



THE UNIVERSITY OF HULL

**A Critically Systemic Approach for Understanding Information Systems
Failure in the UK Public Sector**

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Abstract

In the United Kingdom, the implementation of large-scale Information System (IS) projects has led to multifarious problems over the last few decades, and this seems to be an ongoing situation. As a result, within the public sector organisations, a number of information systems have failed to meet their pre-specified goals in spite of the large amount money and effort spent on IS projects. Information system projects are highly complex and the complexity is varied based on the different aspects involved including technical, organisational, and social, while the traditional concepts have less of an effect when aiming to achieve considerable improvement to cope with the increasing complexity of the situation. This was apparent in the study of two examples of large-scale IS failures in the UK public sector, whereas the attention was on examining discrete elements without considering the potential relationships between the elements. The current study, therefore, proposes a system approach as an alternative to understanding the nature of large-scale IS failures in the UK public sector. The systems approach, as an advanced movement in management science, seeks to identify social context and organizational issues and to use a combination of methodologies, methods, tools, and techniques to help problem solvers better control problematic situations. Thus, the Systems Approach is privileged because it offers a holistic approach to look at the problematic situation rather than being focused solely on a particular aspect instead of the interconnected relationships among its parts. The alternative approach benefits from the new problem solving and practical intervention strategies toward a better understanding of the complexity, diversity, and change of the problematic situations, while providing a comprehensive insight into the real-world problem of IS failure. This extends to identifying the contradictory issues related to power, conflict, and culture affecting the situation. Within the Systems Approach the researcher employed critical pluralism to the current study, which

is theoretically built upon a combination of methodologies and methods designed for a particular intervention.

Some findings of the research disclose that large-scale IS failure in the UK public sector is treated inadequately, and solutions proposed to reduce the rate of failure ignore this complexity. The findings also reveal that there are four factors affecting large-scale IS failure in the UK public sector: political factors; organisational factors; technical factors; and human factors. The founding related to the methodology, the researcher found that critical pluralism appears able to capture a set of systemic processes: appreciation; analysis; assessment; and action. All these processes were conducted collectively and supported by a particular type of collected data activities in the way of identifying the natures of the IS system and its associated sub-systems. Finally, by conducting a particular Systems Approach technique to assess the IS failure problem in the UK public sector context, it cannot be claimed that the solution is applicable to other situations in another context because the approach itself views any problematic situation as unique and hard to be generalised. Nevertheless, the discovery of such solutions leads to the accumulation of knowledge that contributes to reductions in the rates of IS failure in general.

This work is lovingly dedicated to

my mother

(who has been in my thoughts throughout this study), and to

my father for keeping me in his prayers all the time.

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1 Chapter One

1.1 Introduction

Information systems (IS) currently operate as a core connector of people, organisations, and society. Since the emergence of IS as a discipline, the design, implementation, and evaluation of database systems have given rise to controversial topics and sparked a variety of debates among academics and practitioners alike. In contribution, the present research examines IS failure, particularly large-scale failure in the UK public sector, by applying a critical approach for managing the complexity of IS projects.

During the last few decades, the UK public sector has witnessed several instances of both partial and total IS failure. In response, attention has generally been paid to resolving technological matters to minimise the risk of failure, while other factors of failure have passed largely unnoticed. In the present study, I thus attempt to redefine IS failure more broadly within the organisational context of the United Kingdom, as well as to focus on managerial processes that influence success and failure. In doing so, I assume that though the technical aspects of any IS project are central, they are also only part of the project's whole situation, as factors related to organisational context are additionally important. In large-scale governmental projects in the UK public sector, the situation becomes even more complicated to address; despite its expenditure on IS initiatives, the sector continues to face continual threats of failure given the involvement of a complex network of organisations.

Among examples of IS failure in the UK public sector, I here focus on two cases: the London Ambulance Service computer-aided dispatch (LASCAD) system in the early 1990s and the National Offender Management Information System (NOMIS) in 2009. Both failures offer a range of opportunities to identify, investigate, and understand the nature of IS failure. Since these failures occurred during different periods, they have been discussed differently according to how professionals and academics have perceived the failures over time.

Accordingly, since the 1970s, several attempts based on different paradigms have been made to better understand IS failure.

In that sense, the present study constitutes another attempt to investigate large-scale IS failure by focusing on critical approach that fundamentally originates from critical systems thinking (CST). CST is an interdisciplinary approach under the umbrella of approaches following soft systems methodology (SSM) used as a vehicle for both negotiating the increasing complexity in organisations and perceiving the human and social aspects of problem situations. At the same time, in comprising systems thinking and relevant social theory, CST approaches can offer an alternative approach to better manage the complexity of IS failure in various ways (Jackson, 2000a). Within CST, a range of combinations of systems methodologies used in complementary ways can help managers to think creatively about difficult issues encountered in their organisations (Flood, 1991; Flood & Jackson, 1991c).

Proponents of soft systems thinking , including Ackoff (1971), Checkland (1981), and Churchman (1968), have challenged the dominant scientific thought (i.e., hard systems thinking) based on a linear cause–effect relationship model within the human domain in real-world problem situations (Flood & Jackson, 1991b, 1991a; Jackson, 2006; Jackson & Keys, 1984a; Mingers, 2006a). In doing so, they have developed a contrasting holistic approach that helps to account for the uniqueness of each problem situation. Soft systems thinking approaches are unreplicable in the sense that one model for repeat use cannot be designed for problem situations according to SST logic, but by its very nature considers the different viewpoints relevant to each situation in order to propose a respectively adequate system.

This introductory chapter seeks to reconceptualise the complexity and diversity of large-scale IS failure through the lens of a systems approach (SA) by considering multiple factors and stakeholders that are influential in a specific context. Although designing and planning IS are important stages prior to IS implementation, failure often results from unexpected critical

problems liable to occur during these stages. Therefore, in addition to the complexity and diversity of IS failure, uncertainty poses another set of difficulties encountered in problem situations. Based on the SA used in this study, I perceive IS failure in a wider context and apply this new view toward improving problem situations.

1.2 IS Failure: Background

Though the development of database solutions has increasingly occurred within organisations, these proposed solutions rely on technical-based processes stemming from computer systems development. Unfortunately, some systems never launch, while others appear overdue or over budget, if not both; some systems are partly used, while still others fail to deliver expected results (Fortune & Peters, 2005; Lyytinen & Robey, 1999; Sauer, 1999). IS failure is a recurrent issue whose causes remain the subject of controversy (Fitzgerald et al., 2003), and partly as a result, many IS projects in both the public and private sectors continue to fail (Fortune & Peters, 1995, 2005; Liebowitz, 1999; Myers, 1995; Sauer, 1999b; Yeo, 2002).

1.2.1 The Positivist Approach

Since IS largely derives from computer-based systems development, the dominant approaches to develop database systems used in practice were established based on positivist thought supported by scientific assumptions (Mingers & Stowell, 1997a). For this reason, numerous theories and methodologies have been proposed for negotiating IS failure in computer-based systems. Solutions have often observed the systems development life cycle (SDLC) as part of a stage-wise process designed to mitigate IS failure. SDLC is a linear sequence method that helps systems developers to plan, manage, control, and evaluate IS projects (Avison & Fitzgerald, 2003; Hirschheim et al., 1995) and, as such, extends to IS failure as well. More simply put, the SDLC helps to identify what goes awry during IS project development. Furthermore, the approach accommodates thinking that views IS

according to more traditional perspectives, which largely postulate that the SDLC is no more than variables categorised in objective terms and surveyed in order to identify factors.

In organisational contexts, the concept of IS failure remains crucial because organisational behaviour remains misunderstood (Beynon–Davis, 1995). In response, a variety of concepts have been examined to provide better understandings of IS failure. Lucas (1975) explored organisational contexts and developed a descriptive IS model based on such contexts in order to improve control over IS failure. In general, he maintained that IS success requires attention to not only technical aspects, but also the nature of organisational behaviour. Ein-Dor and Segav (1967;1978) went further by categorising factors that impact the success and failure of IS as uncontrollable, partly controllable, and controlled and ultimately listed 120 variables.

Later, Lyytinen and Hirschheim (1987) identified four categories of IS failure: correspondence failure, process failure, interaction failure, and expectation failure. In a subsequent paper, by investigating IS failure from a system analyst's perspective by administering a questionnaire, Lyytinen (1988) offered additional insight into the concept of expectation failure by distinguishing the existing and desired situation from a particular stakeholder's perspective.

In the 1990s, Sauer (1993, 1997) proposed the notion of termination failure: that a system is considered to have failed when either its development or processes cease or when it does not meet its supporters' interests. In response, he developed a triangle process model of IS failure consisting of three components: the project's organisation, the information system, and the system's supporters. In the model, these components maintain dependent relationships, for each one relies heavily on the others to produce an innovative IS process. Though Sauer (1993) and Lucas (1975) both investigated IS failure, they ultimately produced remarkably different explanations and solutions; whereas the former discovered organisational behaviour challenges related to IS use, the latter conceptualised the abovementioned IS failure triangle

model. Though the studies of both researchers were implicitly interested in understanding IS failure from an organisational perspective, Sauer's (1993) more clearly identified dimensions such as power and history (Beynon–Davies, 1995a). From their work, more recent studies have examined IS project abandonment as another form of IS failure that typically occurs at any stage prior to implementation due to poor organisational management (Ewusi–Mensah & Przasnyski, 1991; Fortune & Peters, 2005).

Yet, despite the host of investigations of IS failure in terms of organisational context, solutions applied for any potential failure are arguably purely scientific, since positivist approaches are underpinned by the need for empirical research to make sense of the mechanistic worldview positivism maintains. Ultimately, this dynamic implies that IS failure is beyond human intervention when it comes to solving problem situations.

1.2.2 The Interpretive Approach

Opposed to positivism, an interpretive approach has emerged as an alternative set of strategies for coping with IS failure. By relying on different assumptions, this interpretive approach offers insight into IS failure to posit that reality can be socially constructed in order to make better sense of the corresponding worldview (Mitev, 2005; Walsham, 1993a, 1993b, 1995, 2006). In this sense, the terms *success* and *failure* are subjectively expressed and depend on an individual's perception. This view boldly counters that maintained the positivist paradigm, the assumptions of which Myers (1994) has argued are invalid for effectively understanding social realities and trends in how people think and act. In general, then, proponents of the interpretive approach seek to study social realities associated with organisations and their technology, as well as those realities' impact on IS failure.

In this sense, and according to Mitev (2005), social constructivism implies that reality can be socially constructed in terms of meaning, discourse, and interpretation. This idea has been extended to the social construction of technology (Winner, 1993), which maintains that the

interpretive sociological approach is a form of sociological analysis of IS phenomena (Howcroft et al., 2004). Accordingly, all IS failures are socially constructed (Mitev, 2005) or, in other words, socially shaped (Wilson & Howcroft, 2002), in terms of the knowledge gained by socially shaping technology. As such, a socio-technical balance can arguably provide a more thorough understanding of the complexity of IS failure, especially failures that seem to derive from organisational and behavioural factors.

Among the contributions of several scholars, numerous methods under the umbrella of social constructivism have suggested the approach's significance to addressing IS failure in the organisational context. In an early attempt, Davis et al. (1992) proposed an interpretive process for diagnosing IS failure in organisations that identified conflicting perceptions among participants in the social system (Davis et al., 1992). More recently, Wilson and Howcroft (2002) proposed the social shaping of technology (SST) approach for studying IS failure, an approach assuming that IS failure or success is a state of a process, not an objectively recognised event. This approach is in fact an evaluative process recognised developed during the mid-1980s for investigating the organisational, political, economic, and cultural factors of IS failure (Williams & Edge, 1996). Also within the context of social constructivism, the social construction of technology (SCOT) addresses the ambiguity of scientific knowledge and how it can be interpreted according to social factors (Mitev, 2005), as well as how one interpretation can supersede another.

Another method proposed to examine IS failure from the socio-technical perspective involves the narrative and multi narrative methods (Bartis & Mitev, 2008; Dalcher & Drevin, 2003; Fincham, 2002). These methods aim to make sense of IS failure by accounting for rational ideas about socio-technical processes related to the nature of decision-making in information technology (IT) (Fincham, 2002). In adopting a multinarrative perspective, Mitev's (2008) work, for example, applied a combination of ideas such as social construction

of technology (SCOT), the concept of relevant social groups (RSGs), and critical narrative methodology to produce different meanings from the perspective of different stakeholders. In effect, this perspective accommodates the deficiencies of the SCOT approach in order to reconcile differences among power relationships within organisations.

1.2.3 The Critical Approach

The final paradigm recognised in this introduction is the critical approach, which has become widespread in the IS community during the last few years. From the name of the approach, the term *critical* has various interpretations, though such IS research has generally been guided by the Frankfurt school and the work of Jürgen Habermas (Brooke, 2002; Howcroft & Trauth, 2005). Klein et al. (2011) have explained generally that ‘critical research in information systems is concerned with social issues such as freedom, power, social control, and value with respect to the development, use, and implementation of information technology’ (p. 17).

Though an interpretive approach given its appropriation of research methods such as field study and ethnography, the critical approach makes it possible to recognise conflicts and contradictions situated in human actions and interactions (Mitev, 2005). Within the critical approach, social relations are structured in light of a different worldview ‘*Weltanschauungen*’ that considers the conditions of the status quo in order to identify actions for change. Among various scholars of IS failure, Mitev (2005) has critically examined the social constructivist approach in terms of factors such as power and conflict processes. In doing so, her work has stressed the importance of referring to political relations within organisations to identify different interests within organisational contexts and their influence on IS failure (e.g., users’ resistance to new systems and disagreement over technical change).

A glance at the foundations of the critical IS research approach, in contrast to the positivist and interpretive ones, reveals that key issues considered are closely related to the principles

of critical management studies—for example, the notion of emancipation from critical theory, which has become dominant in mainstream critical IS studies (e.g., Howcroft & Trauth, 2005).

1.2.4 The Systems Approach (SA)

The following brief review of different approaches to IS failure examines the contributions of SA to managing complex issues such as IS development in organisations and their management. In general, SA focuses attention on three essential aspects: the situation, the user, and the system (Reynolds & Holwell, 2010). By identifying interrelated and interdependent elements of problem situations, SA seeks to effect change in real-world situations. In this sense, SA thus offers a way to see the world in terms of broader issues in social contexts, including conflict, power, social relations, and the beneficiaries of systems. By applying SA, different implications highlighted are typically based on systems thinking or systems movement that has emerged due to the limitations of conventional thinking in solving problems. As a result, numerous Systems approach have been developed by different systems thinkers (Ackoff, 1971; Boulding, 1956; Checkland, 2000; Churchman, 1968; von Bertalanffy, 1968; Ulrich, 1983). Early systems thinker Checkland (1988), for example, issued an call to unite systems thinking and IS throughout SSM in order to create holistic process streams for developing purposeful activities systems. This call acknowledged that SSM helps to identify ill-defined problem situations by capturing pertinent social, political, and technical aspects.

Since any SA is underpinned by a combination of activities undertaken systemically, different forms of systems methodologies have been created to respond to problem situations described as ‘messy’, including ‘creative problem solving’ (Flood & Jackson, 1991a) and ‘creative holism’ (Jackson, 2006). In effect, these methodologies are useful in resolving both strategic and technical problems in any situation. Regarding the social planning of IS projects,

Midgley and Córdoba (2006, 2008) have contributed to the social context by drawing upon Midgley's (2000) systemic intervention as a CST approach (Córdoba & Midgley, 2006b, 2008; Córdoba, 2009). In their work, they have applied theories and methodologies informed by systems-oriented activities such as interviews and workshops that engage diverse participants.

Systems approach constitutes an endeavour to address the complexity of IS failure in order to promote a holistic view, which can offer new insight and pay greater attention to management issues at different levels, at all of which IS failure is considered to be a managerial concern. This concern considers the whole system while making sense of situations encountered by an organisation or across different organisations, as is the case with large-scale IS failure. In this endeavour, the ability of systems methodologies to solve the complexity of real-world situations has been exceptionally useful. Córdoba–Pachon (2010) has defined *methodology* as a set of 'principles and ideas to guide action' (p. 44), meaning that any methodology is a way to view the world for all of its social constructs, conflicts, power relations, general relations, and beneficiaries. A brief review of the recent history of IS failure reveals that organisations continually face particular failures despite the money, time, and effort exerted to secure success. In response, that IS failure persists due to a set of technical, organisational, and human dilemmas cannot be neglected. It has thus been suggested that IS failure should be conceived as a managerial problem situation facing organisations, not merely a series of technological problems, and that organisational management needs to become actively involved in assessing problem situations in order to effect desired changes.

Another concept within systems thinking involves ideas put forward by Checkland and Holwell (1997a) and Jackson (2006), both of whom describe the development of systems ideas as a never-ending cycle of learning processes. Over time, such a cycle forms a

symbiotic relationship between perceived reality mapped by observers and intellectual concepts, such as those pertaining to systems. By linking theory and practice, both the perceived reality and intellectual concepts are steadily created and reinforced by each other. In this way, SA can bring about a continued learning process that benefits from the reflection of both academics and practitioners.

Altogether, this section has been dedicated to briefly exploring different paradigms regarding IS failure. Each paradigm is guided by explicit and implicit assumptions about organisations, which are liable to adopt particular approaches toward IS failure that reflect how that failure is perceived.

1.3 Significance of the Research

In large-scale IS projects, the potential for failure is real, and from the managerial perspective, continuously avoiding such failure has become increasingly complex. In general, managers have expressed concern about the high rate of failure of IS projects in their organisations. McCue (2005) reported the results of an annual survey conducted by the Chartered Management Institute of 440 British managers showing that approximately 70% of managers classified IS failure as the chief cause of any breakdown in the organisation.

The above conclusions raise questions about the feasibility of what can be achieved in negotiating consistent IS failure from technical and organisational perspectives. Partridge (2010) has extended this idea by asking why IT systems always fail, a question that he answers in part by referring to a 2005 report issued by the British Computer Society on IS failure, which revealed that failure occurs due to not technical but managerial reasons. Similarly, Fortune et al. (2005) have identified, among others, top management as a critical factor of success in coping with IS failure.

At the same time, it is evident that many organisations ignore the complexity of IS failure, despite the increase in the number of human issues involved (Clarke, 2007), including poor

project management, overly optimistic planning, budget overestimation, and premature deadlines. These multidimensional issues are also relevant to external actors in IS projects—for example, outsourced providers, government organisations (GOs), and nongovernmental organisations (NGOs)—all of which impact the strategy of any IS project's operation. Interestingly, a cause of general IS failure has been labelled 'mismanagement' or 'poor management'. Having ignored the complexity of IS failure initially, organisations accordingly neglect to study factors of failure and even abandon projects without learning from the experience (Pan, 2005).

Yet, important lessons taught by IS failure can enable managers to treat, if not prevent, the causes of failure by using more coherent approaches. A brief overview of responsive approaches to IS failure clarifies that the phenomenon is critically related to different factors in particular contexts, as well as that identifying a specific focus for IS failure generally seems to address the situation incompletely. For example, if IS failure is attributed to the failure of the organisation's system and subsystems, then any treatment will inevitably neglect the holistic view. While the hard systems thinking approach effectively reduces problems by classifying them into their constituent parts and, in turn, focusing on these parts in order to reassemble them, soft systems thinking can be seen as a problem-solving approach that, by contrast, helps to produce an integrative strategy including human activity and the natural world, especially for problems that seem most difficult to resolve. Unlike literature addressing IS and project management that conceives IS from a narrow view and relies mostly on technical solutions to negotiate problems (Clarke, 2007), soft systems thinking maintains that problem solving requires holistic thinking to make sense of the world's complexity. A brief review by Fortune and Peters (2005) has shown that causes of IS failure involve technical, financial, human, organisational, and political factors, as well as that the viewpoints of different stakeholders should be involved in resolving problem situations.

The insights of the above mentioned studies recommend an examination of ideas of CST rooted in SST in order to carve out a new stance for the investigation of IS failure. Clearly, CST relies heavily on social processes in order to effect change in situations, as well as uses several systems theories for supporting IS in organisations and addressing social concerns involved in such support. Jackson (2000) has pointed out that CST can work coherently by allowing a variety of methodologies, methods, and models for interventions that can cope with complex organisational and social problem situations.

In addition to applying systems approach to pinpoint the sources of IS failure, the present study aims to examine such failure from the perspective of managerial behaviour. Since IS currently play crucial roles in decision making and since managers consider them to be essential sources for managing and operating their organisations in fiercely competitive environments (Stowell, 1995b), I respond here by investigating how IS are managed. Viewing IS failure from different levels of management promises to yield benefits in different aspects, particularly emergent properties emerge into social system.

1.4 Defining Information Systems (IS) in Relation to the Study

A review of IS history shows that numerous definitions for IS have been proposed during the last few decades. In their early stages, IS were heavily related to computing science and applications, in which the processing of raw data drew upon software engineering steps to create emergent IS. This process of software development was guided by IS development (ISD) methods that make sense of and process raw data into useful information. Consequently, IS can be defined as ‘a set of goals, guiding principles, fundamental concepts, and principles for the ISD process’ (Hardgrave & Johnson, 2003, p. 323). Relying on this definition to facilitate the design and implementation of ISD, several methods and tools based

upon systems development life-cycle (SDLC) models, including the waterfall and spiral models, have been suggested.

However, since this defined set comprises a collection of techniques and tools used to design and deliver structural programming solutions, any amendment suggested or any system's success can emerge from software developers only. Such a narrow view of the definition within computer science generally limits the perception of problem situations to technical aspects handled by software developers, though a host of other factors may also affect the situations—for example, the project's size, budget and time. At the same time, the definition perpetuates the positivist paradigm that, for the sake of objectivity, disregards individuals' and organisations' influence in ISD.

Arising from an organisational perspective, another definition of IS moves beyond pure technical methods and takes into consideration users so that organisations can better control IS projects. Avison and Fitzgerald (2006) have argued, however, that the previous definition does not suggest that ISD methods have been unsuccessful, but that they have not solved all of the problems as anticipated. This organisational definition of IS also meets the new needs of organisational actors at the management level, including decision makers and managers. In a sense, the definition additionally implies that narrow overemphasis on technological development issues can prompt user resistance, in both organisational and individual aspects. To distinguish the current study's definition of IS according to its focus on a particular real-world problem situation, its definition places greater emphasis upon social and contextual issues from the viewpoint of systems approach. In a sense, the definition zooms out from the narrow focus on technical aspects in order to identify the problem situation in its broadest real context. Though this perspective does not neglect technical aspects, it necessarily also pays attention to entire systems that present problem situations. In systems approach, each problem situation is considered to be unique and has both implicit and explicit relationships

that make it hard to define with any real certainty. In fact, problem solvers who perceive problem contexts form a decent, minimal understanding that can lead to successfully define situations to resolve.

Accordingly, in examining large-scale IS projects for the public sector, the present research takes into account the broadest definition of IS failure situations based on a variety of contextual issues related to the whole system. It is assumed that whole systems demonstrating IS failure entail various subsystems whose interactions constitute the system. In making sense of these situations, a holistic definition can perhaps provide clearer insight into the study of complex problems and yield appropriate long-term solutions.

A final point concerns the nature of defining the reality that the study seeks to understand. Opposed to objective reality, which can be achieved by following scientific rules, subjective reality is more important to understanding situations holistically, for it accommodates interpretations of the situation from different actors involved.

1.5 Context of the Research

To create a coherent understanding of the problem for a systemic intervention into particular IS failure phenomena; the current study has adopted the context of the UK public sector. Instead of breaking the phenomena down into constituent parts and examining each part separately, it is essential in such complex situations to understand the whole system in order to identify better solutions. Jackson (2000) found that SA generally works well to effect desired changes amid serious problem situations. Both he and Churchman (1968) moreover proposed that envisioning whole systems appears to be more about realising a worldview of problem situations by appreciating them from different perspectives. Churchman (1968) nevertheless acknowledged that every worldview is restricted, a concept widely referred to in literature concerning SA as *Weltanschauung*. According to Jackson (2000), *Weltanschauungen* propose an image of the world constructed by relying on personal views

and evaluations of the world, life, and ideals. On this point, Jackson and Keys (1984) furthermore posited that in addressing problems, solvers have to examine different *Weltanschauungen* in order to conceptualise which best reflects the essence of the context at hand.

To accordingly examine the problem context of this study, the present research explores two IS failures in the UK public sector. The first is that of the LASCAD system, an abandoned project that is nevertheless useful insofar as it offers insights into large-scale IS failures in the UK public sector. The second failure is that of the NOMIS project, a far more recent IS failure in the United Kingdom that exemplifies the complexity of IS projects well. In fact, by scrutinising these two major instances of IS failures in the UK public sector from different perspectives, it will be shown that the failure context is generally highly complex. More broadly, a look at the two failures can also elucidate the problem context and nature of IS failure in the UK public sector. Despite sustained efforts addressing both technical and organisational elements to negotiate various issues causing IS failure in this context, ways of managing IS projects remain inadequate, largely due to inattention to the interaction of these elements, which invariably causes problem solvers to lose sight of the problem context.

The study recognises that managing the complexity of large-scale IS projects in the United Kingdom poses a gap in identifying social, technical, and organisational issues that interact to constitute whole systems. Though this gap is a theoretical concern related to available knowledge, systems approach offers problem-solving strategies that facilitate a practical process enabling participants to contribute a variety of views about situations.

1.6 Research Objectives

The study applies SA to examine various factors affecting large-scale IS failure. SA is a holistic procedure proposing better control over IS failure in organisations by using a comprehensive approach based upon systems ideas and CST.

In Checkland's (1988) early call for unity between systems thinking and IS as an alternative to hard systems thinking, he proposed SSM as a way to stimulate debate about real situations. Later, in studies seeking to adopt a critical approach in understanding IS failure in terms of social, managerial, and organisational issues, Jackson (1993, 2010) proposed applying critical systems practice and multimethodology, which can at once highlight interrelated issues and conflicts needing intervention as a means to offer alternative insights into situations.

From the above discussion, four summary statements of IS failure can be articulated:

1. Despite IS failure, since IS solutions continue to be chief elements in contemporary organisations, IS remains a top priority;
2. IS failure appears in real-world situations as a complex, multidimensional phenomenon;
3. IS failure occurs due to many factors at the managerial level—project management, coordination, and support, for example—and mitigating them requires a holistic view; and
4. Since IS failure in the public sector poses great risk, it is crucial to anticipate and prevent the possible causes of such failure.

Based on these summary points, the present study seeks to achieve the following objectives:

- a) To conduct a holistic investigation of IS failure in organisations;
- b) To offer a comprehensive approach for reducing, if not preventing, IS failure;
- c) To identify an appropriate multimethodological approach for IS failure in organisations; and

- d) To learn lessons from IS failure in the public sector.

1.7 Research Questions

For good research, clear questions are necessary (Saunders et al., 2009), for they link the research's objectives to its results. In the present study, since the objectives are to understand IS failure and develop a comprehensive approach for improving IS projects, the study therefore poses the following questions:

1. Why has large-scale IS failure persisted in the UK public sector?
2. What factors affect large-scale IS failure in the UK public sector?
3. How can a critical approach facilitate understanding and inform future IS projects?

1.8 Study Limitations

The present study focuses on achieving success and avoiding IS failure by considering major, general concerns from managerial points of view in dealing with IS failure. So its limitations can be identified through the need of a comprehensive vision. However, due to the need for systems approaches that examine IS failure, limitations cannot be set out accordingly but constitute an ongoing dialogue seeking to understand what is going on, as well as a learning process that helps to address social, managerial, and technological aspects and that focuses on environments and relationships among various entities.

To overcome this inevitable barrier, the present study tends to apply a creative problem-solving strategy that facilitates CST and considers appropriate systems methodologies. While IS failure is often seen as a technological problem, we see IS failure emerging at the managerial level to ensure that we address a different aspect of the situation at hand. While doing so, we expect to engage various groups of stakeholders.

1.9 Structure of the Thesis

The structure of this thesis is articulated in eleven chapters including this introduction. At the beginning, the researcher offers a brief overview of each chapter as follows:

Chapter 1 is an introduction. This chapter provide background about information systems failure (IS) and the various approaches for analysis. The intention is to explore a major shift in IS failure history since it was drawn heavily on a scientific basis. This is followed by an explanation of the feasibility of studying the topic of IS failure. Drawing on the context of IS failure occurring in the UK public, the researcher intends to determine a particular context believing that the problematic situation ought to be studied in its environment in order to offer a better understanding of the issue before proposing appropriate suggestions. The research's objective and question are outlined at the end of this chapter.

Chapter 2 presents a literature review on systems ideas. This chapter attempts to explore systems ideas over the past decades, highlighting various contributions to the field from different disciplines. The shift in our way of thinking toward the conceivable world occurred in the middle of the last century as opposed to scientific rules that were dominated at that time. Since its emergence, scholars of systems thinking have proposed plenty of systems ideas help to form a foundation. In this chapter a particular focus will be on the soft systems thinking movement and its pathway to the present. In addition, a number of systems thinking theories and methodologies have been explored aiming to improve our understanding of complex and real-world problematic situations.

Chapter 3 is another literature review on the information systems (IS) discipline, its emergence, and its constant development from technical perspective to be organisational. We start by identifying the philosophical underpinning of IS research including positivist,

interpretive and critical. We also explore cases of IS research on the basis of quantitative and qualitative data.

Chapter 4 is a literature review on IS failure in the UK public sector. Because of the research about the UK context historical review, we choose two cases to explore and identify what led to the failure. The first is the London Ambulances Service Computer Aided Dispatch system (LASCAD), and the second is a more recent case with the National Offenders Management Information Systems (NOMIS).

Chapter 5 explains research methodology in management. It presents an overview of research paradigms and strategies in addition to reasons why to pick a particular critical paradigm and strategy. The next part of the highlighted the scenario of intervention based on Mingers' model of intervention processes is to explain its theoretical underpinning including critical social theory and stakeholder theory. The current research is conducted based on a combination of methodology and techniques.

Chapter 6 covers the first phase of four in the analysis and finding of Mingers' intervention processes. It is the appreciation phase about the IS failure situation.

Chapter 7 continues to the second phase, which is concerned with the analysis and the findings of interviews about IS failure in the UK public sector.

Chapter 8 presents the third phase of the intervention processes, which is about the analysis and finding of the workshop. The assessment uses the KETSO creative thinking tool for applying a structured workshop.

Chapter 9 is the last phase of the intervention process, action. It is dedicated to improving the situation by relaying what we have learned throughout the previous phases.

Chapter 10 discusses the research findings and answers the research question based on what emerged in the four phases of intervention. The question intends to find out why IS failure has continued, what factors effect IS failure, the ability of a critical approach to change the situation, and finally learning from IS failure.

Chapter 11 presents the research conclusions and the implications of the research including the three types of contributions: contribution to knowledge, contribution to practice, and contribution to methodology.

2 Chapter Two: Systems Literature review

2.1 Introduction

The current research tends to address the complex problem of information systems failure facing organizations within managerial and organizational contexts by simply applying the ideas of critical systems thinking. However, management problems often emerge from the challenges of everyday life, and coping with these challenges requires a variety of approaches in order to produce satisfying solutions. The purpose of this literature review is to bring together diverse contributions and their contributors in the fields of management systems (MS) and information systems (IS). Though these appear to be distinct and separate fields, MS and IS share similar circumstances of development in the second half of the twentieth century. For instance, both are derived from a pure scientific/classical approach, based either in theory or practice that eliminates from analysis the social domains of culture and conflict.

The current research addresses the commonality of these disciplines in order to produce a better vision for organizational problems about information systems failure from managerial perspective. Generally speaking, information is processed at all organizational levels, but it is imperative that organizations manage the flow of this information properly in their changing environments otherwise it may entirely fail of being sufficient. The subsequent literature review will extend across two chapters. Chapter Two explores the development of MS and will cover a variety of systems ideas, including general systems theory, the emergence of systems thinking, complexity and critical systems thinking (CST). Furthermore, this literature review will draw on critical management studies (CMS), which are based on the Critical Theory (CT) of the Frankfurt School, while also considering sociological theories and their impact on development systems studies. Chapter Three examines the discipline of information systems, its evolution from a branch of computer science to an independent

discipline, its transitional forms of development, and the key themes of its evolution. This chapter attempts to understand IS failures by the application of the holistic approaches that currently dominate organisational science.

2.2 Systems Ideas

The ideas of systems thinking have developed across several eras and thus reflect many years of historical debate. Because systems ideas raise huge questions about how we view the world systemically, and thus how we tackle the world's problems, I intend to bring to the surface the key themes that scholars have contributed to systems thinking over the decades. Evidence of a distinctly systematic approach was apparent as early as the beginning of the Renaissance in the 17th century in Europe when Descartes proposed reductionism as a way to understand the world and its problems (Jackson, 2000). Two centuries later, Churchman (1968) proposed a new process for thinking about and coping with the world's problems in which the whole is a set of subsystems that is itself composed of other related parts. The applications of systems ideas in this early stage is also evidenced by the genuine movement of scholars to challenge conventional thinking about observation and experimentation in order to examine more various phenomena (Checkland 1981). In this way, the functionalism of traditional systems thinking eventually developed as a purely scientific approach that relied primarily on the breaking down of a given problem into smaller parts and then focusing on casual relationships between these parts in order to explain phenomena. As a result, terms like fragmentation, reduction and breaking down became dominant within the scientific discourse in the first half of the twentieth century. The hegemony of this approach was challenged when alternative systems movements emerged and proposed different ways of thinking about systemic analysis. Thus, systems thinking approach was born.

The terms “whole” and “part” have since become subjective matters that are perceived and interpreted differently based on the different human judgments associated with the drawing of boundaries around systems. Another important development in systems thinking comes from Geoffrey Vickers (1983) who has researched human systems and their significance for the better understanding of the human condition in societies and organizations. Following this line of inquiry, he has freshly examined various systems, including ecological systems, biological systems and open systems.

It is important to note that contemporary scholars of systems thinking have reached a near consensus of views regarding the development of the discipline over the past few decades (e.g. Checkland 1981, Jackson 2000, and Midgley 2003). We rely on the categorization of Midgley (2003) in his four-volume collection of seventy-six significant articles on the development of systems thinking, as well as on Jackson’s (2000) overview of systems approaches. Both have found solid, common ground in their attempts to bring together systems ideas from various disciplines. Midgley (2003), for example, has explored the work of those pioneering scholars of different points of view who provided the principles and foundations for the emergence of systems ideas. He argues for the existence of three interrelated discourses that have given shape to systems thinking: general systems theory (GST), cybernetics and complexity, which have all played a role in the debates that have encouraged the evolution of systems thinking. GST and the notion of open systems challenged the narrow, traditional method of reducing subject matter into smaller elements in order to identify causal relationships between these elements. GST also offers us a broader range of boundaries in a system comprised of organized elements linked with one another in a set of particular relationships. Cybernetics, another discourse that has shaped systems thinking, focuses on the feedback mechanisms that allow monitoring and control of systems’ stability in order to accommodate their environment. Midgley has identified a strong

relationship between GST and cybernetics in terms of how both account for systems' monitoring and responsiveness to their environments. The third discourse is complexity theory, another influential concept in early systems thinking. According to Midgley, there is a linkage between organised complexity theory and systems in their historical basis (Midgley 2003).

Jackson (2000) has explored systems ideas by identifying a number of disciplines that have in some unique way contributed to the origin of systems thinking, namely, philosophy, biology, physics, general systems theory, sociology, management, organization theory, control engineering and cybernetics (here we intentionally ignore to mention other references Jackson has written in systems idea as though they are recognized consistently in literature review).

Jackson employs an historical review in order to explore the contribution of each discipline. For instance, in the case of philosophy, Jackson tracks systems ideas in the thought of Ancient Greek philosophers like Plato and Aristotle, and then extends this examination to the work of later Western philosophers, including Spinoza, Kant, Hegel and Marx. Both Jackson and Midgley provide each in their own way, an overview that helps beginners in systems thinking understand the various contributions of various disciplines and various eminent scholars. Additionally, Jackson and Midgley have also produced their own significant contributions to systems thinking; these will be detailed shortly.

Skyttner (2001), another theorist, investigates systems ideas by examining general systems theory and changing worldviews in Western thought from Ancient Greece onward. Each existing worldview reflects contemporary needs as determined by contemporary beliefs and knowledge. Thus, Skyttner's is a time-dependent paradigm in which the phenomena of a particular period of time are understood according to the most prominent way of thinking in

that period. Skyttner identifies four major paradigms: the scholastic world; the renaissance world; the mechanistic world and the systems age world. Analysis of the whole spectrum of paradigms provides insight into the many ways we recognize and understand phenomena. For instance, the scholastic paradigm, which belongs to the pre-scientific era, views the world philosophically, that is, as correlated with spiritual truth; thus, phenomena are interpreted by appeal to religious texts. With the exception of the systems age paradigm, these worldviews exist independently from human control and intervention. According to Skyttner, the systems age emerged in response to the increasing complexity of the world, to human intervention, and to compound problems rooted in a wide variety of technical, social, organizational and political domains. The mechanistic solutions of the scientific worldview were no longer adequate in the face of these complex situations.

Lilienfeld (1978) provides insight into the emergence of systems thinking by investigating how the rise of systems ideas initiated a major reorientation in scientific thought. Lilienfeld first highlighted systems concepts in their respective and various fields, and then demonstrates how a synthesis of these concepts underlies the philosophy of the systems approach. According to Lilienfeld, information and communication theory, operation research, game theory and techniques for simulating social and environmental processes are all central to the establishment of systems thinking.

Mingers (2006) also explores the contributions of different disciplines to the systems movement by demonstrating how the systems movement has spread across these disciplines. Ever since the systems movement took root a few decades ago, according to Mingers, the newer ideas regarding systems thinking have intentionally attempted to shape themselves into full-fledged discipline by dealing with problems holistically. In yet another view, Jackson (2000) categorizes the systems movement into three divisions: systems thinking within the

disciplines; the study of systems in their own right; and systems thinking for solving problems.

2.3 Pre-systems thinking era

According to the systems thinking view, in the pre-systems era, the dominant modes of thinking about phenomena and thus the construction of the universe failed to address the behaviour of complex phenomena (Flood and Jackson 1991). Ackoff (1981), a major contributor to systems thinking, has detailed the inadequacies of the reductionist, mechanistic worldview that flourished in the machine age. He claims that machine age thinking ignored relevant systemic elements capable of affecting understanding of the whole system, therefore independently optimising the parts that constitute the whole. Ackoff also argues that this mechanistic approach relied on the postulate of cause-effect in order to explain phenomena. Moreover, the industrial revolution greatly enhanced the role of machines; thus, the concept of reductionism complemented widespread industrialization, in which work is reduced into smaller tasks to be accomplished by a machine. Ackoff claims that humans behave like man-machine systems when doing tasks, and that during the machine age of the industrial revolution problems were primarily solved by appeal to mechanistic thinking.

The well-known systems thinkers Flood and Jackson (1991) have written on vitalism, a way of thinking about phenomena that relied on metaphysical doctrines. Like mechanistic thinking, vitalism failed to understand complex like organisms, and was thus refuted by biology. The explanative limits of both vitalism and mechanistic thinking in the case of biological phenomena led to the acceptance of systems thinking in the 1940s. The systems thinking view understands organisms as systems open to their environments and as whole entities with emergent properties. Systems thinking holds the concept that each system is a whole made of parts, and that these parts interact and interrelate to make another “whole”.

Such a conception is contrary to the classical model of systems with independent parts and casual relationships. Significantly, Flood and Jackson have introduced systems thinking to the social sciences, generally, and to problem solving strategies, in particular (e.g. total systems intervention) (Flood and Jackson 1991; Flood 1995).

2.4 The Emergence of Systems Thinking

It is widely acknowledged that the origin of systems thinking can, at least in part, be credited to work by biological scientists—the first systems thinkers—on the concept of emergence and hierarchies of organisms in relation to a whole (Lilienfeld 1978; Checkland 1981; Jackson 2000). The study of organisms inspired biologists to lay the foundations for systems thinking, as an organism is an extraordinarily complex phenomenon that operates by forms of relation distinct from those of physics and chemistry (Checkland 1981). Organisms cannot be experimentally recognized within the extant laws of science, and thus in order to demonstrate the complexity of organisms, a different descriptive language was required. The ideas offered by biologist engaged in the study of organisms promoted the philosophical view of holism against reductionism because a holistic approach can better explain complex phenomena. Flood and Jackson (1991) and Jackson (2000) illustrate that the systems view emerged in biology and that ideas like “*emergence, hierarchy, equilibrium, homeostasis, self-regulation, autopoiesis, autonomy, development, stability, survival, adaptability, flexibility and growth*” are, in fact, biological analogies for systems thinking.

One important conception of biologists is equilibrium (Lilienfeld 1978; Jackson 2000). Lawrence J. Henderson (1878-1942), a biochemist by training, is considered a founder of systems thinking. He devoted himself to the study of self-regulating and mechanistic processes in organisms, which, by virtue of the interrelationships of parts, maintain the organisms’ equilibrium. According to Henderson, it is possible to apply these biological

principles to social systems by replacing the biological components of the system with individuals. The role of any system, in his view, is to achieve and maintain equilibrium.

This concept was treated by Walter B. Cannon in his book “the Wisdom of the Body” (Cannon 1932), which represents a remarkably valuable contribution to systems thinking. Cannon introduces the concept of homeostasis, which operates to maintain the stability of organism. As happens, the human body may often be exposed to circumstances that lead to deviations from normality. In these situations, different systems in the organism work together in order restore homeostasis, that is, to return the organism to a constant condition. Cannon transfers this concept to social systems in which the level of complexity is similar to that of the body. In addition to homeostasis, another fundamental concept to emerge within the biological domain and then find itself exploited in systems thinking is the theory of “autopoiesis” (self-production), as figured by the biologists Maturana and Varela. According to Mingers (1997, 2006), the essence of autopoiesis is the theory that living systems are composed of complex characteristics that differ from other systems. Previous approaches to living systems had hitherto failed to distinguish these characteristics.

