sufficient communication at a force level but failed to be truly representative of the actual picture on the ground. As we will see, without adequate levels of communication, an accurate requirements capture was hindered and the development team lacked the information to recognise or respond to issues as they occurred and limited their ability to predict future incidents.

Regional innovation amongst the forces was noted by the development team to have been occurring at a number of forces. Forces that had not developed their own portal systems were left to decide the relative merits of the system on their own. However, those forces that had taken the initiative and developed their own portals prior to the inception of a national system, presented a number of challenges to the NPIA. Those with existing portals had a system by which they could compare the national Police Portal's offerings. As innovators those forces felt that they should be closely

consulted so that lessons from their systems could be learnt by the NPIA development team. These forces felt proud of the systems they implemented, as they were created for each force's specific needs, closely matching their forces' business requirements. The attitude and buy-in of forces who had implemented a system prior to the national Portal, was the result of their level of engagement and participation with the NPIA development team. Those forces who felt that they had been listened to and considered as stakeholders, who could offer experience and informed views on the design of the national Portal system, were welcoming of it. On the contrary, forces that were not consulted developed a hostile attitude towards the system, attributing to it a less than acceptable level of usability.

Development Team Theme 3	
Label	Poor leadership and planning
Definition	A lack of clear and decisive leadership and compromises made result in a flawed planning process.
Derivation	From observations, interviews and document sampling at development team level.

Development Team Theme 3a	
Label	Incomplete and selective requirements capture
Definition	Processes within the requirements engineering stage of development had a detrimental effect on the Portal's implementation.
Derivation	From observations at development team, interviews and document sampling at force and development team level.

Development Team Theme 3b	
Label	Lack of full public consultation
Definition	Development team fail to establish sufficient avenues of communication with the public.
Derivation	From observations, interviews and document sampling at development team level.

Development Team Theme 3c	
Label	Slow and reactive approach to problem solving
Definition	Portal team and forces are slow to identify and react to problems when they occur. Problem solving is done in a reactive fashion.
Derivation	From observations and interviews at a development team and force level.

Development Team Theme 3d	
Label	Limited implementation planning and post-implementation evaluation
Definition	Limited availability of implementation planning and a lack of post-implementation evaluation.
Derivation	From observations and interviews at a development team and force level.

Development Team Theme 3e	
Label	Unexpected systems usage
Definition	Forces and members of the public utilised the Portal in ways that were not envisaged by the development team.
Derivation	From observations and interviews at a development team and force level.

Table 5.26 Development Team Theme 3

Theme 3 represents the issues observed in the overall leadership and project management of the Police Portal. While the leadership and management of the Portal was generally observed to be well structured and thought out within the constraints placed on the project a number of issues were noted. As observed in Theme 1 while the e-policing strategy (Centrex, 2001) clearly stated a need for some form of Portal system, the actual details of the system were not as clearly defined as they could have been. ACPO and the Home Office failed to adequately scope the project and, as a result, the true aim and direction of the project was not felt to be established. Leadership of the project was also seen to be atypical within the context of past NPIA projects. Traditionally large infrastructure projects implemented by the NPIA are 'championed' by an ACPO officer. This gives ownership and leadership of the project to a chief police officer from a force and so the project is seen to be lead by the police themselves. Atypically this did not happen within the Portal. With no champion from ACPO to speak for the project the leadership and direction for the Portal was taken in-house within the NPIA, further isolating the development from the forces.

Aside from the apparent lack of a lead figure the constant changes within the development team were seen to have contributory effect on the issues of the Portal's planning. While it is common for development teams to grow and shrink as a project progresses from requirements capture to development through to implementation, the changes within the Portal development team were often seen to occur very rapidly. With a large number of seconded officers from a limited number of forces participating in the development team. Seconded officers were selected to provide a police perspective to the developers, a view that was restricted due to the limited representation of forces amongst the secondments. Amongst these officers and in general within the NPIA staff, people commonly changed job roles, seconded officers went back to their forces and new ones were recruited, leaving little time for members of the development team to become settled in their roles. With such a rate of change

within the development team it was hard to develop a full understanding of the problem domain, leaving little time for knowledge transfer.

Leadership and planning issues were also seen to have an effect on the progression of the project's requirements capture. The large number of forces each with their own regional needs, internal processes and differing technological environments lead to a large number of conflicting requirements that would need to be reconciled or processes changed before a solution could be proposed. As a result of the time pressures placed on the Portal's development and the issues of force engagement and limited communication, a full capture of all the forces needs failed to be fully implemented, resulting in fragmented requirements that were under representative of the true problem domain. Power bias also had a strong part to play in many of the issues observed. While in an ideal world all levels of users and stakeholders of an IS project would be consulted, ultimately the commissioning body and management at a national level followed their interpretation of what was needed. The lack of time to develop the system and the lack of a strong requirements capture methodology resulted in the requirements capture and the subsequent guidance of the Portal project being heavily skewed towards the views of a few, with insufficient priority given to the consultation and acceptance of the views of the end users of the system. This acted detrimentally to exclude the opinions and needs of the force level users of the system, the Call-Takers and control room staff. The use of seconded officers, while beneficial to the development in gaining an officer's perspective and establishing limited communications with some forces, introduced a significant bias in the development team's views based on the forces those officers represented. This exacerbated already difficult interactions with the forces and failed to generate cooperation among forces who felt they were under represented.

The adoption of email and an attachment as the primary method of systems integration was seen as the simplest option available and the most likely to encourage force adoption. Email provided the relevant information to forces without having to worry about interfacing with many different crime systems and required little technical integration however it provided the least overall functionality to the system and represented a point of contention amongst the forces when attempting to demonstrate systems benefit.

Public engagement in the requirements process was also problematic. While the need for the public's use of the system was never in doubt the development team never truly engaged them as an equal stakeholder in the systems development. Given the diverse nature of the public as a whole, their involvement within the development presented many challenges and the developers were unsure of the best approach for the engagement of the public. While the public were acknowledged as needing to be involved in the system the development team was uncertain as to how to initiate such contact and involve them within the process. This is particularly relevant to organisational knowledge as the individual forces already had strong links to the public via community liaison committees. The requirements for the Portal were incomplete in their assessment of the publics needs and as a result a number of unexpected behaviours such as the high business use of the Portal were not predicted.

Unexpected usage from the public can be seen as a result of this limited consultation or consideration of the public as a stakeholder in the Portal's development process. Initially it was only considered that individuals would submit crime reports online, however, members of the business community also started to use the system in a way that, while not unwelcomed, was unexpected by the project. As such, this placed additional load on those operating the system.

The limited implementation methodology within forces manifested in the development team's response to problems as they occurred in the development. The approaches adopted in the solution of problems identified were seen as a manifestation of limited force wide organisational awareness. As a result of not truly understanding the global problem domain and resultant inability to foresee possible problems within the development, the development team was sometimes on the 'back foot', acting in a reactive fashion to issues as they arose at a force level. The speed of response to issues was further shown to be curtailed by the lack of communication with forces with many problems remaining unidentified through a lack of proactive dialogue.

Further along in the development process, implementation and post implementation planning were seen to have suffered, with limited guidance provided to the forces. The complex variations in control room operations across the forces resulted in a

decision to leave the integration of the incoming NoC inbox to the forces as the best judges of how to integrate the system into their business processes within the control room. However as seen in the force themes this did not go as expected, with little knowledge of issues such as the priority flags, and the volume of NoCs expected, forces were seen to implement the Portal in novel and sometimes very inefficient and detrimental fashions, placing considerable stress on the operators. A lack of established communications with the forces and limited post implementation evaluation procedure resulted in forces having little avenue to communicate issues back to the development team, and left the development team unable to examine implementations to see if issues were occurring. This highlights the limitations of the operational knowledge held by the development team of how the Portal was operating once implemented within a force. The management team viewed their knowledge of the statistics of submission volumes as a sufficient indicator of a successful implementation without monitoring the forces' ability to develop effective processes and protocols to capitalise on the functionality of the system whilst reducing integration and data entry effort. Few systems were in place to capture relevant implementation data and the development team was not equipped to facilitate future analysis of this information to establish trends and issues within forces operating the Portal system.

5.8 Finalisation of the theme set

Upon completion of the data-collection phase of this research the themes developed from the initial investigation, force investigation and development team were then cross compared. Common themes across these three sets were merged and reorganised to represent the issues apparent across the whole development with themes that were viewed as isolated were removed. This resulted in a final theme set taking a holistic view of the development process and the problems encountered from all levels examined. The initial political pressures accelerated the Portal's development with the organisational regionalisation effects serving to greatly increase the complexity of the problem domain and exacerbate problems already present within the leadership and planning of the project.

Final Theme 1	
Label	External political influence
Definition	National bodies and political figures are seen to be exerting pressure on the Portal's development. Short deadlines or attempts to steer the course of the project were observed.
Derivation	Development Team Theme 1.

Table 5.27 Final Theme 1

Final Theme 1 again reflects the significant impact that national political pressures and a lack of legislative mandate had on the efforts to develop the Portal system. From the very inception of the Portal project the time pressures that were introduced as a result of national political action severely hindered and constrained the project's development, resulting in the lack of a clearly defined problem domain and compromises to the development methodology.

Final Theme 2	
Label	Organisational regionalisation
Definition	The segmentation of the police into multiple autonomous regions results in a significant increase in the number of stakeholders present and an associated increase in the variance of organisational requirements across the forces.
Derivation	Revised Initial theme 3/4, Cross Force Theme 2/6 Development Team 2b.

Final Theme 2a	
Label	Willingness of forces to cooperate with the development
Definition	The degree of participation from each force varied considerably based on a number of factors.
Derivation	Revised Initial Theme 3, Cross Force Theme 3/3a Development Team 2a/2b.

Final Theme 2b	
Label	Regional innovation
Definition	Prior systems replicating functionality of the Portal present an additional component for comparison within the force.
Derivation	Development Team Theme 2c.

Table 5.28 Final Theme 2

Theme 2 represents the amalgamation of themes representing the considerable extra strain the regionalised organisational makeup of the forces placed on the development process. The operational autonomy of the forces led to a diverse operational environment with each having its own differing regional circumstances. Technological choices and the differing business processes adopted within the forces resulted in each force having its own needs and expectations from the Portal system. Such a structure presents a large volume of very similar stakeholders but with subtly

differing and often conflicting requirements for the same processes. What works in one force will not necessarily work for them all, placing additional strain on the requirements capture process when attempting to reconcile the many differing opinions present. With such a large group of disparate stakeholders, a lack of communications was seen to be a significant issue affecting all areas of the development. Establishing adequate representation of this group proved exceptionally problematic for the development team as they failed to adequately demonstrate the benefits of the system and take into account existing negativity towards the NPIA.

The lack of willingness to cooperate from many of the forces strongly impacted the Portal's development process. Without adequate participation of all forces their differing requirements and needs could not be accounted for. As shown, this lack of willingness had its roots in a number of factors. Historically, as an organisation the police forces were prone to being very insular and protective. Forces acted to preserve their independence and autonomy, seeing the Portal as a risk to these. Mistrust of the NPIA as an organisation exacerbated by the lack of an ACPO 'champion' further discouraged forces to engage with the Portal development team. The lack of active engagement from the NPIA further acted to foster the feelings of mistrust within the forces, leading some to feel excluded from the development team while seeing others being welcomed. Willingness to participate was also seen to be affected by the degree of alignment of the one-size-fits-all approach that was adopted to the individual force's goals. Those who felt their requirements had been ignored or undermined in the new system were much less likely to continue to be actively involved in its development. Such issues were seen to be further exacerbated by regional innovation within the forces. By ignoring the accomplishments of other forces' portals, existing mistrust and tensions between the forces and NPIA were heightened and those with existing systems felt that they were being offered an inferior product.

Final Theme 3	
Label	Lack of clear leadership and planning
Definition	Throughout the project a failure to establish clear ownership of the project and methodological problems hinder the projects development.
Derivation	Revised Theme 1, Development Team Theme 3.

Final Theme 3a	
Label	Lack of organisational understanding
Definition	The development team and leadership fail to significantly take into account the effect the organisational structure and regionalisation of the forces will have on the Portal development.
Derivation	Cross Force Theme 6, Development Team Theme 2.

Final Theme 3b	
Label	Issues within the requirements capture process
Definition	As a result of problems with project definition and issues with consulting forces the requirements capture process is incomplete and under-representative.
Derivation	Revised Initial Theme 2/4, Cross Force Theme 1/5, Development Team Theme 3a.

Final Theme 3c	
Label	Lack of full public consultation
Definition	As a result of a lack of consultation with the public as a significant stakeholder use cases and opportunities for systems development were missed.
Derivation	Revised Initial Theme 4, Development Team 3b.

Final Theme 3d	
Label	Development team structure
Definition	The development team structure and makeup further serve to exacerbate planning problems and the issues communicating with the forces.
Derivation	Development Team Theme 3/3a.

Final Theme 3e	
Label	Slow and reactive approach to problem solving
Definition	Portal team and forces are slow to identify and react to problems when they occur. Problem solving is done in a reactive fashion.
Derivation	Cross Force Theme 1a, Development Team Theme 3c.

Final Theme 3f	
Label	Limited implementation planning and post-implementation evaluation
Definition	Limited availability of implementation planning and a lack of post-implementation evaluation.
Derivation	Cross Force Theme 1a/4/4a/5, Development Team Theme 3d/3e.

Table 5.29 Final Theme 3

A lack of clear leadership and planning throughout the process of the Portal was seen to contribute significantly to the failure encountered within the development. Initial political pressures resulted in the project starting out with poorly defined and conflicting leadership, with ownership of the project within the NPIA rather than within the forces. Confusion led to a poorly defined project scope. When combined with the time constraints this led to compromises in planning and development that had a considerable impact on the projects ability to deliver. The structure and

organisation of policing within the UK presented a number of challenges for the developers of the Portal. The strong regional variations across forces, their operational independence, and the forces' reluctance to engage on national level projects presented significant difficulties. Difficulties that the development team struggled to recognise and respond to. As a result of a failure to understand the increased complexities of the regionalised organisational structure and the scale of consultation required, many forces were not heavily involved in the development process. A failure to account for this increased complexity and the dialogue needed with everyone involved resulted in a failure to establish formal communications channels with the all the forces on a routine basis. Without this communication, key stakeholders in the development process (the Call-Takers) went unconsidered and forces were alienated by the lack of engagement from the NPIA.

As a result of these concerns attempts at requirements capture were significantly curtailed, with the lack of proper and detailed requirements capture having a significant impact on the project. Pressure from the commissioning group and the resulting time constraints placed on the development team to produce an operational system had a significant impact on the time allowed for requirements capture and ultimately had a significant effect on its execution and accuracy. Power bias from those commissioning the system was seen to skew requirements in their favour and away from the end-users, those who would ultimately be using such a system. This was exacerbated further by NPIA's compromised reputation amongst some of the forces. A failure to proactively engage forces resulted in fragmented requirements that were not representative of the overall problem domain, resulting in a system that placed considerable strain on the Call-Takers using it. The requirements capture was further complicated by the failure to acknowledge the public as an equal partner in the development process and the lack of their full inclusion and consultation resulted in a number of unexpected systems usage approaches. The rapidly changing makeup of the development team served to exacerbate the problems encountered within the development. With such turn over of staff, efficient knowledge transfer became problematic. The use of seconded officers, while beneficial in many respects, again created bias in the requirements in favour of those forces which were represented and further reduced the willingness to cooperate of forces who felt underrepresented.

As seen in the development themes, a failure to establish proactive communications channels with the forces and limited post-implementation planning resulted in a slow and reactive approach to the investigation and solution of problems. Without an adequate communication with the forces the development team were unaware of many of the problems being encountered in the forces. This lack of information meant that the development team could not pre-emptively plan for and respond to issues much earlier in the development cycle.

As a result of this and assumptions of ease of use, the Portals implementation within forces was left to the individual forces to decide. A lack of consideration of the end-users and training for the system was also shown. The OCR system as implemented within forces was regarded as very simplistic and intuitive from the perspective of the development team. As such it was assumed that forces would be able to implement such functionality with little or no training on the system. This assumption was made without consideration of the different IT environments within each force and without the knowledge of the considerable extra workload the OCR system would require from those operating it. While XML functionality was included to allow forces to develop their own automation software for data entry into their crime systems this option was not adopted in any known force during this study.

Limited thought was given to the Portal's existence within the police forces post-implementation. Through a lack of consideration of the Portal's effects once implemented, the national development team was left with few avenues to check how the system was truly operating within forces. Instead the team concentrated on its own role as the maintainer of the technical backbone of the system, relying on the national level statistics provided by the system and limited dialogue with the forces establish the level of implementation of the system across the forces. The ill effects observed to internal force business processes and issues such as operator stress went unreported to the national team. Instances of innovative implementation and instances of irregular unplanned usage of the system were not seen by the development team.

Within this final theme set one theme has been deleted. Revised Initial Theme 5 (Difficult Regulatory Environment) was removed as it was felt that while the regulatory environment did present challenges to the development team they were not

sufficiently severe to warrant inclusion in the finalised theme set and their occurrence across the data collected was minimal.

5.9 A Problematic Development

Ultimately, while regarded as a brief success and a useful tool by a number of forces and the public alike, providing a considerable and valuable new tool for communicating with the public, the external pressures exerted upon it and the choices made during its development and implementation resulted in a system that did not take into account the needs of a number of the forces using it. The purely technological approach adopted by the development team lead to a failure to recognise the complex regionalised organisational nature of the police environment and the strong effects such an environment would have on the developments progression. Assumptions of technological simplicity were found to be erroneous when the system was actually implemented within the complex dynamic of the control room environment. An inability to control political pressure and time constraints exerted at the national level and a failure to take into account competition resulting from the historic organisational structure lead to a limited requirements capture that was unrepresentative of the true problem domain. The public as a stakeholder was ignored despite many avenues for possible engagement being present within the police. The development was viewed as complete as soon as implementation had finished with little planning for how the system had been accepted within forces and the impact such a system may have had.

5.10 Summary

This chapter has evaluated the data collected in the progress of this research. It has identified common themes across the forces studied and within the NPIA development team, combining these into a coherent set of concepts highlighting areas of weakness in the Portal project's development. In Chapter 6 the results of this analysis will be discussed within the wider context of public information systems development literature. Conclusions will be drawn to assist in the examination and development of future system and a new Public IS STS model will be proposed based on these.

Chapter 6

The Complexity of Public Information Systems: Regional Structure and External Political Factors

6.1 Introduction

As highlighted in the previous analysis, the regional structure of a public organisation and the external political factors influencing an IS development within this context can be seen to have a significant deleterious effect on the likely chances of project success. This chapter outlines an extension of the STS model previously adopted in Chapter 2, expanding the four core components to highlight areas of concern specific to public information systems that were identified through the themes emerging from the case study. The value of this model is identified before progressing to a detailed discussion of its core components. It is then evaluated against secondary data, examining the development of other UK public projects as reviewed by the National Audit Office (NAO) in order to assess its utility outside the policing context with resultant changes then explained.

6.2 Value and Purpose

The Piccoli (2007) STS model discussed in Chapter 2 provides the grounding for an overall understanding of the interactions between the components of an IS and allows for a more in-depth examination of failings in the development process; however, the use of such a generic STS model also presents a number of issues. Such a generalised model, while valid for the examination of a large number of IS projects, fails to highlight the subtleties of IS design and operation within certain domains. As seen from the STS models developed by ODPM (2003) and Sittig & Singh (2010), specific areas such as e-government and Health Information Technology (HIT) have been shown to benefit from a more tailored approach in their adoption of a STS model. Both these models highlight that, as a result of environmental concerns and constraints unique to each of these operating environments, a more generic approach to STS modelling misses important descriptive details of these systems. Instead, these authors seek to tailor a model that best portrays the concerns specific to the domain under scrutiny. E-government approaches seek to highlight the importance of public engagement in their modelling with HIT seeking to highlight the importance of the

user interface as key in the effectiveness of the system. Just as the remodelling of IS STS models was seen as valid and required in these examples, it is proposed that as a result of the case study conducted, there is sufficient evidence for the proposition of a new STS model relating to the examination of public information systems.

As seen from the case study, the Portal experienced many of the same development problems as IS developments from the private sector, as identified in Chapter 2. A lack of leadership and planning, poorly defined requirements and poor communication led to a system that was not representative of the problem it was trying to solve and as a result caused considerable stress for its end users. These problems were seen to be considerably compounded by the public nature of this development. The inherent regional organisational structure and external political pressures common to many public IS developments, which will be examined later in this chapter, were found to amplify issues within the development. This greatly increased its scale and complexity and placed additional constraints on the project's leadership which led to damaging concessions and compromises.

6.3 Model

Just as with the HIT and ODMP models, the purpose of this revised STS model is to provide a more focused lens for the investigation of IS development, and with particular reference to the public sector. This model will highlight important areas of concern identified from the Portal case study and how these concerns interact with and affect the core components of such STS. The purpose of this is to allow such a model to be used in the examination of past, present and future public information systems projects in order to provide for a more detailed and thorough understanding of the issues that could be encountered. This allows for the incorporation of such knowledge to inform the future adoption of development methodologies that could account for and incorporate the issues that were identified into an IS system's development.

As shown by the case study, the public nature of the IS had a considerable bearing on the progress and ultimate failure of the project. External political pressures acted to place considerable constraints on the project's development from its inception resulting in a flawed approach to the Portal's execution. Development was further

complicated by the regionalised organisational structure of the UK Police, creating a much larger and more diverse and complex range of stakeholders than would otherwise have been present. A failure to understand the effects of the regionally autonomous forces, the unique nature of policing within these regions and the effect this organisational structure had had on the people, technology and processes within each force had a considerable bearing on the outcome of the development. The issues encountered as a result of these concerns have been mapped onto the original STS model used in Chapter 2 (Piccoli, 2007) in order to present a more tailored model of these effects within a public system. The components on which they act are highlighted in figure 6.1 and discussed in greater detail below.