Maturana and Varela based their research on observations of a single-cell organism of a living system and its relation to other organisms in the living system. They discovered that the processes of living systems are organized in such a way that cells continually produce and maintain (autopoietic) themselves in a circular process of production, while other non-living systems cannot similarly self-produce. According to Mingers, “Autopoietic systems are characterized by autonomy since they are not dependent on external production processes” (1997, p.p. 305). Thus, autopoietic systems maintain a unique and autonomous relation to their environment, whereas other living systems are considered open to their environments.

Building on the work of other biologists who contributed to systems, Von Bertalanffy's work on the emergence and hierarchy of organisms led directly to the development of General System Theory (GST), one of the theoretical foundations of systems thinking as a discipline (Checkland, 1981; Jackson, 2000).

2.5 The Development of Systems Thinking

The remarkable development of systems ideas began in the mid-twentieth century, and it aimed to alter the dominant way of thinking about real world problems. In Lilienfeld's phrase, "the nature of the revolution is the replacement of analytic atomistic modes of thought by holistic integrative ones" (1978, p. 7). Jackson (2000) and Checkland (1981) agree that the work of Ludwig von Bertalanffy and Norbert Wiener proved essential to the emergence of systems thinking. Jackson and Midgley (2003) explored the influential work of pioneering scholars in GST, including Alexander Bogdanov (1913) and Kenneth E. Boulding (1956), which hastened the expansion of the systems community. We add to this survey Hammond (2003) whose work produced further implications for GST, and Sir Geoffrey Vickers (1983) whose significant views regarding the characteristics of open systems will be discussed shortly.

2.5.1 General System Theory

In the following discussion of systems thinking, we will identify general systems theory as one of systems thinking's leading principles, and reflect upon some of its implications and ideas. The work of biologist Ludwig von Bertalanffy (1901-1972) on general systems theory is regarded as a cornerstone in the systems thinking movement. In addition, Jackson (2000) and Midgley (2003) revealed that certain ideas related to general systems theory had been published by Bogdanov, a Russian scientist, from 1912 to 1927, under the concept of "Tektology". According to Jackson, this word is derived from the Greek "tekton," which

means “builder”. This builder can be either nature or a human, so long as the builder creates forms or systems. The facts presented by Jackson regarding the principles of general systems theory illustrate that both Bogdanov and von Bertalanffy embraced similar ideas about the complexity of systems and the interrelationships between elements. The identical views of the two contributions of these scientists compelled Gorelik (1975) to claim that while Bogdanov assembled the conceptual nature of general systems theory, von Bertalanffy is the founding father whose implications gave direct birth to systems thinking. Midgley (2003) has also acknowledged the contributions of Bogdanov and von Bertalanffy, noting certain similarities and differences in their work.

According to von Bertalanffy, the emergence and hierarchy of organisms shape the principles of a general systems theory capable of applications to organizations and society (Lilienfeld, 1978). He explained that if the term “organism is replaced by other organized entities such as social groups, personality, or technological devices; this is the program of systems theory” (410, 1972). Kenneth Boulding (1956) built upon this general theory by addressing, as he claimed, a more systemic approach to complexity. He established a classification range of nine levels for real-world complexities, beginning with the simplest level and ending with the most complex.

Hammond (2003) offers a further examination of the development of systems ideas by investigating, in depth, the founders of systems thinking whom early on introduced concepts that would shape systems thinking. According to Hammond, systems ideas emerged out of the growing need to understand human behaviour in World War II, and integrated various scientific disciplines, including cybernetics, information and communication theory, operation research computer technology and management science, in order to analyse organizational processes in biology and social systems. Hammond argues that the highly complex nature of human behaviour requires an understanding of humans as open systems,

active agents that purposively behave and act upon perceptions, interpretations, and constructions of meaning. In his analysis, Hammond identifies five systems founders whose concepts together constitute the general theory of complex systems: Ludwig von Bertalanffy and the notion of general systems theory, Ralph Gerard, Anatol Rapoport, and James Miller and their integrated theory of human behaviour, and Kenneth Boulding who developed an integrated interdisciplinary approach to the social sciences. Systems scholars studying systems behaviour in the early 1970's fell under the categorization of human behaviour (Group 1981). This work explored the vast implications of systems ideas and, as a result, systems thinking emerged in a variety of disciplines in order to address the complexity of behaviour. These important developments refuted the then-prominent and inadequate scientific approach and offered systems ideas as a better method for coping with the complexity of phenomena and predicting the behaviour of systems.

In this same context, Vickers (1967, 1983) explored ideas related to the emergence of systems thinking, particularly the notion of a system as open and complexly constituted by other related systems in different types of relations. These open systems are characterised by their form, which proves enduring and flexible in response to the substances that constitute it at any specific moment of time.

Kenneth Boulding (1956), whose paper "General systems theory: The skeleton of science" is widely known, explored the GST ideas of von Bertalanffy. Boulding criticized the narrow and purely mathematic view of theoretical model building that generalised relationships into a coherent and abstract system suited to individual discipline. By contrast, he argues, systems thinkers should take a wider view in order to generalise the knowledge that can be produced through interdisciplinary approaches between disciplines. To this end, Boulding developed a practical framework in "The skeleton of science" based on nine levels of complexity for the integration of knowledge, organised with respect to hierarchy and to the increasing real-world

complexity of each discipline. Systems scholars recognize Boulding's proposition as a leading systems idea (Jackson 2000; Midgley 2003; Wilby 2005).

2.5.2 Cybernetic (Control and Communication)

The prevailing reductionist environment of the mid-twentieth century presented difficult analytic problems. Ackoff (1981) argues that World War II drove scientists to look away from their isolated projects in order to deal with real and complex world problems in different fields. They found that these problems could not be solved from only one perspective; researchers needed collaborators from diverse disciplines. In other words, addressing real world problems is an inherently interdisciplinary activity that necessitates the involvement of many sciences.

The previous argument invokes Norbert Wiener's foundational idea, proposed in the 1950's and elaborated in his book, *Cybernetics (Control and Communication)* (Jackson, 2000; Checkland, 1981; Lilienfeld, 1978). Cybernetics is Wiener's term for a science that concerns control and communication. According to Jackson (2000), the cybernetic is not a discipline in itself; rather, it involves the collaboration of different disciplines in order to solve problems. In the view of Checkland (1981), the cybernetic is a theory of messages that relies on the transformation of information into a control. Depending on the type of feedback information, the purpose of a control is modified in order to achieve a desired performance.

2.6 Systems thinking and relevant social theory

It might be argued that the social sciences and the systems movement are interrelated precisely because social theories lead to better understandings of systems methodology. Jackson (1991, 2000) claims that the social sciences are strong on knowledge production and theory, but weak with regard to practice. Jackson himself has examined the theoretical considerations of social theories relevant to systems methodologies, and employed social theories in the practical adoption of systems approaches.

In order to understand the implications of systems methodologies for complex situations, it is helpful to consider the development of social ideas over several decades. These ideas include social theories, sociological paradigms, and organisational metaphors. At this point in our review of systems concepts, it is important to note that social theories support systems thinking by establishing principles for intervention in the real world in pursuit of knowledge about reality. Jackson (1991) has argued that our assumptions about reality ought to be created by relying on theoretical assumptions about social systems.

2.6.1 Social theory

Since emerging as a discipline, sociology has undergone several developments in its response to the interrelations of humankind and the social world, and society and individuals. Thus, increasing an interest in relevant issues like social theory raise the possibility of a more complete understanding of the social world. In the process of analysing social phenomena, sociologists seek to make sense of what they are doing, and different sociologists reflect the different ways of perceiving the environment where a phenomenon exists (Craib 1992). Jackson (2000) has explored two sociological works that have proved formational for social theory: Ian Craib's book *Modern Social Theory: from Parson to Habermas* (1992), and Michael Haralambos and Martin Holborn's book *Sociology, themes and perspectives* (1980). According to Jackson, Craib claims that social theory can be divided into three paradigms: the "action" paradigm, the "structure" paradigm, and the "structure and action" paradigm.

With respect to social theory, Craib admits that sociology is confusing because one theory cannot embrace the whole discipline. Thus, he offers four social theoretical dimensions related to the establishment of knowledge about the social world: cognitive, affective, reflective, and normative. Craib developed this view of social theory by drawing on Roy Bhaskar's ontological and epistemological reflections on the knowledge gained about the

world. According to Craib, Bhaskar employs a realistic view of the social world by demonstrating that the ontological and epistemological questions concerning knowledge about the world are interrelated, and thus the object of study determines knowledge. He also addresses the question of whether societies create individuals (agents), or the other way around, and that argues societies and individuals have markedly different properties. Bhaskar's work is generally understood as realism.

On the other hand, Haralambos and Holborn identify social theory as a "*set of ideas that claims to explain how the society or aspect of society work*" (Haralambos, Holborn et al. 2004). In this view, organizations are considered as the part of the social world that interrelates individuals and society. Haralambos and Holborn were concerned with three main social theories, Functionalism, Marxism, and interactionism, each of which possesses its own fundamental assumptions, explanations, values, and critiques. These authors also explore human behaviour regarding data collection and the methods employed for the collection of that data. Such an analysis moves beyond the external factors that influence society and considers the state of individuals. Haralambos and Holborn examine three different approaches for sociological research: positivism, social action perspectives, and phenomenology. Of particular importance for us is the phenomenological approach, which is concerned with the subjective state of individuals, and applies their perceptions in order to analyze actions.

The works of Craib and Haralambos and Holborn are both relevant to how we understand society, or as Jackson writes, "the most appropriate way of classifying different social theories depends on the perspective and the purpose of the reviewer" (2001, 21). The distinction mentioned above between ontological and epistemological knowledge can be applied to the sociological context. Systems thinkers need to employ social theories in order

to determine which theories that are adequately related to systems approaches. Jackson argues that we need to pay attention to which social theories can be applied in practice, as not all of them would make a difference for systems thinking.

Sawyer (2009) explores the evolution of social theories throughout different stages, and how these theories benefited from early social theorists and their ideas about the social reality. He illustrated that social theories can be categorized into three influential waves. Each one is represented by one or more theorists. The first wave includes Talcott Parsons and his concept of structural functionalism, which itself is drawn from Norbert Wiener's cybernetic model. The second wave consists of general systems and chaos theory. This wave, according to Sawyer, understands social systems as dynamic, changeable, nonlinear and open. The focus here is more on process orientation than static processes, and both the first and second waves are interdisciplinary in nature. It was the work of Bertalanffy in 1968 that initiated the second wave. Sawyer states, "second-wave advocates attempted to develop universal principles and laws of systems that would apply to systems at any level of analysis" (2009, 14). Sawyer is chiefly concerned with third wave systems thinking, which is committed to the explanation of complex social phenomena, emergence and complexity in sociological theory. Much consideration is given to the capturing of dynamic and interactive social processes between the system and its environment. Thus, Sawyer suggests that complex dynamical systems called "complex adaptive systems" work on improving the response to feedback from the environment.

2.6.2 Sociological Paradigms

In order to understand the social world, one needs a framework that places one's analysis of an organization within the social context. In his work, Burrell (1999) summarizes the notion of paradigms as ways of seeing the world and how it should be studied. The establishment of

a paradigm can be achieved through a common, conceptual language. Researchers can allocate themselves to one paradigm and then proceed to intervene in the real social world accordingly.

In 1979, Burrell and Morgan proposed four sociological paradigms that allow social scientists to understand the social world. According to Jackson (2000), systems thinkers find this framework of the four sociological paradigms useful in their research. Jackson has argued that systems thinkers are more interested methodology and conceptual modelling than in building theories for society. However, application of the four paradigms would provide insight into the social world by utilizing a set of assumptions about the nature of social science and society. Assumptions related to the nature of social science are organised into subjective or objective categories. By contrast, assumptions about the nature of society are divided into two types: regulation and radical change. By combining these two dimensions, one obtains a grid of four sociological paradigms: functionalist, interpretive, radical humanist and radical structuralist.

2.6.3 Functionalist Paradigm

The system here is one of structured components where the internal regulations govern the whole system. The existence of the system is independent and real, and the systems can be modelled by a rigid and concrete scientific method (Morgan 1980). The functionalist paradigm aims to understand the current situation in order to facilitate the prediction and control of systems (Jackson 2000).

2.6.4 Interpretive Paradigm

In contrast to the functionalist paradigm, the interpretive paradigm assumes that the social world is unpredictable and resistant to the rules of objective assumptions (Morgan 1980). It is

exists subjectively in relation to human beings. In order to better predict and control interpretive systems, researchers must be aware of the status quo.

2.6.5 Radical Structuralist Paradigm

The paradigm is concerned with reality, members of the society, and the potential dominating force of that society. Nevertheless, this model can conceive of radical change in society, including contradictory groups in a system (Jackson 2000). Morgan (1980) illustrated that these contradictions can lead to radical change in the system (1980). Consequently, people can emancipate themselves from existing social structures.

2.6.6 Radical Humanist Paradigm

This paradigm is based on the view that reality is socially created and sustained. Moreover, the intentions of human beings play a large role in the construction of systems (Jackson 2000). As a result of their involvement in the system's activities, human beings tend to understand the current situation and this enables the emancipation of individuals from the existing structure or bounds of the reality. Morgan has emphasized the ability of thought and action on the part of radical humans to transcend the bounds of social reality.

Although the framework of Burrell and Morgan has inspired a large number of scholars in the research community and gained a significant influence in organisational analysis, it has also been criticized. In organizational science literature, for instance, Deetz (1996) focuses on the genuine potential feasibility of using the four paradigms in research programs by concentrating on subjective-objective dualism as a dimension of contrast in social science. Jackson (2000) offers a view that reflects the influence of Burrell and Morgan's framework on systems thinking, but claims that the framework is not clear in distinguishing the 'structuralist' orientation from positivist epistemologies with respect to the functionalist

systems approach. Thus, there are significant epistemological differences in how patterns and regularities are discovered in the social world.

2.6.7 Organization Metaphors

The recent trends in organization theory are illustrated by the field's increasing interest in identifying metaphors of organisation. This interest takes various forms within social theory (Cornelissen et al., 2005). Organization theory attempts to identify adequate theories for organizations that build a specific image. Jackson (2000) has argued that metaphors of organization develop in order to offer more precise measurements for understanding the world, especially in the presence of organizational paradigms that scientists traditionally consider incommensurable. The metaphors also challenge scientists' misunderstanding that scientist must be aware of each other's paradigms. Moreover, metaphors enhance insights and develop critical thinking (Jackson, 2000). Morgan (1983) demonstrates that metaphors aid scientists in understanding commonalities so that they can better account for phenomena. Critically, metaphors move us beyond the limitations of the early organization theories that have influenced management science since the proposals of Henri Fayol, Fredrick Taylor and Max Weber. Gibson Burrell commended Morgan's idea of bringing the term "paradigm" into organizational theory, arguing that Morgan's metaphors bestow upon organization theory the necessary plurality within orthodox organizational theory (Burrell 1999).

Tsoukas (1991) has noted another controversial issue associated with the role of metaphors in organizational science by arguing that the developments of the theory essentially fall into two categories. Metaphors either broaden the way of thinking and help conceive of the complexity of social phenomena, or metaphors, as a result of their imprecise language, negatively impact theoretical development. In his article, Tsoukas attempts to clarify the difference between literal and metaphorical language and to detail the impact on organization science. He considers these two categories as rivals, but notes that they can work together by

supporting each other. Tsoukas identifies three types of metaphors: live metaphor, dead metaphor, and dormant metaphor. In his view, metaphorical language offers an alternative perception that connects subjective description to social phenomena. By appeal to Beer's methodology, Tsoukas also suggests a transformational model from metaphorical to literal language.

Although metaphor is described as an accumulative knowledge of what we see and what we think that can aid us in better understanding the world (Morgan, 2006), debate still rages between two theoretical perspectives. One view perceives metaphor as playing a vital role that cannot be ignored by theorists, while the contrasting view sees metaphor as much less important a concern. Cornelissen et al. (2005) elaborate on the debate between those objectivists who claim the world is structured and that our perceptions ought to be related to this same structure of the world in order to be deemed correct, and thus for whom metaphors should be translated into real concepts and propositions, and those who hold the contrasting view, which is that metaphors can possess new meaning and can lead to new structures of understanding that contain hitherto unrelated concepts and perceptions. Morgan (2006) accords with this later view when he writes that "*all theories of organization and management are based on implicit images or metaphors that lead to see, understand and manage organizations in distinctive yet partial way*" (2006, 4).

While Jackson (2000) claims that metaphors can aid in the development of systems thinking, Pepper (1942) ignores the contributions of organizational metaphor and instead abbreviates the root metaphor into six hypotheses regarding the explanation of world experience: mysticism, dogmatism, formism, mechanism, contextualism, and organicism.

Morgan suggests eight metaphors (images) that can be applied to different organizations (Morgan, 2006). Each metaphor offers different perceptions, and Morgan claims that using two metaphors

simultaneously gives the researcher a fuller sense of the phenomenon under investigation. Potential metaphors include organization as a machine, organization as an organism, organization as culture, organization as a brain, and organization as political systems.

2.6.8 Organization as Machines

If an organization runs as a machine, then it utilizes repetitive processes. The industrial revolution imbued the structure of organizations with mechanistic thinking, and as a result, made the processes incompatible with human thought and action (Morgan, 2006). Weber noticed that bureaucracies and mechanism are similarly employed in organizations. Jackson (2000) and others pay attention to the organization theories applied in management science that treat organizations like machines (Oswick, Keenoy et al. 2002). Henry Fayol created administrative management theory, Frederick Taylor founded scientific management, and Max Weber establishes the theory of bureaucracy. The common ground of these theories is that rigid rules of the organization run all the way through to the very principles of management (Jackson 2000; Morgan 2006).

2.6.9 Organization as Organism

We mentioned above that cellular theory inspired systems researchers to think differently about organization. In this metaphor, organizations are treated like living systems with parts, relationships amongst these parts in a hierarchical manner, environments where the organizations exist, and boundaries that comprise the organizations. The view here is holistic and aimed at conceiving of several aspects of the organization at once. In contrast to mechanism, organization as organism holds systems to be complex and considers parts and their interrelated relationships in a holistic manner. Jackson (2000) and Morgan (1983, 2006) argue that the organization as organism is uniquely capable of dealing with various environments.

2.6.10 Organization as Culture

The culture metaphor is a modern approach that has been widely adopted. Within the culture image, organizations are considerably affected by human beings, and meanings and perceptions of the social domain are seen as essential in shaping behaviour. It emphasizes that the survival of an organization can be understood in relation to its environment. This form of organizations reflects national culture and takes into account values, rituals and rules (Price 1999). Morgan (2006) elaborates by arguing that cultures are shaped by their mirroring of patterns of knowledge, ideology, values, laws and day-to-day rituals. The link between organizations and culture offers theorists and scholars alike a method for looking at organizations in society, especially if we agree that the patterns of culture vary from one society to the next in the way that reality is socially constructed. According to Jackson (2000), organizations construct their reality in response to continuous negotiations between the various perceptions that shape organizational processes.

2.6.11 Organization as Brain

The brain metaphor focuses on the active learning processes that aim to achieve organizational goals. Communication and information play a vital role in brain organization (Jackson 2000). Originally founded by Herbert Simon (1947), this model has been developed in important ways by J.R. Galbraith (1977) and Gareth Morgan (2006). Galbraith, for instance, understands organizations as information processing systems. Organizations move conditionally with respect to the level of the information of the task at hand. Drawing on the interdisciplinary cybernetic approach, Morgan notes that organizations actually develop learning processes in a brain-like manner.

2.6.12 Organization as Political Systems

The political metaphor views organizations as political systems where various interests are reconciled (Jackson 2000). The realities of power between groups in an organisational context can create conflict. This conflict is often apparent between organisational departments, individuals, and groups as a result of the diversity of specific interests. Political systems provide a means for individuals in a society to reconcile their interests through negotiations in an organised social order. Therefore, the political system perspective is considered a valuable addition to organizational analysis particularly in cases where the characteristics of the organization impose a specific mode of political rule. Morgan (2006) offers several common examples of these modes—autocracy, bureaucracy, technocracy, codetermination, representative democracy, and direct democracy—though notes that most organizations use mixed types of political rule. Jackson (2000) pays special attention to three frames of reference that describe the relationship between individuals and organizations in political systems. The first, the “unitary” view, characterizes the organization as a well-integrated team pursuing common goals and objectives. The second, the “pluralist” view, stands opposite the first and emphasizes the diversity of individuals and group interests, thus viewing the organization as a loose coalition. Finally, in the “radical” perspective, organizations obey strict regulations designed by certain groups to benefit themselves at expense of others (Jackson 2000). The political metaphor brings into focus how different people act in different ways, and in analysis of such a situation, is thus likely to focus on interests, conflict and power (Morgan 2006).

2.7 Organization Theory

Organization theory (OT) has been influenced by various schools of thought. According to Strati (2000), organizations are established to pursue specific goals in a society. As a result of

its social context, OT was initially dominated by the classical approach, which was widely popular at the beginning of the last century (Strati 2000; Haralambos, Holborn et al. 2004). The classical school understands an organization as mechanistic in its performance of functions, a view heavily indebted to Taylor's scientific management theory, Fayol's administrative management theory, and Max Weber's theory of bureaucracy (Jackson 1991; Jackson 2000). The assumptions that govern organizations in the classical mode are as follows: organizations operate as machines, they have hierarchical organizing structures, and they follow orders. In addition to this traditional approach, Jackson (2000) also draws attention to human relation theory as an alternative approach in management, and argues that human relation theory illuminates the human needs in organizations by studying behavioural issues like individuals, motivation, and leadership. The final model Jackson mentions is the distinctively holistic systems thinking approach that eventually came to dominate management and organization.

Stratus (2000) provides further details concerning the development of organizations in their social contexts, and illustrates just how OT relies on different schools of organizational thought. Thus Strati identifies eleven of these traditional schools of thought (Table2.1).

School of thought	Organization's view (Characteristics)	Founders and Deployment (proponents)
The scientific school	<ul style="list-style-type: none"> - Manager is the central concern of the organization - Does not believe in the division of labour - Shop-floor workers - Physical science language 	<ul style="list-style-type: none"> - Fred W Taylor (Taylorism), the beginning of 20th century. - Henry L Gantt 1861-1919. Gantt chart 1910. - Frank B Gilbrecht 1868- 1924 (1911)
The administrative school	<ul style="list-style-type: none"> - An organization is a set of bodies that perform the enterprise's various functions - The efficiency of management depends on the achievement of tasks according to specific principles - Biological science and mathematical language 	<ul style="list-style-type: none"> - Henri Fayol 1841-1925 (Fayolism) - V. A. Graicunas 1841-1925 (span of control 1937) - Lither Gulick 1892-1993 (1937) - Alfred P Sloan 1875-1966 (1963)
The bureaucratic school	<ul style="list-style-type: none"> - Organizations are founded on rational-legal power - Bureaucracy is an organizational form of governmental enterprise - Public sector 	<ul style="list-style-type: none"> - Max Weber 1864-1920 (The Weberian) - Robert K Merton 1910-2003 (1949) - Philip Selznick 1919-2010 (1961)
The structural-functionalist school	<ul style="list-style-type: none"> - The organization is a system of roles that are connected by norms and shared values - Focuses on internal integration to attain its goals 	<ul style="list-style-type: none"> - Robert K Merton 1949 - Philip Selznick 1949 - Amitai Etzioni 1961

The group dynamic school	<ul style="list-style-type: none"> - The organisational behaviour is influenced by psychological relations between people and their environment. - Studies the dynamic of individuals and groups by laboratory and experiments - Uses action research - Mathematical language 	<ul style="list-style-type: none"> - Kurt Lewin 1948 - Wifred Bion 1961
The human relation school	<ul style="list-style-type: none"> - The organization is a system of stable social relations between individuals and groups. - Focuses on the harmony of workgroup 	<ul style="list-style-type: none"> - Elton Mayo (1933,1945) - Fritz J Roethlisberer and William J Dickson (1939) - Charles R Walker and Robert H Guest (1952)
The decision school	<ul style="list-style-type: none"> - An organization should be analysed in terms of decision premises and processes within certain limits - Modifies the organizational outcomes by acting upon these premises and processes 	<ul style="list-style-type: none"> - James G March and Herbert A Simon (1958)
The technological school	<ul style="list-style-type: none"> - The technology is seen as independent variable determining organisational structure and dynamic. 	<ul style="list-style-type: none"> - Charles R Walker and Robert H Guest (1952) - Alain Touraine (1955)
The historical school	<ul style="list-style-type: none"> - The organization is centred on the relation to the environment, corporate strategy and organizational structure 	<ul style="list-style-type: none"> - Alfred Chandler (1962)
The industrial relation school	<ul style="list-style-type: none"> - The organization is a pluralistic system whose norms are determined by the relations among actors, technology, market and shared ideology. 	<ul style="list-style-type: none"> - John T Dunlop (1958)
The socio-technical school	<ul style="list-style-type: none"> - The organization is considered an open system composed of technological and social elements 	<ul style="list-style-type: none"> - Eric L Trist and Ken W Bamforth (1951) - Albert K Rice (1963) - Philip G Herbst (1974)

Table 2-1 Strati (2000) schools of thought

2.8 Systems thinking in management

The central argument of systems thinking is that most systems ideas are rooted and developed in various disciplines, and this argument is a direct response to the limitations and failure of the traditional approach to cope with complex systems (e.g. mathematical model) (Jackson 1991; Jackson 2000; Mingers 2006). GST, for instance, was developed so as to be applied to any field (Checkland 1997), and systems become a language that can be transferred across discourses.

While studying management science from a systems thinking, Jackson (2000) points out that management science is based primarily on a scientific approach in which tools and techniques are utilized for the management of organizations. Such a notion assumes that

organizations function as machines, and human behaviour (i.e. values and emotions) is thus excluded in organisational analysis (Jackson 2000; Reed 2006). Though classical management wielded significant influence for a long period of time, it fails to address social integration and maintain social order in an increasingly unstable and uncertain world (Reed 2006). Jackson criticizes the classical approach for its relative weaknesses and its concentration on task and structure, and human relation theory for its focus on managing people. Both represent only part of organization management, and thus have limited impact on an entire system's survival. By contrast, the systems thinking approach, Jackson argues, takes into account the organization as whole. Such a view leads us to understand organizations as open systems that integrate with their environments.

Checkland (1993) contributed significantly to management science from the perspective of systems thinking when he examined patterns of management in the natural sciences and their limitations in addressing "real-world problems." Checkland effectively redefined management in order to make sense of it with respect to real-world social systems problems by differentiating management as a science that follows scientific law from management as the practice of real processes. This distinction broadened the gap between management scientists and practising managers. One of Checkland's fundamental premises is that each problem ought to be perceived as unique. Such a stance challenges the basic idea of generalization in the scientific method. Checkland has positioned himself as a systems thinker in the systems movement and has spent several decades producing remarkable work in the area of soft systems thinking. He emphasizes that the reductionist position is limited in its ability to respond to real-world situations, even as the application of scientific methods attempts to cope with this extreme complexity. Checkland's second premise concerns exactly this complexity: only holistic thinking can achieve substantive progress in the face of problems of irreducible complexity. In addition, Checkland has introduced the concept of soft

systems methodology, a way of dealing with social phenomena from a systems thinking as opposed to reductionist approach. He employs the terms “hard” and “soft” systems to distinguish between two types of systems approaches. “Hard” represents the traditional systems approach related to systems engineering methodology and well-structured problems. “Soft” systems approaches are, by contrast, related to the new systems thinking movement and are utilized in the face of ill-structured problems that often involve human systems activities (Checkland 1981b; Reynolds and Holwell 2010). Checkland’s work is a cornerstone of management problem-solving strategy. Soft systems methodology leaves room to employ different activities that match the situation under investigation on the one hand, and assist in making decisions on the other.

The development of systems thinking resulted in the emergence of various systems methodologies. Systems thinkers have traced the ideas of applied systems thinking by appeal to three phases of systems methodologies: hard, soft, and critical (Jackson 1991; Jackson 2000; Midgley 2000; Reynolds and Holwell 2010). According to Reynolds and Holwell (2010), the classification of “hard” and “soft” has been suggested by Peter Checkland to distinguish between hard systems assumptions that rest on real-world entities, and soft systems that are epistemological constructs. Subsequently, a number of scholars including Werner Ulirch and Michael Jackson and his colleagues at Hull University proposed a third phase, namely, “critical systems thinking” to correct inadequate assumptions in both hard and soft thinking (e.g. the relation of power). Table 2.2 summarises the three phases and their respective methodologies.

Systems type	Selected systems approaches
Hard systems	<ul style="list-style-type: none"> - General systems theory (Bertalanfy 1956) - Classical (first order) cybernetics, “mechanistic” cybernetics (Ashby 1956) - Operations research (Churchman et al. 1957) - Systems engineering (Hall 1926) - Socio-technical systems (Trist et al. 1957) - RAND-systems analysis (Optner 1965) - Systems dynamic (Forrester 1971; Meadows et al. 1972)
Soft Systems	<ul style="list-style-type: none"> - Inquiring systems design (Churchman 1971) - Second order cybernetics (Bateson 1972) - Soft systems methodology (Checkland 1972) - Strategic assumption surface testing (Mason and Mitroff 1981) - Interactive Management (Ackoff 1981) - Cognitive mapping for strategic options development and analysis (Eden 1988)
Critical systems	<ul style="list-style-type: none"> - Critical systems heuristics (Ulrich 1983) - Systems of systems methodologies (Jackson 1990) - Liberating systems theory (Flood 1990) - Interactive systemology (Fuenmayor 1991) - Total systems intervention (Flood and Jackson 1991a) - Systemic intervention (Midgley 2000)

Table 2-2 The development of systems thinking

The systems movement continues to improve systems thinking patterns within management science in order to pursue problematic contexts. For instance, working from Checkland’s guidelines, Jackson (2000) mapped three central concerns for systems thinkers, namely, systems thinking in the disciplines, study of systems in their own right, and systems thinking for problem-solving, and then concentrated on systems thinking for problem-solving as expressed in real-world situations. At the level of systems theory, by drawing on social theory in its broadest sense, Jackson (2000) also classified systems approaches into four categories of research and intervention, while in applied systems thinking he managed to identify the eight strands that most accurately represent the diversity of the systems movement.

In contrast to the classification by Reynolds and Holwell mentioned above, Jackson (2000) performed his own classification of four systems methodological groups based on four generic systems approaches: functionalist, interpretive, emancipatory and postmodern. Each group is characterized by its own models, methods, and techniques for research and intervention. The functionalist systems approach refers to the traditional approach dominant in the natural sciences. Reality, according to this approach, is independent of human beings.

In terms of organization images, the functionalist approach is rooted in mechanism, organism and formism (Morgan 2006). Within the functionalist systems approach, Jackson studied several strands: organization-as-systems, hard systems thinking, systems dynamics, organizational cybernetics, living systems theory, autopoiesis and complexity theory. Jackson's second group is the interpretive approach, or soft systems thinking. As the alternative to functionalism, interpretive approaches include those early systems ideas that reacted against goal-oriented and hard systems thinking (Checkland, 1981). Soft systems thinking literature assumes that human beings and their perceptions, beliefs, and values represent the core concerns of research (Jackson, 2000). Churchman, Ackoff, Checkland and others dominated systems thinking in the 1970's and early 1980's, offering systems methodologies based on the interpretive assumptions of social systems design, social systems science, and soft systems methodology. According to Jackson, the root metaphors underpinning soft systems thinking are culture and politics. The third systems approach classified by Jackson (2000) is the emancipatory approach and it is primarily concerned with human values about emancipation in society based on the view that some groups benefit from the current social structure while others suffer under it. In essence, this approach focuses on discrimination and inequality, and thus emancipatory systems seek radical societal reforms. Forms of the emancipatory approach include emancipation as liberation, emancipation through discursive rationality, and emancipation through the oblique use of systems methods. Finally, the fourth systems approach identified by Jackson is the postmodern approach. Postmodern thinking is opposite that of the modernist approach exemplified by Burrell and Morgan's four paradigms. Jackson (2000) states that postmodern thinking "seeks to reclaim conflict and to ensure that marginalized voices are recognized and heard" (p. 333). Jackson's full classification is represented in Table 2.3. We need also note that Jackson (1991, 2000)

introduces critical systems thinking as the very edge of the systems movement leading to the transdisciplinary development of applied system thinking.

Systems Approach (theoretical orientation)	Systems Methodology	Theory
Functionalist (Objectivist)	Organization-as-Systems	- Barnard's systems thinking - Contingency theory - Social-technical systems theory
	Hard Systems Thinking	- Operational research - Systems analysis - Systems engineering
	System Dynamic	
	Organizational Cybernetics	- Beer's Viable Systems Model
	Living Systems Theory	
	Autopoiesis Complexity Theory	
Interpretive (Subjectivist)	Interactive Management	
	Churchman's Social Systems	
	Mason and Mitroff's Strategic Assumption Surfacing and Testing (SAST)	
	Ackoff's Social Systems Sciences (S3)	
	Checkland's Soft Systems Methodology	
	Senge's Soft System Thinking	
	Soft Operational Research Soft Systems Dynamic Soft Cybernetics	
Emancipatory	Emancipation as Liberation	- Critical operational research/Management Science (OR/MS) - Habermas and the Critical Systems Approach - Interpretive Systemology - Freire's Critical Pedagogy - MacIntyre and the Moral Community - Capra's Ecological Sustainability
	Emancipation through Discursive Rationality	- Beer's Team Syntegrity - Ulrich's Critical Systems Heuristics - The Theory and Practice of Boundary Critique
	Emancipation through Oblique Use of Systems Methods	
	A Generic Emancipatory Systems Methodology	
	Critique of the Emancipatory Systems Approach	
Postmodern	Intervention in the Spirit of Postmodernism – Taketand White (PANDA)	
	Postmodern Systems Method	

Table 2-3 Systems approaches

2.9 System of Systems Methodologies

Researchers studying the development of applied systems thinking remark that hard systems thinking began during the Second World War when thinkers worked on developing hard systems methodologies like Operation Research (OR), Systems Analysis (SA) and Systems Engineering (SE) in response to mathematically modelled problem contexts. Although the hard approach demonstrated its ability to tackle well-defined problems (Checkland 1981b), its limitations became apparent in the face of more complex and diverse problems involving

human beings (Jackson 2000). New systems approaches emerged to deal with this complexity. A number of soft systems theorists including Churchman, Ackoff and Checkland focused on conflicting worldviews and utilized systems ideas to address the breadth and diversity of these worldviews. Churchman Social Systems Design (SSD), Ackoff's Social Systems Science (S3), and Checkland's Soft Systems Methodology (SSM) and others presented new perspectives and new arenas in which systems ideas might be employed. As a result of these breakthroughs, systems thinking could now be used in real-world problem management (Jackson 1991).

This wave of systems thinking dominated until a new strand of thinking introduced the Ideal-type grid, an innovation of the Systems of Systems Methodologies (SOSM). When Jackson (2000) investigated the strengths and weaknesses of different systems approaches, he understood them as individual approaches that might be more or less suitable for specific problem contexts. Moreover, Jackson and Key (1984) realized that the problem solver must decide what are the most appropriate methodology and methods for a particular problem context. In response, they developed a research program for problem solving methodologies based on a classification of problem contexts and system complexities. It is an alternative framework that fits well with the language of systems thinking (Jackson 2000). The classification of systems aims to produce a grid of problem contexts based on two dimensions: the nature of the decision makers (participants) and the nature of the system(s) (Jackson and Keys 1984). Thus the problem context can be identified according to whether it is simple or complex, and whether the problem is unitary, pluralist or coercive. This yields a six-box framework of problem contexts: simple-unitary, complex-unitary, simple-pluralist, complex-pluralist, simple-coercive, and complex-coercive, as shown in Figure 2.1. The next step of SOSM is to determine what systems methodology is best suited to each problem context. Flood and Jackson (1991), in a later work on developing a creative problem solving approach,

have classified the characteristics of each system type so as to facilitate the use of particular system methodologies in response to particular problem context.

		Participants		
		UNITARY	PLURALISM	COERCIVE
SYSTEMS	SIMPLE	Simple Unitary	Simple Pluralism	Simple Coercive
	COMPLEX	Complex Unitary	Complex Pluralism	Complex Coercive

Figure 2-1 Jackson’s grid of problem context. Jackson (2000)

With SOSM, Jackson and Key explored the nature of solving-problem methodologies in order to employ the most appropriate one in the face of a particular problem situation. In addition, SOSM can be understood as a learning process between the participants in the problem situation. It also offers a variety of systems methodologies that might be used in a complementary manner, particularly for those working in the management field that find it difficult to elect a method of intervention. And moreover, SOSM initiated a new wave of the systems movement that takes into account the application of social theory in the realm of management science. This development becomes explicit in the application of critical systems thinking.

2.10 Critical Systems Thinking

The most advanced development of systems thinking to date is the critical systems thinking (CST) that emerged in the last few decades. It is a classification that brought together the three strands of systems thinking in dealing with problem situations: hard, soft, and critical (Reynolds and Holwell 2010).

Mingers (1992) traced previous research attempts that he believes give indications of how to shape critical systems thinking (CST) ideas and about the rise of critical management science. He revealed that such attempts can be seen in the work of Mingers (1980), Jackson (1984), and Flood (1990). All three emphasise the need for the critical approach based on social theory in applied systems thinking. Although they separately surfaced various ideas of critical theory and its influence on systems thinking, it can be argued that they established the foundations of CST. The philosophical underpinning of most of CST traditionally rests on Jurgen Habermas's work (Habermasian view); however, the philosophy of Michel Foucault is taken as a possible alternative for CST (Brocklesby and Cummings 1996). Meanwhile, Mingers (1992) claimed that Flood, in his work 'Liberating Systems Theory,' tries to link the ideas of Habermas and Foucault to examine the development of CST.

Since its first emergence in Jackson and Flood's work (1991), entitled 'Total Systems Intervention,' CST has rapidly gained credibility amongst systems thinkers as a way to approach different methodologies in a coherent, pluralistic manner, benefitting from the strengths and weaknesses of various methodologies (Flood and Jackson 1991; Flood 1995; Jackson 2000; Jackson 2006). CST is distinguishable by its three fundamental commitments: critical awareness, emancipation, and methodological pluralism (Jackson 2010). It initially had five commitments, but these were consolidated into three. Jackson has clarified that all three commitments (Jackson 1991; Midgley 1996) comprise the definition of CST. Critical systems thinking, he claims, draws on social theory for maintaining holistic systemic thinking (creative holism). Therefore, one can argue that these commitments provide the theoretical foundations for the pluralism of CST (Dongping 2010).

Jackson has specified three forms of critical awareness. The first form is associated with the use of methodologies and their weaknesses and strengths. The second form is related to the

organisation's social awareness that impacts the way the systems approach is determined. The third form is constrained by the culture that prevents the acceptance of critical systems thinking in the systems community. Midgley (1996) believed the first two forms of critical awareness support the commitment to pluralistic methodologies, whereas the third form supports the commitment to emancipation. The second commitment of CST is human emancipation, which rests on Habermas's theory of knowledge constitutive interests. According to Jackson (1991), the second commitment seeks to improve individuals by pushing them to the maximum of their potential. He links what human beings want to achieve in their technical, practical, and emancipatory interests with the ability of CST to support each one of those interests. Since CST emerged, a debate has risen over other systems thinkers' visions and their criticisms of CST. For example, Gerald Midgley offers the approach of systemic intervention (2000, 2003), and John Mingers explores critical pluralism (1997, 2003, 2006). Both can be taken as alternatives within management systems.

2.10.1 Pluralism in Critical Systems Thinking

The third commitment of CST and the most debated amongst systems thinkers is 'pluralism.' Pluralism will be explored in this section for two purposes: to move toward a coherent pluralist approach in systems thinking (Jackson 2000) and to address the current research's need to develop a pluralist approach. Pluralism has been widely debated, and has gained popularity in the management and systems body of literature over the last two decades (Flood and Jackson 1991; Jackson 1991; Midgley 1992; Flood 1996; Gregory 1996; Midgley 1996; Brocklesby 1997; Jackson 1999; Jackson 2000). Ever since it was dubbed pluralism in the early 1990s by Jackson and Flood (Midgley 1996), the language of pluralism has received increasing attention from the systems community. Jackson's definition of pluralism is 'the

use of different methodologies, methods, models, and techniques in combination' (Jackson 2000, p. 377).

It is important to note that Jackson dedicated systems thinking to management problem solving. In this manner, Jackson and Key proposed the grid of system of systems methodologies (SOSM) as an applied systems thinking, and Jackson extended another version of that grid in 2003. SOSM aims to identify the problem context and then to suggest the appropriate methodology, so it can be taken as an alternative to sociological paradigms (Burrell and Morgan 1980) in organisational analysis. Flood and Jackson (1991) and Jackson (2000) explained that SOSM is an important element in critical systems thinking, because it can facilitate pluralism by locating a meta-methodologies approach toward organisational problems.

In the beginning, pluralism was named 'complementarism' to distinguish it from alternative approaches, which were isolationism, imperialism, and pragmatism. The word complementarism appears in the earlier work of Jackson and Flood (1991) and in other work by the systems community when they used the word 'complementarism' to demonstrate the development of management science before it was replaced by the word 'pluralism.' This term is also employed by Jackson and Flood (1991) in TSI as a complementary approach that concerns various systems methodologies. Zhu (2006), who explored this issue further, noticed that the word 'complementarism' deliberately disappeared in 2000, when the word 'pluralism' was used instead. He thus generated a considerable debate relating the two words. Finally, some scholars (e.g., John Mingers and Anthony Gill 1997; John Mingers and John Brocklesby 1997) adopted the term multi-methodology to refer to the inevitable use of a number of methodologies and methods that stem from different paradigms in a mixing manner.