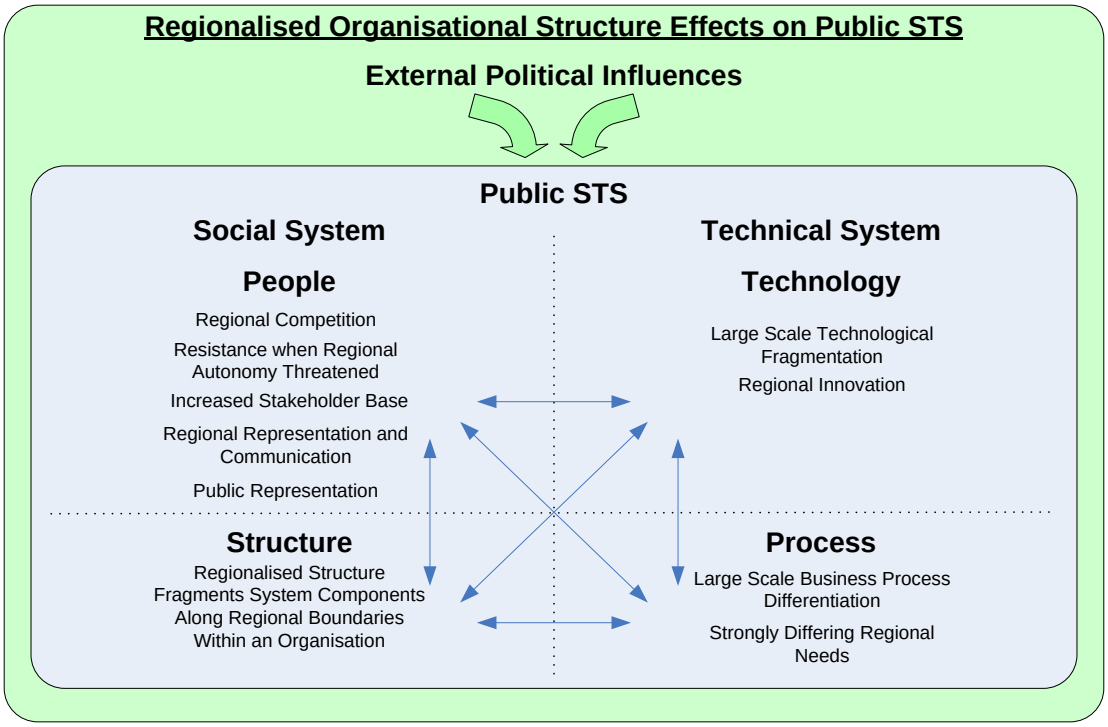

Figure 6.1 A public STS model.

While ostensibly the discussion below will present the four components of this model separately, given their heavily interconnected nature it is impractical to present them in isolation from each other.

6.3.1 Structure

Regionalised organisational structure represents the core issue at the heart of the model proposed. As shown in the case study, the regionalisation of the police forces

within the UK served to fragment the organisation and affects all components of a socio-technical system such as the police Portal. Instead of a single entity with an easily definable management and set of end-users, regionalisation resulted in there being a large and divergent set of stakeholders. Autonomy within regions led to fragmented, differing environments within each force with *technology* and *processes* evolving as a response to the needs and available resources of the forces. This fragmentation was observed to have a profound effect on the progression of the development, greatly increasing the challenges faced when communicating with such a large number of varying stakeholders. Similar challenges are also seen to occur in the reconciliation of the varying regional differences when engaging in requirements capture. In contrast to the ODPM(2003) model, the structural component of a public STS is shown to be key when examining such systems in a national rather than local context.

Regionalisation is not unique to the police and can be seen as a common organisational structure across many of the public services within the UK. All emergency services, the NHS, passport services, education (primary and secondary) and the courts systems operate under a regionalised organisational structure, with varying degrees of regionalisation and autonomy in each situation. As seen in the police, where the public service needs of the population differ, as a result of local factors, such an organisational structure allows for a more tailored service provision that is responsive to these local needs. As seen in the case study, such a structure, while beneficial for service provision, presents significant challenges for those wishing to develop an IS across such an environment. These are challenges that must be taken into account within the development methodology at an early stage.

6.3.2 People

Regionalisation and the autonomy that comes with it can be seen to have a profound effect on the various aspects of the *People* components of this development. As identified repeatedly throughout the case study, the independence amongst the regions can lead to significant competition between them. With the exception of Scotland, where forces successfully formed a homogenous coalition, relationships between regions were often observed to be fractious at best, only sharing information and

cooperation where such cooperation was mandated through legislation. Whilst some cooperation between forces was observed, it was not identified as the norm.

This competition was also reflected in the relationship between regional bodies and their national counterparts. As seen between the forces and the NPIA, this relationship is an elaboration on the subtle police attitudes towards non-force entities identified in Horton and Wood-Harper (2006). As a result of regionalisation and the organic growth of the organisations within these regions, regional branches can, rightly so in many instances, come to the view that they know best how to deal with the unique circumstances within their areas. Coupled with the considerable powers invested in each chief constable there was a strong resistance to change within the forces. Forces resisted changes that they felt threatened their autonomy, strongly mimicking the internal political manipulation observed in Kling & Lamb (1999) in a larger and more regionally diverse manner, amplifying the effects of such manipulation and rejection when issues are echoed from such a large number of stakeholders.

The strong subdivision of policing into 53 regional forces also presented significant issues within the development in terms of the collection of data from such a large group, their involvement with the development process and the establishment of proactive communication between the many regions and the development team. This large subdivision can be seen to greatly amplify the task of data collection and requirements capture when considering future IS development. Rather than a single homogenous entity with a limited number of viewpoints to consider, as in the Akkermans & Van Helden (2002) study or the CAPSA system examined by Fortune & Peters (2005), large public IS present a number of specific challenges. The large number of autonomous regions in many public services, 53 within the UK Police, 46 within English fire services and, as will be seen, 130 regions within the NHS, results in a vastly increased pool of systems users. These are users with their own regional needs and views that must be collected, conflicts resolved and compiled into a representative view of a much greater complex system. As observed, this task can prove to be a considerable challenge when many of the regions may have strongly conflicting needs.

This large number of regions also presents issues with regard to their involvement within the development process. While end-user participation is viewed as a key factor in the success of a development, the selection of end-users from such a wide user base can be seen to present considerable difficulties. As observed in this case study, representation was provided through the use of seconded officers. These helped to provide some formalised contact with the forces, however, the degree of variation amongst regions meant that the size of the selection used was unrepresentative of the true requirements of all 53 forces. That said, allowing full representation of each force via seconded officers would have placed considerable strain on the development team and presented additional constraints and time concerns. The adequate engagement of such a large number of varying regions can be seen as a significant contributory factor in this case. Regional representation also presents issues with regards to the competition presented previously. When regions are seen to be in conflict, the representation of some forces to the exclusion of others was observed to strongly affect the willingness of those under-represented regions to cooperate with the development.

In addition, public representation within such systems can be affected. As already observed within the ODPM STS model (ODPM, 2003), public consultation was highlighted as a significant factor in local e-government projects and was also seen as an issue in this study. The scope of a national scale project presents many problems when engaging with the public as a stakeholder. The needs and views of the public vary considerably across any number of regional and cultural boundaries, presenting a number of difficulties when attempting to capture their perspective on a potential IS and encouraging members of the public to engage with the development process. Many public bodies have relationships and contacts with groups such as the police liaison committees observed in this study, yet such groups often go underutilised as a consultative intermediary within the development. Unseen in the ODPM investigation was the effect of unintended use of the system. Rather than the lack of adoption seen by the ODPM, the Portal system was well accepted by those members of the public who were aware of the system, however their unexpected use of it to submit emergency crimes, despite numerous warnings, presented significant challenges to the forces using the system.

6.3.3 Technology

Issues of technological diversity (differing operating systems, software, hardware and configuration) within an organisation are not new to the literature (Williford & Chang, 1999). However, the extremely high degree of such diversity present in public IS as a result of regionalisation, autonomy and the resulting technological change can be seen to have a profound and unique effect on the development of public IS. As highlighted in this study, the regional autonomy of each force allowed them to make their own unique IT choices based on their regional needs and available resources. These choices resulted in an extremely wide divergence in the quality, application and standards of *technology* implemented across each region. While a number of forces adopted similar crime systems, the overall trend was that of an uncoordinated approach to the acquisition and implementation of IT across the regions.

This fragmented technological landscape can present significant problems for an IS development which has an aim of generating coordination at a national level. A lack of uniform, technological standards across regions can result in a system being developed to suit the 'lowest common denominator', considerably impacting the system goals and performance within regions whose technological choices may be perceived as more advanced. This generates frustration amongst such forces. The variety of systems in place across regions has been seen to restrict efforts to integrate new national systems into regional ones due to the significant level of work and investment that would have been required to customise the integration and the necessary business processes with each differing regional level system.

In addition, the different levels of technological innovation at a regional level may impact the progress of a national development by acting as a comparative tool for regions to judge the national systems effectiveness. As seen in the Portal case study, a number of forces pre-empted the national vision for a homogenous portal system creating their own portal tailored to their individual needs and requirements. Such innovation, if embraced properly, offered the chance for a national system project to learn the lessons from their regional level counterparts, and could have provided significant problem domain expertise from these developments. If ignored or underutilised this innovation has been seen to stifle the attempts at providing a unified national approach to such system. Where regions feel their attempts at systems

creation are being undermined or overlooked or where the specification of a national system felt short of their own implementation, regions became reluctant to participate and engage with the national development. Such bodies would feel that they were being offered an inferior product and that their often considerable investment was being diminished and ignored.

6.3.4 Process

One of the strongest observations within this study has been the observation of the considerable variation in implemented business processes within each force due to their regional autonomy. While constrained to some degree by data handling legislation, as a result of organic growth and development, the business processes within each force have evolved to handle the unique nature of the criminal environment within each region and the attitude of management within each force. As a result of this autonomy and unique set of needs there can be considerable and often conflicting divergence in the business processes in use within each region.

The degree of divergence of often conflicting processes across regions can present a number of difficulties. There is a common recognition within the literature of the needs for business process reengineering to occur at the same time as IS implementation (Katzenstein & Lerch, 2000) and such simultaneous change is implicit within the adoption of a STS approach to information systems. However, care must be taken when attempting to amalgamate regional needs. Differing regional processes have resulted from unique circumstances and balances must be struck in the understanding and unification of business processes at a national level. Alignment of these views through the simplistic one-size-fits-all approach used in the Portal to form a single unified national model was seen to result in loss of functionality for certain areas, again prompting change resistance from those regions. Attempts to create a unified standard for the NoC system resulted in system input that collected the bare minimum of information required rather than the information that was often desired by forces. Providing a one-size fits all solution without recognising that each region has differing integration needs presents further problems. Without providing adequate support for the implementation of such systems within the regions their efficient deployment can prove problematic. Without the provision of support via adequate training and instruction, or through individual region by region implementation

planning, coupled with monitoring of this integration with local support processes, very inefficient local implementations of national systems may emerge.

6.3.5 External Political Influence

External political pressure placed on an information systems development is not a new phenomenon and has been seen to be exhibited in IS developments before, (POST, 2003). Within public systems, with their inherent high visibility and cost, the threat of political interference is increased. Supporting POST (2003), the examination of external political influence within the context of this study has also been seen to have a considerable impact on the progress and development of public STS. While not part of the four core components of the STS, the actions of external actors on an IS development can amplify existing difficulties and are seen to have a profound effect on such systems. Politicians acting to be seen as responsible and engaging with the public view as well as being accountable also need to be seen to be acting on external triggers. As seen in the Portal's inception, politicians reacting to the London bombings put considerable pressure on the system's development. While such initial pressure was seen to be at least partially beneficial, in this case spurring the Portal's development from purely concept to a finished product, the timescales placed on the project were observed to be unreasonable. This time scale and the additional political pressures that exerted upon the development resulted in shortcuts and compromises that further serve to exacerbate the problems already encountered within the development.