The emergence of critical systems thinking encouraged the pluralism that led to the use of various methodologies, methods, and techniques for addressing complex problems (Jackson 1999; Jackson 2006). At the theoretical level, Jackson (1991, 2000) has identified two contributions that pluralism has made to CST. The first contribution is its distinction from the other development strategies we mentioned earlier in this section (isolationism, imperialism, and pragmatism), in which it offers opportunities for future development. The second contribution, as cited from the work of Mingers and Brocklesby (1997), is that it offers a table of possible ways to mix the methodologies for intervention under the umbrella of pluralism. The table provides a variety of methodologies that can be used in part or as a whole according to the problem situation. Finally, Jackson turns to TSI as pluralism in CST, and explores the similarities and differences between TSI and the multi-methodologies suggested by Mingers and Brocklesby (1997). Jackson's view is that TSI seeks pluralism in the sense that it can be associated with meta-methodology through various methodologies based upon different paradigms in the intervention of a complex situation. In contrast, Jackson admits that TSI fails to adhere to Habermas's theory of human interests, which weakens the attention that it can pay to agents during the process of intervention. Moreover, Jackson agreed with Mingers and Brocklesby that TSI employs the whole methodology. Jackson referred it to the way TSI was set out, which makes it seem impossible to detach methods and techniques from the methodologies in which they are adequately combined. It is noted that Jackson, in later work, has encouraged the development of mixing methodologies in CST to address the increasing complexity and diversity of problem contexts. This work can be readily seen in an approach he suggested, called 'creative holism' (Jackson 2003; Jackson 2006; Jackson 2010).

2.10.2 Total Systems Intervention

The framework of SOSM has been developed in an approach that encourages managers, who are the ‘problem solvers,’ to plan, design, and evaluate in a practical manner. The work of Michael Jackson and Robert Flood on organisations and their problems since the early 1990s has resulted in the methodology of Total Systems Intervention (TSI). TSI is comprehensively explained across various published works (Flood and Jackson 1991; Jackson 1991; Flood 1995a; Flood 1995b; Jackson 2000; Jackson 2003). According to Jackson and Flood, the theoretical underpinning of TSI derives from Morgan’s work on metaphors, which Morgan developed in a systems direction; it also derives from SOSM. Within the practical sense, TSI is used to encourage creative thinking that provides a problem solving system the principles and processes of systems thinking. In addition to metaphors and creative thinking, TSI was developed into a critical review process and a critical reflection by Flood, which is related to the type of the model and methodologies conducted in TSI (Flood 1995b; Wilby 1996). Wilby (1996) has contributed to developing TSI in this direction by creating a critical assessment model called Critical Review Mode (CREVM) for the models and methodologies that might be used during the three phases of TSI. CREVM, as Wilby argued, facilitates processes of reflection and critique to generate a comprehensive approach to intervention.

2.10.3 Midgley’s Theoretical Pluralism

Midgley (1992, 1996) provides an insight into pluralism in its broadest sense as an approach that leads to complementarity. In contrast to isolationism, pluralism facilitates various methods that are used as complements to handle the complexity of contemporary problematic situations. For Midgley, complementarity seems to be the vehicle that drives methodologies, methods, and techniques toward pluralism. Nevertheless, complementarity is not achievable until a philosophical foundation is established (Midgley 1996). Midgley’s pluralistic view

aims to seek the validity of using particular methodologies based on appropriate paradigms (positivist, interpretive, and emancipatory) within systems science. It could be argued that Midgley is concerned with establishing an inherent pluralism that can legitimise the use of a particular method based upon our critical understanding of the problem context and the question being asked. Accordingly, the legitimacy, he points out, comes from applying philosophical ideals that support a variety of methodologies within a meta-theory lens. The theoretical perspective and methodology are intimately interrelated, and, at this level, Midgley attempts to distinguish pluralists from theoretical isolationism. The term 'ontological complexity,' given by Midgley, plays a key role in this distinction, because it is essential to differentiating between pluralism and theoretical isolationism. Thus, Midgley's notion of ontological complexity identifies three ontological domains of meta-level complexity: natural world, normative forces, and subjectivity. At the level of conceptual rationality, the focus is placed on the relationships of three statements: truth, rightness, and subjective meaning. In contrast, reality comprises three constitutive elements within ontological discourse that are reflected based upon these three statements: object reality, power, and several subjectivities. Midgley has asserted, 'if "truth", "rightness" and "subjective understanding" are all legitimate ideals to aim for...then methodological pluralism becomes essential if we are to address ontological complexity adequately' (Midgley 1992, pp. 163). Within methodology, these ideals are used in different ways, depending on different research methods. Midgley then moved to provide some examples of how to pursue these ideals in 'hard systems' methods and 'soft systems' methods. From these examples, Midgley continues, it is found that hard systems methods are dominant within the truth ideal, while soft systems methods are dominant within the rightness ideal. Midgley's argument then goes on to prove that no systems methods appear to be the dominant concern within the subjective understanding ideal. In terms of dealing adequately with ontological complexity in system

research, which involves multifaceted views, Midgley proposed taking into account all three ideals of “truth,” “rightness,” and “subjective understanding.”

Finally, it is important to acknowledge that Midgley has constituted his philosophical position through long-term work that he began in the early 1990s, which resulted in a new pluralism approach to CST called ‘systems intervention.’ This approach relies on theoretical pluralism. Furthermore, remarkable work and contributions from Midgley arose from his dedication to theoretical pluralism in systemic action research, (Midgley 2000; Midgley 2011).

2.10.4 An Argument toward Pluralism in Critical Systems Thinking

The intention behind using pluralism is to gain multifaceted views of a given problem while rejecting constrictive paradigms, such as isolationism, pragmatism, and imperialism, on account of their single views (Jackson 2003). A complex problem is widely identified as one that involves humans; therefore, a complex problem is an ill-defined situation that requires more than what the traditional approach considers (Jackson 2000). Systems thinking, which is based on systems ideas, tends to have a holistic view in opposition to traditional management. Therefore, critical systems thinkers aim to encourage flexibility and the use of different methodologies based on different paradigms in the same intervention. This flexibility is beneficial to the pluralists, who are considerably concerned with the need to live with a degree of paradigmatic incommensurability within pluralism. Nevertheless, pluralism has become a contentious aspect amongst systems scholars in applied systems thinking, including both theoretical and practical perspectives.

2.10.5 Paradigm Incommensurability

We briefly draw attention to the nature of paradigm incommensurability, which occupied a considerable amount of the discussion among academics after the emergence of pluralism

(complementarism). It can be noticed that different stances of pluralism have been established toward paradigm incommensurability in systems community, after which point the debate arose over accepting incommensurability in critical systems thinking.

Jackson (1991) quoted the notion of paradigm incommensurability from Khun (1970, p. 150), who stated, ‘two groups of scientists see different things when they look from the same point in the same direction.’ In the systems literature, this quote implies the use of theories in a conciliatory approach within the same intervention. Whilst the proponents of CST find it difficult to employ different systems methodologies through different theoretical assumptions, Jackson argued that Burrell and Morgan’s sociological paradigm was good example of paradigm incommensurability between different paradigms.

Flood (1995c) has adapted the term “diversity” to discuss the possibility of incommensurability related to theoretical and methodological levels. Accordingly, there is a spectrum of diversity in theory. This theoretical diversity can be reduced to one theoretical premise, such as theoretical isolationism, or it can possibly be perceived as a degree of diversity that could constantly live with, such as the complementarism approach. Jackson (2006) put forward a constructed approach of pluralism called “Creative Holism,” which is underpinned by multiple paradigms and multiple methodologies. According to Dongping (2010), creative holism appears to be an effective framework in the practical guidance for managers to face increasing complexity and diversity, but, in contrast, it is a lack of being meta-paradigm compatible with pluralism.

Flood and Jackson (1991) accepted paradigm incommensurability in pluralism, claiming that CST is meta-paradigmatic, which they clarified in their work on TSI. In responding to Midgley’s argument, Jackson (2000) continues to defend the same position by asserting that paradigm incommensurability can be managed by reference to meta-theory drawn from

Habermas's theory of knowledge constitutive interests or his later work on the 'three worlds.' Furthermore, Jackson claimed that one paradigm is not pluralism (Brocklesby and Cummings 1996).

Midgley, who holds an alternative to Jackson and Flood regarding pluralism, rejected their constitution of pluralism based on paradigm incommensurability. The position taken by Midgley refers to the notion raised by von Bertalanffy against disciplinary fragmentation and Bertalanffy's attempt to find a common language through systems science and thereby the unity of science (Midgley 1996; Midgley 2001). He then examined the work of Khun, focusing on the notion of paradigms shift, whereby the old paradigm is replaced by the new one. By comparing the two scientific views, Midgley found that von Bertalanffy's notion of the unity of science appears to be ironic, which suggests the ideal of a unity of science. Therefore, Midgley (1995) regards CST as a new paradigm that represents its own unique assumptions. It is important to mention that the critiques launched by Midgley were directed at Jackson and Flood's vision of paradigm incommensurability in CST in 1991.

Bowers (2011) put forward in a recent study a new theoretical framework that copes with paradigms' incommensurability, called Process Structure (PS) ontology. According to Bowers, the framework of PS ontology is a theory that accepts incommensurability, and incommensurability, in turn, can support epistemology and methodology in critical systems thinking and practice.

Mingers and Gill's (1997) argument legitimates the use of different paradigms, because real-world situations appear to be highly complex and multifaceted. Thus, different paradigms are desirable to deal with the multidimensional complexity of the real world. Moreover, different paradigms require multi-methodologies to treat each aspect of the situation in order to yield better results.

With the desirability and feasibility of multi-paradigm methodologies in intervention and research, Mingers and Gill have identified three different levels of problems. They describe the philosophical level, which is the acceptance paradigm incommensurability, the cultural level, which is the validity of using multi-paradigms in particular organisational and academic cultures, and the psychological level, which is helping an individual agent to move from one paradigm to another easily. Like Jackson, Mingers and Gill's position appears to accept paradigm incommensurability, stating that cross-paradigm research is philosophically feasible. The emphasis of the studies by Mingers and Gill (1997), Mingers and Brocklesby (1997), and Mingers (2003) have put forward a framework that mixes different methodologies based on various paradigms in the pluralism approach to intervene in complex situations. Mingers (2003) has counted several multi-methodologies that are theoretically employed in systemic intervention and research. These multi-methodologies, which have been developed from the view of pluralism, are total systems intervention (TSI), critical pluralism, coherent pluralism, pragmatism pluralism, and creative design. The next section concentrates on the pluralism introduced by Mingers.

2.10.6 Mingers's Critical Pluralism

Mingers's credibility comes from the comprehensive experience he gained while working in different branches in management science and from his contributions to the research community. Because of the limitation of the present report, it will introduce only briefly some characteristics of the critical pluralism that Mingers developed within the context of multimethodology, noting that the standpoint Mingers takes is a response to the challenges facing critical pluralists within theoretical and practical aspects. Mingers argues that the actions taken by agent(s) are their commitment to the situation that they regard as problematic. By borrowing from the work of Checkland, Mingers proposes that the

purposeful engagement of an agent(s) is handled through the context of multimethodology. The framework of multimethodology contains three national systems, as shown in Figure 2.2: the problem content system (PCS), the intellectual resources system (IRS) and the intervention system (IS). According to Mingers (2003), this framework is important because it establishes relationships between a particular agent and the two systems: PCS (commitment, power and values) and IRS (knowledge and competence).

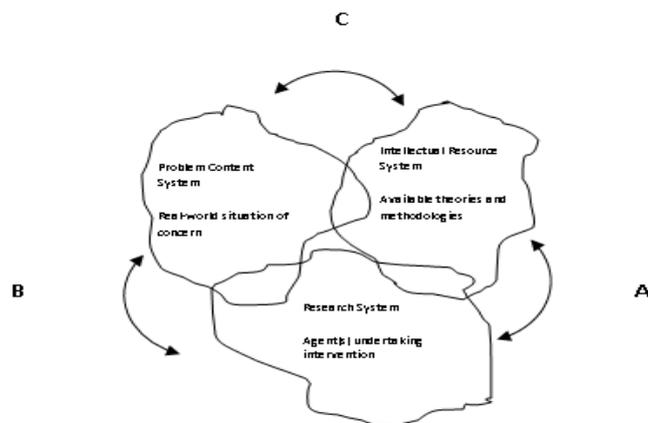


Figure 2-2 Checkland's Context of multi- methodology intervention. Mingers (1997)

2.10.7 Mapping Methodologies

After identifying the nature of the relationship between different systems, the next step is to design a combination for the use of methodologies in order to process the way of intervention. To do so, Mingers (1997, 2003) developed a framework that relies on Habermas's three worlds (material, social, personal) to assist in viewing different aspects. Moreover, the nature of the intervention from the agent(s) requires different types of activities linking to different worlds. These activities have four classifications: appreciation, analysis, assessment and action. Figure 2.3 shows the framework of intervention.

	Appreciation of	Analysis of	Assessment of	Action of
Social	Social practice, power relations	Distortion, conflict, interests	Way of challenging power structure	generate empowerment and enlightenment
Personal	Individual beliefs, meaning, notions	Differing perceptions, personal rationality	Alternative conceptualisations and constructions	Generate accommodation and consensus
Material	Physical circumstances	Underlying casual structure	Alternative physical and structural arrangement	Select and implement best alternative

Figure 2-3 Multi methodology combination. Mingers (1997)

Mingers (2003) emphasized that agents must choose the methodologies, methods, tools and techniques that are appropriate to their competencies and the perceived needs of the project. In order to establish the needs of the project, the participants should engage in a debate.

2.11 Theoretical Framework

The current study is recognized as interdisciplinary research where the range of investigation is related to management science and information systems. The researcher's perception considers the failure of information systems as a complex problem position, which the focus will then be on the managerial perspective of the organization. The researcher believes that although IS failure carries technological characteristics it is important to expose other organizational-related factors. It would therefore give the problem-solver the opportunity for a wider vision of investigation. Furthermore, this initially entails total intervening action in different domains whether technical, social or organizational issues, with no constraints for holding a better understanding of the problem. From the body of literature, a theoretical framework has been envisaged and led by a critical approach and holistic view in multiple activities throughout the study. Theoretically the research programme encompasses an interdisciplinary view where the problem will be critically examined through an

interventional manner to bring about change. The researcher's reflection on the problem is shown in figure 2.4.

The study has been developed to meet the shift occurring in the perception of management systems and information systems. Both have shifted to adopt a pluralistic view aiming to enhance perceiving the organizational context, thereby encouraging the pluralism in dealing with the real-world problem. The real-world problem attracts attention as a complex situation that needs to maintain different worlds (i.e., Habermas's three worlds), and arises the desirability of multi-methodologies research. The systems approach proposes a wide variety of methodologies, methods, tools and techniques (Jackson 2000, 2003, 2006, and 2010).

Thus the concern of this research is managerial-oriented endeavour, the person(s) who has the power, control and decision-making ability, which takes into account various views in order to reveal the interrelation amongst these different themes. Additionally research facilitates adopting an intervention process when intending to make change. The gap is identified as maintaining in better understanding of IS failure and utilizing critical action that is based on a critical approach for better outcomes. Mingers leans on agent(s) to design unique intervening activities that lead to undertake a combination of methodologies and techniques (Mingers 1997).

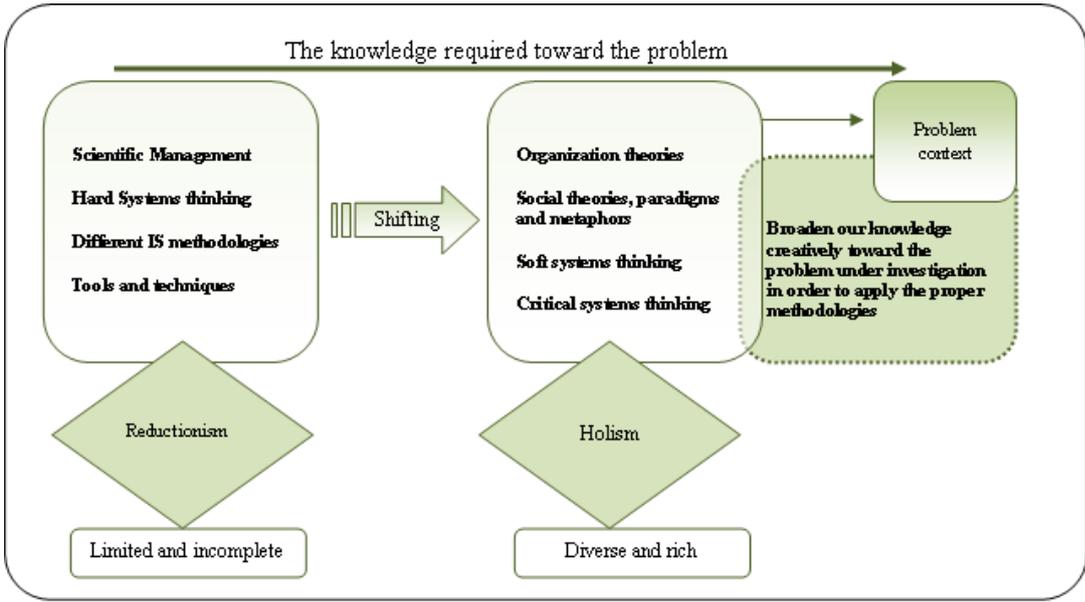


Figure 2-4 the development of theoretical framework of the study.

3 Chapter Three: Information Systems Literature

3.1 Introduction

Interestingly, the evaluation of IS projects has brought some controversial issues to the scope of this discipline rather than provided insights. Its domain cannot be separated from a variety of related disciplines. That is, the boundaries of IS seem to be changeable due to the variety of researchers who involve themselves in the area of information systems or/and other related areas (e.g., information science, information management, management information systems, computer science, information processing, and information technology). Therefore, one important matter face those working in the field are how to distinguish information systems from other relevant areas hardware and software technology rather than how to improve human affairs and organisations.

The intention considerably examines the changes of a range of fields, such as management science, social theory, organisation theory, and the information systems and strategies that frame the recent development of IS. However, this examination places its main focus on management systems and information systems due to the sense that the two are affected by each other in the organisational environment. It is claimed that the lack of awareness between the management and information systems specialists, whereby the specialists work merely on the technology aspect of the organisation, obstructs the completion of information systems projects (Galliers, Leidner et al. 1994). In the late 1980s, Checkland (1988) had an early vision of this lack, evident in his call for the unity between management systems and information systems. A decade later, Checkland and Holwell (1998) examined the context of IS within human affairs and organisations, attempting to constitute a coherent approach.

What is quite common in the MS/IS literature is both attempting to offer a variety of solutions to organisational problems that require the participation of other disciplines, e.g., sociology and organisation theories. The purpose of the present study is critically examining

these options that respond to each research problem to predict the accomplishments that could be efficiently achieved by adopting many of these options.

The discussion in this literature about information systems will be addressed within the context of history which appears insightful to point out the current circumstances surrounding information systems from different views. The point beyond that step is to consider broadly the contributions of other disciplines to information systems.

3.2 The Information Systems Discipline

The name 'Information Systems' (IS) has its emergent roots in computer science. This is the most likely origin story but, interestingly, this assumption might be challenged if it is known that the major concept of information systems emerged before computer science (Mingers and Stowell 1997). Computer science itself, Mingers and Stowell claimed, was rooted in the existence of information theory, where the information was engineered based on mathematical rules. At that early time, the scope was the pattern of transmission rather than a meaningful perspective.

The intention of information theory, as introduced by Shannon and Weaver (1964), is to process an encoded message into a signal to be transmitted over a channel (Lilienfeld 1978; Checkland and Holwell 1997). This pattern of transmission is performed by a coding system that conveys information statistically; therefore, it is argued that the contents of information cannot be distinguished by the information theory (Checkland and Holwell 1997). Lilienfeld (1978) has interpreted information theory and communication theory perspectives to point out that information theory is concerned with coding and decoding transmitted messages, so its meanings lie beyond the scope of the theory; meanwhile, communication theory has been devoted to dealing with the semantic contents of transmitted messages. Following the claims of the previous authors, it could be argued that the present era of development has been

working on coding information and communication into engineering systems by using mathematical laws. These communications thus become mathematical in themselves, leading to translate the language and meanings of information.

The second era of IS that could be recognised is the data processing (DP) era, wherein computers are used as calculating machines. Galliers (2003) summarised the major developments in computer science and its applications in the commercial aspect during this era. He illustrated that commercial computing, especially in the first and second generations of computers, mainly processes administrative operations which, accordingly, increase the efficiency of organisational performance. A parallel was the rapid developments associated with data processing, which were highlighted by Galliers (2003): generating new programming languages to treat slow operations made by earlier computers and then developing operating software to increase the power of utilising computing machines. In addition, this era has witnessed the emergence of information technology (IT), which refers to technological devices and equipment that support collecting, processing, storing, and distributing information (Checkland and Holwell 1997). Consequently, it could be then claimed that both engineering systems throughout information and communication theory and data-processing (DP) systems in computer science were merely vehicles delivering specific data to the human.

From the 1960s onward, the number of assessments of computer-based information systems in business for automating different operational tasks has been flourishing. The growing influence of IS in organisations requires a way of managing effectively the huge flux of information in organisations. This demand led to the creation of what is called Management Information Systems (MIS), which develops strategic activities in managing information systems to take better control of information use. Although there are a variety of definitions

of MIS all across the nation, they are all centred on topics like managing people, organisational context, and computer-based systems. Such ideas appear in Lucey's (2005, p. 31) definition, which reflects the above topics: "It is a systems using formulised procedures to provide management at all levels in all functions with appropriate information, based on data from both internal and external sources, to enable them to make timely and effectively decisions for planning, directing and controlling the activities for which they are responsible." As later MIS models were designed, they included designing and implementing, and they concerned various activities aligning the three aspects (Robson and Hall 1997; Boddy, Boonstra et al. 2005).

Accordingly, it could be argued that MIS discipline has become an interactive approach that mediates the applications of IS and its context. This interaction is best seen during the implementation of IS, because both the people and the context are influencing each other. People tend to change their context based on new ideas that influenced them in order to promote specific objectives, whether they be personal or/and organisational, and this adaptation then creates a new context (Boddy, Boonstra et al. 2005).

A differing view of information systems holds that it is a pluralistic field (Avison and Elliot 2006) that is related to various disciplines, including technology and social disciplines. Avison and Elliot argue that from the technology perspective, IS is related to computer science and computer systems engineering disciplines, even though it differs from these disciplines in its focus: IS assists with the applications of technology, while computer science and computer systems engineering assess the principles of technology and theories. In social disciplines, IS emphasises soft issues, like people and organisations, rather than technology, so Avison and Elliot have connected it to numerous social disciplines, such as sociology, psychology, and anthropology. The foundations of IS, they illustrate, are drawn from theories,

methods, and the practices that were generated primarily during the original disciplines, especially computer science, social sciences, and management. The way that IS has been recently formulated seems to move forward from technology to a broader spectrum that reflects an interdisciplinary manner in the formation of IS.

Walsham (1993) pointed out that information systems discipline comes from two main areas: computer science and management. In addition, other disciplines have somehow contributed to it, such as psychology, sociology, statistics, political science, economics, philosophy, and mathematics. This combination appears unique, but, at the same time, is critical and not easy to wield. The major contribution of Walsham have comprised mainly interpreting information systems in organisations (Walsham 1993a; Walsham 2006).

The last fashion in the discipline, which represents the fourth era of recent development in the IS domain, has been underpinned by the systems thinking approach wherein the holistic view and soft methods become key issues in research and practice. Thus, the fourth era is an integrative endeavour to maintain technical, organisational, and human perspectives in information systems. Checkland (1988) has put forward an argument that calls for the unity between information systems and systems thinking in terms of applying systems ideas to organisations' IS projects. A number of studies, including individuals and group work, have tackled planning, designing, managing, and strategies (Stowell 1994; Checkland and Holwell 1997; Clarke and Lehaney 2000; Howcroft and Trauth 2005; Córdoba and Midgley 2006; Cater-Steel, Al-Hakim et al. 2009; Córdoba 2009; Córdoba 2010; Dwivedi, Wade et al. 2012)

Based on the argument above, the characteristics of IS as a discipline have been shaped over the years in a pattern that makes IS close to and interrelated with a variety of disciplines. Table 3.1 is an attempt to summarise the overall evolvement of IS discipline over the years. The range of its spectrum shows a wide transformation in the formation and purpose of

information systems. It would be argued that the table is infinite; however, it is a conceptualised framework that has been suggested to represent the creation of IS.

Stages	Characteristic	The Trend	Application	Description
First	Coding	Single	Engineering /electronics	1930s and 1940s The theory of information by Shannon
Second	Processing	Single	Computer science and Information Communication Technology (ICT)	1950s Data processing (DP)
Third	Managing	Multi	Organisational studies/ Management information systems	1970s Processes of information systems development ISD to help organisational tasks
Forth	Systemic	Holistic	Soft systems thinking	1980s Aligned to fit with various theories and methodologies.

Table 3-1 Evolution of IS discipline over years

3.3 Information and Related Meanings

This section seeks to identify term ‘information’ and related meanings since its emergence. Information seems to be multifaceted term depending on its context and on the way information is inevitably treated, whether it is handled by computing processes, an organisational context, or even a social construct. Moreover, information might be connected with the development of information systems, where it is automated to accomplish well-defined tasks in computing development.

Therefore, information systems needs to be traced back to the first time the term appeared. Kawalek (2008), in his discussion of IS growth as a discipline, first mentioned two aspects of IS, which in turn reflect upon the basis for studying, understanding, and making sense of information systems as disciplines. These two aspects are the significant ambiguity in the discipline and the significant ambiguity in the field of practice. He claimed that the term ‘information’ is itself ambiguous and has different definitions reflecting the concerns of their creators. For example, Shannon and Weaver, when they developing the theory of information in 1964, were more interested in the coding and communication of information as physical characteristics in order to represent and communicate information, so in their work there

made no distinction between data and information. This lack of distinction can be readily seen amongst professions that treat information theory from a purely mathematically based illustration. In contrast, Kawalek (2008) sees information as a situation that results from the human interpretation of presented data.

Checkland and Holwell (1997) also differ in their definition, criticising the inaccurate use of the word ‘information’ as given in ‘information theory’ by Shannon. They claim that information results from a human act: only the human creates the type of information that becomes structured knowledge. This process can be seen through three distinct steps: selecting data; attributing meaning to this selected data; and building larger structures of the meaningful data. They recognise four products that help to achieve these three detections, giving each process a suitable word: data, capta, information, and knowledge. Figure (3.1) provides an explanation of how these four products are linked.

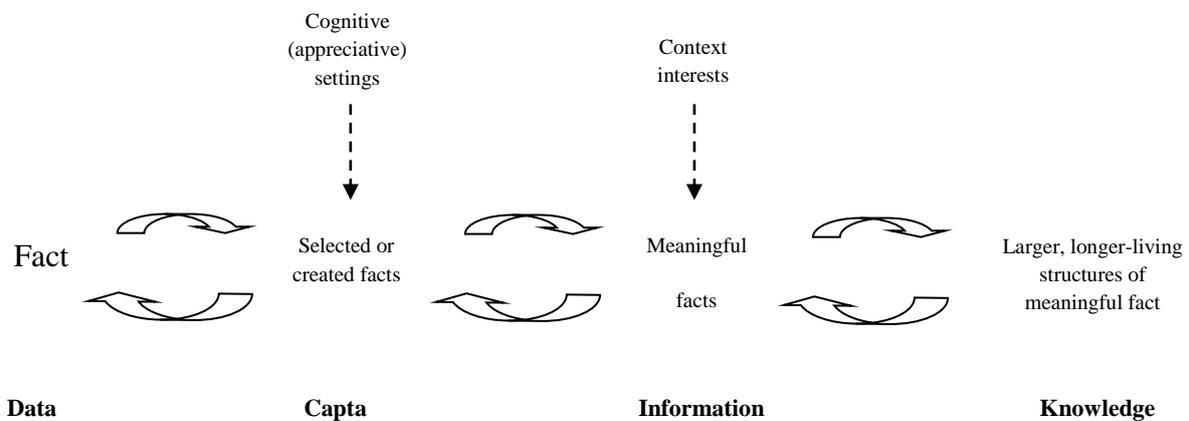


Figure 3-1 The link between data, capta, information, and knowledge. Checkland and Holwell, 1997, p. 90

They start by demonstrating that the world consists of a great mass of facts that humans represent as data. Once humans pay attention to some of these data in order to create a fact, the second stage of information handling begins, which is described as ‘capta’, or the result of our selection to introduce meaningful facts as ‘information’. This stage can be achieved through mental process. When the data are selected and then converted into meaningful data

that are put into context as a part of a larger structure, they become 'information'. Finally, the collection of relevant information can lead to larger structures, which are called 'knowledge'.

3.4 Definition of Information Systems

The UK Academy for Information Systems (UKAIS) defines the academic study of IS as 'a multi-disciplinary subject' that 'addresses the range of strategic, managerial, and operational activities involved in the gathering, processing, storing, distributing, and use of information and its associated technologies in society and organisation' (Probert, 1997, p. 39). Although this definition could reflect a spectrum of organisational and technical activities engaged during IS development, it neglects the meaningful purposes and effectiveness that IS can have in particular contexts. Furthermore, the UKAIS definition does not differentiate IS from IT, suggesting the possibility that the two terms are interchangeable.

Piccoli (2007) has defined IS in terms of its social and organisation aspects: 'information systems are formal, sociotechnical, organisational systems designed to collect, process, store, and distribute information' (p. 24). For him, the crucial element of this definition is its emphasis on kinds of IS that can be applied within organisational contexts and provide information-related needs toward fulfilling managerial responsibilities. In this context, Piccoli (2007) distinguished IS, which depend on the interplay of technology and other related components such as people, structures, and processes, from IT, which concerns hardware and telecommunications equipment. Accordingly, meaningful information can justify the purposes of the IS designed. To clarify this viewpoint, Piccoli (2007) explored two different purposes of modern IS designs: a constrained purpose design stemming from systemic rules of operation to collect and analyse data using computations and formulaic calculations, as well as a rational purpose design allowing the creation of meaningful information based on separate pieces of data. Considering this viewpoint, arguably IS are

purposefully designed in organisations to run a variety of specified business activities, in which actors involved can benefit from information provided for operating and making decisions. In this context, IS designed for organisations facilitate the translation of raw material into meaningful information toward identifying appropriate actions to take.

By some contrast, Checkland and Holwell's (1997) argument regarding defining IS leans on the notion that organisations are the contexts of all IS work and that it is therefore vital to understand the concept of the organisation according to its way of thinking. In conventional thought, they have argued, IS serves 'to provide the information which supports the decision making at various levels from the strategic to operational' (p. 85). In a sense, this definition is rational insofar as any organisation is collectively modelled to achieve its goals despite the pursuit of individual interests. This concept of organisation thus borrows from positivist models that, in working mechanistically, are less concerned with an organisation's members and their agendas. As with Piccoli's (2007) definition, such a positivist definition of IS arguably conceives any organisation as a sociotechnical system in which information provided serves its context, structures, and mechanistic processes.

Alternatively, Checkland and Holwell (1997) have proposed a goal-seeking model that takes into consideration multiple organisational aspects, including the interests of the group and of individual members and non-members alike. In contrast to the positivist model, this type of model implements an interpretive soft thinking to support the organisational discourse. According to Checkland and Holwell (1997), though complex and far more problematic, the goal-seeking model not only appears more concerned with the concept of the organisation, its context, and its activities, but also promotes debate about the purpose of IS.

Since information is central in supporting the purposeful action of the goal-seeking model, the definition of IS heavily leans on understanding of the meaning of the terms *data* and *information*. Checkland and Holwell (1997) have paid attention to the interchangeability of

data and *information* in definitions of IS suggesting that the two terms have a single meaning. Opposing the notion that data are invariances or facts because their meaning is inevitably interpreted, these researchers have proposed that data are ‘raw facts’ and have no inherent meaning until processed into meaningful information. From their perspective, data can be described as basic preliminary material for creating information. Checkland and Howell’s (1997) view is thus that organisations are social units with specific objectives to pursue via continued debate and action supported by familiar IS processes.

To illustrate the transformation of certain raw material into meaningful information as a way to create long-term knowledge—that is, the final image of data—Checkland and Holwell (1997) have used the terms *data*, *capta*, *information*, and *knowledge*. In their schema, meaning as a result of human activity, while information is the result of processing raw material through what is called *capta*, which processes information. Consequently, *capta* gives insight into meaningful aspects of information by assuming that how people make meaning about the same data differs. While most IS definitions in related literature support conventional conceptions of organisations, the previous definitions arguably emphasise the design and presentation of information to accommodate the possible divergence of meaning made from the same information.

Data and information require the human act of attributing meaning, which can be done both autonomously and intersubjectively, with both individuals and groups. To some extent, the group’s attribution of meaning more closely relates to the concept of organisation already embedded with a social system. From this perspective, Checkland and Holwell (1997) have conceived IS as a service system supporting actors, the systemic form and content of which have to account for how the supported action is conceptualised. Accordingly, IS are defined according to the action taken in a specific context and the information needed to meet that definition.

The complexity of such a definition lies in the fact that, though making meaning cannot be automated as if by a machine, it can be supported by three examining processes proposed by Checkland and Holwell (1997). The first is the personal process, a human-based process that changes according to the context in which individuals experience the world in different ways and attribute meaning to what they perceive. Since societies are groups of individuals who sustain particular social patterns, each individual is liable to have a unique view in selectively perceiving the world. Within society, individuals' views are challenged in debate, dialogue, and discussion, in which we attempt to effect each other's perceptions, judgments, and actions. This dynamic refers to what is called 'the social situation', in which communication among individuals influences how both thought and action.

A final point related to the processes supporting IS pertains to organisational process. In conventional thought, an organisation consists of a collective of individuals collaborating in pursuit of meeting organisational goals, which typically restricts the individual experience of the world. By contrast, the conceptualisation of organisation proposed by Checkland and Holwell (1997) depends heavily on individual and social processes to offer accounts of organisational processes. This perspective stems from the idea that individual experience can be shared, exchanged, and debated, all to make intersubjective meaning, generate information, and in turn, create knowledge. Checkland and Holwell (1997) have argued that the complexity of the concept requires conceptualising organisations, personal agency, and technology processes and their interactions in terms of making sense of the IS world.

Altogether, the goal-seeking definition of IS appears more appropriate to large-scale IS projects in the UK public sector given its emphasis on situations as wholes and interrelated dimensions. Despite the sundry definitions of IS, this definition best accommodates organised thinking for actors addressing problem situations, whatever their purpose, as well as gives holistic insight into the field of IS.

3.5 Information Systems Philosophy

The philosophical attitude in IS can be examined through ontology and epistemology perspectives. An ontological thought concerns with the reality of world whether objective or subjective. Objective thought deems that the reality exists independently of human beings (objectivism), while subjective thought sees that the reality is socially constructed, which relies on the beliefs and culture of human beings as a part of the real world (subjectivism). However, even though these entities are not visible or tangible (Lee 2004). The differences between the two thoughts can be illustrated as follows: the first thought is scientifically clear and easy to engineer in order to achieve specific objectives, while the second seems vague and difficult to achieve objectively because of its complexity and the involvement of social actors. Similar debates can be extended to management science and systems thinking (Checkland and Holwell 1997).

An epistemological perspective, which is the nature of knowledge obtained Information systems are mostly confined within positivism and interpretivism. It was found that the discipline of information systems had been dominated by the thought of the hard, “positivist” approach before IS gradually involved the “interpretive” approach (Checkland and Holwell 1997; Mingers 2003; Lee 2004; Mingers 2004; Burke 2007). The distinction is that the engagement of social theories in the field of information systems is advantageous over carrying out positivism paradigm. The shift toward this adoption is widely recommended by researchers and scholars for new challenges in organisations. What can be noticed is that the philosophy within information systems has been critically moved from the philosophical position of positivism, which comes from the natural sciences and applies rigorous rules, to interpretivism, which depends on meaningful entities of the social world by using the soft systems method.

3.6 The Paradigm Shift in IS: A Historical Review

Mingers (2003) reviewed a wide range of IS studies up to the early 2000s, and found that various paradigms and methods have been applied in IS research. His survey shows that none of these studies consider combining methodologies. Furthermore, Mingers explored other authors concerned with IS researches in different periods of time (e.g., Orlikowski and Baroudi 1991; Cheon et al. 1993; Walsham 1995a), and tracked several journals within North America and Europe. Their conclusions reflect different results; however, the trend shows that information systems journals rarely combine methods. Mingers also found relevant relationships between the journals and specific research methods. North American journals, for instance, are dominated by the positivist approach, while the European journals employ a variety of research methods with more concern for other methods, such as interpretive and multi-methodologies. Mingers has identified several barriers to multi-methodological research. These barriers are associated with philosophy, culture, psychology, and practice. He claims that social research is more concerned with pluralism; therefore, he has suggested critical realism as a philosophy of science that is influentially coping with pluralism. Extending the other barriers, Mingers has concluded that the multi-method work is rich and valid for long term use and capable of dealing with complex real world problems.

Burke's (2007) work identifies the paradigm shift and the rules that govern the research of information systems. First, he claims that information science in general, including information systems, does not involve itself in one paradigm, and the philosophical aspect that constitutes it is still under ongoing debate. He mentions the sociological work of Burrell and Morgan (1979) as an entrance for his justification. Burke has explored the four paradigms: radical humanist, radical structuralist, functionalist, and interpretive views, finding what the positivism and the interpretivism paradigms are likely to be associated with in the context of the information systems field. Burke takes into consideration the need of

information science to address pertinent issues related primarily to the nature of society, such as people and culture, in order to produce the richest results. Given this justification, Burke has rejected the other three sociological paradigms. Despite the other thoughts that lay between the two paradigms, it is strongly recommended that the interpretive approach, as a form of investigation, is the most useful approach in information systems within social phenomena (Walsham 1993, 2006).

The argument above provides us with a discussion on the relationships between information systems and social aspects, and this discussion was recently grounded in epistemological paradigms (both positivism and interpretivism paradigms) as an accessible way to generate research designs. In addition, it needs to adopt a human-based approach to study social phenomena (Burke 2007).

The next discussion will go through the three paradigms (positivist, interpretivist and critical) and their relation to IS research. The purpose is to find out an appropriate paradigm that is heavily fitting to the complex issues under examination in this research.

3.6.1 Positivism Paradigm Underpinning Research in Information Systems

It has been traditionally assumed that positivism is a monistic tendency in the philosophy of science. Drawing on this sort of philosophy, the applied criteria raise coherent rules that must be followed scientifically in the research community in order to produce certain knowledge; the rules here can be fundamentally named paradigms. Therefore, positivism is conducted as a paradigm to generate such knowledge, whereby the researcher applies an empirical experiment in order to gain reliable and absolute results. Nevertheless, the meaning of positivism varies based on the terminology adopted by its users. Moreover, in the field of science, positivism is the only methodology in which knowledge can be accepted to be essentially inductive. By doing so, the facts can be proved or rejected. Pather and Remenyi

(2005) have identified two reasons for conducting a positivist approach. The first concerns the nature of the information systems discipline, which grows within a scientific context. The second is related to the scientific background of those academics who are now concerned with information systems research (Pather and Remenyi 2004). In the recent history of social science, the word 'paradigm' has also been borrowed by sociologists for providing interested people with particular knowledge in social science.

In sociology, the same word is used with different meanings in the work of Burrell and Morgan: they use paradigms to identify the assumptions of the social research community (Burrell 1999; Jackson 2000). Burrell comments on Kuhn's view of science, which the former sees as an attempt to redefine the concept of scientific science rules not through the falsification tests of scientific facts but through realising the development of the scientific community through the sequences of replaced paradigms confronting new challenges in the scientific progress. Burrell has seen this change become so expansive and radical that the old way of thinking appears different to the new way of thinking; in fact, the old way seems like a discontinuous method for seeing the world.

The positivist is a traditional paradigm position often used in natural sciences, and it aims to deal with fact as they are (Saunders, Saunders et al. 2011), and the phenomena within positivism can be independently measured as objective matter that has no other (external) factors or interpretations affecting the processing of the positivistic paradigm. Positivism is interested in the cause and effect of social phenomena in general, but it still pays little attention to the subjective concern of individuals (Collis and Hussey 2009). The idea of positivism comes from the assumptions that the world comprises laws and that the research tends to work within these laws as it deals with phenomena (Kim 2003). The positivists offer high reliability and precision in their outcomes while dealing with data (Collis and Hussey

2009; Blaxter, Hughes et al. 2010). Furthermore, the incapability of positivism to deal with phenomena derived in social science due to its rigid processing has motivated researchers to adopt other strategies of research that are more flexible and that understand the values, behaviours, and beliefs of human beings. Collis and Hussey (2003) give another criticism of positivism, which is related to the complex problem under investigation (the failure of IS). They explain that positivism treats the human as a numerical value and ignores any subjective judgment.

The early work in information systems was relevant to the thought applied in natural science science, including assumptions and analysis, thus suggesting that objective solutions would stem from the role of the positivist paradigm as the paradigm attempts to model objectively the phenomena with no involvement of human beings. It has been assumed that the positivist paradigm is a scientific method that aims to produce reality as it appears, and the results should be reliable and consistent.

Cushing (1990) is more focused on giving a particular meaning within the management of information systems (MIS) literature, addressing problems in the field facing researchers. He first admitted that information systems as a discipline has been raised from a scientific environment in which paradigm, approach, and methodology are sensibly regarded as the same philosophy of other scientific research. Nevertheless, he criticises the definition of paradigm given by Kuhn for not incommensurably fitting with the elements of MIS. Before developing a paradigm for information systems, Cushing he claims, it should necessarily establish laws and theories for MIS as a discipline. His main concern is to develop a consensus body for MIS scholars through proposing frameworks. Cushing believes the proposed frameworks will help to develop the body of phenomena in IS research. These frameworks are “the user’s problem, the organisational context of the problem, the

information needed by the user to obtain a solution to the problem, organisation's external environment, MIS development process and its environment, MIS operation process and its environment and the concept of feedback'' (p. 44). In addition, Cushing demonstrated that in spite of the dominance of the functionalism approach in IS, researchers could improve IS by turning to more subjective matter that would gradually take part in scientific studies (Cushing 1990).

Overall, this review established that the discipline of information systems existed within the positivist paradigm as responding to environmental dominance, and the positivist studies that have been carried out thus far are influenced by technological aspects as well as include technological aspects in their results. The situation did not last when scholars and practitioners moved toward the interpretivism paradigm to address issues related to social factors such culture, behaviour, and beliefs, or what are considered real-world situations.

3.6.2 Interpretivism Paradigm Underpinning Research in Information Systems

In contrast and in the matter of epistemology, interpretivism came into existence when researchers encountered the limitations of positivism while dealing with complexity in the social world within the business context. Saunders et al. (2009) claim that the rule which can be applied in positivism to understand scientific phenomena is unable to cope with social phenomena. Jackson (2000) mentioned that it is impossible to break down social phenomena into parts because the relationship amongst these is sometimes more important. People and their actions and behaviours in the social world are the core mission of the researcher of social phenomena, and these things, according to Collis and Hussey (2003), stem from human mentality. It is claimed that interpretivism comes from two intellectual ideas: first, the phenomenology that relates to the human being and how he perceives the world and makes

sense of it, and second, the symbolic interactionism that is related to the human being and his continual interpretation of the social world (Saunders, Saunders et al. 2011)

Interpretivism has the ability to acquire in depth data; however, these data probably possess a different face of truth, because they are processed through social constructions that are subject to the way the participant perceives and transforms these data (Oates 2005). In contrast with the deductive approach, the inductive approach has low reliability and high validity in its findings (Collis and Hussey 2009). Saunders et al. (2009) pointed out that the inductive approach is interpreted through the context that depends on a small group of people, and there is no need for a large sample to justify each phenomenon.

Geoff Walsham has introduced remarkable contributions to the interpretive approach in information systems research (Walsham 1993a; Walsham 1995; Walsham 2006). Walsham (1995) has claimed that interpretivists hold the other strand of reality, where knowledge is the socially constructed, the facts rely on different views, and controversy is involved. The data collected do not necessarily need to test hypotheses or theories. By adopting an interpretive paradigm, an organisation can liberate itself from the orthodoxy approach and allow human actors to play crucial roles.

Walsham (1993) has deliberately explained the influence of the interpretive approach on organisations, seeking knowledge subjectively as social construction. In addition, he examines the image of the organisation through cultural and political metaphors so that he can consider attitudes and values in organisational change. This approach interestingly meets Morgan and Burrell's explanation of metaphors, because the latter claimed that the image of the organisation is the researcher's primary concern. Furthermore, the same concern would also support the new tendency of the management to apply holistically the approach presented by the systems theorists. Another claim made by Walsham is that the interpretivist

paradigm is valuable for studying information systems in organisations, because organisations involve the conflict of social relations and different descriptions of the problem.

Finally, he has given different examples of research on information systems that were carried out with different interpretivist techniques, such as case studies, ethnography, interviews, and observations. The techniques applied are considered alternatives to testing hypotheses in conceptual, theoretical, and empirical bodies of work (Walsham 1993a; Walsham 1995). In the management of information systems, he explored another interpretive body of work based on direct intervention that depends on the soft systems methodology (SSM) of Checkland, which is now widely used among management practitioners within the organisational context. SSM aims to address the interpretations of individuals and groups about the world.

Klein and Myers (1999) criticised the state of information systems and the positivist paradigm during the late 1980s and early 1990s. During those decades, the research was dominated by the methods of surveys, laboratory tests, and experiments, which resulted in solutions that are more associated with information technology. This situation now yields dissatisfaction amongst IS researchers and leads them to accept an interpretivist approach. They believe the acceptance of interpretivism comes with the shift in information systems toward managerial issues that deal with real problems and that address human purposes. Klein and Myers (2011) have made a record of a variety of interpretive research strategies that have been suggested in information systems, such as grounded theory, ethnography, phenomenology, hermeneutics, and critical hermeneutics.

3.7 The Nature of Information System Methodology

3.7.1 Historical Review

The endeavour of this section is to provide historical insight into the way that information systems methodology is undertaken. Since it counted on computer science until its emergence as a discipline, the information systems methodology has been through fundamental changes in the development life cycle. Additionally, it might be said that information systems design sounds like only part of an organization, but after the information revolution, the concern of information systems has increasingly become the heart of matter. In general, scholars agree that until the 1960s, there were no specific methodologies within the project of information systems (Avison and Fitzgerald 2003; Elliott 2004). The individuals who were developing information systems before the 60s were pioneers and had only their programming skills. They did not yet understand the needs of the users, so they spent considerable time correcting these applications.

Avison and Fitzgerald (2003) tracked the early stage of information systems and discovered a correlation between computer science and developing information systems in organizations. This correlation reflects the programmers' efforts toward that development. Avison and Fitzgerald claim that the earliest programmers may have been good at programming, but they were not necessarily good at communicating. Therefore, the designs of some information systems are inappropriate for their application, and if programmers possessed more knowledge of end users, then they could greatly reduce the dilemmas of information systems development. At the same time (60s), organisations began to demand more computers to meet their high demand for appropriating systems. Changes in technology became a primary rule of information systems. According to Avison and Fitzgerald, changes tend to shape the role of information systems, because organizations are always changing in size. Therefore,

the acceptable methodology for the development of information systems is one that always changes.

Since their earliest stage, information systems discipline seems to change continuously, which shows the need for a framework that provides an organization with the maximum benefits of information systems. One result of this stage is the consideration of information systems as a project that matters to the management of organizations in terms of planning, designing and managing (Avgerou and Cornford 1998). The project is essentially based on the life cycle approach, which includes an iterative model that has list of tasks, and this process is widely recognized as the information systems' development life cycle (SDLC). This process aims to formalize all operations associated with developing information systems in organizations.

3.7.2 Information Systems Development Life Cycle (SDLC)

The launch of the SDLC could be considered a new stage that will help to track the information systems' development. Before going deeper into this issue, it is important to reflect on the argument of Cadle and Yeates (2008). They differentiate between two terms that are related to information systems subject, and they describe the limit of their boundary of each term. The terms are 'systems development life cycle' and 'project life cycle in terms of systems development'. They say that the first concerns the whole life system that starts from the feasibility study until the system has been accepted by its beneficiaries. The second is constrained to factors such as time, budget, resource and quality, and the second term unnecessarily covers all stages of the SDLC.

In this stage of a project, the developers must carry out a specific approach through the model(s). The model serves as a guideline for producing SDLC and follows the structure of the waterfall model, which was created in the 1970s. The waterfall model has the following

stages: feasibility study, systems investigation, systems analysis, systems design, implementation and finally review and maintenance. The process in this model may be repeated in case of a system failure, starting the cycle over again to replace the system entirely (Avison and Fitzgerald 2003).

In addition to the waterfall model, other models serve the same purpose of SDLC. Cadle and Yeates (2008) claim that there are only two basic models for the development life cycle for information systems: the waterfall model and the spiral model. They believe that other models are somehow refinements of these two. They have examined five SDLC models that include the waterfall model, the spiral model, the 'v' model, the 'b' model and the incremental model. These models are sequential in their accomplishment, so developers cannot move on to the next stage before finishing the previous one. Finally, it is important to mention that developers generally apply these models to projects according to the models' strengths and weaknesses.

3.7.3 Information Systems Development Methodologies

Based on SDLC, different methodologies have appeared immediately after the structured methods approach, and they each offer a set of activities, including techniques and tools to accomplish information systems development. Cadle and Yeates (2008) claim that methodologies are concerned with how projects are going to be achieved, while Avison and Fitzgerald (2003) indicate that there seem to be three changes that increase the need for the methodologies. The first change affects the theme of analysis and design that the rapid needs to be formalized in developing such information systems in order to set out the role of systems analyst like the programmer. The second change occurs on the organizational level and concerns the realization that the organisation is growing in size and complexity. In response to such a change, the organisation needs to adopt an integrated approach rather than

one-off solution. The last change pertains to an organisation's desirability to appreciate an accepted methodology in information systems development. The businesses of the late 1960s witnessed the earliest methodology proposed and widely adopted in the UK by the National Computing Centre (NCC) (Galliers, Leidner et al. 1994; Avison and Fitzgerald 2003; Elliott 2004). Since then, many methodologies have grown from the earliest methodology in computer science and in the business environment.

3.8 The failure of Information systems

3.8.1 The Failure: Ideas, Issues and Approaches

The term 'failure' comes to many as an annoying expression within the managerial level of organizations, and it is especially unfavourable in information systems. However studies reflecting critical results indicate that failure in IS have been increasing in the last few decades (Heek, 2006). Therefore, even when an organization accepts that information systems work brings significant solutions to its performance, it should admit that information systems also bring the risk of technology failure. As a result, most articles on IS have mentioned that IS projects are classified as high risk and expensive (Lyytinen and Robey 1999; Sauer 1999; Fortune and Peters 2005; Bartis and Mitev 2008). Compounding this problem is the lack of learning from the failures of information systems. It would appear that developers are paying less attention to learning lessons from system failure that could help them to improve the future of IS projects. It could be therefore said that with growing in IS failure; developers have been making attempts to examine subjective approaches that may yield more successful results. The core of these approaches is dedicated to broadening the view to include factors such as human issues, management issues and organizational issues. The information systems discipline has become more and more influential on organizations, because they need information processing for operating, managing and decision making.

Checkland, for example, links information with the actions taken in the real world situations, and adopts the soft systems methodology (SSM) as a holistic approach to giving a purpose for any action toward the problem investigation (Checkland 1990; Checkland and Holwell 1997).

Surveys and studies on the growth of information systems discipline show that the information systems projects are not necessarily technological matters, given the organizational and managerial perspectives that have risen when studying IS failures. Jay Liebowitz's work on success and failure of information systems projects in 1999 reflected many critical points. He reviewed four highly credible surveys carried out by both academics and professionals to stand on reasons cause IS failure (Liebowitz 1999). Afterward, he conducted his own Delphi survey. He found that the main reason for IS failure is the lack of human consideration, that is, the developers treat the project solely as an IT project. The importance of his survey comes from the basis that the respondents were IS managers from 15 major organizations in the US. The discussion revealed that the success or failure of IS depends on a range of technological and organizational factors that ultimately lead to uncertainty. Moreover, Liebowitz (1999) indicated that the findings of his survey appear consistent with what he found in the other surveys that he reviewed in his work about IS success/failure.

3.8.2 From Normative Toward Interpretive

The core matter that one might implicitly or explicitly take into consideration is how to achieve success and avoid the failure of information systems. Another important matter is the type of measurements applied to judge IS projects. The literature on IS failure features a variety of information systems failure situations. Despite this variety, attempts are always made to adopt normative approaches, such as new tools and techniques to overcome the

problem of IS failure. Consequently, the average number of IS projects that fail remains high even though the technology may have been partly successful at dealing with failure. Fortunately, the debate has broadened to include other influential factors rather than focusing on the technology perspective. The debate seems to be following the information systems' movement toward the adoption an interpretive approach to remedy the limitation in dealing with the failure phenomena. For example, Fortune and Peters (2005) view the subjective approach as the only way to understand the complexity and ambiguity of the success and failure of IS. The last two decades witnessed comprehensive work in the research field (e.g., Walsham, 1991, 1993, 1995; Mingers, 1997, 2001, 2004). Yet, the diverse contributions to IS failure are still trying to recognize social and organizational contexts.

3.8.3 Different IS Theoretical Frameworks

Different frameworks have been proposed to cope subjectively with the phenomenon of failure, and this review will examine a number of them for two reasons. First, it wishes to expose different activities of the frameworks when they undertake IS failure. Secondly, it aims to pick an appropriate framework for the soft systems methodology and for the critical approach of the current study. This piece of literature shows that IS failure cannot be isolated from the complexity of the real world, including social and organizational perceptions. The frameworks are divided into two categories in which a range of factors can be represented. The first category is initiated originally in the contextual information systems, whereas the second category depends on social shaping interests. A number of examples can be identified such Sauer's model, K. T. Yeo's (2002) Triple-System(S) model and Checkland and Holwell's (1997) Processes of organization Meaning (POM) model.

3.9 The Nature of IS Failure

The present review will discover the nature of IS failure by tracing it since the period when it was taken as a computer-based failure (system crisis) until the recent period, when the failure

has become key concern for management. The first type of failure falls in the technical context, such as software and hardware failures, whereas the latest failures relate to the management context, including users, budget, time and organizational goals. The nature of IS failure is now associated with both aspects, because they are somehow interrelated and suffered from each other in terms of investigation, but as Fortune and Peters (2005) have claimed, they are not synonymous.

Sauer (1999) reviewed many IS failures occurring in the late 1960s, 1970s, 1980s and 1990s, and demonstrates that the rate failure remains high amongst IS projects and that risk containment is limited at dealing with such a failure and learning from it. Sauer mentions that IS failure is a serious problem for both practitioners and researchers. He explores a range of IS failures across a period of three decades from different statistics. His findings come from different authors' surveys that reflect deep concern over developing IS projects. The summary of these findings shows that IS projects meet different types of problems such as being overdue at delivering IS projects, being over the budget, abandoned or incomplete projects, not meeting requirements, used as delivered and partial failures. In turn, recent studies on IS failure show similar results of what occurred in the past, such as the study by (Bartis and Mitev 2008). In terms of the practical perspective, Sauer claimed that the practice of information systems development is influenced by two types of dynamics: one is the dynamic of capability and the other is the dynamic of opportunity. The former considers attention paid to technological ambition, and the later considers organizational ambition.

Fortune and Peters (2005) explore a number of issues related to IS failure including technical, managerial and organizational aspects. First, they reported that IS failure is complex and multifaceted. They believe IS failure occurring at any stage of the project, and yet causes losses, namely money and time. They attempted to discuss the notion of IS failure from the

perspective of IS success in order to identify processes that may go wrong when developing IS project.

In addition, they criticize the narrow view of developers who design an IS project according to the information systems life cycle (SDLC), because they recognise that the emphasis in this model is on the developers themselves. Instead, Fortune and Peters prefer to consider the IS project as a part of the business context. Thus, they suggest Alter's model of the work systems life cycle (WDLC) so that developers will recognise the wider organizational activities. In this model, humans and technology can work together in order to support the nature of the organizations (Fortune & Peters, 2005). The positive point in their discussion is that IS might fail due to different factors outside IS itself. In order to gain a better understanding of IS, it is helpful to consider the environment where IS operates.

Kawalek (2007) examined information systems independently from information technology, and he believes that most IS projects place a greater emphasis on the technological context rather the organizational context when the projects describe the nature IS failure. He appreciated the essential knowledge provided by technology, such as its tools and techniques, but he criticised the ignorance of organizational knowledge, for possessing this knowledge would produce a greater insight in terms of understanding ways in which organizations seek to improve and change. From this vision, Kawalek has identified IS failure as an organizational problem-solving issue that needs to embed the rule of management in its solution process.

One could also argue that there is no universal quality to IS failure, as there are no typically compatible cases that could benefit from the guidance of well-identified factors. Even in this case, one could still argue that IS failure has two established characteristics: 1) different causes for different failures and 2) learning lessons from such a failure is considered.

3.9.1 Causes of IS Failure

It is difficult to specify that different projects failed for the same reasons, so each case has its own scenario for developers to study. Nevertheless, the outlined causes are theoretically categorized into technological or/and organisational related causes. Within those factors, the causes could be further deconstructed into sub-categories. Sauer (1999) argued that the explanations for the earliest failures (those in the 1960s and 1970s) featured technical causes and almost entirely overlooked organizational reasons. In the same context, Kawalek (2007) criticises causes that are confined within the technology and related topics, such software, hardware, development life cycle and network.

Stephen Flowers identified four IS failure cases within in the book, *Software Failure: Management Failure*. Upon exploring the various failure cases that Flowers mentioned, this review found that causes seemed unique to each situation. Each case had causes leading to the failure at some stage of the development. Flowers also noted that in the case of failure, the blame is first directed to the managers, who are responsible for the project and the way in which they behave and act.

3.9.2 Learning from IS Failure

Most IS failure is likely to be abandoned with no further action taken in order to understand what went awry, so researchers have insisted that organisations should learn from IS failure (Lyytinen and Robey 1999; Southon, Sauer et al. 1999; Pan 2005; Pan, Hackney et al. 2008). Failures can come from human, technological and organizational issues, and to avoid IS failure, it is necessary for researchers and practitioners to learn from antecedent failures. It appears that there are two effective ways of learning from IS failure. One way is provided by Information Systems Development (ISD) organizations as outsource for IS projects, and the second tends

to come from the internal lessons created by an organization that manages IS projects.

After covering many IS failures produced by ISD organisations, Lyytinen and Robey (1995) concluded that IS failure is an organizational matter rather than a technological matter. They attempt to reformulate the characteristics of IS failure to help developers to absorb the lessons of failure, because “ ISD organizations have failed to learn effective means for solving problems such as project risk and project scope” (p. 86). They claim that learning can be achieved through the sources of knowledge, insisting that knowledge plays a vital role in the development of IS practice. The knowledge involves both internal and external sources that impact the performance of ISD organizations. In addition to a lack of knowledge, Lyytinen and Robey consider ‘theories in use’ to be another to IS success. These theories adhere to typical procedures depending on cause-effect relationships. Different roles have entered the development processes of IS in a way that does not necessarily rely on cause-effect models. They feel that the theories in use appear to have the same characteristics, so developers will feel inclined to apply them mechanistically without including the experience they gained from knowledge. In addition, organizations may differ from one to another, so an IS project might unfold within an organizational culture where ‘fear-based’ culture dominates. Flowers has emphasised this lesson in his discussion of failure cases. Pan (2005) criticized the lack of effort to understand the failure, much less learn from it. Managers could avoid a number of failures by establishing simple steps to be followed during projects. Managers have been advised to learn how to heed and evaluate early signals of failure in the development process (Pan, Hackney et al. 2008).

Southon et al. (1999) dealt with issues related to IS failure, such as organizational and human factors, in order to help clarify the problematic aspects of IS failure that go beyond technology alone. They encourage analyzing the failure and publicising the reasons behind it. During their discussion of a failed situation in complex health organizations, Southon et al. (1999) focused on three coordinating systems that could be implemented simultaneously in different places under a political power from the environment where the systems exist. In this situation, the lessons include the integration between technology, organization and cooperation, which leads to mutual experience among stakeholders during the development and implementation.

Fortune and Peters (2005), in their comment on the opportunity to learn from IS failure, added that the main reason for not avoiding such failure is to learn from mistakes.

3.9.3 Definition of IS Failure

Perhaps the first and foremost criticism to note is that IS failure is hard to define and consequently not well defined (Sauer 1993; Sauer 1999; Wilson and Howcroft 2002). However, different perceptions tend to define the failure upon the view that reflects self-impression, particularly if the systems concern different stakeholders (internal or/and external). Flowers (1996) defines IS failure as “the systems as whole does not operate as expected and its overall performance is suboptimal” (p. 4). This definition suggests IS has many degrees of failure, and the level of failure should be part of the judgment. He categorized failure into four levels of technical and managerial problems.

Wilson and Howcroft (2002) provide a more detailed definition, stating, “System failure is constituted by the system not working properly: it does not perform as expected, it is not operational at the specified time and it can be used in the way attended” (p. 237). They also

mentioned other kinds of failures that are related to the project and the users. In contrast, Fortune and Peters (2005) examined different failure situations in order to define successful IS projects. They state that IS success occurs when “the systems achieved what was intended of it, it was operational at the time and cost that were planned, the project team and the users are pleased with the result and they continue to be satisfied afterward” (p. 13). From this definition, they attempt to set up criteria by identifying six measurements of IS success. If a given project does not fulfil these criteria, then the IS is a failure.

Sauer, who has experience as practitioner, teacher and researcher, clarified that IS projects can be conceived within the organizational project, and these IS projects would consider the people who support the project organization (internal and external) and would link the failure with the termination of those supports. Moreover, he criticized the definition of IS failure presented by Lyytinen and Hirscheim (1987), because their concept is based on the expectation of failure (Sauer 1993).

This review will now derive some highlights from the arguments presented above. For instance, Sauer (1993) raised the idea of termination failure, which is mostly related to the end of development, when the end users operate the system. The definition might therefore correlate to this perception. Lyytinen and Hirscheim pointed out that IS failure could occur when it does not meet one or more expectations of the stakeholders. The failure cannot be illuminated through a single view, so most recent studies try to draw a bigger picture of failure that contributes to adequate understanding. Finally, all definitions of IS failure indicate that undesirable things appear to be going on in the system performance which, in fact, reflect deep concern over organizational, managerial and technical contexts and in turn require an actions to be taken.

3.10 Triangulation of Information Systems Issues

This review has now almost framed the information systems discipline. It is obvious that the trend requires information systems researchers to appreciate other dimensions and be critically concerned with understanding better the problems under investigation. These dimensions are as follows.

3.10.1 Philosophical issue

This has recently been developed within the information systems of scientific and social sciences. It is argued that different results emerged when researchers adopted different i.e. from positivist to interpretivist and to critical (Mingers 2001; Howcroft and Trauth 2004). Walsham (1993, 1995) believed that applying the interpretivist approach in IS would give the researchers insight into social contexts. Mingers (2003) demonstrated the shift of paradigm in IS from positivist toward interpretivist then to critical realism.

3.10.2 Management systems issue

This system offers a wide intrinsic spectrum of options for the systems approach toward the problem under investigation. This variety takes into consideration the metaphorical development in organization theory, which gives metaphorical expressions of how to see the nature of organizations (Jackson 2000; Strati 2000; Morgan 2006). Also, the traditional method has been replaced by the new systems movement that fundamentally applies new ways of thinking and encourages plurality in the management. What is superb is that systems approaches provide researchers and practitioners with various tools and techniques to move freely within the management science. The hard systems thinking is limited, and it is not able to tackle real-world problems due to its objective assumptions. Consequently, soft systems thinkers like Checkland's Soft Systems Methodology, Ackoff's Social Systems Sciences (S3) and Churchman's Social Systems Design begin to address the human activities, whether

individuals or groups, subjectively based on the different perspectives and allow researchers to analyze them in different worldviews “*Weltanschauung*”. The aim behind soft systems thinking is to aid problem solving and decision making in ill-defined situations (Jackson 1991). From this point of view, the social theories have found their place in systems studies, for example Burrell and Morgan’s (1979) sociological framework, Morgan’s (1986) images of organizations and other related theories (Jackson calls them social awareness in the methodology of CST). For instance, the critical systems thinking that was produced to overcome the earlier systems ideas has limitations in dealing with the complexity, subjectivity, conflict and diversity in organizations in the meta-methodologies manner. This integration of social studies into systems thinking is called total systems intervention (TSI) for solving problems in general (Flood and Jackson 1991; Flood and Jackson 1991; Flood and Romm 1996; Midgley 2000; Jackson 2006), and for solving problems in IS (i.e., Broadening the boundaries: an application of critical systems thinking to IS planning in Colombia, (Córdoba and Midgley 2006). Jackson has emphasized that unlike critical systems thinking, the soft of systems methodologies consider the other systems as working together in a coherent manner to produce a successful solution of complexity.

3.10.3 Management of information systems issue

These systems have shifted into more successful orientation for organizations just like management systems. When they first appeared, managing information systems counted on a purely scientific area that examined only computer-based machine and developed mathematical models to serve the designers of information systems (Jackson 1987). This system became obsolete when information was no longer treated through the same concerns. The commitment presented by the first two domains helps to apply different strategies and changed the dominance of machines in the philosophy and organizational matters (Jackson

1987; Checkland 1988; Checkland and Holwell 1997; Jackson 2000; Mingers 2004). In addition, managing information systems changed to reflect the intimate involvement of social affairs with information systems by addressing both actions and actors in such an organization. Peter Checkland has launched soft systems thinking for the enhancement of the issues related to information systems. His soft system methodology is respectfully accepted in IS to tackle human activities in systems. Moreover, the interpretation within the social context has reflected on information systems development. IS benefits enormously from social theories and social thinkers and produces an insight of how society is socially constructed. In addition, social theories have helped to create critical IS research, regardless of whether they concern the individualist or collectivist. Walsham (1993) has accepted the interpretivism approach in IS disciplines, and he believes that the interpretive epistemology pays attention to social construction as a source of knowledge by using hermeneutic process interpretation for the use, design and study of the information systems. In the latest stage, Mingers (2004) hoped that research in IS would address the technical and human perspectives. He aims to re-establish a type of combination that can be applied within IS research and that can bring together different philosophical approaches, different method strategies and different social realities that need to be undertaken (Mingers 2001).

3.10.4 Information Systems and the Role of organization

Within organizational context it is evident that the role of information considerably takes different characteristics from the past which was computer-based circumstances, thus the meaning will be strategically focused on information systems within the role of organization. And the concern, here, is to take into account two pathways of reflection: first, the interrelated fields of social sciences that related directly to the human affairs inside organization, and secondly those scientific fields which fundamentally work on developing such information systems in organizations.

Avgerou and Corford (1998) raise an argument that surround the concept of information systems in organizations. Initially they introduce information systems as new field of study which doesn't have adequate theoretical basis. As result, information systems can be categorized into different views, for example technological, organizational, and human views. Each of which can be studied separately and bring a particular kind of knowledge. Their type of work is more relevant to information systems in organization and principally the purposeful activities that related to the handling human activities in organization. What is interested is that their attempt to study information systems throughout different domains of knowledge, so they acknowledge the contributions given by psychology, organization theory, sociology, computer science, decision theory, systems theory and anthropology as a multidisciplinary field. Finally they state that '*the field of information systems draws concepts and theoretical principles from many other established disciplines in order to understand, explain and guide the development and management of information handling procedures in organizations*' (p.112), and they identify four concepts which is basic for understanding the nature of information systems: information, systems, organization and technology.

Since few decades, Somogyi and Galliers (1987) mentioned that IS had been shifted in attention from computer-based context which originally based on data processing to supporting organizational context through information processing. Thus would require strategy in managing information for better serving in order to achieve organization's goals (Galliers, Leidner et al. 1994).

Managing information systems is considered as a part of the management of organization in the way that the maximum benefit can be achieved to organizations. Besides the process of information toward the flux of information through organizing the internal tasks of the daily

routine works, information systems significantly provide useful information for management. In such a competitive environment there is a consensus that information systems is strategically needed to enable decision makers act correctly in the right way and to improve performance.

Galliers (1995) called for an integration that involve information systems strategy with business strategy in order to achieve successful information systems strategy, and mention that this because of lack of awareness of both managers and information systems specialists which lead to difficulty in the formation of information systems. Accordingly he is identifying a list of seven factors for improving this integration; all these factors carry holistic characteristics that take into consideration the advanced ideas in management studies, organizational theories and social science as well as the new direction of information systems development. Some of them might be useful to be explored (p. 51-52):

- key stakeholders, at all level within the organization (and sometimes in other closely related organization) are involved in, and are committed to, the formation and implementation of the plan;
- the process of strategy formation, implementation and review is integrated into ongoing activities;
- the information systems function is organized and stuffed in such a way that it fits with that of the organization as a whole.

Finally, Checkland and Holwell (1998) see that the most work of information systems can be seen in an organization for the reason of supporting its members and its everyday work. The core concern of information systems is to deal with large quantity of data and information within the organization. They start by criticizing as ignorance the concept of the organization

in IS conference and literature which does not get an attention as problematic concept within two strands of thinking, hard and soft. they examine the nature of IS in organizations, exploring that information systems in the hard strand model is functionally planned and created as goal seeking machine systems to support the organization activity which is aimed at achieving declared objectives that cannot be accomplished in individuals. This model can be rationally mapped into goal seeking frameworks to provide different types of information systems for different levels of organization. For this purpose several models have been suggested, nevertheless, the decision is made at the managerial level activities including plan, control and operation that are relying on provided information systems in order to pursuit organizations' goals.

While the soft strand is set out as an alternative model in organizations which adopts an interpretive approach and that the organization can be seen as social process and differed from being goal seeking model. Similar to hard thinking the attention here is paid to the nature of IS rather than the concept of organization and there is no model of organization is offered amongst those who take this view of organizations. For this reason and other related, Checkland and Holwell refer the dominating of goal seeking model in the literature of IS. Although the dominance of the model which is based on hard thinking view in IS work, they intend to illustrate that the modern organization theory can offer a model of organization which helps to reflect its members to interpret such a situation in their own way.

They explore the work of Silverman 'the theory of organization' which gives different view of the organization as system. Silverman considers an organization as continuous construction of social reality through the meaningful of the interaction of individuals in the society 'social actors', so he suggested an alternative model for organization which is called 'the action frame of reference'. According to them this view would shift the theory from

'taken as given' to different perception of an organization. Also it could be said that Checkland and Holwell adopt the view of organization as presented by Silverman to develop the perception of information systems in organization which lean upon meaningful language reflecting the real world information systems that lead people to take purposeful action and the system itself can be shaped and refined depending on that action carried by people. In a brief summary, Checkland and Holwell see that the successful design of information systems is developed not for the designing itself but for the purposeful action information systems would support. And the potential users and technological experts should be together involved in developing information systems in order to avoid the systems failure in organizations.

4 Chapter Four Literature on Large-Scale Information Systems Failure in the UK Public Sector

4.1 Introduction

Chapters 2 and 3 provide an overview of systems ideas and information systems (IS). Subsequently, this chapter explores large-scale IS failures in the United Kingdom (UK) public sector. To fully understand an IS failure, one must address the context in which the failure occurs. Examining the context of an IS failure begins by reviewing its history, which reveals key events throughout the development of IS initiatives, including errors as well as social, political and organisational factors. Moreover, this chapter identifies the differences between IS initiatives in the public sector and initiatives that are developed for commercial purposes. In addition, this chapter explores some large-scale IS projects that failed to fulfil their intended purposes. Two UK large-scale IS initiatives are reviewed herein: one initiative implemented in the health sector and another implemented in the National Offender Management Service. Both initiatives exhibit the particular complexity and diversity of IS projects in public sector organisations. In general, the two examples were governed, sponsored, and managed as government reforms to improve the organisations' performance by providing efficient IS, which could in turn help to establish better services. It is thus postulated that since these and all other IS projects within the UK public sector have been monitored by public watchdog organisations, the policy underpinning them appears to uphold common procedures for all. By contrast, each IS failure arguably has its own purpose and design to accomplish.

It is worth mentioning that two policies have informed IS initiatives in the UK public sector during the last few decades. The first policy focused purely on technical issues, while the second has since 2000 held business rules. The failed LASCAD designed and implemented

early in the 1990s was based on the former policy, while NOMIS marks a more recent IS failure carried out according to the current policy. The scope of this research focuses on IS failure factors in the public sector as expressed for each of these initiatives.

4.2 4.2 Recognising IS Failure

Failure is a running theme in IS literature (Avison & Fitzgerald, 2006; Fitzgerald & Russo, 2005), in which a major problem, especially in recent years, has been how to define *failure*, largely owing to the different research approaches contributing to the field. Defining the term is both complex and difficult, for the concept requires the scrutiny of the specific social and organisational context in which failure is suspected. Its definition also could be influenced by the views of IS beneficiaries, whatever their degree of involvement.

Accordingly, different studies of IS failure have contributed to how failure is perceived. Wilson and Howcroft (2000) have defined *IS failure* as ‘constituted by the system not working properly: it does not perform as expected, it is not operational at the specified time, and it cannot be used in the way intended’ (p. 237). This definition, however, seems to prioritise the final outcomes of systems that fail to meet demands without considering the full complexity of IS within the interaction of technical and social issues. Along quite a few others, these authors have adhered to a school of thought in IS literature that identifies factors so that the success or failure of IS projects can be statistically measured. This approach of recognising IS failure dominated from the 1970s until the 1990s. In the mid-1970s, for example, Lucas (1975) called for an organisational approach that recognised factors’ impact on IS failure, while in the subsequent decade, Lyytinen and Hirschheim (1987) proposed the concept of expectation failure for recognising social and organisational factors related to IS failure. Lyytinen (1988) further investigated the concept of expectation failure by differentiating failure that occurs during the development stage from that during the usage

stage. In this case, IS failure could be defined either in the development or usage stage based on the interests of stakeholders and their continued concerns. A few years after, Sauer (1993) contributed to literature addressing IS failure by suggesting a framework consisting of three dependent factors—namely, project organisation, supports, and IS—and suggesting that IS failure can relate to sustainable relationships among them. In a comparative study in 1996, Fitzgerald and Russo (2005) used Sauer's (1993) framework to analyse the successful implementation of the LASCAD system compared to the failed one in 1992. It is important to mention that the above concepts have also been explored throughout empirical studies exhibiting the positivist approach.

In time, however, a new mainstream against rationality became accepted across literature addressing IS, its basis stemming from several social studies of technology using an interpretive approach to recognise IS failure. The proponents of this school of thought have tended to consider factors of social realities surrounding IS success or failure (e.g., Fincham, 2002; Mitev, 2000), as demonstrated in the early attempts of IS scholars such as Walsham (1993a, 1995, 2006) and Lee (1991, 2006), who established an inherent structure of interpretive research on IS. Later, Mitev (2000) suggested a social constructivist approach for identifying IS success and failure, pointing out that the interpretive approach can provide different interpretations that help to better recognise the nature of IS. In contrast to objective reality determined through positivism, knowledge of reality in the interpretive approach is shaped intersubjectively, and the shared meaning is a result of human action. In a broader sense, because interpretive studies consider social and organisational contexts of IS failure, their strength lies in their concern for stimulating interactive discourse toward making sense of IS failure. Arguably, a single view is limited in addressing the complexity of IS failure, especially in large-scale projects, thereby underscoring the necessity of considering different

views that subjectively interpret the failure or success of IS. In this sense, what is deemed IS success from one viewpoint might be deemed IS failure by another.

The above discussion on failure elucidates the difficulty of establishing consensus on the definition of IS failure since failure itself is determined by the interrelated perspectives of different causes rooted in technical, organisation and social contexts. Failure is apparent when IS goals are not met by those who define them (Wilson & Howcroft, 2002). Furthermore, Checkland and Holwell (1997) have defined IS through social, organisational, and personal processes in the sense that they affect and are affected by each other. Altogether, the literature in the current study of IS failure has exposed how these themes are critical for understanding problem situations.

The scope of the present study is to examine large-scale IS failures as unique, complex problem situations. Each failure studied here is assumed to have occurred in a particular social context characterised by unique political and social situations and maintained by a set of regulations and commitments. In SA terms, this context refers to ‘the whole system’ made up of subsystems that work together to meet specified goals. Relying on subjectivity, the study assumes that IS failure is poorly defined by positivist and interpretive approaches limited in their recognition of the total picture of the problem. By contrast, the present study considers that IS failure is best recognised as a problem situation in its broadest sense, in which it can be defined well according to the interconnectedness among personal, organisational, and social perspectives.

4.3 Information Systems Failure in the Public Sector

Large-scale information systems initiatives have become a key issue in public sector organisations that perform a large number of computer-based operations. Unfortunately, these kinds of projects are rarely successful and are considered to be risky, despite major government investments in information technology (IT)/information and communication

technology (ICT). Over the last few decades, the UK public sector has witnessed numerous information systems failure projects in different organisations, some of which are addressed in this chapter. When such failures occur, the blame is often directed at the high bureaucracy, rigid hierarchy and autocratic government administration (Horton and Wood-Harper 2006). While these factors reflect manageability issues, the technical reasons invariably reveal that the blame is rightly placed. Further, the pitfall in public sector IS failure is that many interacting components contribute to the failure. In his view on the future of the UK IT public sector, Brown (2001) summarises three problems—software complexity, lack of management and IT procurement—before consolidating them into one overriding problem: lack of qualified managers. Specifically, Brown comments on ‘the lack of sufficient numbers of suitable skilled managers’ (p. 376). The Government’s commitment to modernising IT initiatives in the public sector represents a diligent, ambitious effort to more efficiently and effectively provide services in new ways. This is apparent in an authorised report issued by Cabinet Office in 2000. The report’s vision was based upon a review of previous government IT failed projects in the delivery, the budget and the fulfill requirements. The report was issued after an investigation held in 1999 by the Committee of Public Account, which included the review of more than 25 public sector IT projects from the 1990s. After noting the consistent problems that plagued the reviewed projects, including delayed implementation, inconvenience to the public and additional criticism from the National Audit Office (NAO) (Fortune and Peters 2006), the report’s new vision identifies innovative ways the government can provide IT services to the public sector. The new vision creates an obvious shift in how the project is considered, essentially adopting an IT-project approach. For example, the report states, “A change of approach is needed. Rather than think of IT projects, the public sector needs to think in terms of projects to change the way government works, of which new IT is an important part. Our recommendations aim to achieve this change” (p. 5). This statement

intends to alter the way IT projects are managed in order to evoke desirable change; however, in terms of systems ideas, concentrating on only one project's entities would negatively impact the comprehensive entities that surround the project and are as important as the project's entities themselves. Furthermore, the 'improvement' of coping with the IT public sector reveals that managerial issues are of less concern regarding development, whereby the situation appears more complex than it seems. The report also specifies the following areas for potential improvement: business change, leadership and responsibility, project management, risk management, modular and incremental development, benefit realisation, procurement and supplier, relationships, cross-cutting initiatives people and skills, learning lessons and implementation strategy (Office 2000). Upon initial examination of these areas, it appears that the major focus for improvement is primarily related to managerial concerns. As a result, one is reminded of the claim by Wood-Harper and Horton (2006), which encourages the adoption of a mutual process approach that, purportedly, would shape the future trajectories of IT in the UK public sector. The essence of the mutual process they suggest relies on interaction elements linking technology, organisational context and people within historical and cultural accounts in terms of improving IT public sector outcomes. It should be noted that the terms 'IT' and 'ICT' are used here in their broadest sense, and include software, hardware procurement and systems development, to reflect on government initiatives toward large-scale IT projects. At this point, we narrow our focus to examine the study's topic of IS.

An IS is used by an organisation to provide useful information to its members and customers; this information serves different contexts, including public and private organisations. Moreover, this information is the result of unstructured data that is meaningless before it is processed through information systems development (ISD). According to Avison and Fitzgerald (2006), ISD is the core concern of IS because ISD allows the data to be formulated into a particular context. The nature of the ISD process relies on traditional systems analysis,

or the IS development life cycle (SDLC), which is an iterative procedure consisting of orderly stages that create adequate IS. The procedure may start over when a particular IS no longer fulfills the purposes of its creation. Regardless of any relevant domains that may impact IS development, the procedure is a computer-based structure governed by computer science applications. Therefore, IS failure is defined within technical aspects, while the pursuit of a solution to maintain the IS project depends on an empirical approach (Sauer 1993). In general, this view is short-lived, as it becomes necessary to turn toward organisational and social perspectives due to the complexity of IS failure, although the approach remains empirical. Another noticeable turn is that IS failure accepts an alternative approach that considers people and organisations via a particular social structure in terms of understanding various domains of IS failure (e.g., Williams & Edge 1996, Fincham 2002, Wilson & Howcroft 2002, Mitev 2000 & 2005 and Bartis and Mitev 2008).

Numerous large-scale IS failure situations have occurred in the UK public sector, indicating a variety of causes in both technical and managerial contexts. Unfortunately, multibillions of pounds are lost, time is wasted and the ultimate result is either cancelled initiatives or poor outcomes. Furthermore, lessons learned from the failure become another pitfall in the overall understanding of failure situations, as the notion of failure itself seems to be a multifaceted, controversial concept (Fortune and Peters 2006). Heeks (2006), whose major contributions are dedicated to the success/failure of UK health information (HIS) in the public sector, has argued that the judgment on IS success/failure depends on the assessment subjectivity that can be addressed based on different views. In the HIS initiatives, Heeks (2006) establishes a very generic categorisation that enables each IS to be viewed as a success or failure, essentially labeling each IS as a total failure, partial failure or success, with independent criteria that can shape our judgment. Although Heeks' categorisation is used to identify IS initiatives in health services, it could fundamentally be extended to include any IS project. In

contrast, Fortune and Peters (2006) create a more precise system for categorizing each IS by specifying six criteria by which success is measured. IS success is defined as 'the systems achieved what was intended of it; it was operational at the time and cost that were planned; the project team and the users are pleased with the result and they continue to be satisfied afterwards' (p.13). The six criteria suggested by Fortune and Peters might be another way of creating a bounded subjectivity, as introduced by Heek (2006). Fitzgerald and Russo (2005) claim that the success/failure of an IS project falls into the following two factor types: success factors and failure factors. As argued by Fitzgerald and Russo, success factors relate to potential development process system risks, such as lack of management, top management support, technical complexity, unwilling users, management changes, intangible issues and aligning IT with business. Alternatively, failure factors are associated with broader issues, such as organisational, political and social factors. According to Fitzgerald and Russo (2005), these factors are beyond individual impact and beyond the technical aspect.

In general, the discussion above illustrates how difficulties related to definitions play a central role in considering IS success and failure, particularly those factors that become a matter of argument, such as organizational, social and political factors. To some extent, we essentially agreed with the benefits of identifying a variety of issues related to IS successes and failure factors. However, the more effective approach is to oppose the separation of issues and their relation to each other. Furthermore, rather than viewing an IS project as one of many interrelated parts in a coherent relationship, it is preferable to maintain the factors themselves rather than focus on the nature of the relationships. Narrowing our views would ultimately obscure the whole system.

4.4 Historical Development of the IT Large-Scale Project in the UK Public Sector

At this point, it is beneficial to examine the characteristics of IT large-scale projects in the public sector that develop from extremely simple functions built upon technical concepts to becoming highly complex functions involving socio-technical interactions. Brown (2001) argues that, in the 1950s and 1960s, a gradual use of IT emerged, particularly in the administrative field; in that sense, the public sector developed its own projects via internal specialists. Brown continues by stating that the manner in which IT projects were developed changed during the 1970s and 1980s, when a variety of modes existed, including external providers, in-house providers and joint approaches. According to Brown (2001), this refers to the decrease of public sector IT specialists because it became less attractive. Another movement of the late 1980s and 1990s involved the decision to outsource IT public sector projects and to rely on external consultants and contractors.

Another point regarding the differences between public and private sector IS development is clarified by Flowers (1996), who explains that, in terms of superficial development, they share similarities regarding technology used and system developments adopted; however, unlike private sector IS projects, public sector IS projects are developed to serve specific tasks in a particular context. Accordingly, Flowers identifies five major differences in designing large-scale IS in the public sector:

1. Size of the population intended to serve and the huge data that need to be dealt with
2. Unique application, or 'one-offs applications', rather than off-the-shelf applications
3. Complex public sector IS because they are created based on specific requirements and concern legislations that have developed over the years
4. Long-term development timescale in large-scale IS development, which is influenced by the government operations scale that accounts for alterations
5. Very high costs due to complex requirements and unique solutions that require time to develop in large-scale, public sector IS projects

According to Flowers (1996), the differences extend to the process of building large-scale IS in the public sector, resulting in the need to account for numerous factors. The differences reflect technical, organizational, managerial, social and political themes, and require examining how the public sector is managed and which key themes impact IS. This can be accomplished by briefly exploring two major IS cases that occurred within the past few decades in the UK. Exploring these cases is important because they demonstrate different tasks of a public sector IS project and because the current study focuses on the managerial perspective, which reveals issues based on the management system for each situation. The two IS failure cases are chosen because they represent a certain context in the UK public sector and because they occurred in two time periods, with a historical gap of 20 years. In both cases, the emphasis will be on the complexity of IS failure.