The scale and complexity of national developments coupled with the difficulties presented through regional variations result in a number of variables and concerns that can take considerable time and effort to reconcile into a workable national representation of a system. External pressures acting on this already delicate process have been seen to considerably amplify the difficulties encountered.

6.3.6 Model Summary

As seen above, the regionalisation of organisational structure that was highlighted within the Portal was shown to cause fragmentation across the entire STS. *People*, *Processes* and *Technology* are all strongly influenced by the local environmental and political factors that result from a regionalised *Structure*. The fragmentation of such

processes results in greatly increased complexity when examining these systems. A national level approach in their examination was seen to be invalid and incomplete as it does not encompass the high level of variation that is present amongst the regions or the strong impact this variation has on the system as a whole. The culture of IS design and the choice of development methodology when pursuing the implementation of such systems must be carefully selected in order to account for these factors. Such a methodology should account for the differing needs and context of the regions and encourage participative engagement of each region in such away that national priorities can be rationalised to meet local requirements. As seen in the Portal case study, an overall failure to acknowledge this complex structure and the resulting over simplification of the problem domain to a few isolated cases coupled with external pressures on the system led to poorly constructed requirements. This ultimately resulted in a system that was neither fully aligned to the needs of the local regions nor implemented correctly within the internal business processes.

Within the context of national bodies with a regionalised structure, the importance of understanding this complex distribution and divergence of responsibilities and processes prior to the instigation of requirements capture can be seen as a preliminary key factor to the successful development of such systems. The large number of isolated regional entities requires significant planning and effort to fully engage with the development process. Regions must be engaged by a central vision of the benefits such systems can provide and encouraged to view changes in their internal processes as positive enhancements to the way in which they operate. Disparate views must be aligned through active cooperation and engagement rather than mandated in order to avoid regions becoming defensive and withdrawn. Innovations within regions should be embraced, with the lessons learnt from previous efforts acknowledged and integrated into national developments. Institutional competition must be accounted for when examining such systems, as it can play a significant role in deciding the level of engagement each region exhibits. One must consider carefully these attitudes and their influence on other components within the system. Representation of regions must be carefully considered in the context of these attitudes and balanced to ensure that regions do not feel ignored or sidelined.

6.4 Evaluation of Model against Past Projects

While the above model was constructed based on data gathered from the examination of the Police Portal, it is necessary to rule out regionalised concerns as a phenomenon unique to the police environment and ensure that this model can be generalised within the public domain outside of its original policing context. An evaluation of the model will be conducted through its application to three existing public IS developments. As seen in Chapter 2 very little literature provides an in-depth full lifecycle evaluation of problems encountered in public IS development within UK projects. As a result of this and the need for detailed information in the evaluation of the proposed model, the secondary data used in these evaluations were primarily gathered from the results of National Audit Office (NAO) reports. The NAO is an independent body tasked with the examination of public projects within the UK. The reports provide a detailed in-depth analysis of the issues encountered within projects, providing detailed timelines of events and allowing for an exploration of these issues from the perspective of the STS model proposed. Similarities and differences in their execution and progress will be highlighted, together with the issues that regional organisation presented in the development of these systems.

6.5 The Libra Project

The first project to be used in this evaluation is that of the Libra project (National Audit Office, 2003). The Libra Project was commissioned by the Lord Chancellor's Department, as it was known then, to provide a national IT infrastructure to the regionally devolved magistrates' courts within the UK. The aim was to provide a unified case handling system across the regional courts and to provide direct links with other criminal justice agencies, the Crown Prosecution Service, the Prisons Service, The Probation Service and the Police.

6.5.1 Organisational Background of the Project

Similar to the structure observed within the policing case study, the organisation of the magistrates' court system is broken down into semi-autonomous regional divisions. At the time of the project's inception the magistrates' courts were based around 42 regional court committees aligned to the boundaries of the police forces they served and under the ultimate jurisdiction of the Lord Chancellor's Department. Just as with ACPO and the NPIA, while responsible for the execution of the law

within these committees, the Lord Chancellor's Department had no direct control over their internal business processes and operations. As a result of this lack of a national unified approach for the management of internal business processes, IT infrastructure and as a result of the differing regional pressures placed on each court, there were considerable variations in place within each magistrates region. As with the Portal, every court had adopted its own unique business processes for the purpose of case handling and the systems it utilised towards this aim.

The growing disparity between differing court systems presented a number of difficulties for the Lord Chancellor's Department. Differing technological capabilities and data storage approaches meant that the sharing and compilation of data across a large number of court bodies was impossible. Efficiency targets set for the courts were also seen as difficult to assess as a result of the poor access to relevant statistics at a national level. Recognising this, the Lord Chancellor's Department sought to develop a national IT standard for the UK magistrates' courts and from this the Libra system was born.

6.5.2 Issues Encountered within the Libra Development

Similarly to the Portal case study, the regionalised organisational structure of the UK courts system was seen to cause a number of issues within the project's execution. While no active regional competition existed between the individual courts, the regional court committees acted against the national body when they felt that their regional autonomy was under threat. The Lord Chancellor's Department had the power to force the implementation of technological change across the regional courts but it had no authority or mandate to push for business process changes within these regions. This resulted in a conflict between the regions and the national body. As with the police forces, individual court committees felt that they best understood and recognised their unique regional circumstances and felt that their internal business processes were best equipped to manage these needs. While attempts at full regional representation were made in the process of the Libra development, the often divergent and conflicting requirements of the differing regions meant that a unified specification of the system placating each region was impossible.

The addition of Libra not being a new system but replacing a large number of older regionalised systems also exhibited many of the issues observed within the innovation conflicts within the Police Portal. Having prior systems in place allowed the individual regions to compare the national offering to those already in place within their region. This increased resistance from those who felt the system did not add benefit to their own or did not capture the same level of data as their existing systems.

As a result of the lack of mandate to implement business process change and with the courts reluctance to engage in such a process voluntarily, insisting that their regional processes not be dictated from a national plan a compromise had to be made to allow for a national systems roll-out. Instead of seeking large scale change to existing business processes, the Lord Chancellor's Department decided to implement Libra as a system designed to support existing processes within each court. While the nationalised implementation of such a system would require the standardisation of some components across the courts system, mirroring the Portal project, each committee was left to decide its own relevant working practices surrounding the physical implementation of the system within their jurisdiction. This was seen as the only viable compromise at the time; however this decision was ultimately viewed as the point of failure within the development. Despite considerable involvement of the representatives of each of the courts committees, attempts to define clear requirements for the needs of the system ultimately failed as they were unable to reconcile the needs of each region into a common standard. By failing to develop new processes at the same time as a system's development, the differing business processes and required information at each court were always in conflict with each other, resulting in requirements for the project being poorly defined.

While parts of the Libra system were ultimately delivered, as a result of these issues, the project arrived incomplete, heavily over budget and faced long delays and legal wrangling over its eventual delivery, with plans for its replacement already underway before its completion.

6.5.3 Evaluation against Proposed Model

Within the Libra project many of the problems predicted by the model were seen to occur. Regional autonomy led to diverse and fragmented technological and business

process landscapes within the regions with each having its own unique needs and desires based on its regional environment. These factors combined to create increased pressure and problems within the requirements capture process. Regional representation proved problematic with a range of participation based on perceived benefit to the individual regions and the degree to which each region felt threatened by the perceived devolution of their autonomy. Comparable past systems showed a similar effect to the innovation concerns perceived within the Portal. These systems allowed a side by side comparison of the new system versus the old and acted as a catalyst for rejection when such systems failed to adequately replace existing functionality.

As a result of this system being a purely back end system, public representation was not observed to be an issue in this instance. Regional competition was also not seen to be present. As a result of a less competitive organisational culture, regions in this instance were willing to participate should systems allow such cooperation.

6.6 Case Recording and Management System (CRAMS)

The consequences of a regional organisational structure can again be seen to manifest in the CRAMS project. Again resulting from a lack of examination of such projects within the literature, the analysis of the CRAMS project is conducted from secondary data gathered from the NAO and HM Inspectorate of Probation reviews of the problems encountered in this project (National Audit Office, 2001; HMIP, 2000).

The CRAMS project was commissioned as the main software component of the National Probation Service Information Systems Strategy (NPSISS) seeking to establish a common IT infrastructure across the UK National Probation Service (NPS).

6.6.1 Organisational Background of the Project

The organisational structure within the NPS strongly mirrors those previously seen.
At the time of this project's development probation services within the UK were divided into 54 regional offices that were independent and autonomous, managed by a probation committee with each regional service being headed by a chief probation officer appointed by the committee. While being autonomous, as with the Courts

system, the probation service must operate within a nationally legislated statutory model and adhere to a common set of national standards administered by the Home Office, reporting compliance at regular intervals. Just as was seen with the previous two cases this independence led to an extremely diverse and heterogeneous IT and business process environment with each region having its own unique ways of processing information and their own custom built systems. The degree of technological differentiation was of specific note in this instance with some regions having predominantly paper based storage systems with others having more developed IT processes in place.

6.6.2 Issues Encountered within the CRAMS Development

The subdivision and differentiation of autonomy and business processes was again seen to play a pivotal role in the progression of this IS. The generation of meaningful requirements and acceptance was hindered through the failure of maintaining adequate communications with each of the regional bodies. While meetings of chief officers were conducted at least once a month, many decisions regarding the key functionality of the system were made by the Home Office and no formal communications methods outside of this monthly meeting were established with the regions. As a result of the failure to engage each group, only 50% submitted the required business cases and review of needs for the system therefore the goals of the system were not clearly defined. Regionalisation was again seen to amplify the problems faced in the accurate collection of specification for such systems. With the unique needs and demands of each region and the dissimilar and conflicting business processes implemented in support of them, additional burdens were seen in the reconciliation of these requirements.

The project's choice to provide an enhanced version of one region's IS as the national version of such systems presented additional challenges to the development. The software selected for enhancement was unusual as it was based on a mainframe architecture, a considerably different technology to that used by the majority of other regions. It was a well designed and functional IS within its confined environment. However, the redevelopment of it to be used for the server technology in other regions was not a scenario that its original developer had intended. As a result, a number of issues arose in this process; functionality was curtailed from the original design and a

once stable platform became unreliable when implemented outside of its original technological environment.

Business processes were being incorrectly mapped onto existing system constraints and valuable reporting features were lost as a result of technological incompatibilities with the new host environments within each region. Implementation was again considered to be a regional level responsibility and no national level plan was put into place to assist with the implementation of the system within the regions. Despite dramatically differing IT implementation and management capabilities within each region, each region was left to negotiate the implementation of the system with the project's contractor as needed.

As a result of the poorly defined requirements on the system and challenges face in its development the system, as delivered, failed to support many of the operational features required within each region. This ultimately resulted in further fragmentation of the internal IT environment of each region as each probation committee commissioned the creation of additional software to manage these omitted features. This issue was further compounded by the lack of adequate communication with the regions. The full functionality of the system was not explained and demonstrated, which resulted in the duplication of software development processes within regions. Where regions erroneously believed that functionality was missing within the system, in-house development was conducted to design software to fill these perceived gaps. In a number of cases such gaps did not exist, the functionality was provided by the system it had just not been highlighted or trained out to the regions.