4.4.1 London Ambulance Service Computer-Aided Dispatch System Project (LASCAD)

The London Ambulance Service Computer-Aided Dispatch (LASCAD) system project was created to automate the UK ambulance service dispatch system (Beynon-Davies 1995). Managed by the National Health Services (NHS), the purpose of LASCAD is to improve the standard performance for ambulance dispatch systems in the capital city. Instead of using human labor to process the details of emergency calls, the LASCAD system aims to decrease the response time by ambulance dispatch services, and to avoid problems caused by a paper-based work process. Accordingly, LASCAD is designed to systemise the emergency call procedure as an event-based system (Beynon-Davies 1995). Essentially, LASCAD is expected to provide up-to-date information about location and status, which enables the ambulance dispatcher to appropriately decide whether an ambulance needs to be dispatched to a potential patient. The geographic information system (GIS) identifies the patient's precise location as well as the closest three ambulances. In addition to providing the patient's

location, the GIS helps the ambulance dispatcher ensure that the ambulance is heading in the right direction. Moreover, the automated functions of the LASCAD system monitor multiple activities from the time of the initial emergency call until the ambulance arrives. Flowers (1996) argues that the project's proposal was innovative, as it brought together a number of activities in a single system. LASCAD implements a combination of computerised call taking, vehicle location mapping and automatic resource allocation, which is unique to the UK. Initially, human intervention was identified in the operation system, such as receiving, coordinating and monitoring calls. Fitzgerald and Russo (2005) intended to examine another LASCAD system that was implemented in 1996. In the development of an IS project, the study uses Sauer's (1993) triangle dependencies framework, which was used by Beynon-Davies (1995) to study LASCAD. The study's outcomes derive from the four factors suggested by Sauer's framework: environment, IS, project organisation and supporters. The study concludes that the elements often identified as failure factors might be considered successes under different circumstances.

The timeline of the LASCAD project was first set in 1987 with a budget of 3 million pounds for voice transmission only. After its initiation, the project encountered numerous obstacles before NHS pronounced it to be a total failure in November 1992 (Flowers 1996). Reportedly, several patients died en route to hospital or before the ambulances arrived. An overall it was commented that the LASCAD had fallen into chaos (Partridge 2010). In 1996, LASCAD had a far more successful implementation after issues of project failure were addressed. In their comparative study, Fitzgerald and Russo (2005) analysed the two projects by applying Sauer's (1993) framework in order to examine the flow among three dependent elements. They noted that the turnaround of LASCAD was able to overcome the previous dilemma of processes related to the organisational project, the IS, and its supporters.

4.4.2 National Offender Management Information System (NOMIS) Project

A recent large-scale IS initiative considered to be a failure is the National Offender Management Information System (NOMIS), which is a 4-year project managed by the Home Office before it was transferred to the Ministry of Justice. The objective of NOMIS was to implement a single information management system across prisons and probation services. The integrated system was intended to work as an end-to-end offender management system to reduce the risk of recidivism in society. Therefore, the single approach project was expected to allow offender managers to monitor offenders in prison and in the community (NAO 2009). At the time, the failure of NOMIS was the lead story in the media, including TV and the press (BBC 2009; Telegraph 2009). Central to its failure were the key management issues, including rising costs and delays. According to the official report issued by NAO (2009), the project started in June 2004 and the cost estimation was £234 million with an end date of 2020. Despite the set project budget and date, the costs continued to rise and the delivery dates continued to be delayed. According to the NAO (2009) report, in 2007, the lifetime cost estimation had risen to £690 million, and an initial delay was reported. Moreover, in the same year, the project was transferred to the Ministry of Justice. According to Partidge (2010), the project has faced mismanagement and uncertainty, which resulted in issues regarding planning, finance and technical complexity. NAO head Tim Burr stated that ‘these problems could have been avoided if the National Offender Management Service had established realistic budget, time scale and governance for the project at the start and followed basic project management principles in its implementation’ (BBC 2009).

Based on the two aforementioned projects, the complexity has been found to exist in every part of each project: a combination of interrelated elements, various power relationships, the involvement of public and private organisations, and the engagement of internal and external stakeholders. To some extent, every factor brings a degree of complexity to the organisational,

social, political, technical and human levels within a particular context. Each level appears to be a highly complex entity unto itself, which accentuates the IS failure in complex issues. In addition, the lessons learned from an IS frequent failure in public sector initiatives are limited. According to Brown (2001), the public sector initiatives encompass numerous organisations with differing objectives. Therefore, Brown elucidates, the key players of IS initiatives should become part of the learning process because of their capability of identifying mistakes, learning from each other and transferring learned lessons to others in the public sector.

4.4.3 Summary

One aspect of this study is aimed at divulging the UK's large-scale IS failure in the public sector. This chapter identifies the key issues in understanding the complexity of IS projects in the public sector, which are different from IS commercial projects in two main areas: design and building processes. Frequent failures of large-scale initiatives are a main concern in the UK. Historical revision shows that IS failures refer to a variety of interrelated factors that are inseparable in order to avoid such failures. LASCAD was expected to improve ambulance dispatch systems, but failed to achieve the intended purpose. Furthermore, NOMIS was promised to implement a single system to manage offenders in prison and the community; however, it was another large-scale public failure.

5 Chapter Five Research Methodology

5.1 Introduction

The literature presented in Chapters 2, 3 and 4 reveal the gap in coping with complexity when dealing with the failure of information systems (IS) projects. Jackson (2000) explored the effectiveness of systems thinking in dealing with real-world problems holistically through the use of diverse problem-solving strategies. Management science usually takes control of all operations within the organization to achieve a high degree of integration in terms of achieving the organization's goals. IS literature suggests that the failure occurs as a result of social, managerial and technological circumstances. Thus a variety of stakeholders and activities, both internal and external to the organization, are involved in the project process. The debate extended to include how the system is provided, whether by internal or external sources. Since IS structures are primarily developed by an external provider, relations among different organizations may positively or negatively impact the project work.

The chapter five begins by addressing the philosophical views that underpin contemporary IS and management systems research, including research paradigms and research strategies. The chapter then explains and justifies the research approach, considering causes for applying a critical approach as an appropriate approach in the current study. The strategy of research design is, therefore, discussed to clarify how the researcher applied systems activities at various stages of investigation. A variety of qualitative data gathering is chosen to provide a better understanding of large-scale information systems failure in the UK public sector. Each type of data is set to serve one particular phase of systems activities (i.e., appreciation, analysis, assessment and action).

This study concentrates on managerial perspective, which is expected to involve different stakeholders: managers, academic staff and professionals. Therefore, the ethical issues in social studies, management systems and IS will be detailed.

5.2 Research Methodology: An Overall Structure

Despite considerable efforts in recent decades toward minimising the continued failure of large-scale IS projects in the UK public sector, genuine progress has remained limited. This struggle is evident in the literature concerning IS failure in general and in the UK public sector in particular. The two stances of IS failure explored reveal uncertainty associated with different issues that might be deemed less important to examine, while the major emphasis falls on considering the technical perspective of IS failure. However, the inability of the technical perspective to adequately gauge success recommends investigating organisational factors related to IS failure. While most previous attempts have followed the positivist approach derived from the natural sciences or the interpretive approach derived from social science, the SA can offer useful insights into improving the situation of IS failure because it focuses on the total components of the system and the pattern of interaction among them. Interestingly, the SA also accommodates a systemic intervention based on stages of practical activities in which participants involved share their knowledge and backgrounds. The present research thus posits SA as an alternative approach for mitigating the complexity of IS failure and for suggesting methodological activities generated from the research questions and objectives. Figure 5.1 shows an overall structural view of the research methodology.

5.3 Philosophical Argument

5.3.1 Research Paradigms

Establishing a particular philosophical position is the core concern of scholars who carry out a paradigm for coherent research. It has been suggested that philosophy is key to answering research questions (Bryman and Bell 2007; Saunders, Lewis et al. 2009); as stated by Wikgren (2005), 'research is always a question of making choices' (p.11). Therefore, when undertaking research, it is appropriate to examine a series of interrelated matters (e.g., ontology, epistemology, methodology, techniques and tools) that reflect certain assumptions and help conduct well-designed research.

Within the context of management and business, there are various philosophical views regarding how research can be undertaken. However, it could be argued that researchers have reached a consensus, establishing the following four explicit approaches as the premised alternative paradigms in management science:

- 1- **Isolationism** rests on the view of Burrell and Morgan, who identify four irreconcilable paradigms for conceiving the world: interpretive, functionalist, radical structuralist and radical humanist. A single paradigm should be followed in order to conduct research.
- 2- **Imperialism** relates to the dominance of a specific paradigm (e.g., the priority of positivism for reasons such as accuracy and rigor).
- 3- **Pragmatism** is opposed to the other positions in management science where the theory contrasts what works in practice. Accordingly, it is tool-kit technique that can be used and developed in real-world situations by managers facing complex social problems.
- 4- **Pluralism** considers a variety of paradigms in a research project. Mingers divides pluralism into three categories: loose pluralism, which is flexible enough to support a variety of paradigms and methods; complementarism, which takes into account different

paradigms for different research questions; and strong pluralism, which gives rise to combining methodologies from different paradigms in the research.

These four alternatives strategies have been extended by Flood (1989a) to include two forms of imperialism and isolationism. The focus in current research will be on pluralism because it is the core concern in critical systems thinking (CST) for addressing ‘problem solving’ strategies (Jackson and Keys 1984; Flood 1989; Flood and Jackson 1991; Jackson 1991; Jackson 1991; Midgley 1992; Mingers 1992; Brocklesby 1995; Midgley 1995; Flood and Romm 1995c; Gregory 1996; Mingers and Gill 1997; Jackson 1999; Jackson 2001; Mingers 2003a).

In CST, the methodology refers to the strategy used to investigate real-world problem situations. Jackson (1991) emphasizes exploring and gaining knowledge about systems in order to apply a set of methods used to intervene and make changes. Moreover, Jackson differentiates between methodology in social sciences and systems movement; the former is used for learning about the world while the later is dedicated to intervene and change it. Social sciences offer strong theoretical bases about ontological and epistemological assumptions in terms of gaining knowledge; however, it neglects social reality. In contrast, systems thinking is based on changing organizations and society, while it is weak on theory. Nevertheless, Jackson attempts to use the word ‘methodology’ based upon the implications of theory and practice rooted in both social sciences and systems thinking. Thus, Jackson’s position explicitly emphasizes theoretical consideration as a foundation for his set of methods. Because they are vital to systems methodology, it is important to note the following three research field divisions of systems thinking that were mentioned by Jackson (2000): research of systems thinking in different disciplines, research of systems thinking itself, and research of systems thinking for problem-solving.

Checkland and Holwell (1998) identified the research pattern of systems methodology by considering the link between methodology, theory and practice, which are relevant to any kind of research. The starting point of Checkland and Holwell is to specify the relation between theory and practice in research development, which conceptualizes the situation where a purposeful action is taken by researchers within systems thinking to improve real-world problem situations. According to Checkland and Holwell (1998), any research effort about ideas in the world (theory) and having experience in it (practice) ultimately concludes that theory and practice create each other in a continual relation. As shown in Figure 4.1, this is called the learning cycle, where ideas and experience are modified by each other based on particular people in a particular context of time, place and ideas. The research pattern above is the core concern of the soft systems methodology (SSM) approach developed in the early 1970s by Peter Checkland in addressing human affairs, which was widely carried out within the systems community as a framework for designing research methodology. Another point that Checkland (1999) relates to SSM is how an observer perceives the real world in the context of two academic positions after the emergence of the soft systems approach. The first 'hard' systems thinking approach views the world as comprised of many systems that can be engineered to make sense of our experience. The second 'soft' systems thinking approach views the world as messy, complex and fuzzy because it involves human beings, which implies that we experience it constantly. In the soft systems thinking, places importance upon how individuals perceive problem context in reality. Its thinking stems from the idea that any problem situation encompasses individuals and groups with different viewpoints, or *Weltanschauungen*, of the situation. This principle of course complicates interpreting problem situations because there are always numerous, sometimes innumerable, worldviews that need to be taken into account. The concept of *Weltanschauung* refers to Checkland's (2006) SSM for solving complex real-world problems, which maintains that *Weltanschauung*

is the most important concept in understanding the complexity of human problem situations. Therefore, when connecting systems methodologies to situations, we offer systemic intervention that takes into account theory and practice in a learning cycle of cumulative knowledge (Checkland and Holwell 1997; Jackson 2006). In terms of intervening in the real world, Jackson (1991) and other systems thinkers reflect on the sociological paradigms framework developed by Burrell and Morgan (1979) to establish methodological principles for the systems researcher to learn and intervene into the real world. This includes certain assumptions being stated explicitly or implicitly about reality and the social world.

Another point worth mentioning is that various terms are used within contemporary systems methodologies. These terms, such as ‘holism’, ‘complementarism’ and ‘pluralism’, are prominent in research on systems methodologies and refer to the use of different methodologies and methods in combination. The three terms themselves and the way they are used have become a debatable issue among systems thinkers. Although it is not within the scope of this research, it is worth noting these terms to reflect on the standpoint of systems thinkers and how they have addressed the terms over the past few decades.

It could be argued that the term ‘holism’ seems to be the earliest one used by systems movement forerunners in terms of distinguishing the new strand of thinking from the traditional thinking of reductionism. For instance, biologists’ contributions to systems thinking were dedicated to studying the organism as a whole in order to surpass the limitation of scientific theories in explaining its behaviour; thereby constituting the orientation of systems concept (i.e., Henderson and his concept of equilibrium). Churchman (1968) introduces the systems approach as a new way of thinking about the total system: ‘the whole’ which is made up of component ‘subsystems’.

The terms ‘complementarism’ and ‘pluralism’ have been used interchangeably within systems research and practice over the last 30 years. Both terms deal with the diversity and complexity of the problem situations, which require the use of different systems methodology. The discrimination is seen in the details of systems scholars through the adoption and the manner in which one of them is used. In the early 1980s, the term ‘complementarism’ emerged as one of three positions underpinning the philosophy of critical systems-thinking alongside critical awareness and emancipation. Complementarism reflects methodological pluralism that is used in the systems community to explain the procedures conducted to intervene in complex problem situations. The procedure includes a combination of systems methods that are designed in a complementary way for effective implementation. In contrast to pragmatism, which is considered to be a tool-kit technique, complementarism accepts different methodologies that reflect different theoretical positions, particularly in the systems movement where a range of systems methodologies have existed. Therefore, it could be argued that complementarism is a metatheory perspective to examine the strengths and weaknesses of different systems methodologies in terms of using those methodologies as complementary (Midgley 1995). In the early 1990s, Flood and Jackson developed an approach based on a complementarism or methodological pluralism approach called total systems intervention (TSI) as a creative problem-solving strategy (Flood and Jackson 1991; Flood and Jackson 1991; Flood 1995b). The complementarist position reveals that systems thinkers appear committed to theoretical consideration as well as practical action, which requires using different systems methodologies for tackling a particular situation.

A parallel term discussed herein is ‘pluralism’, which becomes the centre of systems methodologies research. The emergence of pluralism in systems literature reveals its long history in the systems movement—since Jackson and Keys developed the systems of systems methodologies (SOSM) framework (Jackson and Keys 1984)—which allows for the use of a

variety of methodologies in a complementary approach. Some also claim that pluralism takes different forms (Gregory 1996), emanating from the need to deal with the diversity of problem situations. However, pluralism associates with the use of systems methodologies (hard, soft and critical) or mixing up methodologies in the study. Moreover, pluralism is widely accepted because it offers different lenses for different aspects of a problem situation.

Finally, based on Jackson's work in critical systems-thinking, Zhu (2006) gives terminological, contextual insights into 'complementarism' and 'pluralism' in terms of research on systems methodology (RSM). In so doing, Zhu traces the transformation based on the dominance of one preference during the history of systems science. Regarding terminology, Zhu has paid attention to definitions in *The New Oxford Dictionary of English* and asserts that there tends to be an obvious difference between 'complementarism' and 'pluralism'. Contextually, Zhu's historical review shows that the word 'complementarism' essentially dominated systems literature during the 1990s before it was completely replaced by the word 'pluralism'. Zhu claims that, while this replacement was intended by Jackson, it can only be addressed in the essence of his work. Thus, within the contextual aspect, Zhu argues that the primary difference is in the way Jackson presents his work. It could be said that the debate about 'complementarism' and 'pluralism' raised by Zhu is important for those who study systems science and find it difficult to differentiate between the two terms.

5.3.2 Pluralism in Critical Systems Thinking

Earlier in this chapter, we noted that, while systems science is strong in practice, it has weaknesses at the theoretical level that underpin methodological pluralism. We first borrow Jackson's definition of pluralism, which reflects pluralism in its broadest sense. Pluralism is defined as 'the use of different methodologies, methods and/or techniques in combination' (Jackson 1999, p. 377). Later, Jackson (2000) defines pluralism more precisely: 'pluralism

needs, as an approach to managing complex problems, to employ a meta-methodology to take maximum advantage of the benefits to be gained from using methodologies premised upon alternative paradigms together, and also encourage the combined use of diverse methods, models, tools and techniques, in a theoretical and methodological informed way, to ensure maximum flexibility in an intervention' (p. 387). Several versions of plurality have been suggested for intervention methodologies in critical systems-thinking. This section attempts to summarise three versions of pluralism in management science: Flood and Jackson's complementarism, Gregory's discordant pluralism and Minger's critical pluralism. The form of pluralism created by Jackson and Flood has been distinguished from other forms of plurality offered in critical systems-thinking (Midgley 1995). The position taken by Flood and Jackson toward methodological pluralism can be better pursued in their proposition of 'system of systems methodologies' as a theoretical basis, and TSI approach in a practical sense. It is apparent that Jackson and Keys (1984) intended to constitute a theoretical framework in terms of classifying different approaches based on the nature of the problem context, which then provides guidance in choosing the most appropriate methodology. Later, Jackson and Flood embodied the SOSM framework to develop a complementarism approach toward the 'problem solving' strategy, called TSI. Although the systems community acknowledges TSI as a pluralist approach, it has been criticised by different scholars. In the section of 'incommensurable paradigms', we cover a wide range of issues relating to systems literature, however, in this section, the concentration is on issues associated with research methodology.

Midgley (1995), for example, criticizes the theoretical position taken by Flood and Jackson about pluralism in critical systems-thinking, and highlights a number of problems in their positions. One of these problems relates to the way Flood and Jackson understand methodological pluralism in critical systems-thinking, rejecting the 'metaparadigmatic'

approach that coordinates the use of other paradigms. Midgley's point is that CST has its unique assumptions, which establish a new paradigm despite assumptions derived from other systems paradigms. In response to Midgley's claim, Jackson's oppositional stance is that paradigm diversity seems to be required for the greatest benefits of pluralism.

'Discordant pluralism' is another version of pluralism that has been proposed by Gregory (1996) in critical systems-thinking. Gregory's account on pluralism has addressed some constraints on Flood and Jackson's complementarity. Gregory claims there is a lack of dealing adequately with dissension or 'critical appreciation', further stating that 'complementarity provides no clear guidance on how to undertake either an ideology critique or a process of self reflection, it does not have the potential for overcoming this constraint' (1996, p. 39). It is noted that Gregory adopts the term 'complementarity' instead of the term 'pluralism' to draw on the work of Flood and Jackson to distinguish her pluralist position 'discordant pluralism' from that of Flood and Jackson at theoretical methodological levels. For instance, Gregory accepts a degree of discordant theoretical approaches to support each other, where the proponents of complementarity employ theoretical approaches in a complementary way.

Lastly, we will discuss the critical pluralism of Mingers, who has widely contributed to operation research, management science and IS and witnessed the transformation systems community from the hard systems approach to soft systems and, further, to critical. Reflecting on this background, Mingers has reconstituted his view of the critical pluralism approach based on the legacy of Habermasian critical thought and former philosophers such as Kant, Hegel and Marx. Thus, Mingers's critical pluralism is one feasible approach that is carried out in critical systems-thinking; however, compared to other pluralities, it has a

distinctive practice with implications in the context of multimethodology that are employed for an intervention.

Critical pluralism is a multimethodological context approach that relies on an agent or a practitioner who takes action in a situation that is considered to be problematic. This requires two forms of continual activities: actual action, which is related to the problem situation; and critical reflection about the intervention related to the action and methodologies that are conducted. Initially, Mingers stated that ‘the general context for the use of multimethodology is the purposeful engagement of agent(s) with some aspects of their social or organisational world’ (1997, p. 419). Further, Mingers draws on theories and frameworks to facilitate the use of this general context in terms of designing a multimethodology approach for intervention. The work of Checkland and Cropper on three national systems is a key principle for developing the general context of multimethodology (Mingers 2003a). Mingers’s model counts on three main elements: the problem content system (PCS), which concerns the real-world situation; the intellectual resources system (IRS), which considers available theories and methodologies that are relevant to (PCS); and the intervention system (IS), which includes the agents, participants and existing resources for the intervention. The relationships (labelled A, B and C) between the three systems are important for designing successful multimethodology relationships (A) between agents and theories/methodologies, (B) between the agents and the situation and (C) between methodologies/techniques and the situation (see literature on system for more details). These relations help address the way in which the intervention is designed (Mingers and Brocklesby 1997; Mingers and Gill 1997; Mingers 2006).

Having determined the three national systems and the relationship between them, Mingers continues to develop the suggested framework for mapping methodologies through linking

the theory of communicative action (i.e., social world, personal world and material world) and phases of an intervention process (i.e., appreciation, analysis, assessment and action). This would lead to two types of frameworks: the first combines different system methodologies in the intervention and the second decomposes methodologies (i.e., techniques and tools) and links them together at various stages of the intervention.

The predisposition toward pluralism in critical systems-thinking clearly seems to be required to treat the diversity, complexity and conflicts of real-world problematic situations. As shown in the following comparisons, pluralism is produced by Flood and Jackson's total systems intervention and Mingers's critical pluralism principles:

- Both developed their work based on Jurgen Habermas's critical thought. Flood and Jackson proposed the theory of knowledge constitutive interests for developing the methodological pluralism approach (TSI), and Mingers adopted the theory of communicative action for the strand of critical pluralism.
- Both can be taken as theoretical considerations for the pluralism approach that drives the combination of methodologies, methods and techniques for real-world problematic situations.
- Both accepted the incommensurability of the multi-paradigm to deal with the complexity of real-world situations.

Finally, it should be acknowledged that pluralism has dramatically influenced applied systems thinking, which is the practice phase for systems methodologies, focusing on the agent(s) who challenges a real situation in social and organisational systems in order to bring about change while maintaining a stance of critical reflection in employing the most suitable methodologies for real activities. Further, pluralism's powerful approach is apparent in management science as a problem-solving strategy for managers, planners and decision

makers, whose objective is to involve systems practice activities (e.g., methodologies and techniques) within a particular context and deal with the inevitable complexity and uncertainty in organisations.

The theoretical framework provided by the pluralism approach could guarantee the essence of the following three commitments expressed in the critical systems thinking in its broader perspective: critical awareness, emancipation or improvement and methodological pluralism. However, some debatable issues amongst a number of systems thinkers remain fundamental after 20 years. One of these issues is the philosophical underpinning of critical systems thinking. Pursuing this claim briefly reveals some systems thinkers' ideas. Flood (1990) gives rise to an early call for liberating systems theories, exploring the three competing traditional approaches and emphasizes the impact of social theorists Habermas and Foucault. Brocklesby and Commings (1996) propose Foucault's thought as a possible alternative to the philosophy underpinning critical systems thinking. Brocklesby and Commings assert that the lineages of Habermas and Foucault are rooted in critical thought, which refers to a number of philosophers, such as Kant, Hegel and Marx.

As illustrated by Brocklesby and Commings, the systems community identifies critical systems thinking throughout the work of Jackson and, subsequently, Flood as a new idea in the systems movement. Their methodological pluralism approach of TSI was mostly embodied in Habermas's human emancipation perspective. Consequently, it is widely accepted that critical systems thinking has traditionally dominated Habermas's work of critical theory (Flood 1991; Jackson 1991; Brocklesby and Cummings 1996; Midgley 1996; Jackson 2000). Nevertheless, more recent work draws on other philosophical positions, which can primarily be explored via Midgley's systemic intervention approach. To develop a philosophical basis for the systemic intervention approach, Midgley (2000) reviews a

number of philosophical stances, including those of Habermas and Foucault, to support his process philosophy as a suitable basis for theoretical pluralism. Midgley believes that Foucault's work is more compatible to establishing an alternative theoretical framework for critical systems thinking. Mingers (2006) articulates his position toward this debatable issue in a more flexible and conciliatory manner. On the one hand, Mingers identifies a contradiction between the works of Habermas and Foucault regarding the limits of rationality and the nature of power. On the other hand, Mingers does not ignore the minor differences and the opinion that the two works are considered to be complementary. Ultimately, Mingers adopted this position in developing the multimethodology approach.

5.3.3 Critical Research Approach

This section briefly examines critical research within the applications of CST and IS since they are based on scientific disciplines. Due to new activities associated with the organisational and social nature of their applications, CST and IS have both shifted toward adopting the critical approach. A variety of key similarities between IS and CST are apparent in the critical approach aspect. One remarkable similarity is that IS and CST have been widely influenced by the Frankfurt School and its philosophical contributions to the social context. Herein, an attempt is made to separately trace the development of critical approach in IS and CST before we explore other attempts at applying systems approach applications to an IS situation.

5.3.4 Critical Research Approach in Information Systems

It is commonly known that IS research is dominated by a positivist paradigm, wherein a set of assumptions is developed to empirically yield aspects within information systems development (ISD), such as hypotheses about system structure, analyst requirements, user value and behaviour. On the other hand, an alternative set of assumptions based on different

paradigm(s) may lead to different outcomes (Hirschheim and Klein 1989). Orlikowski and Baroudi (1991) note that, between 1983 and 1988, a major percentage of IS research used a positivist paradigm; however, two other paradigms increasingly participated, including interpretivist and critical paradigms.

The emergence of interpretivist paradigms allow IS researchers to presume that the reality is socially constructed and flexible enough to examine different perceptions in terms of shaping our understanding of IS. This becomes especially apparent in the development of various socio-technical theories (e.g., social construction of technology approach (SCOT)), which take into consideration the view that technology can be socially constructed and interpreted (Doherty, Coombs et al. 2006), as well as the social shaping technology approach (SST) for technology foresight (Williams and Edge 1996; Jørgensen, Jørgensen et al. 2009). Numerous IS scholars either contributed to the interpretivist paradigm in research (Walsham 1995; Myers 1997; Myers and Avison 1997; Lee 2004; Walsham 2006; Lee 1991) or adopted it in particular situations, such as IS evolution (Wilson and Howcroft 2005; Stockdale and Standing 2006; Lee 1991) and success and failure in IS development (Lyytinen and Robey 1999; Mitev 2000; Fincham 2002; Wilson and Howcroft 2002; Mitev 2005; Bartis and Mitev 2008). It could be argued that the interpretivist paradigm has taken an advanced step in shaping the relationships between IS as a technical aspect concerned with technology and society as human and organizational aspects benefiting that technology. The third paradigm underpinning IS research is the critical paradigm. The term 'critical' in IS is used to refer to the Frankfurt School, which reflects one common ground with critical work in systems thinking, and its insight of seeing the nature of knowledge in the social reality. Although the majority of critical IS research was based on Habermas' work, other critical positions streams included Foucault and Bourdieu (Table 5.1). Mayers and Klein (2011, p. 17) stated that

‘critical research in IS is concerned with social issues such as freedom, power, social control and values with respect to the development, use and impact of information technology’.

According to Orlikowski and Baroudi (1991), the philosophy of the critical paradigm embraces the following three persuasions in terms of undertaking critical research in IS: persuasion about social reality, which is historically constructed; persuasion about the nature of knowledge ‘epistemology’, which is the result of social and historical practice; and persuasion of the relation between theory and practice, which is the role of research. Their argument extends to distinguish the critical paradigm from the other two paradigms, positivist and interpretivist. The critical paradigm differs because it critiques existing systems and exposes potential conflicts in social reality in order to change the structure of existing systems, whereas the positivist and interpretivist paradigms focus on predicting and explaining the status quo. In addition to the Frankfurt School’s work on both disciplines, one commonality between IS and CST is that they both challenge the status quo situation, specifically the existence of social systems and the inevitable conflict and construction in the systems’ structures. Challenging the status quo situation in this way entails assuming a state of instability in social relations throughout the process.

Article	Critical Research Stream	Research Method	Theoretical Focus	Key Finding
Lyytinen and Klein (1985)	Habermas	Conceptual study	Habermas’s theory of knowledge interests applied in IS development	IS should be designed not just for organisational effectiveness, but also to emancipate people from ‘undesirable social and physical constraints’
Ngwenyama (1991)	Habermas	Conceptual study	Habermas’s theory of knowledge interests applied in IS research	Since critical social theory’s primary objective is ‘the improvement of the human condition’, IS research should be oriented toward practice
Hirschheim and Klein (1994)	Habermas	Conceptual study	Critical social theory applied to IS development	Emancipator principles from critical social theory can be implemented using Mumford’s (1983) systems development methodology, ETHICS
Ngwenyama and Lee (1997)	Habermas	Conceptual study	A critique of information richness theory using critical social theory	Critical social theory reveals that the validity or richness of what is being communicated is pivotal
Doolin (2004)	Foucault	Case study	Foucault’s theory of disciplinary power applied to IS	A new medical information system made the doctor’s work more visible; however, doctors successfully resisted the ‘gaze’ of this new form of surveillance

			implementation and use	
Kanungo (2004)	Habermas	Case study	Habermas's theory of communication action	The establishment of knowledge centres in an Indian village had emancipatory consequences
Levina (2005)	Bourdiru	Ethnographic field research	Practice theory applied to multiparty IS development	Power conceptualised as both institutionalised and emergent in ISD project
Kvasny and Keil (2006)	Bourdiru	Two-case study	Bourdiru's concepts of habitus	Providing free technology access is an oversimplification of the digital divide problem

Table 5-1 Key Characteristics of Selected Critical Research Articles in IS

In an attempt to reflect on social reality produced by humans, Walsham (2005) builds upon the three persuasions of critical paradigm in IS research produced by Orlikowski and Baroudi, linking them to the existing world where power and wealth become primary factors of the status quo. As stated by Walsham, adopting the critical approach should enable the exploration of current social situations, based on historical and cultural contexts, in order to encourage positive change. To facilitate such an exploration, Walsham proposes using the word 'engagement' to support the third persuasion for critical IS research 'role of research', as produced by Orlikowski and Baroudi (1991).

According to Walsham, the term 'engagement' is a critical research concept that implies various meanings. Engagement is a somewhat long-term approach to addressing deep-seated historical and cultural social issues during the examination of complex situations. One meaning of the word produced is that of an undertaking course of action. Further, the term connotes a military metaphor as one of its meaning, which reflects the rigorous type of engagement that is necessary to confronting powerful, vested situations. Walsham's suggestion of engagement is a descriptive term in its sense of a duty or moral commitment. Therefore, it is associated with three questions—'why, what and how'—that reflect the social involvement of IS researchers. A recently edited handbook on IS critical research (Howcroft and Trauth 2005) includes several ideas about key themes in IS critical research, including theory and application. Editors have argued that the critical approach is essential to enriching

IS research, noting that a considerable amount of research from different disciplines appears to support the critical approach. This, in turn, led the editors to examine critical orientations that are generally recommended for addressing various issues such as power, freedom and social control.

Myers and Klein (2011), who conduct the critical approach in IS, take a more obvious stance regarding this issue in exploring three research paradigms. The first research paradigm was proposed by Burrell and Morgan's framework (1979), which suggested four research paradigms: 'functionalist, interpretivist, radical humanist and radical structuralist'. The second paradigm was suggested by Guba and Lincoln (1994) and takes into account four paradigms for research: positivist, post-positivist, constructivist and critical. The third paradigm was proposed by Orlikowski and Baroudi (1991) and adopts three classifications of research paradigms: positivist, interpretive and critical.

Myers and Klein (2011) criticize Burrell and Morgan's framework for its inability to cope with current research directions. Myers and Klein note that the framework suggested by Guba and Lincoln confronts major issues related to classification, and further state that the classification of Orlikowski and Baroudi (1991) is widely acknowledged within IS research. In fact, their central concern is to suggest a set of principles in terms of conducting critical IS research. These principles are associated with three elements—insight, critique and transformation—each having its own principles.

Another contribution to critical IS research is critical interpretivism, which Doolin and Mcleod (2005) argue aims to transcend the merely descriptive attempt about what IS researchers perceive and understand about the phenomena in its social nature. Critical interpretivism has its origins in critical social theories, as previously discussed, but focuses on the hidden agenda that challenges an organization's status quo, including assumptions and

certainties. Further, power and control of human interaction is broadly considered. Therefore, we conclude that Foucault's view on power has formulated the general ideas of critical interpretivism.

Finally, based on the discussion above, it is evident that the current mainstream in IS research tends to legitimise a critical approach. It has become widely accepted and argued that the critical theory could be helpful to conducting more thorough investigations.

5.3.5 Critical Research Approach in Systems Thinking

Critical theory emerged in management and organisation studies in the late 1970s-early 1980s (Alvesson and Deetz 2000). Thus, it is conceivable that systems scholars experienced critical research a few years earlier than critical IS researchers in the late 1980s, despite the priority given to overcoming systems limitations in dealing with the increasing complexity of the contemporary world. Jackson (2000) reveals these limitations when exploring the origin of critical systems-thinking. In contrast, critical social science offers opportunities to enhance the way systems scholars cope with real-world situations, whereby critical research deals with a particular social condition.

Remarkably, a number of soft systems thinkers and critical systems thinkers within the systems community employ ideas in IS within a variety of themes (e.g., IS development, IS requirements analysis, client-led design and IS planning) as the theoretical framework underpinning IS (Checkland 1995; Mingers 1995; Stowell 1995; West 1995; Checkland and Holwell 1997; Jackson 1997; Córdoba and Midgley 2006; Córdoba 2009; Córdoba 2010). In the late 1980s, Peter Checkland called for unity between IS and systems thinking, and used soft systems methodology (SSM) in IS (Checkland 1988). Checkland (1995, 1997) demonstrates a set of roles for conducting the SSM approach in IS research, believing that systems thinking could offer an approach for IS. Further, Checkland deems social

implications and human activities to be equally vital to the technical aspect of IS development.

In CST, Jackson (1992, 1997) examines how IS can yield an integrated approach from CST ideas, concentrating on two points. The first point focuses on relevant social theory, which states that ‘critical systems-thinking can function as an effective conduit, channelling relevant social theory to the applied disciplines’ (Mingers & Stowell, 1997, p. 217). Jackson (2000), outlines the relationships of social theory and different type of systems (e.g., hard, cybernetic, soft and critical). The second point is devoted to the commitments of CST and its influence on establishing IS research (despite the fact that this reflection is based on the old version of five commitments in CST). In developing theoretical pluralism in IS research, Jackson (1997) leans on Habermas’s knowledge of the constitutive interests theory to be used in terms of supporting the present work in IS, which is purely technical, and the need to address a broader perspective, which includes practical and emancipatory interests. By addressing these commitments as interrelated, Jackson claims that it is possible to develop an integrated approach in IS research at the methodological level.

Cordoba (2010), whose contribution relates to the implications of CST in the information society, argues that the three commitments of CST—critical awareness, pluralism and improvement—shape our ‘thinking about action’ in order to enhance the current situation. In IS, this type of thinking helps people consider the technical aspects, social factors and status quo of the situation. Cordoba (2010) distinguishes between two schools of thought regarding CST awareness that can be used in IS: (1) employing different systems methodologies after examining the most appropriate based on the situation at hand and (2) using the concept of systems boundary to maintain a degree of continual support for the awareness. The first school of thought, Cordoba points out, can work perfectly with IS development because it is a

predefined-goals stage that helps organizations define the roles of information, strategy and technology. The second school of thought is excellent at conducting the concept of systems boundary. Within this strand, Cordoba (2010) suggests several practical strand approaches of CST to inform IS activities, such as critical systems heuristics (CSH) and boundary critique. A recent work on IS critical research was developed by conducting systems boundary ideas, and is demonstrated by Cordoba/Midgley (2006) and Cordoba (2009). In this attempt, there have been various critical systems-thinking ideas and social theory at the theoretical level in order to support a methodological framework in IS planning. One of these ideas is the concept of 'boundary', which was created by Churchman and developed by Ulrich in 1983. Within the critical approach, Ulrich developed a practical method in systems thinking involving the concept of boundary called the critical systems heuristic (CSH). CSH is a framework for reflective practice based on practical philosophy and systems thinking (Ulrich, 2005). In CSH, reflective practice requires heuristic support that cannot be secured by theoretical means insofar that it helps to facilitate mutual understanding related to the situation of concern. Its philosophical basis draws heavily on Kant and Habermas and the notion of an emancipatory systems approach (Jackson 2000). Therefore, in attempting to understand whole systems as given by systems ideas, Ulrich (2005) set out a practical process methodology that can be used by planners and ordinary people in designing social systems. In contrast to the systems idea used in systems science based on an instrumental sense, in grasping the whole system as identified by Churchman (1968), CSH presumes that the 'whole system' is highly selective based upon presuppositions made by those involved. In a practical sense, this helps planners and concerned participants to reflect critically on the inevitable lack of comprehensiveness and partiality of all systems design. To design social systems, Ulrich has proposed the concept of boundary judgments to examine values, facts, and norms deemed relevant to a potential system's design and identify others deemed less important.

Fundamentally, the boundary judgment sets out 12 questions to interrogate four distinct dimensions associated with designing social systems. Three dimensions relate to people involved in the situation, including clients, planners, and decision makers, whereas the fourth dimension relates to witnesses who are not involved but nevertheless affected. Ulrich (2005) has articulated that the primary concept of CSH is to establish a systemic process by which to support critical boundary critique and judgment.

In a later stage, Midgley (2000) built on this work to develop further insight into the idea of ‘boundary critique’. Cordoba and Midgley (2006) propose a critical approach for its ability to examine different social concerns that cannot be expressed by the traditional approach of investigation. Based on the systems idea of boundary critique, Cordoba (2009) developed a framework of methodological approach for IS planning, which includes two systems theories. In addition to boundary critique, an autopoiesis is employed as social theory. According to Cordoba’s boundary critique facilitates critical reflection in situations including values and assumptions, while the autopoiesis theory serves continual dialog and cooperation between participants. In the practical sense, there is a variety of systems-based methods, such as SSM and CSH, embodying the intervention. Figure 5.1 illustrates the methodological framework suggested by Cordoba in IS planning.

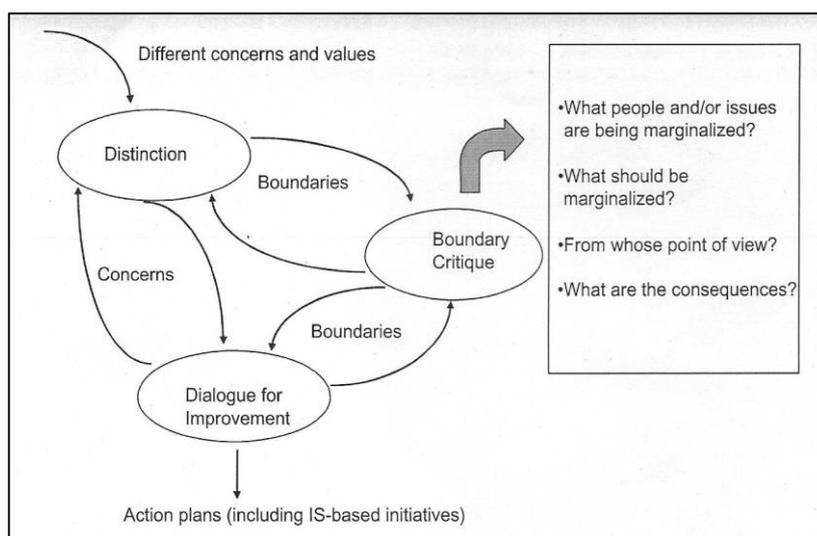


Figure 5-2 A Critical Framework to Information Systems

The contribution of

CST approaches in IS reveals that soft systems thinkers and critical systems thinkers believe in systems ideas that link theoretical and practical perspectives in IS applications. The claim originated from the view that there are social concerns about problematic situations and involving human activities that are hard to tackle with traditional approaches. Additionally, a critical approach can provide different methodologies that apply to a particular situation depending on their strengths and weaknesses. Systems ideas often work with multi-faceted problems encountering organisations.

The review of CST in IS critical research shows that systems ideas can work at different stages of developing an IS project, during planning, redefining, designing and/or implementing. While the review on IS critical systems approach demonstrates an incremental move among IS scholars toward adopting this type of research. In IS failure, many approaches are used to deal with various situations of IS within the positivist/interpretivist paradigm. In contrast, the current study examines the IS failure phenomenon by conducting critical systems as an approach to exploring how different organisational and technical criteria of IS failure are carried out.

These frameworks have successfully been applied in both IS and MS. Burrell and Morgan (1979), for example, identified four social paradigms: 'functionalist, interpretivist, radical humanist and radical structuralist' (Jackson 2000). Later, researchers (Jackson and Keys 1984) developed their work of SOSM, which is proposed to be an ideal grid of problem within the context of critical systems-thinking (Jackson 1991; Jackson 2000).

5.4 Research Methodology

Current research is attempting to improve the situation of large-scale IS failure in the UK public sector through the critical systems-thinking approach. The argument outlined above is intentionally set to (1) expose the critical approach to IS and its relationship to CST as the

theoretical basis of IS research and (2) explore the engagement of systems ideas in the IS field through the study of soft systems thinkers/critical systems thinkers and the way in which this kind of engagement has evoked fresh insights. To some extent, a vast majority of these contributions, created by systems thinkers and critical systems studies are devoted to the development and implementation of IS projects. The current study is another endeavour by the researcher to examine the ability of the critical approach to better cope with information systems failure, assuming the critical approach will give more insight into problematic situations. Also, bear in mind the complexity of IS failure, particularly in the public sector, arising from its diversity and uncertainty of social and technical perspectives that characterise a specific context and impact how IS failure is currently treated. Checkland (1995, 1997), Jackson (1997) and Cordoba (2010) focus on both social and technical issues when developing their particular views on IS research in systems approach. Furthermore, some IS studies fail to show exactly how the complex situation is managed; some remain focused on purely the technical perspective while some confine the concentrate efforts to manage the technical issues of the IS project. It is claimed that large-scale IT/IS projects are manageably complex and any potential failure refers to management reasons (Partridge 2010). As a result, the study assumes that IS failure likely stresses managerial issues more than other factors.

Therefore, this section aims to transform the theoretical applications of CST, as discussed in the study, into practical processes that consist of several research activities. This transformation begins by introducing the type of research and reason(s) qualitative research is chosen. Subsequently, we explore three classifications of research goals—Exploratory, Descriptive and Explanatory—justifying which one would properly fit with current research. Systems theories and systems methodology are central to improving the understanding of large-scale IS failure. Therefore, the researcher deliberately begins to employ systems ideas

that would probably articulate interrelated issues that often existed when tackling IS failure. Jackson's (2000) extended version of the SOSM framework establishes assumptions based on the problem context chosen by the researcher. According to these assumptions, it is possible to demonstrate the ideal type for the situation in order to draw appropriate systems activities. The researcher then exploits Checkland and Holwell's framework to identify the type of research that will be conducted according to the three relevant elements suggested: framework of ideas (F), methodology (M) and area of concern (A). The implication is that the relationships between the elements will extend into conducting research activities to gauge large-scale IS failure in the public sector. This includes the use of various social theories and system-based processes.

5.4.1 Qualitative Research Method

The study's questions can only be accomplished by qualitative method because an information system is a social system that is used, operated and managed by human beings. Despite the domination of positivist culture in IS and management, a gradual shift toward interpretive research has occurred over the last few decades (Walsham 1995; Walsham 2006). In general, sociology and anthropology disciplines shape an interpretive approach to organizational research (Davis, Lee et al. 1992). Further, the way of reflecting on reality, based on the claim that it is socially constructed, needs to examine perceptions, attitudes and relationships. Walsham's definition is that '... interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is social construction by human actors' (2006, p. 320). This construction tends to make sense of the real world, whereby the subjectivity, rather than objectivity, plays a central role in shaping our epistemological view. In an IS project, for example, while someone sees it as a success, someone else might see it as a failure. During the early development of IS, social context was

disregarded because the focus was based on a very technical manner in the development process, which refers to natural law. The key attribute of interpretive methods is its ability to bring a meaningful approach to our real-world situations. Since its emergence in IS discipline, interpretive approach has become gradually accepted and has gained reputation among IS scholars, especially those who involved in the social phenomena and organisational concerns (Mingers 2001; Walsham 2006).

Thus, the last two decades have seen a constant shift that occurs when adopting various types of interpretive methods in IS; particularly in IS failure. Davis, Lee et al. (1992) apply a hermeneutical method based on an interpretive approach in diagnosing IS failure. Fincham (2002) examines the success and failure through a narrative method. Stockdale and Standing (2006) use an interpretive approach to explore social, cultural and political factors when evaluating IS. Bartis and Mitev (2008) assume a multiple-narrative approach to the IS failure situation. In addition, multiple frameworks based on an interpretive approach address socio-technical entities in the body of IS research. For example, a dialectical hermeneutics framework on the implementation of IS takes into consideration interpretive and critical aspects (Myers 1995) as well as the social shaping of technology (SST) model, which is an integrated approach for addressing social technical concerns (Williams and Edge 1996; Wilson and Howcroft 2002; Jørgensen, Jørgensen et al. 2009).

In the systems movement, an interpretive approach refers to soft-systems thinking, which focuses upon a subjectivist view of individuals in terms of supporting the worldview. The terms 'soft' and 'interpretive' are both used to distinguish human patterns from the 'hard' functionalist approach, where the reality is objectively engineered. The emphasis is therefore on their values, beliefs, perceptions and interests to subjectively construct the social reality. Also, the research activities employed within soft-systems thinking often aim to raise a

debate among those taking part in the problem situation to bring about change (Checkland and Holwell 1997). In addition, soft-systems thinking benefits from the ‘root metaphor’, which was suggested by Morgan to underpin the nature of the context situation to enable the researcher to employ an appropriate metaphor. Jackson (2000) argues that ‘culture’ and ‘political’ contexts are mostly used in interpretive systems research.

The researcher has decided to conduct a qualitative approach based on the view that social reality is shaped only through communication between human interactions and contextual elements of IS failure in the public sector. The qualitative approach offers the opportunity to understand the social entities that are related to a particular context and the nature of their cultural and political circumstances. In the complexity of real-world situations, Checkland (1995) emphasises human affairs to bring possible improvement through the use of systems concepts. It is evident that the complexity of IS public sector project(s) is based on the involvement of power relationships and the conflict of different stakeholders, which impacts the success or failure elements related to the project.

By carrying out a number of research activities, the study intends to interrogate the current complexity of IS failure in the UK public sector. The focus will be on managerial, organizational and political elements that are situated in a particular context to form such a failure. It is important to note that the study is driven by systems concepts that consider the IS failure to be a real-world problem situation. Comparatively, a number of activities will be conducted to examine different qualitative data, including secondary data, interviews and a workshop to identify IS failure in the public sector.

5.4.2 Goals of the Research

One of social research’s dimensions is the goal of the study, which often refers to the researcher in the way he or she produces certain knowledge. By choosing one of these

purposes, the researcher can proceed with the remainder of the research strategy and identify research type, data gathering procedure and analysis tool. According to Newman (2000), there are three social research study purposes that the researcher intends to accomplish: exploratory, descriptive and explanatory (Table 5.4); each purpose has its own characteristics to carry out.

Fundamentally, the researcher is supported by an inductive orientation approach in terms of addressing new issues in IS failure and, further, learning how these issues are interrelated. As a result, the decision was made to conduct multiple purposes: exploratory and descriptive. Newman states that ‘studies may have multiple purposes, but one purpose is usually dominant’ (2000, p.21). Newman also argues that exploratory and descriptive purposes are similar and difficult to distinguish in practice. The process of choosing the exploratory goal begins by using critical-systems thinking to explore IS failure as new ideas that provide information about the frequent failure in public. Likewise, the descriptive goal is realized by examining the description of social patterns related to the problematic situation. It is further expected that the descriptive goal focuses on questions such as ‘who’ and ‘how’ (Newman 2000), which represent the subjective aspect of the situation.

<u>Exploratory</u>	<u>Descriptive</u>	<u>Explanatory</u>
<ul style="list-style-type: none"> • Become familiar with the basic facts, setting and concerns • Create a general mental picture of conditions • Formulate and focus questions for future research • Generate new ideas, conjectures, or hypotheses • Develop techniques for measuring and locating future data 	<ul style="list-style-type: none"> • Provide a detailed, highly accurate picture • Locate new data that contradict past data • Create a set of categories or classify types • Clarify a sequence of steps or stages • Document a casual process or mechanism • Report on the background or context of a situation 	<ul style="list-style-type: none"> • Test a theory’s prediction or principle • Elaborate and enrich a theory’s explanation • Extend a theory to new issues or topics • Support or refute an explanation or prediction • Link issues or topics with a general principle • Determine which of several explanations is best

Table 5-2 Goals of Research (Newman 2000)

5.4.3 Stakeholder Theory

In general, the critical systems-thinking approach encourages continual debate among stakeholders, who are either in a problematic situation or who expect to become part of it. The current study is about large-scale information systems failures in the UK public sector, whereby various stakeholders with different interests and viewpoints, relying on their knowledge and experience, are able to enrich the study. To avoid an arbitrary choice of those involved and those affected according to problem situation, stakeholder theory principles will be central to guiding the identity of the study's participants and will allow the researcher to organize the participants involved in a responsible manner. Obtaining in-depth details about stakeholder theory is beyond the scope of the study; rather, the researcher tends to draw on basic ideas that could manage this stage of research. The application of stakeholder theory is broadly relevant to many areas of research, especially public management, strategic management, corporate social responsibility, business ethics, marketing and others (Mainardes, Alves et al. 2011).

Since R. Edward Freeman set it out in 1984, the stakeholder theory has become widespread among academics. Fontaine et al. (2006) explore the stakeholder theory, including the definition, the principles, and the implications. According to their argument, the stakeholder theory has been defined several times by Freeman. An initial definition is stated as 'any group or individual who can affect or is affected by the achievement of the organization's objectives' (p. 3), while a more recent definition of stakeholder theory has been stated as 'those groups who are vital to the survival and success of corporation'. Freeman's former definition, Fontaine et al. claim, is widely preferred among academics because it includes those stakeholders who are outside an organization but can be considered to be stakeholders. The principles of stakeholder theory seek to identify people that the organisation takes into account regarding their interest, needs and influence on the organisation's policy and

operation. To some extent, this includes the following three main elements: (1) the organization, (2) the other actors and (3) the nature of the company-actor relationships (Mainardes, Alves et al. 2011).

In fact, stakeholder theory has evolved in response to increasing interaction between various stakeholders and organizations, which led to a move from organisational concern toward considering the pressure of particular groups of stakeholders and their interests (Mainardes, Alves et al. 2011). This evolutionary shift provides additional insightful into the theoretical development of stakeholder theory in contemporary organisations. Fontaine et al. (2006) and Mainardes, Alves et al. (2011) depend on the contribution of Donaldson and Preston (1995) for developing stakeholder theory. Theoretically, the management of stakeholders has been separated into the following three divisions:

- 1- **Descriptive stakeholder theory:** The relations between managers and stakeholders are governed by the way managers deal with stakeholders and the way stakeholders represent their interests. Therefore, the relation seems unsteady: sometimes conflicted and sometimes supportive.
- 2- **Instrumental stakeholder theory:** In addition to the descriptive dimension, the instrumental can be centred on the managers-stakeholders relationships, where the organisational strategy is influenced by stakeholders' concerns, which lead to formulating an organisational process to attain stakeholders' interests.
- 3- **Normative stakeholder theory:** The core concern of normative theory is the values and moral premises that organisations exemplify toward stakeholders, although they merely impact organisational performance. The relationship between managers-stakeholders can be framed according to ethical commitments.

According to Mainardes, Alves et al. (2011), the first and second dimensions (descriptive and instrumental) are categorised as an analytical perspective to stakeholder theory, while the third dimension is categorised as a narrative perspective to stakeholder theory. Furthermore, the first two dimensions are based on a deductive approach, where a differing variable-factors model is developed in order to demonstrate the particular characteristics of organisation-stakeholder relationships (e.g., power, perceptions, behaviour, and legitimacy). Alternatively, the normative dimension is undertaken by an inductive approach to show principles of values and ethics that rest on managerial activities toward different stakeholders. Within the normative approach, the organisation-stakeholder relationships are based on multiple interests of competing, conflicting and cooperating.

In the current study, the researcher built on the early concept of Freeman's stakeholder theory to develop his own approach. As known systems ideas are widely acknowledged in that they work well within an entire organization in terms of creating participants, this sometimes leads one to consider those who are outside, yet somehow connected to, the situation. This way of identifying participants also seems strongly related to the essential phase of practical intervention for supporting systems methodologies (e.g., Gerald 2000 and Cordoba 2009). For the purposes of this study, where the aim is to improve how we deal with the complexity of the IS project from the managerial standpoint and where the researcher follows an opposite strategy that rests upon various stakeholders, both academic material and outside practitioners from outside whose previous experience and knowledge are substantially considered. Based on the argument on stakeholder theory in terms of the identity of study participants, it is found that normative would be the most appropriate one to carry out for many reasons. The first, we have learned that the stakeholder theory concerns about the nature of organisation-actor relationships that influence and is influenced based on the policy and the operation of the organisation (Mainardes, Alves et al. 2011). The second reason, the study seeks out the

interpretive approach in order to bring meaningful orientation to the situation of IS failure in the UK public sector through the critical systems-thinking approach. Finally, the researcher realized that in order to produce sufficient ideas to improve the management of the IS project in the public sector, we should put forward our experience and knowledge to enable us to learn about the problem under investigation and then improve it. In terms of identifying the study's participants, there are certain actors who either influence or are influenced by the large-scale IS failure in the UK public sector, which include government and government agencies (GOAs), non-government organisations and academics and practitioners, all of whom have been nominated to take part in the dialogue process.

5.4.4 Habermas Communicative Action Theory

Critical theory has been shaped by social theorists who refer to what is known as the Frankfurt School, whose main claim is to reject the domination of the positivist approach in social science, arguing that social patterns are shaped through particular historical and cultural circumstances (Scherer 2008). The most influential thinker on critical theory is the German social theorist, Jurgen Habermas, who takes critical theory to new levels of investigation. Habermas argues that humans have two main cognitive interests in terms of knowledge obtained: a 'technical interest' and a 'practical interest' (Ian 1984; Jackson 2000). The two interests are shared by all humans and can be accomplished through work and communicative 'interaction'. Jackson (2000) clarifies that the work facilitates the way people live and achieve their goals, and that its importance gives rise to the type of knowledge directed by the technical interest. The positivist dominates this type of knowledge in order to predict and control natural and social systems, and, in turn, the threat comes from failure of the processes of predication and control. While interaction is concerned with human communication, where humans tend to protect and increase opportunities for intersubjective understanding among social organisations, Jackson (2000) notes that the disagreement of

individual and groups in social systems can be considered a threat to the socio-cultural structure of life. The interaction is supported by the practical interest of human beings, who maintain their mutual understanding that gives rise to ‘hermeneutic sciences’. The final cognitive interest, as suggested by Habermas, is ‘emancipatory’ interest, which stems from practical interest and gives rise to the critical sciences (Ian 1984). It could be claimed that Habermas’s emancipatory interest builds upon power relations and distortion in communication. Jackson (2000) emphasises the analysis of power relations and how it is used in work and interaction, which prevents human beings from enjoying open and free discussion. According to Habermas, Jackson explains, the emancipatory interest helps free people from being constrained by the power relation, and therefore brings about genuine discussion in the society.

One of Habermas’s major contributions to critical theory, the theory of Communicative Action, can be seen as a linguistic philosophy aiming to use people’s communication skills in order to establish an ‘ideal speech situation’ (Scherer 2008). Through the engagement in such a dialog, the speaker takes into account four types of validity claims, which are summarised by Jackson (2000) as follows: ‘the utterance is intelligible; that its propositional content is true; that the speaker is justified, in terms of certain social norms, in saying what is said; and that he is sincere in uttering it’ (p. 34). According to Gerald (2000), the first claim of intelligibility could be regarded as a precondition for effective communication, while the other three claims refer to Habermas’s three worlds—external natural, social, and internal—or as expressed by Jackson (2000)— objective, social and subjective.

In general, critical systems-thinking (CST) has been informed by the emancipatory thought of Habermas, although some systems thinkers have begun to delve into Michel Foucault’s thought as a possible alternative for theoretical underpinning (Brocklesby and Cummings

1996). Midgley (1992, 2000 & 2008) has reviewed the philosophical position taken by systems thinkers, including the underpinning philosophy and the paradigm problem, but the focus are on the theoretical work of Habermas. In this respect, Midgley explores and comments on the theoretical work of Habermas. For instance, in contrast to Habermas and his notion of rational argumentation and ‘ontological vision’ in the sense that a good argument should draw on the three worlds, Midgley trends toward a more flexible position, where the decision is based on the necessity of the context. As suggested by several authors, there is another position calling for the unification of the work of Habermas and Foucault. Midgley argues that such unification is out of reach, but that it would be beneficial to learn from their differences.

Midgley’s philosophical position on systemic intervention appears slightly different, reflecting his view of power-knowledge and its influence on personal and social identity; the subject that acts on power-knowledge formation as proven by Foucault’s insight. Thus, he finds a dynamic relationship between the subject and power-knowledge. He continues to explain that we ourselves are part of this relationship. The relation that he proved aims to rebut the pure critique from the context of action on the one hand while preserving the intervening subject on the other hand. In fact, Midgley attempts to initiate his vision of intervention, considering that any intervention relies on an intervener who makes an act of judgment. Midgley’s position differs from the position taken by Habermas, who sees that power preserves the knowledge formation.

The focus here is upon Habermas’s theory of Communicative Action as a critical social theory, guiding and maintaining systems activities that the researcher intended throughout data collection.

5.1.1 5.4.5 Systemic Intervention: Mingers' Four As

Having explained the various activities underpinning the research methodology, we attempt to identify the context of systemic intervention that relates to the current study. In its basic sense, an intervention implies a purposeful action taken to improve or/and change a situation (Midgley 2000). This raised an argument that reflects upon two ideas developed in CST. The first idea is concerned with the position of the agent(s) who carries out the intervention, followed by the relationship between the agent(s) and the type of methodologies, methods and techniques embodied. The second idea is the intervention process, and each idea must be identified. The word 'systemic intervention' is used by the researcher to establish a particular systemic way of intervention, relying on systems activities.

Midgley's (2000) argument about the nature of intervention, in contrast to observation, opens up ways of performing observational activities that can be considered to be a technique for an intervention, considering that the observer participates in the situation. In his view, intervention is conceived as a set of activities, which include co-operative processes initiated by an agent (individual or group), that ultimately results in desired learning and change (e.g., creating dialogue with various participants inside and/or outside of a problematic situation). Midgley views observation as a special case of intervention. Although the intervention suggested by Midgley is part of his systemic intervention approach, the researcher found it helpful to draw particular activities that led to his position in the situation.

The second idea is concerned with the process of intervention, as carried out by the agent(s). Mingers (1997) states that 'the intervention and research is not a discrete event but a process that has phases or, rather, different types of activities, that will predominate at different times' (p. 11). According to Mingers, the process guides the researcher (the agent) to conduct particular methodologies and techniques in the problem situation in order to gain

comprehensive outcomes. The process contains the four following stages: appreciation, analysis, assessment and action. Each situation uses these phases, followed by appropriate methodologies and techniques. The appreciation of the situation concerns the expression of the situation to gain a better understanding of it. Mingers clarifies that the appreciation stage depends on the researcher's experience and the level of access to the situation. The second activities are related to the analysis of the situation as it is in its historical and social context and the nature of the structure that lead the situation to remain. The way in which the situation is improved is considered in the assessment stage activity, where the attention is paid to the possible change it could achieve based on the agent's position of intervention. The last stage is the action activities stage, where the change is undertaken. Mingers (1997) has asserted that the four stages are performed as a scheme of the following activities that are individually conducted.

5.5 Methodological Framework

The different types of activities applied in the present research fulfil the purpose of the study—that is, to investigate the subjective nature of large-scale IS failure in the UK public sector and related managerial approaches. Interpretive research stems from the view that knowledge is socially constructed by human actors involved in the social situation. In contrast to objective reality upheld by positivist assumptions, subjectivity is concerned with producing a sort of reality that makes sense of the world and shared meanings (Walsham, 1993). In addition to the subjective basis of the research, it is expected that systems approach including social theories will provide general guidance for better understanding particular IS failure. At base, systems approach facilitates an open dialogue among participants to explore views differ from their own so that their total perceptions are conceived to form reality. Though generalisation is not an objective, the research seeks to illuminate a particular social

pattern characterising the situations in a collaborative process involving the researcher and stakeholders in the situations.

The current study carry out a methodological framework borrowed from Checkland’s (1985) and Checkland and Holwell’s (1997) work on research types that can take place. The framework is used as a roadmap to identify considerable ideas in an organised matter to produce in IS failure. Checkland and Holwell summarise three related elements—framework of ideas (F), Methodology (M) and Area of concern (A)—as shown in Figure 5.1:

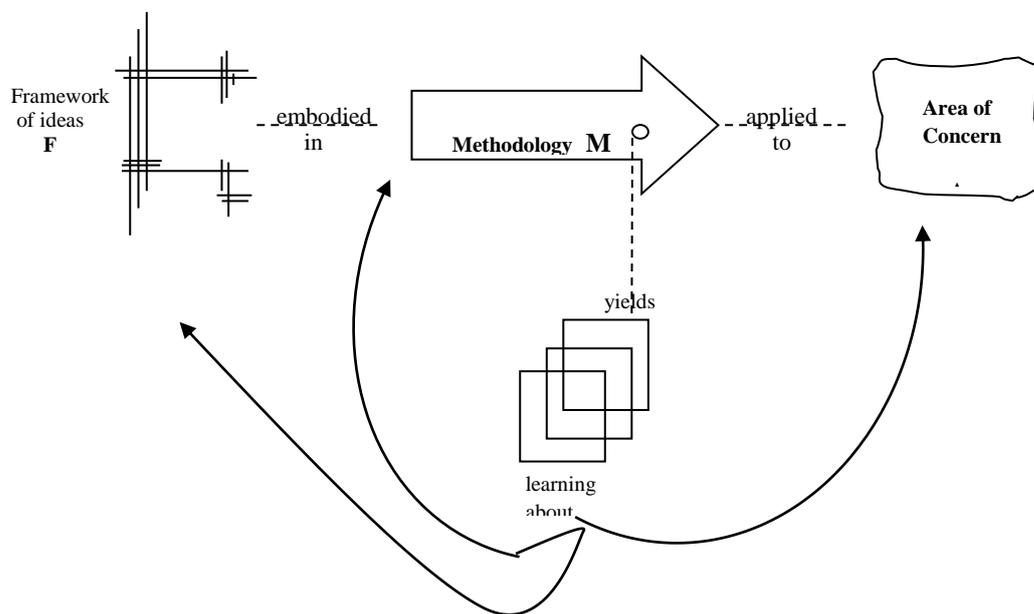


Figure 5-3 Element relevant to any piece of research (Checkland & Holwell, 1997)

The three elements work as a framework, guiding the knowledge produced. Based on the relationships between these research elements, the research is divided into three different types, each of which has its own interests and goals as well as its particular ideas. According to Jackson (2000) the first type is self-contained research which tends to develop theory within a discipline in order to improve a specific subject. Therefore, it leans on the framework of ideas F through M for producing knowledge A and, consequently, Jackson argues that this type of research has no relation to the real world. The second type of research is widely conducted in natural scientific disciplines (positivist approach), which found that stress placed on M works on a hypotheses-testing procedure through experiments and

observations for part of real-world behaviour derived from F in order to generate knowledge in A. This type of research is commonly conducted in social sciences, whereby F often reflects the theory of an aspect of social reality, while M is the procedure to learn about that social reality. These two types of research are called Mode1 (Gibbons et al., 1994), where the knowledge is theoretically produced to enrich a particular academic community. According to Checkland, these two types of research are governed by F. The third type of research, which is related to Mode2 research, as Gibbons et al. refer to it, wherein the knowledge produced is governed by A.

In addition to the aforementioned three research types, Jackson (2000) and Checkland and Holwell (1997) identified the fourth type of research, which is an action research. The origin of this mode of research refers to natural science, where the phenomena are investigated through scientific law. When it comes to complex social situations, it is difficult to apply the same procedures; instead, it was proposed to test theory in action by conducting practical process. Based on the research elements produced, Jackson (2000) argues that the action research puts the emphasis either on theory F or on practice A; in both situations, Jackson claims that action research is an alternative type comparable to the second or third types of research.

Dongping (2010) points out that Mode 2 research is identified by three characteristics: (1) its contribution is in a practical application in solving problems rather than theoretical development, (2) its methodologies are underpinned by interdisciplinary theories and (3) its focus on methodology. While Mode 1 knowledge is produced to meet academic purposes, Mode 2 knowledge is produced in response to the needs of specific users (Jackson 2000).

Cordoba (2010) has put forward an argument on two types of research in which systems methodologies are used. The argument starts by emphasising that the commitments of CST

determine the way researchers think about action (research) in terms of improving the current situation. In the IS situation, for instance, our action is guided by one type of thinking that is concerned with the technical aspect, whereas social aspect and the status quo are neglected. While in CST, Cordoba continues, our way of thinking is determined by systems methodologies regarding what they can offer to the situation. Based on this view, Cordoba identifies two ways of action: (1) action toward the situation at hand in order to employ the most appropriate systems methodology and (2) action being supported by the nation of systems boundary. It is evident that the argument produced by Cordoba appears to be similar to the dualism of Mode 1 and Mode 2, where the former focuses on theoretically improving a specific subject, and the latter maintains practical by relying on the concept of the systems boundary.

The discussion above leads the researcher to focus on Mode1 for many reasons. First, it was decided to conduct a practical study on a very recent IS failure in the public sector before the researcher amends the plan due to access difficulties. Second, the practical study within systems approach is considerably time-consuming and involves long-term activities, while the researcher is governed by a research time limit.

5.5.1 The Problem Context Based on SOSM

A wide spectrum of systems approaches, underpinned by systems thinking, has been suggested to deal with organisational problems, which includes hard, soft and critical systems-thinking (Flood and Jackson 1991). Each systems approach often works perfectly under some circumstances. The question raised is how do we know which is the most suitable approach in the situation facing managers? Jackson and Keys (1984) and then Jackson (2000) developed a practical guideline that suggests the way to use one or another through the SOSM. The establishment of the SOSM facilitates the assumptions conducted based on two

dimensions: the type of ‘system’ and ‘participants’ (Jackson 2000). Therefore, the two dimensions constitute a grid of six grouping problem contexts (Figure 5.2). It is important to briefly highlight some key issues about SOSM before the researcher employs which ideal fits with the current situation.

		Participants		
		Unitary	Pluralism	Coercive
Systems	Simple	Simple Unitary	Simple Pluralism	Simple Coercive
	Complex	Complex Unitary	Complex Pluralism	Complex Coercive

Figure 5-4 System of systems methodology (SOSM) (Jackson, 2000)

Flood and Jackson (1991) point out that the purpose of the grid is to group different systems methodologies based on the complexity of the situation. Moreover, the appreciation of different problem contexts of the real-world situation can only be classified relying on debate, particularly in sociological terms where the real-world situation existed. Another point is that each system’s type has its characteristics that identify either simple or complex, while the participants have been classified based on the relationships: unitary, pluralist and coercive.

Relying on the literature concerning large-scale IS failure in the UK public sector and according to the assumptions of the research, this study attempts to identify the problem situation according to the two dimensions of Jackson’s SOSM. In terms of the systems dimension, the problem situation under investigation appears to exhibit the characteristics of

the complex system type. In terms of participants' classification, SOSM is associated with pluralism, meaning the use of different methodologies and methods in the intervention. According to the research methodology of Mode 1, pluralism entails considerable systems activities to maintain the intervention and bring about change. Table (5-3) has articulated the characteristics of complex systems/ participants.

Complex systems characteristics	Pluralist participants
- a large number of elements	- they have a basic compatibility of interest
- many interactions between the elements	- their values and beliefs diverge to some extent
- attributes of the elements are not predetermined	- they do not necessarily agree upon ends and means
- interaction between elements is loosely organised	but compromise is possible
- they are probabilistic in their behaviour	- they all participate in decision making
- the 'system' evolves over time	- they act in accordance with agreed objectives
- 'sup-systems' are purposeful and generate their own goals	
- the 'system' is subject to behavioural influences	
- the 'system' is largely open to the environment	

Table 5-3 Characteristics of complex systems/participants (Flood & Jackson, 1991)

5.5.2 Theoretical Framework for Large-scale IS Failure in the Public Sector

Having proposed the type of problem context I intend to examine, I have designed a conceptual intervention framework based on Model research to summarise activities for large-scale IS failure in the public sector that reflect a variety of concerns employed. According to the second type of research we examined, the emphasis was put on F, which then applied through M in order to produce particular knowledge in practice (Jackson, 2000). The framework of ideas (F) is perceived as theoretical ideas through real-world experience in a way that it can generate new experiences related to an area of concern (A). Checkland and Holwell (1997) assert that the relationship between F, which is the theory (ideas), and A, in which the experience (use of ideas) is represented as a continual learning cycle where they create each other "Neither the ideas nor the experience are prime, since each creates and modifies the other" (p. 11). M is used within the framework as a vehicle in terms of

transforming ideas into A. According to Jackson (2000), M embodies the practical sense in the discipline to A, which represents a particular area of concern. Finally, it is important to note that the knowledge produced within the second type of research, Mode 1, is usually managed by the research community whose concern is governed by (F). Figure 5.3 shows the three research elements and activities employed by the researcher throughout the investigation within F, M and A, while the summary of the study methodology is presented in Table 5.2.

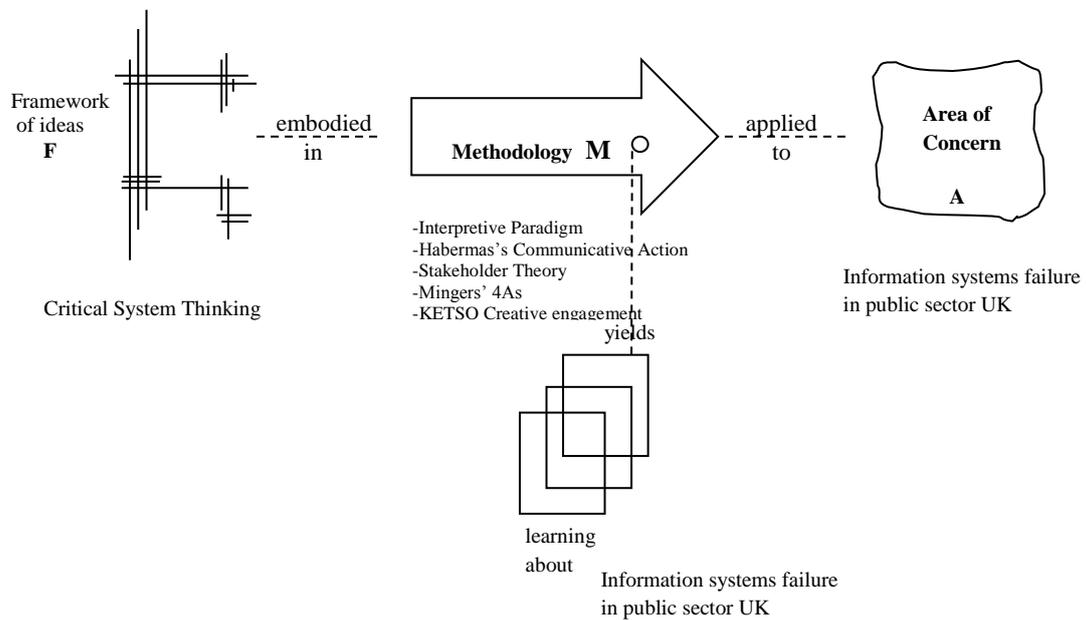


Figure 5-5 Theoretical framework of research methodology Mode1 (Checkland & Holwell, 1997)

Framework of Ideas	Critical Systems Thinking
Methodology	-Interpretive Paradigm -Habermas's Communicative Action -Stakeholder Theory -Mingers' 4As -KETSO Creative engagement
Area of concern	IS failure in Large-scale Public Sector UK (LSISPS)

Table 5-4 Research Methodology, Summary

5.5.3 Qualitative Research Activities Following Mingers, Four As

While designing a theoretical basis for a particular intervention, Mingers' four activities were determined to guide the intervention process to bring about change to the situation. During these phases, the researcher employed different types of qualitative techniques that are explained in the next section. The purpose of the study is to understand the recurring failure of IS in public sector organisations through system ideas as an alternative approach to improving the situation. The following questions have been used in the current study:

- Why has large-scale IS failure continued in public sector?
- What factors affect large-scale IS failure in public sector?
- How can a critical approach facilitate understanding and informing future IS projects?

The study is expected to improve the current situation of large-scale IS failure in the public sector in light of the managerial perspective and supported by the researcher's experience in the technical aspect related to ISD. Further, the study proposes a theoretical framework to improve the situation of IS failure, which will lead to improvements. Finally, the suggested systems activities are established to accomplish the study's objectives, as illustrated in Figure 5.5.

5.6 Ethical Issues in Business Research

A consideration of the ethical perspective is important throughout the research process in business and management, especially when the research will focus on people and organisations. Ethics is defined as the ‘norms or standard of behaviour that guides moral choices about our behaviour and our relationship with others’ (Cooper & Schindler in Saunders et al., 2009, p.184). Bryman et al. (2007) and Saunders et al. (2009) describe the basic ethical issues that should be of interest to the researcher. These basics are related to the privacy of the participants, deception of the participants, harm to the participants, behaviour of the participants and confidentiality of the participants.

Universities and research associations typically adopt an ethical code to guide their members; this code usually contains the principles and procedures that should be followed in terms of conducting research. This may reflect a controversial debate to justify what has or what has not been considered ethical over time. Bryman et al. (2007) suggested that a researcher in the field of business research must be aware of general ethical principles because this would help the researcher to treat other ethical issues properly. Those researchers whose studies collect data by other means, such as a questionnaire or ethnographic study, may be less concerned about ethical issues (Bryman et al., 2007).

To avoid ethical issues that might be problematic in research, the researcher should start thinking about ethical issues when the topic is determined and while designing the research. This gives the researcher insight about managing potential situations that might occur during the research process. Saunders et al. (2009) extends the timeframe for concern over ethical issues throughout the research, including data collection, analysis, and recording the findings. Nothing will go perfectly; every study encounters some degree of problems. Collis et al.

(2003) explore some ethical dilemmas that could happen while the researcher studies the behaviour of an organization and the participants.

In this research, interviewing people, attending workshops, reading documents and revealing important data are parts of the investigation and the solution to problems. The researcher will encounter various ethical issues that are related to the organization, different stakeholders, and documents. Essentially, the researcher must remain aware of the general principles of ethical issues that legitimate this relationship. Also, the researcher's ethical code must be clearly and simply presented to the participants in order to highlight the boundaries of the relationship. Finally, it is essential that the researcher graciously expresses appreciation to the participants for their assistance.

5.7 Summary

In this chapter, four main paradigms— isolationism, imperialism, pragmatism and pluralism—were presented as they relate to management research. It has been decided that critical systems-thinking based on a pluralism approach offers an opportunity to bring about change in terms of intervening into the real-world situation of large-scale IS failure. This chapter highlights the contribution of critical approach in IS and systems thinking. In summary, they are both based on critical social theory, such as Habermas and Foucault; however, systems thinkers enhance intervening by proposing a wide range of systems methodologies. The researcher counts on Habermas's communicative active theory as social theory to examine the power relation during the intervention. In addition, stakeholder theory initiation is used to notify participants of the situation. In terms of exchanging ideas and improving the situation, the KETSO creative engagement tool is used to interrogate participants during workshops. Based on the second type of research, which focuses on theoretical perspective, the current study intends to conduct a combination of systems

thinking activities guided by a framework of ideas (F). While the process of intervention depends on Mingers' four As approach (appreciation, analysis, assessment and action), each stage has its own method of data gathering. This chapter concludes by clarifying ethical issues that are essential to the situation because of those who participate in the research process.

6 Chapter The Analysis and findings of Secondary Data: the First Manager's 4As The Appreciation Phase of IS Initiatives in the UK Public Sector

6.1 Introduction

This chapter and the following chapters (7, 8 & 9) are an attempt to translate systems ideas and the knowledge obtained about the UK IS initiatives discussed in the previous chapters (2, 3 and 4) in order to build an appropriate intervention to a messy situation. Bear in mind that the researcher has conducted Mode 1 of research types as articulated in figure 5.5. According to Jackson (2000), this kind of research is governed by a 'framework of ideas' (F) that leads to the choice of a 'methodology' (M) in terms of producing the body of knowledge that is related to the 'area of concern' (A). Having drawn the theoretical aspect of the current study, we decided to identify a number of research activities that seem capable of serving the research objectives. Qualitative methods involved a variety of data collection: secondary data that includes official documentation and report; 15 semi-structured interviews; and, a half-day intensive workshop. These different qualitative methods responded to Manager's 4As: appreciation; analysis; assessment and action. These phases will be analysed on critical hermeneutics which is a strong fit with the IS failure situation in the UK public sector, and it can assist in interpreting the context as another form of text. Also critical hermeneutics considers the political constraints within which human communication takes place.

The chapter starts by introducing a brief summary of the hermeneutic analysis approach including data collection strategy. We intended to follow orderly techniques in the data collecting strategy whereby we started with secondary data to appreciate and explore the situation in depth before entering into the second step of data type and so on. This chapter is dedicated to analysis of the secondary data in order to appreciate the situation of the IS failure

in the public sector. It consists of official reports and publications that reflect a historical background.

In order to enrich the appreciation phase, we tend to focus on two IS failures that occurred in the UK public sector: LASCAD in 1992 and NOMIS in 2009. We draw heavily on the appreciation phase to monitor, in particular, management issues behind IS failure projects. Throughout the two examples we uncover a number of key aspects of large-scale IS in the context of the UK public sector and those who probably participated as stakeholders

6.2 Hermeneutics Strategy for Data Analysis

It is important to remember that the current study has exploratory and descriptive purposes, as they aim to pursue how things are going in particular ways. Furthermore, it is an induction study seeking to interpret the social situation relying on Habermas' critical theory. Saunders et al. (2009) claimed that the inductive approach intends to describe and explain phenomena in the social world. These strategies were employed throughout the current study in terms of interrogating the current state of IS failure in the UK public sector. Habermas' argument about the three cognitive interests paid attention to the 'practical interest as associated with human language and environment. Accordingly Habermas' practical interest leads to establishment of hermeneutic sciences (Jackson 2000). This is concerned with human interaction and how our actions toward each other are interpreted, understood and directed in social organizations (Ian 1984). In addition to interpretive and ethnographic approaches in the qualitative research, hermeneutics has been identified as one way of appreciating real people in real situations (Alvesson and Deetz 2000). The hermeneutic approach is, however, one approach in which the qualitative data can be analysed. Myers has stated that "hermeneutics focuses primarily on meaning of qualitative data, especially textual data" (2013, p.182). Further to the previous definition, there are four ideas, or 'concepts,' that the researcher

should consider in the way in which the text is processed within hermeneutics analysis (Myers 2013): hermeneutic circle, prejudice, autonomization and distanciation, and appropriation and engagement. There are two ideas that are most related to this stage of analysis:

1. Hermeneutic circle in which the interpreter of a text constantly moves throughout the text, from the whole to its parts then back again to the whole. The intent is to decipher the hidden meaning in the apparent meaning during the analysis of the text.
2. Prejudice, or pre-judgment, which is a fundamental part of our understanding. When involving a text, one is expected to have prior understanding or an expectation of what the text is about.

Myers (2013) also illustrated that there are different forms of hermeneutics; each has its purpose and use. The first form is called pure hermeneutics, and this is the objective form of hermeneutics. This form tends to understand human action from inside, and the text seems amenable to investigating in an objective manner. The second form is the post-modern hermeneutics approach, which stresses the subjective basis to investigate the text. The facts in post-modern hermeneutics are shaped within culture and community as a true meaning. The third form of hermeneutics is the critical hermeneutics approach which takes a middle position between the objective truth and subjective truth. Myers (2013) argued that critical hermeneutics considers that the text is open to several interpretations and is never closed. Furthermore, the interpreter takes into consideration the context as another form of text, in which the context itself is critically analysed; therefore, the hermeneutic interpreter creates another text based on a text. It appears that the dualism between the text and interpreter seems to be infinite and runs in circles of constructing and deconstructing meaning. The last

form is depth hermeneutics which suggests that the text hides a deeper meaning. Our focus will be on critical hermeneutics for several reasons.

Additionally, a critical approach was used in the study to enable the researcher to demonstrate the historical creation of political aspects. Alvesson and Deetz (2000) asserted that social theories seemed to be appropriate to question public organisations because of their capability to examine the social structure of an organisation and its forms of domination. Alvesson and Deetz also emphasised that critical theory to deal with forms of domination distorted communication and conflicts.

The current study aims to understand the problematic situation of information systems failure in a particular context, where it is situated in the UK public sector. Therefore, it could be claimed that a proper strategy is needed to carry out the data analysis. Amongst various strategies that were suggested, a hermeneutics strategy was chosen throughout the study. The researcher decided to use the hermeneutics in a flexible way to demonstrate different activities of intervention, including people, organisations and related functions, in order to produce a particular social reality. Before we move on to analysing the appreciative phase of IS initiatives in the UK public sector, we summarise in Figure 6.1 the variety of different qualitative data gathered in this study.

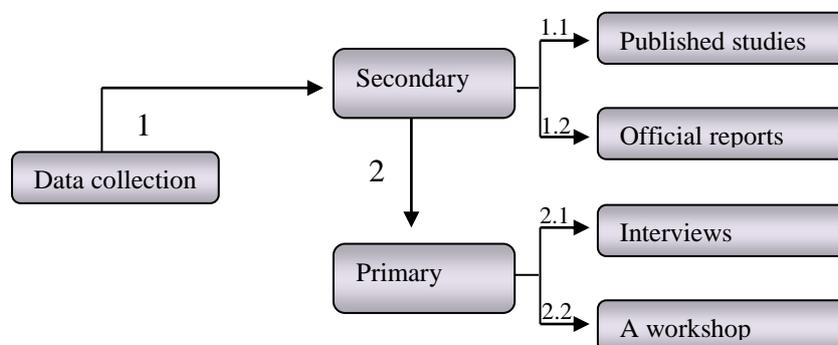


Figure 6-1 Data Collection Strategy

6.3 Secondary Data

One of the techniques we used in the current study involved the secondary data being collected from academic, official documentary and press sources as useful sources in the appreciation phase of the study. Saunders et al. (2009) argue that the secondary data, whether raw data or compiled data, can be used mainly in explanatory and descriptive research in both quantitative and qualitative data. Moreover, the ways in which the secondary data in the social sciences has been classified takes various forms. Bryman (2012), for example, argues that one classification of document materials is based on official documents and personal documents, while the other takes into account the quality of documents. Saunders et al. (2009) classify secondary data into three types: documentary data, multiple source data and survey-based data.