One of the principle arguments presented by the regions in their dismissal of the system was the poor quality of the GUI presented by the system and the stress it placed on the operators. While acceptance testing had been conducted, it was conducted within a very limited number of the regional areas and the software presented during testing was of such low quality that a number of regions actually withdrew from the acceptance process further increasing tensions in the remaining regions.

External political factors also drove changing requirements that the development failed to take into account. When legislation was introduced requiring the individual monitoring of high-risk offenders within each region. The CRAMS system failed to respond to this changing demand and again the local regions were forced to develop their own additional solution.

Ultimately, as a failure to adequately understand many of the subtle nuances of the organisational structure of the Probation Service and adequately engage all regional committees to gain a true understanding of the problem domain, the project failed to be fully implemented. This ultimately resulted in a more fractured if not more up-to-date technological landscape than existed prior to CRAMS implementation. 5 regions failed to participate in the CRAMS project, rejecting the system and investing their own money to develop an alternate system, ICMS (Integrated Case Management System). These regions considered this system to be of higher quality than the one offered nationally. 12 other regions opted to use alternative systems post CRAMS and 15 developed systems to supplement it.

6.6.3 Evaluation against Proposed Model

The CRAMS project examination reflects similar adherence to the problems predicted by the proposed model, mirroring those experienced within Libra. The initial technological and business process fragmentation presented many challenges for the system's development. In the case of CRAMS the stark degree of technological fragmentation and the methods employed for adapting the new system to this environment played a pivotal role in its demise. Differing regional needs were not taken into account and a standard national template was used in the implementation of the system. Regional representation and communication were considered to be minimal outside the scheduled leadership meetings and contributed to the mistrust surrounding the implementation of the project. While no active resistance based on threats to autonomy were observed from the data available, the availability of similar projects within each region again allowed for comparison with existing systems. This built resentment in those regions whose systems were more advanced, to the point that 5 regions did not even join the CRAMS scheme. External political pressures served to exacerbate problems within the development by forcing requirements change at

various stages of the projects development leaving the CRAMS system missing additional vital components.

Again as a result of this system being a purely back end system public representation was not observed to be an issue in this instance. Regional competition was in fact observed to be contradicted in this case with a strong desire to share information present within the regions.

6.7 National Health Service Program for Information Technology (NPfIT)

The final project used in this comparison is that of the NPfIT and ongoing IS development project aimed at unifying the existing disparate information systems architecture of the NHS. This examination is based on secondary data obtained from the analysis of the NAO review (National Audit Office, 2006) in light of the proposed model.

6.7.1 Organisational Background and Pressures Present within the NPfIT

The NPfIT has been described as the largest civilian IS project undertaken in the world to date, (Clegg & Shepherd, 2007) and presented significant challenges to those undertaking its development. At the project's inception the NHS was broken down into 130 regional primary care trusts (PCT) each responsible for their own processes, systems and implementation resulting in considerable variation in degrees of functionality of systems between trusts. The scale and complexity of these systems is far greater than that seen in the systems already reviewed. As a result of the NPfIT's aim of replacing many disparate systems within the many sub-specialties of the NHS means that the number of systems in use across all the areas of the NHS within the NPfIT remit reaches well into the thousands. Each NHS organisation within a PCT may be comprised of multiple sites, each with many functions and specialisations. Each of these functions and specialisations may have their own custom built IS and even differing numbers of systems for the same task. An example of this is an Oxford hospital which was observed to have 7 pathology systems within the same facility. Each of these systems may well be unique to the hospital or the PCT in which they reside and often have a very limited ability to share information between systems even within GPs surgeries or within the regional level. Many data transfers within the NHS still take place using paper as the primary transfer medium.

The high degree of technological and process fragmentation resulting from the regionalisation of such a vast organisation presents many problems for the developers. As seen in the previous two projects the management of requirements capture and systems development presented considerable challenges when faced with a comparatively smaller numbers of regions and covering only a limited number of internal processes and systems. Recognising this, and in an attempt to mitigate the risk of a total collapse of the project should some systems be found to be inadequate, the PCTs have been divided into 5 regional areas with each area allocated a different industry supplier, known within the NPfIT as a local service provider. Common communication and networking specifications were created, known as the National Spine, to allow for interoperability of the systems designed for each region. While this subdivision has served to reduce the scale of the task faced by any one contractor, the number of PCTs and NHS organisations within each NHS PCT is still considerably larger than observed in the other projects and presents a number of conflicting requirements and views that must be considered in the design of such systems. This is especially true of a number of systems that could be classed as critical systems where the life or quality of life of patients could be adversely affected if they were to fail.

Recognising these concerns and the effects of replacing existing innovative system, if highly functional systems are already in place, provided they are made compliant with the communication and integration standards of the Spine they need not be replaced with NPfIT systems until the latter achieves an equivalent or greater level of functionality or greater level of integration across local health communities. Systems are to be deployed in conjunction with the host organisation at times convenient and suitable to them, thereby helping to reduce tensions and worries amongst those who fear incoming systems are less suitable than existing solutions.

The business process variation has also been recognised by the NPfIT leadership. While some systems will require varying degrees of standardisation, they have recognised that the many organisations within the NHS are operationally unique and attempts at such generalised standardisation may do more harm than good. Region-wide systems will be implemented but in a more tailored fashion with local service providers required to tailor their general solution to each individual organisation's

requirement. While considerably more work is required utilising this approach, it is believed it will reduce resistance to the project, produce a more integrated system and reduce the issues of region wide requirements conflict.

GPs have been observed to be particularly hard to account for in the development of such systems. With such wildly varying needs across thousands of practices, and with each used to complete self management and autonomy many GPs were reluctant to change systems, especially when they had implemented existing systems at considerable expense to themselves. Agreements had to be put into place to allow GPs to stay with their existing suppliers as the NPfIT progressed. Considerable attempts have been made at ensuring adequate communication with all levels of staff and operations within the NHS. However, surveys at the time still illustrated measurable concern from staff over the lack of clarity of the functionality provided by many of the systems proposed.

Public engagement is also seen as a significant issue within the NPfIT, many of the developed systems have some interaction with members of the public and nearly all will hold personal and confidential information on them. As has been seen in the high profile rejections and resistance to some of the national patient record storage approaches, communication and transparency with the public was observed to be key (Cayton, 2006; Leigh & Evans, 2006). Many attempts at public communication have been implemented within the NPfIT but communication and engagement with such a vast number of people with differing needs and regional and cultural variation will always be problematic.

External political pressures on the NPfIT have also been severe. Given the sheer scale of the project, its large cost and the reputation of the NHS as one of the UK's greatest institutions, national political interest in the project has been great. Politicians keen to be seen as accountable and responsible for the public finances exert pressure to ensure that systems are developed in the most cost effective way. External constraints placed on NHS budgets restrict what may be operationally possible or serve to push for more modest improvements. The national political agenda changes with a new government and the recent restructuring of the NHS presents additional challenges for the developers of such systems.

6.7.3 Evaluation against Proposed Model

As seen, the sheer scale of the NPfIT and the granularity of its regionalisation and segmentation within the regions present vast challenges to the system's development. Technological and process fragmentation is present across thousands of systems and organisational groups that must be considered in order to produce viable replacement systems. Recognising the need for considerable communication with regions many systems have been put in place to ensure that people are aware of change and dialogue has been established to ensure that all views are represented. Fragmentation has been taken into account through the adoption of regionalised customisation rather than through the application of a blanket national or regional template on newly designed systems. The ability of past systems to affect acceptance is also recognised in the statement that such systems will not be replaced until such time as incoming systems meet or exceed their specification. Public representation and involvement has also been seen to be a significant factor in the development of the NPfIT. While a limited number of systems are directly accessible to the public, many backend systems, holding confidential information on them, are within the project's remit. Failures in initial public engagement led to strong resentment against such systems and ultimately required changes in the system to placate this feeling. Politics were again observed to play a significant factor in exacerbating problems within the NPfIT. Financial pressures and the politically instigated reorganisation of the NHS all serve to complicate development further and constrain the development's progress.

6.8 Model Review

Regional organisation is not inherently negative and is often beneficial and necessity for the provision of an efficient public service. As a result of the sheer size and scale of the service offerings required at a national level it has been seen in many examples that such organisation is required for the adequate tailoring of national services to individual regional needs in order to make best use of resources available. When implementing IS at a national level it is important to take into account the added complexity and conflict such an organisational approach can bring to an IS development. As seen in this analysis, the model highlights and predicts many of the problematic issued observed to be created or exacerbated as a result of this regional autonomous distribution and the external political pressures inherent from the high value and visibility present in many national public projects. Taking into account the

results of the evaluation of the model, 'public representation' has been extended to 'public representation and communication' in order to reflect the level of dialogue required in the NPfIT. Representation was sufficient to gather the requirements of the public, however true and accurate communications and engagement were also seen to be necessary. They were required in order to engender support and cooperation with the project, to explain the benefits of the systems provided and to engender trust in the data that was collected and amalgamated within such systems. Regional innovation was also amended to describe the impact of any prior systems on the development process. Within the police the issue was encountered by those in the process of developing their new regional systems along side or in close proximity to the beginning of the Portal system. The comparison has shown it is not just recent innovations that cause such issues, but any prior system's functionality, that allow such comparison to incoming national systems. Regional competition, while not observed within the three comparison projects, have been left in to allow for their possibility within other organisational cultures. Given the strength of the competition observed within the police forces, it is believed organisations of a similar competitive nature could also experience such issues. An amended model has therefore been proposed below:

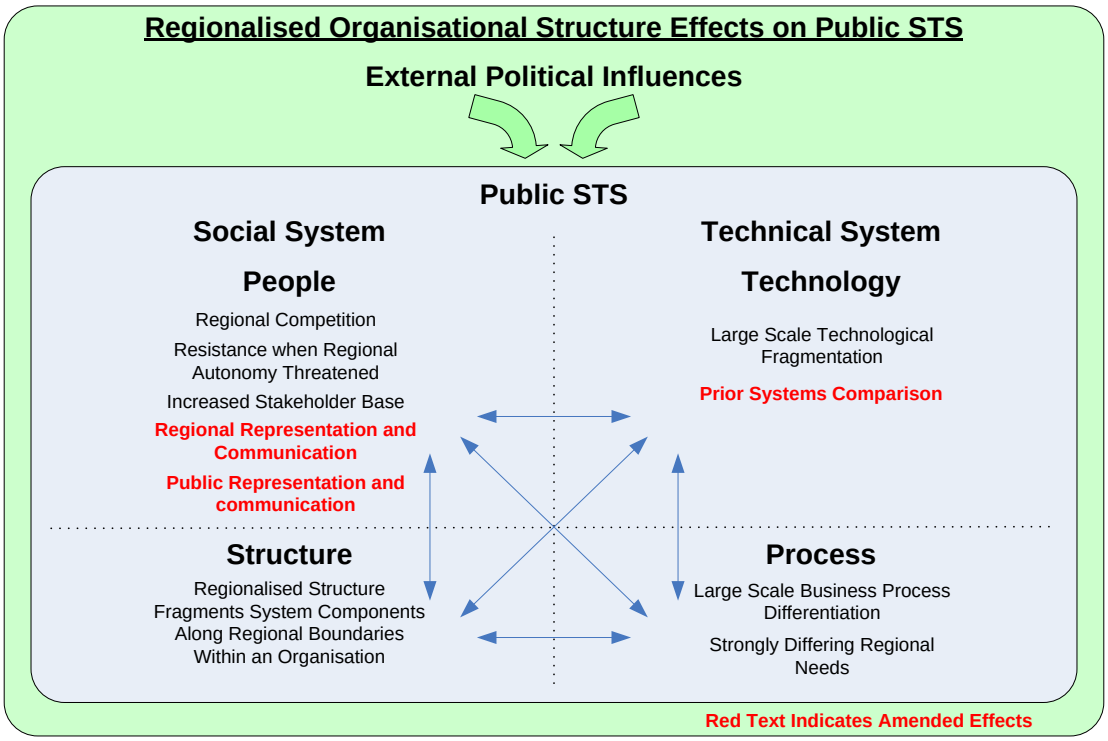

Figure 6.2 Amended Public STS Model

Ultimately the development of this model has highlighted the profound complicating effects that the regionalisation of national public services can have on the development of national IS solutions. Care must be taken to understand the relationships within such regions before undertaking such developments. Regionalisation leads to a complex political, social and technological environment presenting conflicting requirements that must be considered to engage and enrol all regions within the development process. As seen in many of the examples, a failure to take into account this fractious and diverse nature from the very beginning of an IS development can have considerable detrimental effects on the progress of such projects.