The researcher's experience of collecting secondary data was rich and time consuming, especially official reports issued by government departments to demonstrate a variety of issues related to the government vision of the IT public sector and reports on the IS failure situation. For example, three official documents had been collected after email exchanges and an official letter provided by the Hull Business School research office in order to attain these documents. Another experience the researcher had was with a member of parliament who apologised for not being able to conduct an interview due to a busy schedule. Instead, that member kindly allowed the researcher to use a letter he wrote to a government official regarding the failure of the NOMIS situation.

A variety of secondary data were used in this stage of intervention including three official reports, publication studies which covered the last two decades of information about systems failure in the UK public sector and, finally, the press reports and investigations about IS failure cases. All these secondary data addressed intensively the two cases we revised in

chapter 4, and considerable ideas from these may be recognised. We should acknowledge that the use of different document sources helped us to reflect on key issues in the IS failure situation in the UK public sector: government policies, academic efforts toward improving the situation based on knowledge and experience, and, finally, the reaction of various players such as individuals, public and media. Therefore, the appreciation phase depends on the secondary data to play a vital task in shaping social reality. Also, this phase tends to draw an initial conceptual framework of integrated elements that are concerned with the real situation of IS failure in the UK public sector, and the nature of relationships and connections amongst these elements. As a result, it could be argued that secondary analysis of qualitative data heavily supports the historical creation of social reality.

Bear in mind that the researcher has explored the nature of large-scale IS failure in the UK Public sector projects, and then an emphasis is put on two major failure events that occurred in different periods of time. The first project failed in 1996; this was the London Ambulance Service Computer-Aided System (LASCAD) within the larger health systems services. The second project was the more recent failure in 2009 of the National Offender Management Information system (NOMIS). These were selected for many reasons. First, there was a gap in time which let the researcher explore the effort spent since the earlier incident in improving the IS failure in the UK public sector. Second, although the two projects both targeted the public sector, they involved different tasks; LASCAD was intended to serve the entire public, while NOMIS was supposed to serve a particular segment of the public. Third, both projects had varied circumstances throughout the development phase, but termination was the same. Fourth and last is the academic reason; since the LASCAD failure occurred in 1992, until NOMIS 2009 there were numerous studies proposed in both theory and practice to cope with such failures, but the rate of failure remained the same. The current study is an

attempt to examine the IS failure from the critical approach, benefiting from systems ideas to answer the research questions. The current study essentially concentrated on the whole situation, including technical and organisational perspectives, however a particular focus was on the managerial perspective.

6.4 The Appreciation Phase of Large-scale IS Failure in the UK Public Sector:

The researcher plays an agent from outside to appreciate the situation of the IS failure in the UK public sector. According to Mingers (1997), the appreciation phase aims to gain knowledge about the situation which would be supported by the agent's pre-knowledge and experience. In addition, the agent's concern at this phase is to produce a world view to understand the situation. This entails exploring major events within their historical background in order to interpret these events.

6.4.1 Historical Review

An overall UK government commitment to IT in the public sector can be highlighted as ambitious and generous, but nevertheless the failure rate of the public sector IT projects is between 60% and 80% (Brown 2001). The prior statement summarises the history of IT projects since they were used within the public domain. The main purpose of using IT functions was to improve basic functions such calculations in the entire organisation. In the 1960s, information systems were completely built based upon engineering software analysis; thus, when a system failed it was called a 'software crisis' (Sauer 1999). This is an indication that building such information systems was the result of non-technical intervention and was primarily associated with computer-based capability.

From the 1970s onward, a key player entered public sector IT projects. In addition to in-house means of developing IT projects, external providers were used, leading to the use of a variety of approaches in the development process. Brown (2001) has stated that:

“One of the drivers of using joint and outsourced development was the increasing shortage of in-house specialist IT project development as the private sector proved increasingly attractive to them” (p. 364)

Moreover, during the 1970s there was also an attempt to reduce users and organisational resistance through understanding their interests and involving them in both design and operations (Sauer, 1999). As a result, a significant relationship had begun between information system users and systems design, which extended into studying organisational behaviour. During this period, the misunderstanding between users and designer could become a problem area leading to a potential IS failure. Although there was a turn toward understanding organisational behaviour and users when designing systems, the political aspect was less concerned with influencing the public sector IT projects (Brown, 2001).

In the 1980s and the 1990s, there was an incremental effort to adopt national strategies in information systems initiatives in the UK public sector. This was apparent in the magnitude of IS projects which were bigger in budget and function, as well as the increasingly apparent reliance on IS external providers and consultants. The government strategy aimed to modernize public services by IT-enabled initiatives. Unfortunately, over the period from the 1980s to the 1990s, IS initiatives witnessed an increasing number of large-scale IS failure in different government organisations.

Flowers (1996) and Brown (2001) listed eight major failed projects reviewed by the National Audit Office (NAO) and Public Account Committee (PAC) from 1984 to 1999. Table 6.1 shows the details of each project, as well as the final assessment of NAO and PAC since the start of the project until it was deemed a failure. It is notable that the managerial issues were strongly obvious throughout the review of ISF projects, while the technical issues became

less of a concern. Going briefly through these projects shows that constant, repeated issues such as delay, overrun, over budget, planning, coordination and conflicts, were identified as primary reasons for the past failure of projects.

	The IS Project Name	Year	Cost		Delivery	Characteristics	NAO and CPA investigation outcomes
			Before	After			
1	Wessex Regional Authority (WRHA) Regional IS Plan (RISP)	1984	£43M	£60M	Abandoned 1990	- Delay - Cost overrun - Serious conflicts of interest	- WRHA & NHS Management executive - the management of RISP
2	The UK Passport Agency System	1997			Unsatisfied operations and abandoned 1999	- Minor delay - Neither complete nor fully tested - Increase the time of issuing passport. - It doesn't respond to the high demand of new passports.	- Project Management
3	The Immigration and Nationality Directorate Casework Programme			£120M	Not delivered	- Miscoordination - Conflicts between IT provider and its main sub-contractor. - Delay	
4	The Ministry of Defence Intelligence Processing System 'Trawlerman'	1988	£32M	£41M	Replaced 1997	- Delay - Dose not meet specifications	- Project Management
5	The Benefits Agency and Post Office Counter Ltd, Benefit Payment Card				Part of the project cancelled	- Delay due to change the specifications -	
6	The West Midland Regional Health Authority Electronic		£10		Cancelled Before the		- It is described as fictional project on the basis of business

	Trading System				start 1992		plan
7	The Benefits Agency Replacement National Insurance Recording System	1997	£38M		Delivered in 2002	- Delay many times	- Misjudge the complexity
8	The NHS Executive 1992 and 1998 Information and Management Technology Strategies	1992				-	- Lack of goals. - Plan for evaluating the success of the strategy. - Lack of clear business case

Figure 6-2 Revision of large-scale IS failure projects in the 1980s and 1990s

From 2000 onward there was a new era of dealing with IS initiatives in the UK public sector. The PAC's report (2000a) and Cabinet Office (2000) revision of government IT projects show a shift in dealing with the failure of projects. The PAC's report, for example, outlined a variety of issues to be considered in government IT projects. These issues emphasised the way in which the projects are managed. One of the main issues the reports mentioned was the consideration of IT systems as management decisions rather than technical decisions. Another issue emphasised the support of senior management and skilled managers in the projects process. Furthermore, in terms of dealing with complexity of such projects, the PAC report suggested that the projects should be broken down into manageable elements, while the Cabinet Office report pointed out that a new approach is needed for improving IT public sector projects. The new approach entails a shift in the way IT projects are undertaken, from being a technical project to a government project of which IT is an important part (Office 2000).

In a report issued in 2005, the Committee of Public Account (CPA) set out the Government’s strategy to optimise the delivery of IT public services. The new vision was focused on the needs of citizen rather than the provider. Furthermore, the e-Government Unit (Cabinet Group Office’s Delivery and Transformation Group) was allocated to formulate IT strategy and support departments to improve efficiency and project delivery. In this report, three main principles are identified that underpin the delivery of successful the projects: engagement of senior level management; acting as an intelligent client; and, the benefits of change (CPA 2007). Lastly, the report emphasised lessons learned from successful IS projects to improve performance. In terms of learning lessons from IS failures, we recall the ideas raised by Brown (2001). Brown asserted that the key players within senior management and executives who initiate IT projects should involve themselves in the learning process. They, Brown continued, are able to identify mistakes and are able to communicate in order to learn lessons from each other.

The historical review above gives an overall appreciation of large-scale IS in the UK public sector. The review has determined general characteristics that bring to light the nature of IS projects in the UK public sector since they began developing. Table 6.2 briefly summarises these characteristics that highlight the main issues in the development of IT/IS initiatives in the UK public sector.

Years	Characteristics
1950s-1960s	<ul style="list-style-type: none"> - Basic functions of IS are related to administrative process. - The project was developed by internal IT specialists. - It was delivered through pure technical work and automated based on software engineering. - The failure was called a system crisis and the focus therefore on process failure. - Academically, information systems were developed within computer science field. - Out of the human intervention and influence (politician, managers, users).

	-IS failure was defined through technical criteria.
1970s	<ul style="list-style-type: none"> - Users and organisational interests were considered in the technical process to avoid any resistance. - The new shape of relationship was grounded between the users who operate and use information systems and the technical designers who develop the systems. - External providers were used in the development process. - In addition to software crises, the users became another aspect of failure in the systems development. - Organisational behaviour and users of IS were defined as problems areas.
1980s- 1990s	<ul style="list-style-type: none"> - An increasing of IS projects in the national domain. - Organisational issues gradually took place in IS failure debate. - IS initiatives were designed in public services as government strategic goal. - Majors IS failures in this period (Table 6.1). - Government worked to improve the delivery of IS projects. - Management and project management issues were recognised.
2000s onward	<ul style="list-style-type: none"> - Intensive effort led by House of Commons to highlight the future of IT initiatives (CPA report 2007). - The work was based upon the revision of different IT/IS reports issued between 2000-2006. - A new strategic policy set out to deliver successful IT project. - E-Government unit becomes responsible for improving IT project. - The cooperation among government departments appear evident, especially the public watchdog organisations NAO, PAC and CPA. - The focus on senior level management as key factor in delivering successful IT.

Table 6-1 General Characteristics of IT in the UK public sector from 1950 to 2010

By contrast, Table 6.1 explored a number of IS failure projects as reported by the public sector watchdog organisations. It is found that insufficient management is a major factor contributing to permanent failure within the public sector. The inability to manage IS initiatives could be recognised at different levels, policy makers, executives, and in

organisation management, including senior management and managers. The Public Account Committee investigation report on IS failures investigation (2000), and the Cabinet Office report (2000) on modernising IT in the UK public sector, highlight different key issues in management of the IS failure initiatives. PAC reports, for example, criticise inadequate management, the lack of skilled project managers, as well as the senior management's reluctance to intervene in the situation. Naturally, this implies that they lack the ability to appreciate the nature of complexity of information systems projects in the public sector. The Wessex Regional Health Authority project seems to offer a good example of the inadequate management that was regarded as a total failure (Brown 2001). It is obvious that management mistakes were constantly happening, causing flooded projects, and thus remaining barriers to achieving any desirable change.

In order to enrich the appreciation phase, we focus on two IS failures that occurred in the UK public sector: LASCAD in 1992 and NOMIS in 2009. We draw heavily on the appreciation phase to monitor issues particularly related to management behind IS failure projects. The two projects have key issues that can support our understanding of IS failures. The purpose is not a comparative case study approach; rather, the cases presented are considered good examples of various factors as explored in the historical background. The awareness of these factors is very important to appreciating a world view of IS failure in the UK public sector.

6.4.2 London Ambulance Service Computer-Aided Dispatch System (LASCAD)

LASCAD is an NHS information systems project aimed to improve the performance of the imbalance in the dispatch system in the city of London. It was supposed to launch in 1992 before the project collapsed due to a number of obstacles encountered during development. Flowers (1996) traces the story of LASCAD by examining the context of the LAS organisation before the project took place and revealing a chain of events that led at the end

to the failure. On the other hand, Davis (1995) draws on a set of errors in the development phase, issues that unfold the way the project was managed, particularly at the senior management level. Both interpretations alike appear to be feasible concepts for shaping a better understanding of the situation's context.

According to Flowers (1996), in the early 1990s, London Ambulance Service (LAS) faced restructuring due to the total reorganisation of the National Health Service (NHS) in an effort to improve the healthcare system in the public sector. A new LAS management framework was created for the restructuring, and a new senior management team were appointed to enact the new management restructuring in LAS. This led to a reduction of nearly 20% of senior and middle management posts. As a result of this change, LAS lost a number of experienced staff at the management level followed by a lack on investment in management training, which impacted the managerial style. Moreover, LAS management witnessed a strained relationship between managers and staff over pay and conditions which led to distorting the relationship between LAS management and the trade union (Beynon-Davies 1999). There had been a brief review about the situation before the LASCAD begun, and it is important because the following managerial actions after that were explicitly or implicitly affected.

6.4.3 LASCAD Scenario: Key Events

The LASCAD system was proposed to meet the performance standards provided by the government, the goal of the project. These standards took into consideration the activation time and the response time. The activation time was set at three minutes once a call is received, while the response time was set between 8-14 minutes to arrive at the scene. LAS had not met the performance standards for some time. Although the project was seen as information systems development work, the reality showed that there were interacting elements led to the IS failure. Beynon-Davies (1995) and Flowers (1996) agreed that the

LASCAD failure was the result of two years of organisational change that LAS had been through, such as reducing a large number of managers and then the dispute between the management, the trade union and government. This led to the lack of project management of LASCAD, which failed to take better control of the project since it had started. From the beginning, the project was seen as a software development process which entailed reformulating the specifications of the system requirements that were intended to improve dispatch service. In terms of the system supplier that designed and developed the major part of the computer aided dispatch system (CAD), it was reported that it had had no experience in developing such a dispatch system. In the implementation stage, the information systems suffered from the delay many times before the managing director announced that the system had totally failed (Beynon-Davies 1995).

In a broader sense, it could be argued that the LASCAD failure was the result of accumulative events before and during the project development phase. There were interrelated entities together within a specific organisational context behind the LASCAD failure. This context was affected by the political, cultural and economic context of NHS that shapes the organisation's information systems.

The discussion shows that LAS management failed to deal with multi-faceted areas within technical and human activities. This was obvious in the resistance of LAS staff, particularly in the headquarters and among drivers (Beynon-Davies 1995). Flowers (1996) puts the blame on the new management that was appointed to improve the performance of LAS and oversee its reorganisation. The policies of LAS's new management did introduce many changes that impacted the corporate culture. For example, there was a massive drop by 20% in the number of consultants and managers, which led to the creation of a fear-based culture and increased pressure inside the organisation. Also, Flowers traced back the development scenario of

LASCAD and found out that the decisions made by the LAS board showed a lack of control on managing the project process as related to the budget, timetable, staff training and dealing with technical aspects.

6.4.4 National Offender Management Information system (NOMIS)

The Nation Offender Management Information system (NOMIS) is a recently failed IS initiative in the UK public Sector. The situation is higher in costs, larger in terms of the government departments involved, and even more complex. In 2004, the Home Office initiated NOMIS to replace an existing inmate information system in order to improve the method of managing offenders in England and Wales (NAO 2009). According to the National Offender Management Service (NOMS), the NOMIS project was developed to support the new offender management model that was set out to track the beginning-to-end management of offenders across their sentences (NOMS 2006). In a short while, NOMIS was under attack from public watchdog organisations, Parliament Members, specialists and the media, as well as the voice growing louder about the misuse of taxpayers' money (BBC 2009). The project management failed to estimate the high risk of control and fell into sloppy management (Partridge 2010). The revision of NOMIS shows that the project started to suffer a series of mistakes that can be recognised throughout the project process. The NAO (2009) revealed that the NOMIS project was transferred to the ministry of justice in 2007, at the same time the project started to struggle when indications of trouble were exposed. The lifetime costs blew out, up to £690 million, while the estimation was £234 million, and the final delivery date was extended from 2011 to 2014. In 2009, things became more complicated when the project split into five smaller projects. Although there was technical complexity, the blame for failure focused on the poor management of NOMIS. One of the criticisms of NOMIS management is that the failure could have been avoided if basic management rules had been followed. The prison Minister of the day stated that “As soon as

the projected costs and delays ... were recognised, we took immediate steps to halt the project and consider the most cost-effective way forward” (BBC 2009). Within the political domain, there was a criticism held by a Member of Parliament who represented the opposite party, questioning the Minister of Justice of the day about a series of events in relation to the NOMIS project before it even started. It could be claimed that the project missed its main goal, which was to set up a single shared database of offenders in order to improve the way they were managed. In addition, there had been key management issues such as an unrealistic budget, time overruns and, lastly, the absence of governance for the project.

6.4.5 NOMIS Scenario: Key Events

As mentioned above, NOMIS was a communication design set to support a new approach to offender management, a single approach called end-to-end management, and aim to present an integrated and flexible system to manage offenders from sentence to release. In 2006, the National Offender Manager introduced a revised version of the offender management model, claiming that the new management model met the specifications for being seamless, flexible and integrated (NOMS 2006). According the NAO report (2009), NOMIS was a four-year project started in 2004 and supposed to be delivered in 2008, with an estimated budgeted lifetime cost of £234. In 2007, the responsibility for NOMIS transferred from the Home Office to the Ministry of Justice. Nevertheless, the NOMIS project was struggling to survive, and bad indications started to emerge the same year. There was dramatic increase in the cost of NOMIS for the first time, and the project board was informed of the overrun in costs. In spite of this, the project kept proceeding to target the original implementation date. However, in Augusts 2007, the Minister of Justice imposed a moratorium while options were considered. In 2008, the project was rescoped and rescheduled due to the new assessment. Regarding the scope, the NOMIS project was reduced into five separated projects, while the delivery date of the new schedule was pushed ahead to 2011. It is noted that, although the

NOMIS had faced many difficulties throughout its development, there were no management actions taken, whether at the level of project management or senior management, or within government to avoid such a failure. This also extends to include the public watchdog organisations that started a late move to investigate. Two investigations into the NOMIS project were held, both in 2009: the first was conducted by the Public Account Committee (PAC), while the second was carried out by the National Audit Office (NAO). On the examination of PAC, there were 12 recommendations that the Ministry of Justice should perform to improve the status of NOMIS. Most of these recommendations focused on management issues in decision making, planning, monitoring and project managing. The annual report of the Ministry of Justice, 2010-11, explored these recommendation and actions taken to overcome problems (MOJ 2011). For example, recommendation 3 was about individuals who took key decisions on NOMIS and were responsible for oversight and monitoring. The action taken by the Ministry of justice was to appoint new project management consisting of senior leaders and senior management. On the other hand, the NAO report (2009) pointed out that NOMIS had been through a variety of management problems: inadequate oversight; poor project management; misuse or inappropriate use of resources; poor supply management; and, underestimations in cost and timeline of the project. In terms of the technical aspects, the report indicated that there was a lack of estimation of the technical complexity and potential solutions. In additional, key suppliers were weak. An NAO officer said that sloppy project management was responsible for the spectacular failure, as well as senior management who failed to follow basic project management principles (Telegraph 2009).

6.4.6 Key Aspects of the Large-scale IS Failure in the UK Public Sector

In terms of the appreciation phase, it noted that large-scale IS failure has a long history in the UK public sector despite the efforts of government and different organisations to avoid it. A

high degree of complexity is exposed in the examination of various IS failures, particularly the ones we previously examined (LASCAD & NOMIS). For a long time, it was claimed that the risk level in IS public sector initiatives were increasing rather than being reduced (Willcocks 1994). Brown (2001) argued that policy makers prefer the tasks of initiating and planning policies, so a few of them tend to exercise their ability to control and manage their policies relating to IT development. An in-depth report was carried out by the Institute for Government, comprised of a high level taskforce of government, private sector, senior civil servants and thought leaders to provide expert support to IT government initiatives, demonstrating that government was struggling to get the principles of IT initiatives right, while most attempts to solve errors ignored the underlying system-wide problems (Stephen, Page et al. 2011).

The findings of the appreciation phase help specify most factors that are inevitably behind large-scale IS failures in the public sector, considering that the determination of these factors translates the nature of the UK context involving political, cultural and organisational aspects.

The factors are as follows:

- 1- The Government and organisations fall into bureaucracy that governs organisational behaviour. This culture appears spread at all level and dominates decision-making
- 2- The goals set by policy makers are over optimistic and/or unrealistic, which leads to unexpected ends; NOMIS is a good example for overly optimistic goals.
- 3- Ignore the fact that policy makers failed to deal adequately with diversity, uncertainty and conflict as important themes in IS initiatives.
- 4- Managing IS projects remains rolled out depending on a mechanistic approach in which impact on any procedure is taken at any stage of the development process. The mechanistic approach ignores that the IS failure is a real-world situation involving

human beings; rather it follows a rigorous agenda without paying an attention to human behaviour.

- 5- In spite of the mechanistic solutions, there is a weakness in managing the operational tasks carried out by the IS project board related to planning, developing and monitoring, as well as control of timeline and cost. Most failed IS initiatives failed to treat these issues properly.
- 6- Senior management is not aware enough of the development process, or it does not have enough experience to deal with difficult issues related to IS projects, which leads to misuse of the most appropriate resources.
- 7- The organisational culture plays vital role in achieving success or failure in an IS project. In the LAS Failure, for example, the fear of failure was dominant among the organisation's members.
- 8- Poor communication, in the entire organisation on one hand, and between the organisation and the external actors on the other hand, appears to be less concerning, although IS projects in the public sector need to increase public confidence.
- 9- The complexity intended by IS initiatives primarily relates to the technical parts of the project including software and hardware; thus, there was a lack of appreciation of the complexity of the project itself. Even the technical aspect was treated poorly. In the two situations, the system requirement specifications were identified by the project board (LAS system), which led to poor applications.
- 10- The engagement of different stakeholders in IS initiatives appears almost absent and insufficient. In the LAS project, for example, the ambulance crew was eliminated.
- 11- Finally, the reasons for IS failure in the public sector are varied and involve many complex components. Therefore, the focus should on changing managerial styles to tackle this kind of complexity.

Also, the appreciation phase helped us to identify the potential stakeholders, or ‘actors,’ engaging in IS initiatives, whether dependent participants or those who are external but have an impact on the situation. The dependent participants can be identified by looking at the owner(s) who fundamentally initiate and support IS projects at different stages of the development process, and they are also responsible for introducing successful outcomes. At this level, the government policy makers who propose the initiatives to the public sector are considered dependent participants. After that, the organisation and its members can be heavily drawn on dependent actors; this group includes multiple levels of organisation managers, the IS project committee, and staff. The external or independent actors vary based on participation in the IS initiative. Generally, in the UK public sector, the public watchdog organisations PAC and NAO can be identified as permanent actors, as can the opposition members of Parliament. Others related to the IS project can be identified within the private sector such as IS providers and consultants. Nowadays, researchers can play a vital role through their academic contributions to engage in the situation. Finally, the media, whether media or other press, has their influence in the form of public pressure; therefore, they will be counted as an independent actor as shown in Figure 3.6.

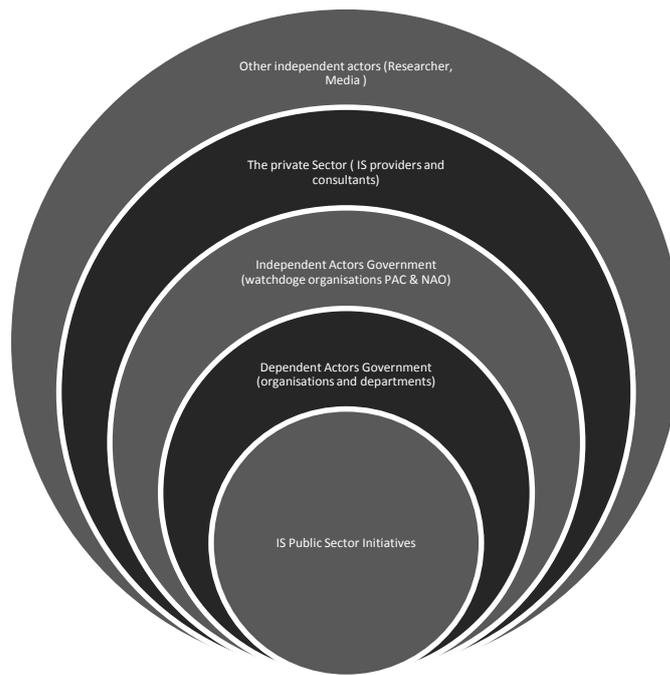


Figure 6-3 IS Failure Public Sector potential stakeholders

It is evident that large-scale IS failures appear diverse, with uncertainty in problem causes, which therefore requires a problem-solving strategy that takes into account managing complex and interrelated issues. In terms of a systems approach, the situation is considered as an ill-defined problem which cannot be solved through conventional approaches. The whole is often missed, and the focus is placed on dealing with issues without considering that these issues are affected by each other. The substance of the problem-solving strategy is its ability to assist in information systems initiatives in practice and bring about change. Furthermore, the method of problem-solving strategy intervening into the situation allows any potential stakeholders to share and exchange experience, knowledge and reflection on how to improve the situation, as well as its ability to reveal the powers that influence the organisation.

6.4.7 Summary

The chapter appreciates IS failure in the UK public sector based on analysing official reports and publications. The appreciation phase activity can help to better identify IS failure and

issues that create the permanent failure. The historical background heavily supported the researcher, 'an agent,' to gain a rich understanding of the situation in its context, and revealed that although the method of managing IS projects has evolved over the years, the improvement remains modest because of a lack of coping with the complexity that underlies the methods of managing the diversity and uncertainty surrounding the situation. The diversity is related to the interaction of different organisations and stakeholders with different interests, from both the public and private sectors, in the initiatives of the IS project, while uncertainty is related to organisational and technical aspects. In order to confront the complexity of situation, diversity and uncertainty surrounding IS projects in the UK public sector.

7 Chapter The Analysis and Findings of Primary Data Interview: the Second Mingers's 4 as the Analysis Phase of IS Failure in the UK Public Sector

7.1 Introduction

Chapter 7 examines the second phase of Mingers's 4 as the intervention process activities of the situation, which is the analysis phase. According to Mingers (1997), this activity tends to analyse the underlying structure/constraints that generate the experienced situation. Thus, the aim of this analysis phase is to understand the information system (IS) failure in the UK public sector, as experienced by practitioners and scholars. In terms of understanding the various issues that generate permanent failure in the eyes of the general public, the viewpoints of practitioners and scholars likely complement the knowledge obtained through the appreciation phase. Alternatively, a critical hermeneutic analysis would help the researcher construct the context of the IS-failure situation based on available data and, in turn, create another way in which the IS-failure situation may be understood.

This chapter focuses on three areas: understanding IS failure in the UK public sector, understanding management issues and learning lessons about IS failure. As noted above, this phase is considered to be complementary to the appreciation phase. Both phases prepare for the next phase of intervention, the assessment phase, which is discussed in Chapter 8.

7.2 Interview Procedure

This phase began in 2013 and included several trips to London in an attempt to meet government officials and national associations in management and information technology. Unfortunately, the response was unenthusiastic. Consequently, this option was eliminated and an alternative option to the interview phase and conducting individual interviews was developed. As such, this phase is based on the participation of practitioners and scholars, whose contributions provide insight and understanding of the situation. The researcher

interviewed 13 dependent respondents with considerable academic and/or practical experience in management, project management and IT management. The interviews required face-to-face contact with the respondents, however, a number of interviewees excused from being interviewed face-to-face because of their own busy schedule which led to send the questions through email. For those who conducted face-to-face interviews, each interview lasted, on an average, about 1 hour. A structured interview was conducted to avoid spontaneously creating questions during the conversation that may distort the aim of this phase. Via email, we provided respondents with the research topic and summary of the study, including two examples of IS failure in the UK public sector as guidance (Appendix A). We maintained confidentiality by replacing the respondents' names with Participant, or P, followed by the assigned transcript number, from 1 to 13. Table 7.1 summarises the characteristics of the participants.

Participants	Position	Notes
Participant 1 (P1)	Management system	Academic
Participant 2 (P2)	Management	Manager
Participant 3 (P3)	Project management	Project manager
Participant 4 (P4)	Management	Project manager
Participant 5 (P5)	Management	Planning
Participant 6 (P6)	Risk appraisal consultancy	Private sector
Participant 7 (P7)	IT executive	Public sector/former IT editor
Participant 8 (P8)	Project management	Manager
Participant 9 (P9)	IT manager	IT project
Participant 10 (P10)	Management	Manager
Participant 11 (P11)	Risk and crises management	Academic/consultant
Participant 12 (P12)	IT management	Business management private sector
Participant 13 (P13)	Management systems	Lecturer/author

Figure 7-1 Characteristics of Participants

7.2.1 Understanding IS Failure in the UK Public Sector

The first area of concern relates to the causes of IS failure in the UK public sector. As indicated in the appreciation stage, official reports and publications note that most failures relate to management issues that pay little attention to project development but focus on technical complexity.

We recognize that the respondents' knowledge and experience impact their view of what causes IS failure in the UK public sector. For instance, Participant 1, whose background is in management systems, identifies the IS failure as follows:

“In my view, this is due to lack of understanding of the complexities of projects. Traditional project management techniques focus on completing on time and within budget. They often break projects into ‘manageable’ chunks, managed by different teams and co-ordinated by programme managers. However, this involves a loss of understanding of the holistic picture”. (P1)

Participant 1 attempts to view the situation holistically, as interrelated issues that ultimately lead to failure. Participant 7, who also has an IT background as former executive editor and is an expert in IS failure in the public sector, declares the following:

“Every project is different and when it fails it’s for unique reasons. Sometimes, indeed often, there are common factors which have little to do with the technology itself: unrealistic expectations, a poor understanding by supplier(s) of what the clients really wants—and the clients change their minds on what they want—and too much reliance by clients of promises and ability of the supplier to deliver”. (P7)

In addition, Participant 7, based on experience with several IS failures in the public sector, notes a disconnect between middle management and top management, which ultimately conceals the potential reasons for IS failure, states,

“Middle-grade managers don’t wish to harm their careers by speaking truth to power, and those at the top may want to hear solutions, not problems” (P7).

Participant 9, who is an IT manager with 15 years of experience, highlights the following three factors that lead to large-scale IS failure in the UK public sector,

“There [are] usually three elements for the reason: one is either human element, two is either systems element, and three could be an external element” (P9).

Participant 9 explains that the human factor is related to the organisation’s members, who manage and support an IS initiative unsuccessfully. This includes making decisions, planning and coordinating. The systems factor is concerned with technical issues, such as systems, poor systems requirements, systems process and flexibility and implementation. The last factor is the external factor in government policy makers and politicians. Most participants identified those three factors as causing large-scale IS failure in the UK public sector.

In contrast, Participant 11, who specializes in risk and crisis management and is interested in human society and culture, emphasises that the large-scale IS initiatives appear to be long-term projects, and that the time period spans from when the ISs start designing to when they are delivered. As a result, IS projects become out of the date, as noted by the participant,

“Information systems probably, like any other system, have a tendency to be designed fit to a purpose that almost down to date,

presume that they created, often by the time they created they are out of date” (P11).

Participant 11’s view is worth considering. A quick review of the previous IS initiatives reveals a period of four to five years between creation and implementation. For example, NOMIS project was generated in 2004 to be accomplished in 2008. During that time, the purpose of the project divided into five smaller projects. The participant explains that, during this period of time, many changes to the systems activities occurred, such as alterations to systems’ users, systems’ requirements or business changes. The participant emphasises the ability of the IS to adapt in order to survive.

Participant 13, who has a strategic management background, suggests that there are many factors related to large-scale IS initiative failures. At the organisation level, the participant considers unrealistic planning to be a main factor of IS failure,

“You sometimes have an ambitious plan, especially in an IT project and when it comes to fact you discover a gap between what you planned and what you really need” (P13).

This view seems to be related to Participant 11’s idea, which consists of two outlooks concerned with time projections and their impact on IS initiatives.

Participant 4 brings his knowledge and experience in organisations to the fore and attempts to portray the situation as a lack of vision toward IS initiatives, which leads to failure. According to Participant 4, the following six obstacles in organizational vision influence how the IS project is treated:

“1) Approaching a ‘large-scale information systems’ project as if the problem to solve is IT rather than business, 2) Insufficient

clarity about purpose, 3) Focussing too much on the output rather than the benefits, 4) Focussing too much on delivery to cost and time constraints thus missing the bigger picture, 5) Placing too much emphasis on control and governance mechanism as opposed to creating an environment where learning can take place, 6) Too much emphasis on the technical elements such as planning as opposed to dealing with stakeholders". (P4)

In the appreciation phase, we trace similar factors associated with IS failure initiatives in the public sector. We also note that, since 2000, government policy shifted toward adopting business rules to create a more efficient approach; however, the overall result shows that IS initiatives remain afield. In fact, Participant 4 expresses significant issues that can help government improve IS initiatives in the public sector. Other participants identify several issues related to previously noted reasons, such as poor project management, lack of business objectives and technical issues.

Another controversial idea we examine relates to when an IS project should be considered a failure? To some extent, it may be subjective to judge IS initiatives. What someone considers to be a failure might be viewed as a success by someone else. By asking this question, we attempt to become more precise in examining ideas produced by interviewees. Participant 5, for instance, emphasises that success criteria should be established during the early stages of planning. As noted by Participant 5, failure occurs once these criteria are not met:

"An evaluation plan with critical success criteria and performance indicators should be produced in the planning stages of the project. Failure will be if these criteria are not met. These need to be short- and long-term and post-project reviews conducted to assess how

well the project met these criteria. However this evaluation plan and the criteria need to be reviewed to capture any emerging benefits from the project”. (P5)

Participant 2 provides the following point of view, which summarises the benefits that are anticipated to be gained by the end of the IS initiatives:

“When it becomes clear that a useful level of benefit cannot be achieved from the perspective of those who need to use the system within a ‘reasonable’ timescale or overspend” (P2).

Another participant makes the following statement regarding benefits that are expected to be achieved by the end of the IS initiatives:

“When the committed costs outweigh the expected benefits” (P3).

Participant 8 notes that failure results when systems do not meet the requirements of end users, stating:

“In my view, if the project does not meet the end users’ requirements, it is a failure...this is failure. The end users here are those people who are affected directly or indirectly” (P8).

Subsequently, the systems themselves could then be deemed to be failures.

Participant 13 provides a unique perspective, agreeing that the IS is considered a failure if it does not attain its goals and expectations. Alternatively, this participant notes that some ISs work even though the goals and expectations are not achieved, stating that sometimes

“...an ‘IS project’ fails to meet its objectives and expectations, and is unlikely to. Knowing a project is a failure is critical, otherwise a

doomed project will continue day to day, week to week, year to year without anyone seeing that it is doomed” (P13).

Using this perception, we note that it is difficult to consider an IS to be a failure as long as the system is doing well, despite apparent signs of failure. This participant’s view appears to be technically based in identifying the type of failure as partial or total. In addition, it tends to exclude other related criteria, such as objectives and expectations that are mostly related to the organisation and people who are interested in the IS.

7.2.2 Understanding Key Management Issues in the IS Failure

Managerial issues within organisations are the primary concerns in this study, as it is presumed that management plays a key role in avoiding failure. In the appreciation phase, we determined that the major cause of IS failure was related to management problems. The two examples we explored revealed that a lack of sufficient management led to IS failure. Considering the importance of understanding IS failure in the UK public sector, we examine key issues as suggested by participants.

At the policy-making level, large-scale IS projects in the public sector are still viewed as the result rather than a cause, and government and senior management do not appear to be concerned with following business rules throughout the IS process. Participant 12 introduces this important aspect that requires consideration when delivering an IS project, stating,

“IS projects are often considered to be just about procuring or developing and implementing an IS solution without regard to the business needs” (P12).

Participant 3 makes another policy making-related point, emphasising the importance of adopting business rules in IS public sector projects, and declares,

“Every IS project needs to be considered as meeting a business need. If the project does not provide a good return on investment it should not be pursued” (P3).

Further, Participant 3 suggests focusing on the planning stage of IS initiatives to ensure the project meets a business need rather than being constrained by technology development, and states,

“Ensuring the project is to meet a business need, not technology for technology’s sake” (P3).

This concept was established as a strategic aim in the Cabinet Office report (2000) on modernising IT projects in the public sector. To some extent, we agree with Participant 3 regarding the argument given by Brown (2001) when he blames the policy makers and senior management for not involving technology in the development process of IS projects.

Participant 6 is a director in risk appraisal consultancy and believes that IS failure refers to the failure of the organisation itself in dealing with the nature of the IS project. The organisation in the public sector, he claims, underestimates several management issues that led to the failure, beginning in the planning stage and continuing through implementation. Specifically, Participant 6 states that the failure of an IS project results from

“...the setting and the management of realistic expectations as to what can be achieved given the people (including the skills and experience). The management of trade off between time, cost, objectives and constraints as planning and procurement over-run and business requirements change” (P6).

Further, Participant 6 argues that organisations sometimes suggest an ambitious plan when initiating IS projects, but subsequently find a gap between what was planned and the reality of what exists. This view can be further understood when we consider that Participant 6 expresses the private sector's way of thinking, which is more realistic and follows strict management rules in order to maintain profitability. In contrast, Participant 6 attempts to say that the way in which an IS project is managed seems an inadequate.

Participant 10 notes that unrealistic objectives set by management lead to undesired outcomes and performance, thus, the need for management to establish achievable objectives at inception to help maintain balance between realism and ambition. In summary, this participant states,

“One of the biggest difficulties when managing will be trying to succeed when the objectives are unrealistic” (P10).

The above analysis reveals part of the problematic situation that stems from top management and policy making in IS projects. It could be argued that senior management and policy makers play the most important roles in establishing IS initiatives. Moreover, it is evident that those who plan and initiate IS policies in public sector organisations do not take the complexity of the project seriously because they devolve their responsibility for IS projects to lower levels of management. As a result, we must examine the notion of IS project supporters in public sector organisations. To ensure projects are delivered appropriately IS project supporters would be stakeholders in public sector IS projects. Participant 8 highlights the importance of IS project supporters by stating,

“I believe projects require support from those who desire the benefits of use and from senior management who can guarantee prioritisation of resources” (P8).

Another relevant managerial concern expressed by participants relates to the lack of management skills in those who carry out IS projects. Participant 5 believes that management is sometimes unable to cope with many issues throughout the project, and expresses his concerns as follows:

“Management fails to involve the right people in the project...It is also associated with a lack of attention to benefit realisation throughout the life of the project. Postponement of benefit measurement until the end is likely to lead to unsatisfactory results” (P5).

Another participant reveals a similar concern regarding management issues by stating,

“The management of an organisation who are responsible for the inception of a project bears the whole responsibility. The nature of the project and the way it will proceed rests with them. The possibility to consider benefits management effectively also lies with them” (P12).

This indicates that IS failure risk remains high and that every failing is unique and can/cannot be shared with one another. In contrast, criteria and performance indicators should be produced throughout the project to assess how well the project meets these criteria. Some management activities produced by participants reflect concerns about, for example, project values, finance, coordination and stakeholders' engagement. In terms of managing budgets and time frames, participants agree that public sector IS projects universally suffer from

unexpected budget increases and delivery delays. In opining that these common IS project problems exist because budget and project timelines are business issues rather than technical issues, Participant 2 states,

“IS failure cases are frequently inaccurate with costs and risks undervalued and return over exaggerated” (P2).

Participant 5 presents another managerial concern regarding coordination, explaining that large-scale projects consist of different parts of government and government organisations. Consequently, coordination becomes essential to the survival of the IS project, as illustrated by Participant 5:

“The point is that in a large-scale project we are dealing with different organisations...or even with the private sector, so the lack of coordination is obvious in the large-scale IS project. It needs to enhance engagement among those people who are involved in the project...” (P5).

Another criterion concerns choosing stakeholders involved in the IS project in order to meet the project criteria, which is described by Participant 5 as follows:

“Most IS projects fail to engage the right people in defining desired outcomes and performance criteria. Reliance on external contractors/recruiters for tasks that require an understanding of the business (including the organizational culture) with a minimum of IT or programme/project management skills and therefore should be done by existing staff, retrained as necessary”. (P10)

7.2.3 Learning Lessons from IS Failure in the Public Sector

A majority of IS failure studies concentrate on lessons learned. For this study, our interviews revealed participants' views about lessons learned. For example, Participant 9 notes that learning from IS failure is important to improve the situation, stating,

“...there is a way to learn from every single part of the project, the strategy, the design, the build, the transformation, the operation. There is always capability to learn whether or not that capability is constantly applied” (P9).

Another participant argues that there are many lessons for the government to learn about IS failure, but it seems we did not learn the right lessons. Participant 11 uses an abandoned NHS IT project as an example, stating,

“...the experience of the NHS IT project, which was abandoned after more than 10 years of investment and work, suggest that we are failing to learn the right lessons” (P11).

In contrast, Participant 13 views learning as a collective process among those involved in IS failure, such government, organisation and individual. He emphasises the willingness of people to share the issues they face, explaining,

“Few organisations are good at learning lessons, or even communicating issues among project staff. There is plenty of scope, however, it depends on the willingness of people to share the issues they faced. A community of practice is one option and action learning sets another” (P13).

To some extent, Participant 5 agrees with Participant 11 by claiming that the public sector seems to discourage learning lessons from IS failure because officials consider the uniqueness of an organisation's IS project to be less useful. In contrast to the private sector, Participant 5 explains that the public sector government never punishes for errors that are the result of IS failure:

“Learning is happening but it’s patchy. In the public sector, every department considers itself unique and officials tend not to think that lessons elsewhere apply to them. Private sector boards have a strong incentive to learn, at least because failure may hit the share price and most directors have shares in their own companies. Improvement in the public sector is happening in part because of Cabinet Office scrutiny and because disasters have a much higher profile than they used to. But a lack of individual accountability, the ease of covering up or interpreting the facts generously, places limits on the scope for future improvement in the public sector”.