6.9 Model Applicability

Given the findings of the confirmation exercise it is believed the proposed model is suitable for use in the analysis and planning of IS development scenarios in any national level public body with an organisational structure that is based on the segmentation of organisational responsibility into well defined, geographically regionalised offices or departments. Thus allowing for the examination and consideration of the effects of regionalisation on IS development and the issues that may arise on a region by region and intra-region basis together with their likely relationships with their national bodies.

While not tested on smaller fragmented organisational structures within local e-government, where organisations are fragmented in a smaller scale across an administrative area, the model may still hold, however further research is required to establish its validity in such areas.

This model is not, however, applicable to national organisations with a non-regionalised development such as higher educational institutions. The organisational structure of such entities is not as rigid as wholly national bodies. In such instances national bodies have little discretion over their operation and tend to act as isolated entities with no national frameworks or governance outside of nationally recognised standards and no formalised shared responsibility between regionalised bodies or representative over a geographic domain. National bodies where no regionalisation is

present and where offices are treated as a whole national entity are also not considered to be applicable in this study.

6.10 Further Discussion

This study strongly supports the observations by Olphert & Damodaran (2007) and Clegg & Shepherd (2007), that public IS developments are commonly disconnected from social considerations, with developers ignoring many of the social concerns with the development process. It has demonstrated that a lack of clear understanding of the organisation in which an IS is to be developed has a strong impact on the ultimate success or failure of such projects, It has also shown that the adoption of an STS view in the analysis of an IS development can be a powerful tool in understanding the complex interactions and relationships between the many facets of a development. The balance between broad models, Piccoli (2007), and those which are more narrowly defined, Sittig & Singh (2010), was highlighted, with the need for the specification and choice of a suitable model being illustrated. This shows the benefits that refinement of such models can have on the identification of problem areas within an IS. Interestingly, as stated previously, the refinement of the Piccoli model directly contradicts that of the ODPM (2003) model that was proposed for local government IS whereby structure was not considered an overriding component of such systems. At a national level, the scale and complexity of both the host organisation and IS were observed to have a critical role in the successful progression of a system's development.

Literature surrounding critical success factors also fails to acknowledge the need for tacit and direct understanding of the host organisation's structure and culture as key factors in their own right. While many models consider the social aspects of communications, planning and leadership to be key factors in a project's success, (Somers & Nelson, 2001; Holland & Light, 1999) and some have begun to recognise the significance of multi-site developments, albeit from a purely technological perspective, (Umble, Haft & Umble, 2003) many still fail to explicitly outline organisational understanding as a primary factor in the success of such developments. Instead, such knowledge is implied as a result of other factors within these models, in that without adequate understanding of an organisation true and valid planning and the adequate engagement of stakeholders would be difficult. This study has shown

such implicit recognition of the need for organisational understanding is insufficient and that given the findings presented above a true and accurate understanding of an organisation's structure and culture prior to the commencement of IS development is a critical factor in its own right, underlying the entire development process and one that must be considered from the early stages of such projects.

Within the examination of failure, these issues must be taken into account when examining large scale national projects. As seen in the confirmation examples, (National Audit Office, 2006; National Audit Office, 2001; HMIP, 2000; National Audit Office, 2003) the initial, obvious causes of such failures can have subtle and differing root causes when viewed with a wider lens looking at the whole organisation, across the whole lifecycle. This study has shown the amplifying effect that regionalised organisational structure can have on the problems being experienced within public bodies, exacerbating what may have started out as minor concerns to issues of a critical nature within project development. In addition, the many differing views observed, which are generated by the regionalised and disparate stakeholder groups present in a regionalised organisational structure, further serve to complicate the very definition of failure itself. As observed by Sauer (1993), the very nature of failure within IS becomes difficult to define due to its strong integration with the host organisation and the resulting large number of stakeholders and perspectives that are present. The magnification of stakeholder views evident in a regionalised national project further increase the likelihood that the project will be perceived to have failed by a larger number of stakeholders as compromise across such diverse needs is shown to be very difficult to plan and manage. As seen with the Portal project and CRAMS once negative perceptions were present they became engrained and spread across regions resulting in additional regions becoming hostile to the IS development.

Within such organisations practitioners must take care to recognise the threat that nationalised IS development can pose to the operational sovereignty of each regional body and the inherently defensive reaction this was observed to provoke in the management at this level, supporting the view of Lucas (1984) that perception of threat is a key cause of user rejection of such systems. National scale IS developments have been shown to often involve very large scale change to the host organisations and its processes and the correct selection of change management methodology is

critical to the acceptance of this. While strong communication, dialogue and participation from all levels of an organisation across the entire development cycle should always be encouraged in the management of change, (Bruhn, Zajac & Al-Kazemi, 2001), this study has shown that dialogue with regional management must be carefully planned and moderated and cannot be treated as a one-size-fits-all approach. Top management support is considered a critical factor in the success of IS development, (Holland and Light, 1999) and while the very top management of the Police at a national level supported the project, the senior management within each region was neglected. As shown by this study these regional heads had a strong effect on that region's acceptance of the incoming system and inadequate engagement with them led to under-representative requirements and insufficient access to stakeholders within the region. Regions have differing needs and the benefits of the incoming system must be explained in relation to each of the differing regional circumstances. Change across regions must also be managed in a coherent way, just as change across organisational 'sub-systems', such as departments within an organisation, must ensure consistent and effective operation between each of these sub-units during periods of change, (Fernandez & Rainey, 2006). This study has highlighted the need for change to occur simultaneously across the independent regions.

Within e-government this study has illustrated that additional dimensions must be considered when examining large national-scale projects and that backend public systems are just as vulnerable to failure as their more studied and more visible public facing counterparts. The internal political problems remarked by Vigoda-Gadot & Kapun (2005) were strongly supported by the evidence in this study. At a more granular level this study has shown that these internal political struggles can be seen to repeat on a region by region basis as result of the differing goals and aims of each region conflicting with those of the system and other regional entities. Differing expectations and requirements served to 'blur' the scope and definition of the project, resulting in conflicting views of the benefits and purpose of such a system again showing the amplifying affect regionalisation can have. External political pressures as identified by Parker & Bradley (2000), were observed not only to have an effect on the behaviour of the target organisation but a significant impact on the IS development process itself. These act as an external steering influence from outside

the primary organisation with negative repercussions when the external political will did not adhere with internal organisational expectations.

6.11 Summary

Building on the analysis of problems encountered within the Portal case study this chapter has highlighted the pivotal role an understanding, or lack thereof, of the regional organisational makeup and external political pressures had on the development of the IS. Recognising this, the STS model utilised in Chapter 2 has been extended to take into account the effects of these pressures in a public sector IS environment. This model was then evaluated against existing public IS projects in order to allow for its expansion and confirmation outside of the policing domain. Chapter 7 will present a conclusion to this research and outline the limitations of the study conducted together with opportunities for future work within this area.

Chapter 7
Conclusions and Future Work

7.1 Introduction

This thesis sought to identify and address the complex issues involved in the development of large scale information systems within the public sector. It was motivated by the high degree of project failure that was observed occurring in IS development and specifically within the public sector together with the gaps identified in the literature examining issues encountered in the development of public IS. The result of this investigation was the generation of a tailored STS model highlighting these issues and illustrating their relationship with the main components of such systems. It provided a tool to allow for a more focused examination of past public IS projects and for its use in the consideration of future developments in order to mitigate the issues that have been identified. Such a model contributes to the academic understanding of the role that regionalised organisational structure and political pressures play in the amplification of development problems within public sector IS.

Concluding this research, this chapter reviews the investigation conducted within this thesis, and illustrates the contributions made. The limitations of this study are then discussed and future work is proposed.

7.2 Research Overview

The literature review presented in Chapter 2 explored and examined the issues of information systems failure. Highlighting the reliance of both industry and public services on their now tightly integrated IS. The definition of failure was found to be complex and dependant on the views of the individual/stakeholder group, with no clear, single definition found within the literature. Examining public IS design specifically, the literature was found to attribute many of the issues identified in their implementation to the technological approaches adopted in their development. Moving away from a rationale that explains public IS failure mainly in light of technological issues, this research uses a STS approach in the examination of problematic areas within the IS development lifecycle from the literature. This has led

to the review of a number of published studies highlighting the predominantly social nature of the IS failures that were identified. Gaps were noted in the literature regarding the exploration of failure within public sector organisations with specific focus on issues and concerns within the development cycle. The literature also seemed to be neglecting the analysis of back-end public systems, while privileging the examination of e-government applications.

In order to study these gaps further a case study was commissioned to investigate the development lifecycle of a newly commissioned public IS project, the Police Portal. This was a suite of tools designed to increase the communication and intelligence gathering capabilities of the police and was selected for this study as it provided a number of unique opportunities to examine a large scale public IS project as it was developed and implemented.

A Grounded Theory case study approach was adopted for the exploration of issues within the Portal development process. After initial familiarisation with the police environment, a research agenda was established to guide the investigation of the Portal's development with both the development team and within regional forces. Data collected from these studies were then triangulated in order to isolate a set of common themes emergent across the development's progression. From this analysis it was identified that the effects of organisational regionalisation and external political pressures imposed additional complexity and strain on the development process, resulting in compromises that had a significant detrimental effect on the Portal's design and implementation.

Considering these concerns in the context of the STS model utilised in Chapter 2, the author proposes an extension of the STS model to encompass the issues observed. The resulting STS provides a more tailored lens for the evaluation of public sector IS projects along with a tool for their planning. Using the primary data collected in the case study, an extended STS model is presented and applied in the evaluation of a number of public information systems; LIBRA, CRAMS and the NPfIT.

7.3 Contributions and Conclusion

Expanding existing literature on problems encountered during IS development, this research has provided an in-depth analysis of the full development lifecycle of a public information system. It has illustrated a number of critical factors affecting large scale IS development within the UK public sector. The regionalised organisational structure of many public services has been shown to be a significant factor in the progress, success or failure of IS within this domain, having profound effects across all components of such systems. Fragmented technological and business processes, regional innovation, internal competition and hostility, problems consulting with the public and change resistance have all been shown to have their roots within the case investigated. The external political pressures placed on such projects have been highlighted as an amplifying factor on projects already experiencing such difficulties. This thesis has proposed the extension of an existing generic STS model to encompass these factors so as to allow a more focused lens for the examination of the problems affecting public information systems development.

The proposed model has shown that *structure* should not be omitted from consideration in the development of public IS, this is in contrast to the ODPM (2003) model examining such issues at a local level. *Structure* is in fact a key component of a national scale system and has a profound effect on its other components. *Technology* and *process* under such a *structure* are shown to be far more fragmented and disparate than envisaged by the original model and seen to considerably complicate the gathering and reconciliation of requirements across regions. The *people* components of public STS are also seen to be heavily affected. The segmentation introduced by the *structure* component increases the variability of stakeholders within a system and introduces additional strain when communicating with these. It introduces the concept of competition between regions and that of autonomy within such a *structure*, resulting in resistance when *people* feel such autonomy is threatened. External political influences are added to the STS model in order to reflect the considerable amplifying effect these pressures exerted on the main components within the STS, adversely affecting a system's development.

The proposed model can be applied in the examination of past, present and future public IS projects in order to permit a detailed and thorough understanding of the

problems associated with regionalisation that might be encountered. This provides the opportunity for the incorporation of such knowledge to inform the future adoption of development methodologies that could account for and incorporate the issues identified into an information system's development.

It has outlined the importance of truly understanding and planning for the nature of a host organisation before undertaking project design and implementation. If developers are aware of the fractious nature of a host organisation and the many ripple effects regional organisation has on the implementation of a given IS, such issues may be mitigated. Regional autonomy cannot simply be ignored when developing systems to suit such a large and diverse range of stakeholder groups. Care must be taken to assimilate and reconcile the views of these many groups, aligning the regional and national views of the development and generating voluntary and planned business process change within the regions.

A further contribution of this thesis is that of a detailed investigation within the context of UK policing and the elaboration of its operational culture and environment at both a regional and national level within the literature. Within national frameworks (NCIS, 2000; Centrex, 2001), the Portal was envisaged as a method for the public to interact with the police and vice versa, a powerful tool for the collection of intelligence and a mechanism for reducing call volumes within already busy command and control rooms. While such a system was implemented and to a degree was successful within certain areas, a failure to recognise and account for the complicating effects the organisation's regionalised structure would have on the development, coupled with the politically charged environment surrounding the Portal's inception, ultimately resulted in the failure of the system.

This study has highlighted the need for the reconsideration of the definition of critical success factors and the recognition of organisational understanding as a key stand-alone facet of IS design success rather than as a sub-component of other factors. It has shown that a regionalised organisational structure acts as an amplifying factor in IS failure which should be taken into account and considered when examining the true root causes of a system failure, beyond purely technical and financial considerations. Change management has been shown to be vulnerable to organisational structure and

that regionalised independence brings with it additional layers of top management that must be engaged before true change can be instigated within each region. Care must be taken to ensure that change is managed at an equal rate across each region involved in an IS development. This study has expanded the literature on public sector organisations' internal political environment within a policing context, highlighting the duplication and entrenchment of internal political activities as a partial result of the regionalised structure of the organisation and the effect this competitiveness and differing goals can have on IS development.

7.4 Limitations and Future Work

Given the vast scale and high degree of complexity observed in many public IS the time restrictions placed on this research prevented the examination of more than one large scale project. While a full examination of all of the forces within the Portal project would have been the ideal for this investigation, the time constraints of PhD research in combination with the premature termination of the initial Portal project after implementation prevented the expansion of this study beyond the four forces involved. Data collection and retention were also limited by the prevalent security concerns within the police, though it was not seen to be overly detrimental to the quality of the data that was collected.

Another limitation is that this study was conducted purely within the UK and within the emergency services arena. Although comparison of these research findings was conducted against secondary data from sources outside of this arena, primary investigation outside of the emergency services may provide further extension to the model proposed. The confirmation of the finding of regional competition in other competitive environments would also be recommended.

Further work could be conducted examining the issues raised within other public bodies outside of the emergency services area and with more time conducted across the full range of regions within such organisations. In addition, the applicability of the proposed model to locally geographically distributed services at a local council level could provide valuable insight into whether such issues occur on a smaller scale. Comparisons to non-UK based organisations may also reveal additional findings, widening the scope of this research area. The extension of this model across national

borders, examining supranational public entities such as the EU and the UN, studying the effects of cross-culture regionalisation could provide valuable insight into the effects of organisational culture on such entities.

Lifecycle specific examination of the problems identified could also be instigated in order to investigate methods of mitigation and inclusion. Use of the model in the predictive identification of problems might allow for early mitigation. Exploration of issues outside the regionalised organisational structure could also prove valuable. As highlighted in this thesis, many national organisations employ a regionalised structure to implement their service offerings based on the principle that differing regions have differing needs. While this is the case for a large number of public services a number of public bodies such as the Driver and Vehicle Licensing Agency, Department of Work and Pensions and the Food Standards Agency operate on a more homogenous national level with very little devolved regional authority. Regional effects may be much less pronounced in such organisations and investigations into such bodies would help to extend the literature further in these areas. In addition, the comparison of the identified issues against a private sector IS from an organisation with a regionalised structure and devolution of authority would further add to the development of the proposed model, allowing the further identification of aspects that are intrinsic to the public sector.

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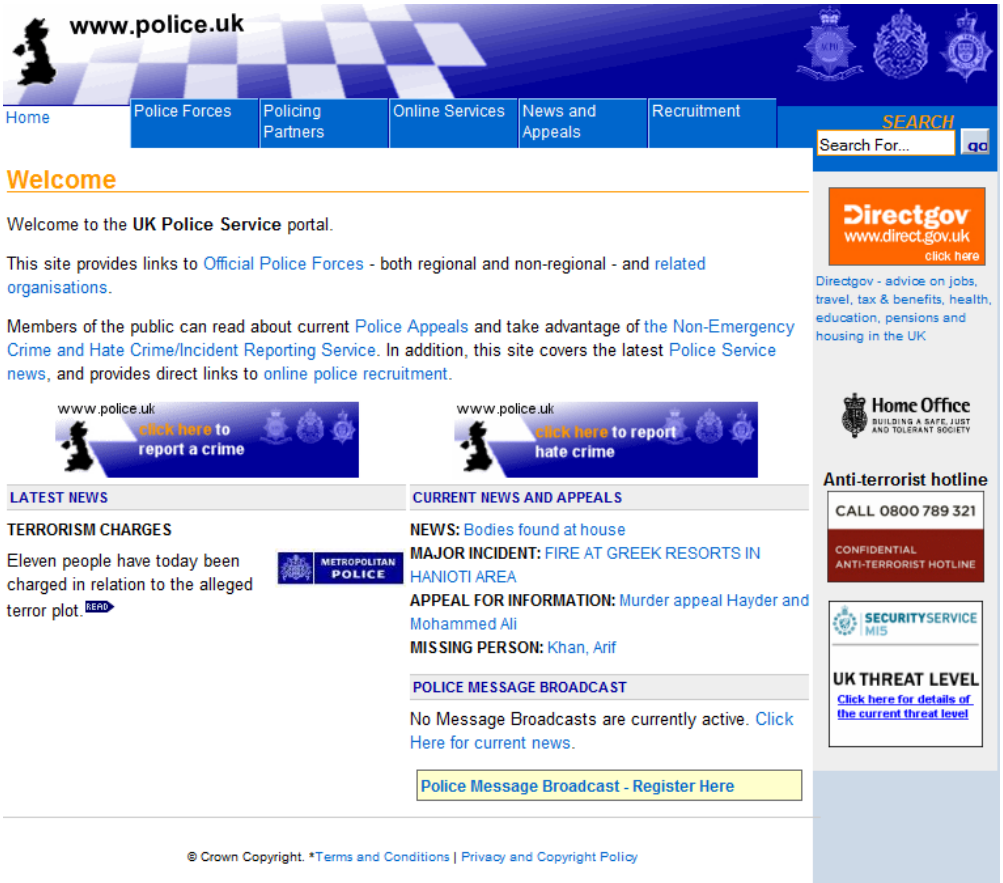
Appendix A

Examples of Police Portal Data

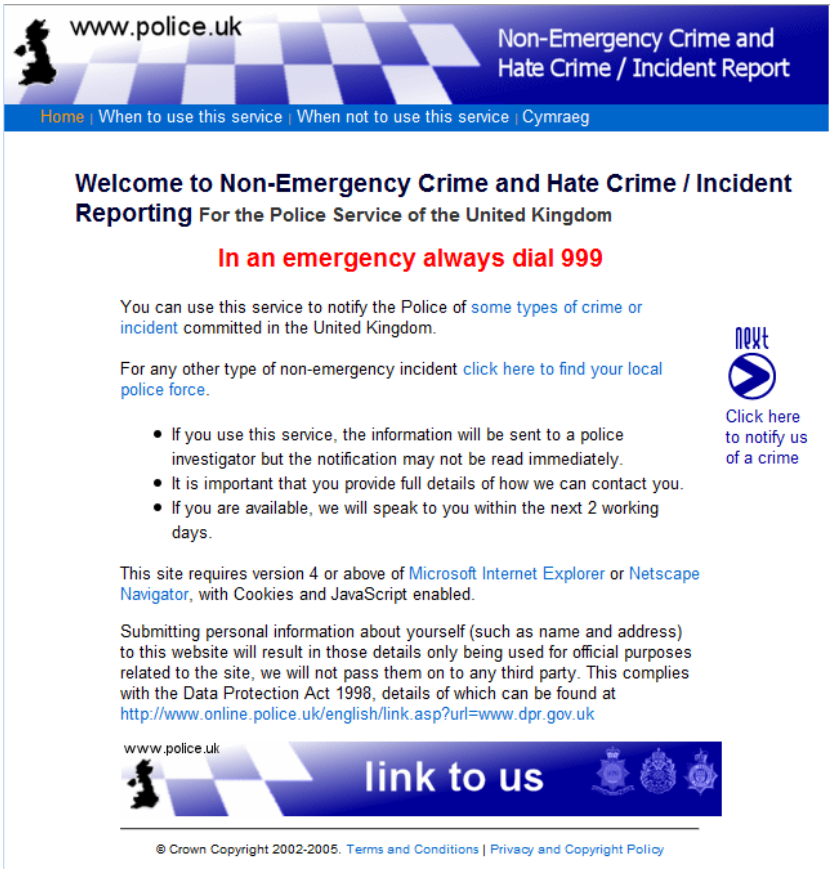
(Given the confidentiality of forces involved some items within the appendix may contain redaction.)

A.1 Police Portal Screen Shots

This section provides a screenshot of the Police.UK homepage. The following eight images then illustrate the process by which users submit a crime to the OCR systems of the Portal. While the process continues on beyond the final image, progressing further on the site would have counted as false reporting of a crime and therefore illegal in this instance.



A.1 Police Portal Home Page (police.uk)



A.2 Stage 1

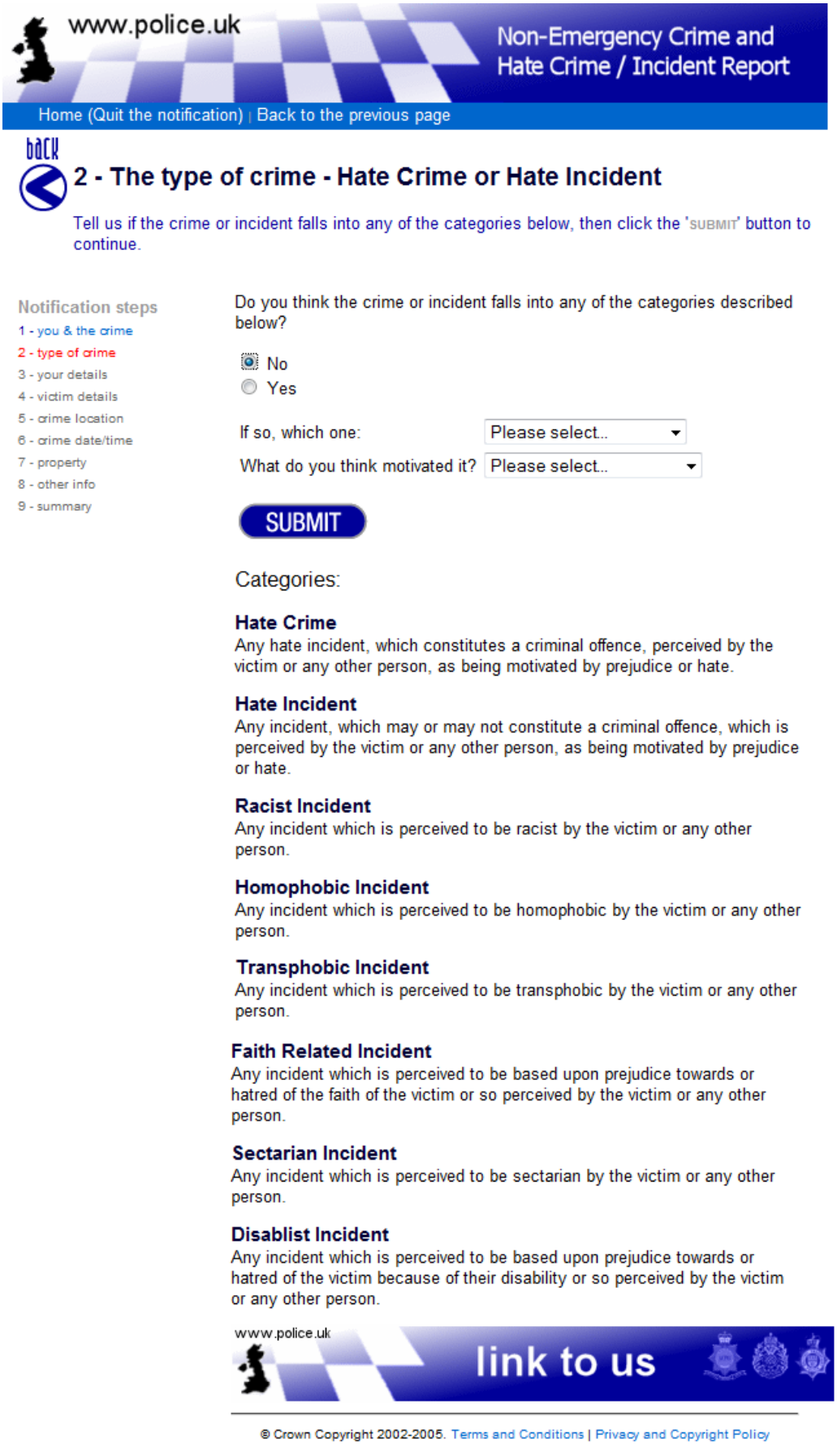
A.3 Stage 2

A.4 Stage 3

A.5 Stage 4

A.6 Stage 5

A.7 Stage 6a


www.police.uk
Non-Emergency Crime and Hate Crime / Incident Report
Home (Quit the notification) | Back to the previous page
back
2 - The type of crime - Hate Crime or Hate Incident
Tell us if the crime or incident falls into any of the categories below, then click the 'SUBMIT' button to continue.
Notification steps
1 - you & the crime
2 - type of crime
3 - your details
4 - victim details
5 - crime location
6 - crime date/time
7 - property
8 - other info
9 - summary
Do you think the crime or incident falls into any of the categories described below?
No
Yes
If so, which one: Please select..
What do you think motivated it? Please select..
SUBMIT
Categories:
Hate Crime
Any hate incident, which constitutes a criminal offence, perceived by the victim or any other person, as being motivated by prejudice or hate.
Hate Incident
Any incident, which may or may not constitute a criminal offence, which is perceived by the victim or any other person, as being motivated by prejudice or hate.
Racist Incident
Any incident which is perceived to be racist by the victim or any other person.
Homophobic Incident
Any incident which is perceived to be homophobic by the victim or any other person.
Transphobic Incident
Any incident which is perceived to be transphobic by the victim or any other person.
Faith Related Incident
Any incident which is perceived to be based upon prejudice towards or hatred of the faith of the victim or so perceived by the victim or any other person.
Sectarian Incident
Any incident which is perceived to be sectarian by the victim or any other person.
Disablist Incident
Any incident which is perceived to be based upon prejudice towards or hatred of the victim because of their disability or so perceived by the victim or any other person.
www.police.uk
link to us
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A.8 Stage 6b

A.9 Stage 7

A.2 PMB SMS Messages

The Following contains example SMS messages as received by subscription to the PMB services of the police Portal: (sections are blanked out in order to maintain the anonymity of the forces involved)

"From:88588

Bulletin 88 now available at 'www.police.uk' This bulletin contains specific information in relation to the 7th July Anniversary and reporting Hate Crime."

(Received 04/06/2006)

"From:88588

[redacted] *Police response to the video tape released showing* [redacted] *visit link http://www.*[redacted]*police.uk*[redacted] */docs/ACSO%20Statement.pdf"*

(Received 07/06/2006)

"From:88588

'Policing Terrorism ? Responding to the Views of [redacted] 'Please visit http://www.[redacted]police.uk[redacted]/docs/letter_policing_terrorism_views.pdf"

(Received 07/06/2006)

"From:88588

Anti-terrorist operation 10/08/06 updates can be accessed via www[redacted]police.uk or www.police.uk these will be updated when new information is available."

(Received 08/10/2006)

"From:88588

[redacted]Special Bulletins Re:unexplained death of [redacted] [redacted], [redacted] Bulletin 99 & 100 visit: www.police.uk [redacted]"

(Received 25/11/2006)

"From:88588

[redacted] Bulletin 95now available, also details of the recent terrorist charges can be viewed via www.police.uk"

(Received 09/11/2006)

"From:88588

Please visit www.police.uk to see the [redacted] response in relation to the recently published IPCC findings."

(Received 13/02/2007)

A.3 PMB Email Messages

This section provides examples of email messages received by subscribers to the PMB services of the police Portal:

Date Received: 02/09/2006
Subject: [redacted] Police Information Update 14:30hrs 02 September 2006

==========

The [redacted] Police [redacted] Team will be provide updates when they become available in relation to yesterday's Anti Terrorist Branch arrests.

Officers from the [redacted] Anti-Terrorist Branch have arrested 14 men under the Terrorism Act 2000 in a pre-planned, intelligence-led operation.

The men were arrested last [redacted] and during the early hours of [redacted] on suspicion of the commission, preparation or instigation of acts of terrorism and are currently in custody at a [redacted] police station.

The arrests in south and east [redacted] follow many months of surveillance and investigation in a joint operation involving the Anti-Terrorist Branch, [redacted] Special Branch and the Security Service.

Searches are being carried out at residential premises in south, east and north [redacted].

The arrests are not linked to the counter-terrorist operation of 9th/10th August 2006 or the terrorist attacks in London on July 7 2005.

We can confirm that police are carrying out a search at a premises the in [redacted] as part of the on-going operation.

The Police operation being conducted by [redacted] Police is not linked to the operation in [redacted].

If you have any information that can help make [redacted] Safer click below to enable this information to be sent in a secure environment

https://www.police.uk/services/intelliform/default.asp?refid=SO13arrests[redacted]&Attachments=true&refererURI=&refererDomain=

[redacted]@[redacted]police.uk or phone 0800 [redacted]

Below are useful website links:

[redacted] Police: http://www.[redacted].police.uk/

[redacted] Police: http://www.[redacted].police.uk/

[redacted] Police: http://www.[redacted].police.uk/

Date Received: 08/09/2006
Subject: [redacted] Police Information Update 14:30hrs 08 September 2006
==========

The [redacted] Police [redacted] Team will be provide updates when they become available in relation the Anti Terrorist Branch arrests on [redacted].

Officers from the [redacted] Anti-Terrorist Branch were [redacted] granted warrants of further detention for 9 people arrested during the anti-terrorist operation that took place overnight on [redacted].

The police were granted warrants of further detention for:

2 people until Monday [redacted]
1 person until Wednesday [redacted]
4 people until Friday [redacted] 2 people until Saturday [redacted]

To re-cap - On [redacted] officers from the [redacted] Anti-Terrorist Branch were granted warrants of further detention for 3 people arrested during the anti-terrorist operation that took place overnight on [redacted]. The police were granted warrants of further detention until Monday [redacted]

If you have any information that can help make [redacted] click below to enable this information to be sent in a secure enviroment

https://www.police.uk/services/intelliform/default.asp?refid=SO13arrests[redacted]&Attachments=true&refererURI=&refererDomain=

[redacted]@[redacted].police.uk or phone 0800 [redacted]

Below are useful website links:

[redacted] Police: http://www.[redacted].police.uk/

[redacted] Police: http://www.[redacted].police.uk/

[redacted] Police: http://www.[redacted].police.uk/

Date Received: 07/02/2007
Subject: ***** [redacted] Bulletin 103 *****
==========
[redacted] Bulletin 103 is now available, to view please go to http://www.[redacted].police.uk/[redacted]/docs/bulletin_103.pdf

This bulletin contains:

1. Suspicious Packages received nationally

2.Association of Chief Police Officers of England, Wales and Northern Ireland Press Statement

3. Secondary schools link up with Safer Neighbourhoods website

[redacted] gets safer update

[redacted] Police Faith & Race Hate Crime Report overview

UK Threat levels

Mi5 The Security Service

More information on threat levels can be found on the MI5 website:

www.mi5.gov.uk

www.mi5.gov.uk/output/Page269.html

Information for people intending to travel overseas can be obtained from Foreign and Commonwealth Office

www.fco.gov.uk

www.fco.gov.uk/servlet/Front?pagename=OpenMarket/Xcelerate/ShowPage&c=Page&cid=1007029390572

Date Received: 21/02/2007
Subject: ***** [redacted] Bulletin 104 *****
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Communities Together Bulletin 104 is now available, to view please go to http://www.[redacted].police.uk/[redacted]/docs/bulletin_104.pdf

This bulletin contains:

Crimewatch (BBC) programme will next be broadcast on Monday 5th March 2007. Their website currently contains a number of current [redacted] appeals that can be viewed.

http://www.bbc.co.uk/crime/crimewatch

1. Police appeal over the murder of [redacted]
2. Police appeal for witnesses and information following the death of three people

* New Temporary Taskforce

* Recruitment

[redacted] Police Faith & Race Hate Crime Report overview

UK Threat levels

Mi5 The Security Service

More information on threat levels can be found on the MI5 website:

www.mi5.gov.uk

www.mi5.gov.uk/output/Page269.html

Information for people intending to travel overseas can be obtained from Foreign and Commonwealth Office