(P5)

Participant 11 offers an opposing view, stating that we should learn from successful IS projects rather than failures because it positively improves systems failure:

“I would say we don’t learn and there is a very good reason why we don’t learn. The reason why we don’t learn from the system failure is because when you are looking at system failures, the first thing you encounter are methodological barriers so, for example, you are involved in a major systems failure and something you did actually caused the failure; the first thing you don’t want to talk

about is system disaster. It is a complete waste of time because the first methodological barrier is getting information; secondly, even if you could get that information, what would you learn other than why a bad system had a bad outcome....learning from disaster is extremely difficult, learning from success in contrast is much more positive". (P11)

7.2.4 Summary

In the interview analysis, we explore many views in order to understand the complexity of IS failure from the point of view of people concerned. Participants agree that managerial factors are likely crucial, but IS projects are often seen as technical in nature rather than focused on business. The complexity of IS projects can be found in technical aspects as well as management issues, and also in the real world. No single view would provide a solution to avoid the permanent failure as long as every participant has a unique world view. Furthermore, it could be said that everyone has their own world view to express the problem based on particular knowledge and/or experience. To some extent, the lessons learned seem diverse, where each participant reflects on his particular view of the problem in order to benefit from system failure. Finally, these views help shape the cumulative knowledge, which aids in understanding the public sector IS failure prior to beginning assessment phase activities.

8 Chapter The Analysis and Findings of Primary Data Workshop: the Third Mingers's 4 as the Assessment Phase of IS Failure in the UK Public Sector

8.1 Introduction

Chapter 8 examines the third phase of Mingers's 4 as the intervention process activities of the situation, which is the assessment phase. According to Mingers (1997), the assessment phase aims to change the situation within the limitations of intervention. In Chapters 6 (appreciation phase) and 7 (analysis phase), the researcher endeavours to understand how information system (IS) failure in the UK public sector affects functioning capabilities. The assessment phase, however, examines the ability of systems approach to change problematic situations through a process of debate among the participants. Purportedly, the system approach accepts that the employment of a variety of methodology, methods and techniques in a pluralistic fashion can support the process of intervention. Therefore, the current study adopts this strategy in an effort to cope with the complexity of a real-world situation. To enable useful debate between participants, the researcher conducted a workshop activity. During the workshop, the researcher applied KETSO, a hands-on creativity tool, to encourage more productive debate between participants.

This chapter begins with a brief summary about the workshop procedure based on KETSO, which was used to carry out the debate. The assessment phase resulted in identifying four strategic levels for change in an IS failure situation: (1) initiative owner, (2) organisation culture, (3) IS design and implementation and (4) users. Each strategy has its own complexity to assess and attend to.

After identifying these four strategies based on the previous two phases—appreciation and analysis—we attempted to develop a metaphoric image to conceptualise the four strategies as

they relate to one another. The most appropriate metaphor that matches the relationship was the clockwise circle because the four strategies interrelate and create each other in a circular fashion. In the last activity, the participants were asked to identify a number of issues within managerial activities in terms of the four strategies. As a result, participants were provided with a suggested framework as guidance to help them focus on managing the complexity of these four levels rather than breaking them down into four separate complexities.

8.2 Workshop Procedure

In October 2013, we began preparing the assessment phase by contacting individuals from different management backgrounds who are interested in sharing their knowledge and experience to improve the IS failure situation. The target was to have 10 participants debate the IS failure situation in an intensive half-day workshop based on the KETSO creativity tool. The study's summary and workshop details were distributed a week before the activity was run (see Appendix B). In addition, the researcher met several times with Dr. Fraser, who managed the workshop as an expert in KETSO. It was assumed that the workshop was attended by 10 participants, as had been confirmed; however, only seven actually attended. The seven participants had different managerial backgrounds, including two of the researcher's colleagues, who wanted to be involved in the debate (Table 8.1). Finally, the KETSO toolkit was conducted during the last two phases of the intervention process: the assessment phase and the action phase.

Participants	Position	Notes
Participant 14	Management system	Academic
Participant 15	Management	Manager
Participant 16	Social project management	Project manager
Participant 17	Management	Project manager
Participant 18	IT manager	Public sector
Participant 19	Student	PhD management systems
Participant 20	Student	PhD management systems

Table 8-1 Characteristics of the Participants

8.2.1 KETSO Creativity Tools

Developed by Dr. Joanne Tippet, KETSO is an innovative hands-on toolkit for creative engagement that provides a structured framework for capturing ideas. According to the KETSO web site, “It can be used for creative thinking, teaching and learning, exploring new ideas, developing options, creating action plans and gathering feedback (2014). KETSO has been refined over the past two decades to meet new challenges and, in addition to promoting creativity, KETSO helps people engage in developing solutions to problems. Hence, it is applied in different areas of research, such as community planning, health and well-being, public and stakeholder engagement and strategy and change management. In the systems environment, KETSO is categorised as a tool to be used in creative engagements by individuals who are already involved and invested in a particular situation rather than a new systems approach to reinforce practical intervention. In the practical sense, KETSO tools depend on re-usable coloured shapes (branches and leaves), different sizes of round labels and icons to stick on a central felt workplace. All of these items are used and reused to arrange and cluster ideas as the conversation develops. For example, the four leaf colours (i.e., brown, green, gray and yellow) are used to ask questions about the situation, while icons are used to highlight key points. At the end of the discussion, a visual record takes place to help the researcher analyse the result.

The current research utilized KETSO because it is a creative tool for learning and exchanging knowledge about IS failure. One of our objectives in this study is to learn from IS failure and to develop new ideas about how such failure can be avoided. Therefore, the researcher used the KETSO toolkit because it encourages participants to make suggestions and think out loud, while also providing supportive tools for the researcher to develop a systemic approach to the investigation. Finally, KETSO tools enable the exploration of an individual’s experience as

presented by the participants, which often results in the proposal of an appropriate solution to the problem.

8.2.2 Complexity of IS Initiatives in the Public Sector

Chapters 6 and 7 address the nature of IS failure in a particular context, which is the UK public sector, and explore a variety of issues and challenges that could lead to "or "that could result in permanent failure. Political, organisational, technical and user perspectives are all involved in the situation, and the solutions associated with these perspectives tend to ignore the linkages between them. Consequently, it is argued that the current containment strategies for IS failure remain inefficient to clearly define the problem's complexity because most of these strategies rely on a reductionism approach. While reductionism seems to rely on breaking down the problem into smaller, more manageable sub-issues, this manner of inflexible thinking proves its limitation to overcoming real-world problems. In contrast, system thinking has the ability to deal with messy real-life situations and address connections, hierarchies and relationships between different priorities in order to bring about change. Relevant system ideas open a debate among stakeholders who engage themselves in the situation in order to gain a better understanding of the problem and offer alternatives.

In current research, we borrow the intervention process model of Mingers (1997) to guide us through the theoretical intervention. In this stage, we propose to change the situation of IS failure in the public sector as it is sought, proposing a general structure before identifying ways (Chapter 9) to improve the situation. The researcher benefited from the previous two phases and sought to change the situation within the recognition of various complexity levels. We finally focused on four levels of strategic complexities: initiative owner, organisational culture, IS design and implementation and user(s). We began by establishing the metaphoric relationship between the four strategies. To specify the relationship, we use "clockwise" as a

metaphor to conceptualise the development processes of initiative owner, organisation culture, IS design and users. The meaning behind the clockwise metaphor is that the IS project in the public sector follows a circular movement, starting from the initiative owner before it returns to the same strategy to start another initiative. Figure 8.1 expresses the nature of this movement, where each strategy is dependently related to the previous and next strategy in a continuous circular figure.

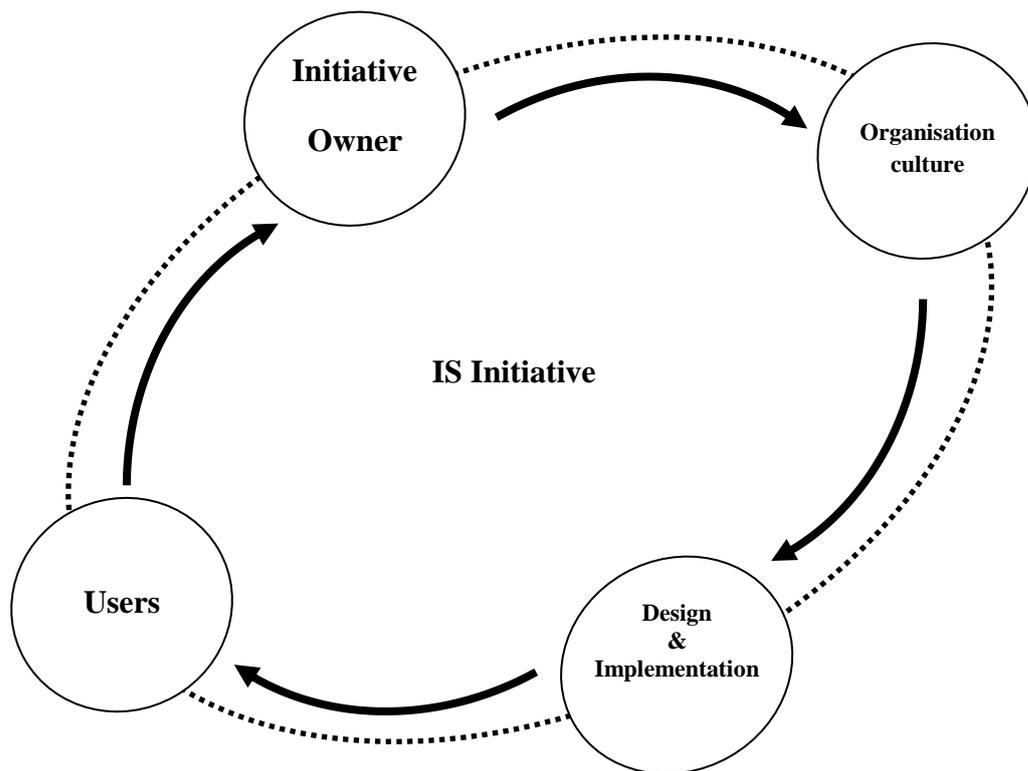


Figure 8-1 Four Areas to Change IS Failure as Clockwise Metaphor

In order to undertake this activity collectively, participants were asked to identify various activities that suit each level of the four strategies identified in the previous step. The goal of this brainstorm scenario was to encourage participants, based on prior experience and knowledge, to suggest issues from their points of view. Bear in mind that the four identified strategies shape the context of IS failure within the UK public sector, which is distinct and cannot be applied to another context. Moreover, we assume that each strategy represents a

kind of complexity to the situation, all of which are interrelated. The next activities we work on expand the four strategies to include the nature of the functions that link each strategy.

Because most participants have no previous experience with systems thinking, particularly with the KETSO creativity tool, their interaction during the debate was an opportunity for them to recognise the ability of systems ideas to solve contemporary management problems. The shared knowledge was useful in identifying the characteristics of a good quality IS project. Therefore, the debate led to the determination of a variety of issues within the complexity of each strategy. The following sub-sections include details about the four strategies.

8.2.3 Initiative Owner Complexity

The initiative owner complexity level is central to the change process because it includes the politicians and decision makers who largely impact IS initiatives. This includes government organisations, parliament members and public watchdog organisations. IS initiatives are often suggested by policy makers in order to modernise IT public services in a very competitive environment. Consequently, they are specifically able to set appropriate goals for the IS initiative, including obtaining suitable government financing and support in delivering the IS initiative. The initiative owner's influence is essential to the IS project's survival because of their high level of control and their ability to change their policies about implementing IS initiatives. The public organisations translate these policies into realistic IS projects under the regulations of IT strategies that are formed and measured to ensure that the delivery of IS initiatives meets the required commitments (i.e., Cabinet Office 2000). Conversely, the government undertakes the IS development work and delivers the IS initiative to the public sector through different organisations. We noted that public sector organisations face challenges from bureaucratic and political processes in underpinning IS initiatives despite

considerable reforms toward adopting business rules to increase efficiency. The role of managing in government organisations failed to avoid the frequent causes of IS failure or even reduce the high risk of failure. This extended into the unwise use of government finance, which seems to be a constant IS failure in the public sector. The vast majority of IS issues in the public sector witnessed an increase in the overall cost compared to the budget set at the beginning of the project. In addition, public watchdog organisations (i.e., PAC & NAO) have a high level of monitoring the policy makers' policies and other government issues through the annual revisions and reports; however, it is noted that the response of watchdog organisations appear late to bring an improvement to IS initiatives.

One of the biggest concerns at this level is that political interests can lead to conflict, which may affect the IS project. Sustaining the complexity of this level is necessary to making the IS project feasible. Conversely, any potential gap in managing this complexity would increase the rate of IS failure. It is significant that this level of complexity concerns the highest level of power and authority between its actors and their political interests in order to credit the achievement of success. Therefore, managing this level of complexity is based on flow processes to respond to the uncertainty and diversity issues related to IS creation while accounting for the nature of political circumstances.

8.2.4 Organisational Culture Complexity

The second complexity is organisation culture. The nature of organisation is executing the policies passed down from the policy-makers and government into strategies. All the managerial processes are performed based on the culture within the entire organization, including senior, middle and lower management of public sector. The way in which the culture is constituted among the organisation's members determines whether the development processes of the IS initiative are affected positively or negatively. The LASCAD project is a

good example of how the new culture of fear that is spread by senior management was dominant in the LAS organisation during project development, which led to a gap between top management and the other levels of managerial processes.

The senior managers of the public sector, who translate IS initiative policy into reality, establish adequate IS initiative plans and take control of operation tasks. Their main responsibility is to achieve the success of IS project development and avoid failure. Therefore, it is clearly presumed that senior managers have the ability to ideally manage and exploit the resources of the organisation and to achieve success, which includes adequately budgeting and scheduling time during the IS project. It is also expected that their skills and experience be embedded throughout the life of the IS project and that they focus on managing the context of organisational issues rather than focussing on technology. There are a range of issues that senior managers should be aware of during the development process, in cooperation with middle and lower management, which are responsible for executing the managerial functions of project. The organisation heavily relies on their skills and experience to deliver a successful project because of their direct influence on operation processes. Lastly, organisation staff or non-managerial staff process multiple tasks during the development of the IS project.

At this level organisational culture complexity, the management perspective significantly impacts the organisation's behaviour and interaction among its members. The complexity of this level led to identifying five important managerial tasks—planning, control, risk, evaluation and report—that likely shape the organisation's culture in order to change an IS situation. The reason for choosing these tasks is twofold: First, they are all relatively related to the management key issues and decision makers where the IS project exists. In the previous examination of IS failure in the public sector, we noted that the planning and control tasks were connected to the responsibility of government and policy makers who initiate IS, while

the executing functions were associated with the organisational processes. Second, combining these tasks reduces any cultural influence because of the separation of different managerial tasks in the development processes. By combining these tasks under the complexity of the organisational culture, managers and decision makers can efficiently manage and deliver IS initiatives and allow for a high degree of flexibility between different management levels.

8.2.5 Technical Perspective Complexity

The third complexity is the technical aspect, wherein the IS initiative is designed and implemented. The private sector suppliers often provide the public sector with the technical needs of IT procurements. The commitment of suppliers is essential, especially in creating the appropriate IS as a software procedure based on computer applications, which are undertaken by IT professionals, and in relying on the methodological procedure of IS development (i.e., life cycle for large-scale ISs that match the particular requirements of a public sector organization). The nature of processes includes analysing new ISs, the design based on systems analysis, and testing the new IS before it is fully implemented. In addition to the software procedure, there are hardware supplies, such as computers and telecommunication devices. The problem might become more complicated when different suppliers are involved. Human participation, such as IT external consultants in the IS initiative, can be defined within this level of complexity as to whether they participate directly or indirectly. Within this level, the concentration extends to include a number of issues that are essential to forming an adequate IS project: applicability, requirements, development and operation (testing). The complexity of this level is twofold: (1) the business rules of private sector organisations, which typically differ from public sector management, (2) the size of the ISs might necessitate continued modifications to respond to new requirements during the development of the IS project. The former leads to miscommunication issues, while the latter causes an increase in expenses and overtime for the IS initiative.

8.2.6 Users Complexity

The last complexity is related to the users of ISs, who benefit from the delivery of the IS project, since the new IS initiative is expected to improve the organisation's performance and services. The main concern of the users is that the IS meets their needs and expectations. The user-level complexity is important to judge whether the IS initiative is a success or failure because the users compare the current IS (i.e., the "old" IS) and the new IS. Also, the beneficiaries are diverse users, consisting of direct users (e.g., decision makers, managers and organisation staff) and expected users (e.g., the general public), whose IS project is created to serve them.

8.3 Managing IS Initiative Complexities in the Public Sector: Change the Situation

It has been postulated that all the components identified above represent the initiation of large-scale IS failure in the UK. Further, each one has its own complexity as well as its assumptions in order to make up the system's structure. The key point is the way the problem solver looks at the system's behaviour in terms of determining what is going wrong. In this issue, the literature on IS failure shows that there are two world view approaches that can be undertaken to deal with such a complex system and are therefore capable of coping with large-scale IS failure. Introducing these two different approaches is intended to shift the way of thinking about the problem situation being addressed and explore how this change could bring a better understanding to avoid IS failure. The first approach adopts a linear-shaped 'reductionist' way of thinking in dealing with the problem situation, which assumes that any problem situation has to be reduced into parts in order to analyse these parts separately while the whole, including its relations and interconnections, is of less concern as a world view. The second approach is holistic, enabling the whole system to be perceived in a way that allows for understanding the interactions between its parts to make up a world view. Both approaches produce a pattern of systems behaviour that reflects how the world view can be understood.

In the next two sub-sections, I offer two models that rely on the two ways of thinking and the change suggested for understanding large-scale IS failure in the UK public sector. I begin to conceptualise the complexities based upon the reductionist view before proceeding to offer the same complexities in terms of a systems approach based on holistic thinking.

8.3.1 Reductionist world view

The first model is based on a reductionist world view that presents the system as being closed and resting upon inputs/outputs without considering relevant factors to impact the system. This view is criticised as restrictive and bound up with one linear model and one world view, which makes it dependent to, in a reductionist way, cause-effect relations. In addition, in accordance with the grid of problem contexts as introduced in the System of Systems Methodologies (SOSM) (Jackson, 2000), the reductionist view of the world is situated as simple-unitary and complex-unitary contexts because it is easy for the system of concern to be mathematically modelled, relaying on the established objectives. Consequently, the way to analyse this type of reductionist world view depends on isolating each part of a system in which its parts and its interactions are hard to perceive in terms of the whole image. The origin of this thought builds upon natural regularities in science, which seems a successful approach for producing knowledge within scientific inquiry but has less impact on social science. Therefore, it can be claimed that despite the contribution of reductionism in the field of information systems, I would argue that this way of thinking about a complex matter has led to limited success because the focus is on splitting the system into parts. A further point related to the reductionist view is that the existing model can be generalised to be applicable in different environments where IS failure is happening without consideration of a particular context that differs from one environment to another.

Figure 8.2 expresses the nature of the traditional systems thinking model for large IS failure in the UK public sector based on the four complexities previously identified: the initiative owner, organisational culture, IS design and implementation and users. I assume that they are all designed to work effectively in the way of achieving objectives. For example, the initiative owner is the policy makers who plan, finance, support and monitor information strategies within the public sector. In the UK, this complexity can be outlined in the government and its related departments, ‘organisations’, the members of Parliament (MPs) having different political backgrounds and of course particular agendas and, finally, the public watchdog organisations whose work is to publish annual reports on the performance of each government department. Further analysis of this complexity finds that it has its own context, goals, structure and criteria of the performance. The human domain in this complexity is seen as pursuing common goals and the objective set by the initiative owner without attention being paid on the individual interests to achieve. In terms of the reductionist view, this complexity is considered as an isolated system in which it has no interconnection with other related issues that make sense in the broader IS context. This is extended to sub-systems of the system itself, which have different objectives to achieve pre-specified needs. The same scenario can be drawn on the rest of the identified complexities as independent parts of the system’s model in which they tend to be linearly regulated. Figure 8.2 shows a framework demonstrating the process and control of the system’s behaviour related to the large-scale IS initiatives in the UK public sector. Initially, four fundamental parts represent the system’s design, which can work under particular environmental conditions. Once a part or sub-system of the whole fails to work as planned, a major effort is devoted to analysing that narrow part in isolation of the other system parts. Further notice of the reductionist view is related to the human activities which seem a substantial aspect of the system’s design; less attention can be found to frame the activities of those who are involved and those who are affected in the real world. Thus, I

would agree with the claim that the principles of the reductionist world view appear to be limited for tackling a real-world problem situation.

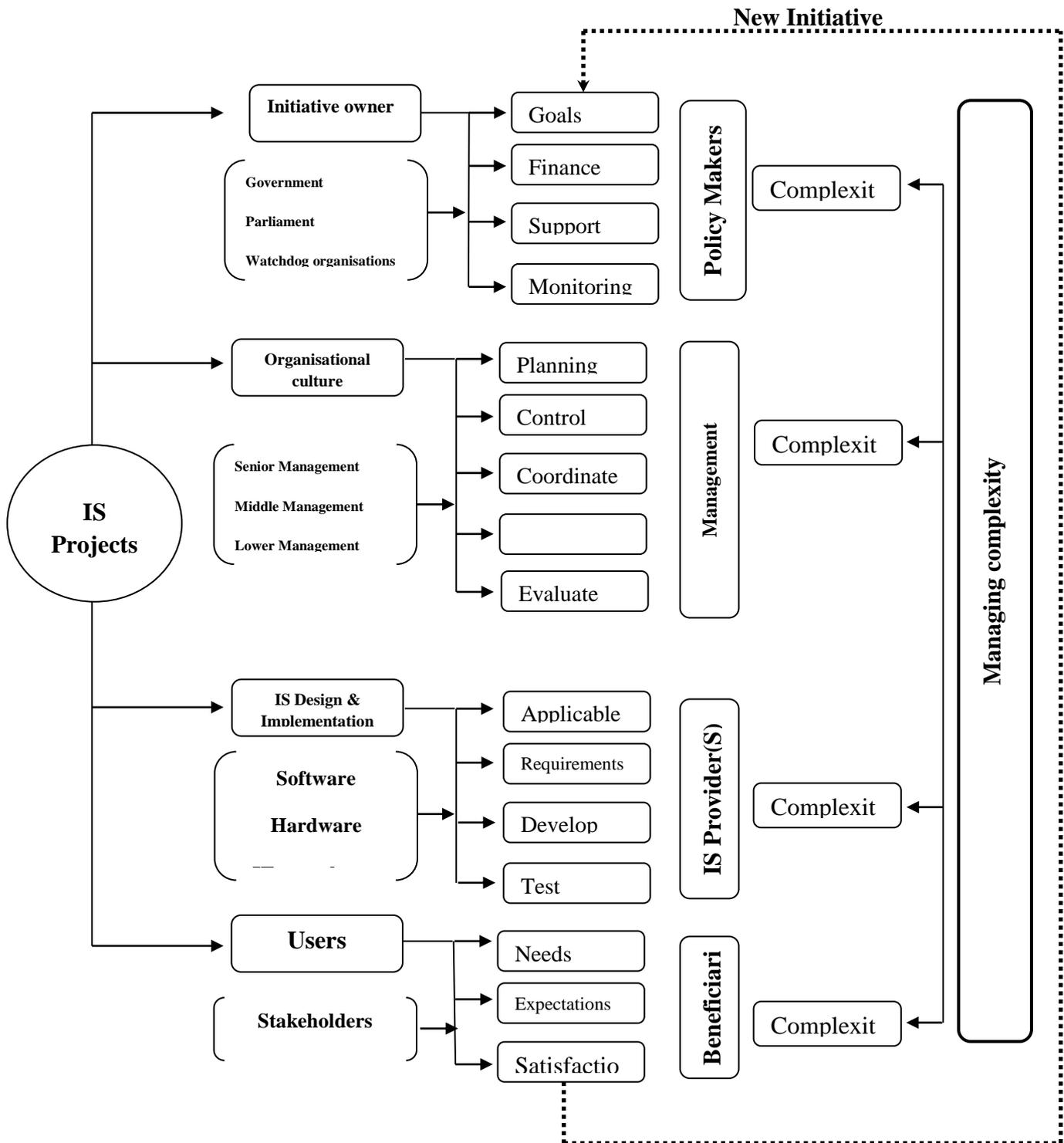


Figure 8-2 A Reductionist View for Managerial Issues Related to the Four Areas of Change (IS Failure)

8.3.2 Systems Approach World view

The concept of systems approach is a further development in the systems movement to cope with a problematic situation recognised as highly complex and messy. Mingers (1980), Checkland (1981) and Jackson and Key (1984) are the earliest systems thinkers who challenge the use of scientific thought in the field of social sciences. Because the limitation underlying the reductionist approach means coping with emergent properties as well as diversity and uniqueness laid in the problematic situation, a number of proposed critical systems approach designs have been suggested on the basis of systems ideas that are capable of making a desired change in a complex world. Mingers (1980), however, pointed out that human beings need to be treated differently from the other types of a system's components. Thus, it could be noted that social theories have a great influence on the implication of the CST approach, with a particular emphasis on the work of Jurgen Habermas and Michel Foucault in critical theory. In the practical sense, critical system thinkers advocate employing a plurality of methodologies to guide the intervention within a uniquely complex problem situation. According to Jackson (2000), the systems approach offers a systemic manner of intervention based on multi-methodology approaches that draw heavily on different theoretical underpinnings for the use of different methodologies.

The current research systems approach has been adopted as the way of understanding the complexity of large-scale IS failure in the UK public sector. The reductionist view's framework in Figure 8.2 demonstrates the traditional approach toward resolving the complexity of the problem situation. However, Figure 8.3 is designed based upon the systems approach view in which the complexity is considered within multiple world views relating to the problem context. Figure 8.3 takes the four complexities we proposed and how IS failure can be avoided comprehensively to demonstrate the key factors in IS initiatives, which were derived from previous IS failure situations, as recognised within the public sector. We first

intended to reorder these complexities at the beginning of a change. The new order was not established arbitrarily; however, it was based on the revision and analysis of different public sector IS failures. Also, there was a consensus among participants that these four complexities appear to be crucial to the development process because they are interconnected properties associated with IS initiatives. In addition, these four complexities will be presented in two frameworks of large-scale IS failure in the UK public sector. The first framework responding to the traditional approach of reductionist view, while the second is designed based upon systems approach in order to conceptualise the interconnections between system's elements..

In a reductionism sense, each complexity has its own problems and solutions without considering their relationships with other complexities and how they are all interrelated. As a result, the suggested solutions to avoid failure are limited because the project was divided into smaller, manageable issues that lack the ability to relate to different complexities. This is apparent in the examination of IS failure when the focus is on technical reasons before management issues are considered. In addition, users and their various needs and expectations are another complexity that is recognised in the IS public sector.

In the broader sense, the systems thinking approach considers IS failure to be insufficiently defined based on the reductionist approach, which remains dominant in the public sector despite current and complicated challenges. The four aforementioned strategies are often treated as a singular, isolated property, with no interrelation; therefore, the analysis and steps to resolution are conducted with a disregard of the other properties. A systems approach considers the real-world problem situation as messy and difficult to address all the properties and their emergences, hierarchy and relationships from the reductionism standpoint because, in reality, they interrelate and influence each other and cannot be separated. Regarding the IS failure situation in the UK public sector, it could be argued that any resolution efforts focused

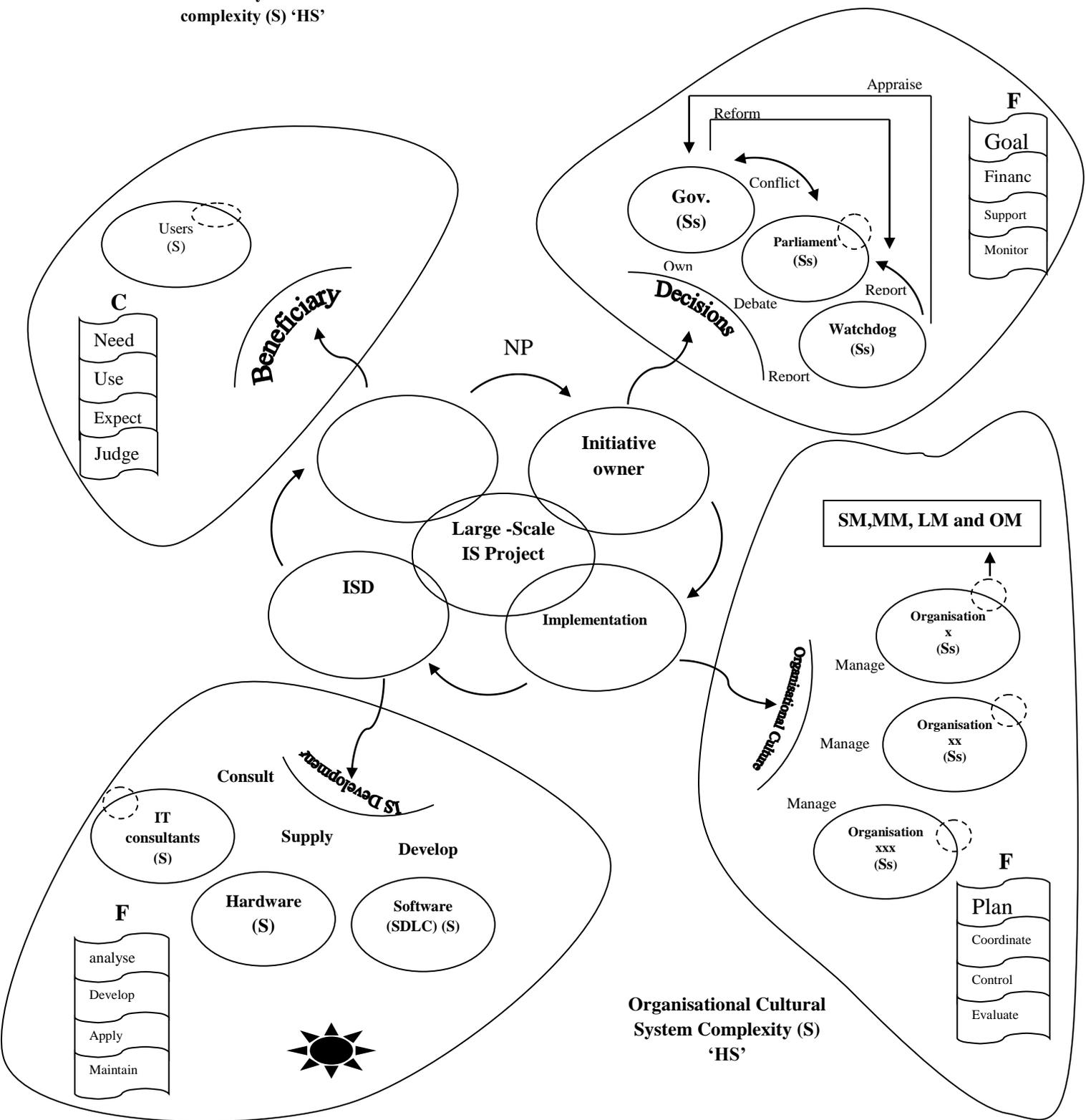
on management or technical factors and that ignore their association with the wider context would not improve the success rate.

Problem solvers should make sense of the complex situation by managing the four areas of complexity suggested previously. In this respect, the systems ideas appear useful for managing this kind of complexity and, therefore, can bring about change to the IS failure situation. Figure 8.1 illustrates a suggested framework to conceive an IS initiative in the UK public sector, using systems ideas to comprehend the problem structure based on previous IS failures and the analysis of different issues that led to the failure.

The framework summarises changing the situation by establishing a new world view of the IS context in the UK public sector. We established four areas of complexity that need to be dealt with. Theoretically, and before the intervention process, these complexities should be seen as interrelating within the holistic picture. Our endeavour is to create an interconnected consideration of different properties and the correlation types to better understand IS failure. In the engagement process, the problem solver can point to causes of IS failure through the investigation conducted to explore interconnectedness between the four strategies. Lastly, the framework enables a restart when it appears that the IS initiative fails at any stage in the development process. In contrast, success occurs if the four-stage complexity is managed as shown in the structure.

Users Systems complexity (S) 'HS'

Political System Complexity (S) 'HS'



IS design system complexity (S) HTIS

- C criteria
- F function
- HS human system
- HTIS human & technical integrated system
- ISD information systems development
- LM lower manager
- MM middle manager

- NP new project
- OM organisation members
- S system
- SDLC system development life cycle
- SM senior managers
- Ss sub-system

Internal debate, conflict and decision made

Outsource Supply

Figure 8-3 A System Map for Managerial Issues Related to the Four Areas of Change (IS Failure)

8.4 Summary

This chapter is dedicated to changing the IS failure situation, which was suggested by the participants. We used the KETSO toolkit to support this phase of the intervention process as a creative way to develop a productive workshop and engage participants as they learn from each other. This change resulted from the appreciation and analysis phases, revealing that the traditional approach shows its limitation to cope with the situation because it misleads the complexity of the situation, whereas this complexity is situated at different stages. Therefore, we attempted to create a new world view, based on holistic approaches, to capture interrelated elements. We first identified four areas of change: initiative owner, organisation culture, IS design and implementation and users; each area having its own complexity to deal with. In so doing, we extended our view to include the inter-relating metaphoric image of these elements. The new change is illustrated as a clockwise metaphor, where the development process simulates clock movement from the beginning to the end, before it starts over again. The nature of this movement is complex and difficult to predict at every stage of development. Thus, the concern should be altered to manage this complexity of the four specified elements. The next chapter, the action phase, will suggest actions for improvement of the IS situation and will also be based on the KETSO.

9 Chapter The Analysis and Findings of the Primary Data Workshop: the Fourth of Mingers's Four A's—the Action Phase of IS Failure in the UK Public Sector

9.1 Introduction

This chapter covers the fourth phase of Mingers's four A's of intervention process of the problematic situation, which is the action stage. The four activities have been enacted one by one, and therefore, they cannot be separated from each other. This phase is the last phase in the process, and it aims to conduct agreed change to the problem to improve it. Phase three (the assessment phase) aimed to bring about change to the situation by proposing a theoretical framework. The intention of this phase is to address the multiple complexities that existed in the IS failure, which turned the focus to managing the four complexities identified rather than focusing on a single complexity. The theoretical framework, which was an image that included clockwise-moving information, also clarified the relationships between these complexities. This chapter, therefore, prompts the participants to ensure that the action taken in this phase relates to management over the complexities.

This chapter recognises three important commitments that help those involved to act to improve the diversity and certainty of the situation. These three commitments are the political commitment, the government commitment, and the learning process commitment. The three commitments appear to be human-based actions, and rather than being conflicts, they persuade those involved to debate about the situation.

9.1.1 Improve IS Failure in the Public Sector

The indications of IS failure prove that sloppy management is partially to blame for the spectacular IS failure. We have witnessed several examples of IS failure over the past few decades. Technical complexity appears to be a part of the problem, while the consistent

failure seems to lie with management, which is where the bigger picture of the situation appears. We specifically figured out that dependent complexities stemmed from the nature of the UK public sector context, which required managing all complexities rather than paying attention to a particular one. As a result, in the previous phase we proposed four complexities that need to be managed in order to address IS failure situations in the public sector. The choosing of these four areas was based on the nature of the problem situation environment, which has unique characteristics belonging to the political, social, and organisational circumstances and, at the same time, are interrelated. Thus, the solutions suggested should be tailored to meet these circumstances.

The next step will involve another session of KETSO to undertake and organise an action in order to improve IS failure situations caused by complexities that were identified in the last chapter. The KETSO toolkit develops strategy and manages change by engaging various stakeholders in creative thinking. In the structured workshop, the engaged participants explored ideas that can help to improve the IS failure situation. However, the focus tended to identify five interrelated commitments as key factors for improving IS failure and managing the complexity of the situation. The three commitments are (1) the political commitment, (2) the government commitment, and (3) the learning commitment. These three commitments bring together the system and sub-systems that shape the IS initiative system, and also facilitate those stakeholders who act within it. The generalisation was intended, as the behaviour of the system is unpredictable due to the change of the initiative owner. The following sub-sections will provide more details about each commitment.

9.1.2 The Political Commitment

It is seen that the IS initiatives' proposals are initially made at the political level in order to improve public services. The UK has its own political and ideological system that has

explicitly or implicitly impacted the IS initiative. Therefore, it has its own complexity that can be managed if we need to improve the situation. The participants found the system to be one of the main challenges facing IS initiatives of the public sector, since the competitive politicians tend to take the credit in terms of achieving public interests. Most of the conflicts and objections raised confine failure situations to the initiative's owner, who failed to deliver a successful IS project. In contrast, politicians could play a central role in enhancing the way IS initiatives are managed through the political pressure they exert on opposing parties in parliament. In managing the political domain, we gave raise to three interrelated ideas: (1) the nature of the political system in the UK cannot be changed, but we can instead cope with it as an integral part of the political system, (2) a new culture that facilitates a degree of stability within the public sector IS initiatives should be established, and (3) we must think in terms of a "national system" that is constructed based on spatial and temporal characteristics. The three ideas suggested above could help to improve the complexity of the political level in the UK public sector that has suffered from the IS project failure.

The first idea, recognised as the coping of the political system, reflects the nature of the political system in the UK that is shaped through a wide variety of political parties. These political parties, because of their agendas, have considerable influence on the public policies. The elected party often offers to citizens—the "taxpayers"—diverse policies for different purposes. In contrast, there are opponents of political parties who attempt to undermine these policies in case they fail (Garnier, 2009). This creates conflicts and contradictions that impact the IS initiatives (we explored the example of NOMIS), even when there was a general government IT strategy aiming to take control of technological initiatives in the public. In addition, the UK Parliament witnessed a number of such conflicts and political influence used to raise a political debate. The debate of such failures is concerned with management issues and the failure of organisational managers to reduce public risk. Such a reduction in planned

functionality results in the misuse of taxpayer money to finance failure projects and delays, and the technical perspectives do not seem to be fundamental factors to debate. It was agreed that though these factors appear to be difficult to change, people could cope with them by seeing that they are shaping the political system in the UK, as well as the laws and regulations systems. For the political parties, efficient participation with good intention is needed between the proponents and the opponents to reform IS initiatives, more than crediting or discrediting means.

The second idea is related heavily to the first one. Once we succeed in establishing political participation, the participation could result in a new culture within the political system aiming to increase the efficiency of public policies to meet the escalated rhythm of the contemporary world. The presence of this new culture implies that policy makers can go beyond their political agenda and help to deliver successful IS initiatives in the public sector. It was mentioned that policy makers initiate IS, and that they can directly influence the way in which policy is undertaken, as they have the ability to modify or even withdraw their policies. However, many policy makers prefer not to engage in the managing process or exercise their control over IS initiatives.

The new culture suggested aims to bridge the gap between policy makers and the managers of government organisations as stakeholders with clear interests in undertaking IS initiatives in the public sector. This bridged gap can further sustain a degree of stability that allows the government to reduce the risk of failure, focusing more on enhancing the managerial process during project development. It has been proposed that in order to reach an appropriate level of stability, three major issues need to be considered within the stability level: experience and knowledge sharing, a new criteria for desirable change, and, most importantly, the full support of IS initiatives. The first issue concerns the accumulative knowledge and experience obtained

in planning and managing IS initiative. The second is more related to what we need to change in order to make improvements based on agreed criteria, while the third considers ethical issues between the participants.

The last idea proposed to improve IS initiatives is concerned with the shift of thinking toward coping with IS failure. It is deemed that the reduction approach remains dominant and preferable within failure situations in order to deal easily with IS complexity. In doing so, however, problem solvers (“managers”) tended to break down the complex system into smaller, more manageable elements which led to missing important activities surrounding the system. Furthermore, the nature of public sector IS projects differs in that they include a variety of interconnected properties, including government organisations and non-government organisation (i.e., IS providers). The IS project has its own social context that emerged and is perceived based upon the interaction of particular components which vary in almost every project. Therefore, it is hard to define such a system in terms of the traditional approach. Instead we suggested that the most appropriate approach in dealing with diversity and uncertainty is to think in terms of the whole system that takes into account certain sub-system components. The whole system is meant to define a particular world view as it is perceived by the participants of such a system. The system runs based on the perceptions of policy makers who initiate IS policies and the staff members of government organisations, all of whom identify the boundary, environment, and hierarchy of the wider system and sub-systems. The system draws on specific spatial and temporal characteristics that vanish when the IS initiative is able to achieve its purposes. This way of thinking can guarantee moral obligation among the system’s stakeholders to underpin a successful IS project on one hand and to provide communicative action through continued debate on the other hand. This also brings about what we have just mentioned to be the sustainable stability issues: experience and knowledge sharing, a new criteria for desirable change, and the full support of IS initiatives.

9.1.3 The Government Commitment

Large-scale information systems initiatives in the UK public sector involve loose groupings of many different organisations. It is evident that there was less awareness about the commitment among these organisations to proceed with the IS project, because every organisation has its own goals, resources, and evaluation, which makes the organisational commitment to IS initiatives difficult to carry out. In terms of IS initiatives, a number of repeated failure causes were found relevant to the government processes, despite means suggested to increase the efficiency of public management (i.e., business rule transformation). The realisation of IS complexity remains related to technical perspective, even though the situation suffers from sloppy management oversight. Therefore, there was a shifted view toward addressing key issues in management like planning, decision making, finance, control, and monitoring. At the level of government organisations, there were weaknesses and indicators in the managerial processes that clearly led to risk failure, and therefore many IS projects in the public sector failed to meet the government standard needs. The revision of management functionality for managing issues related to IS initiatives disclosed that there was a struggle to take better control of the situation, especially in the middle of the development project.

At the senior management level, from which IS initiatives draw heavily, there was a lack of awareness about the complexity of the IS project in different ways. It is known that in the UK public sector, senior management of public organisations is responsible for implementing government policies and managing the organisations, including people and resources. Thus, the senior managers often represent the highest hierarchy position of the organisation, and it is expected that they are suitably skilled for managing and delivering IS projects in association with the organisation staff. We identified that there was an inadequate oversight in handling the situation and taking better control of resources, although senior managers are in charge

of implementing government policies. This oversight included several key management issues that were related to the top level of management. This level of managing is very important because the other managing processes rely on the success of this upper level to survive. For example, the goals set toward developing the project were mostly unrealistic and overoptimistic estimations of the goals set about the IS projects. In the realm of reality, senior managers often discover that the goal appears to be unrealisable and hard to accomplish, which then leads to the reformulation of goals to minimise the risk factor. One interpretation that might help with the understanding of this point is that senior management, for some reason, neglects those stakeholders who involve in the situation from internal and external organisations. It is likely that they have their own points of view that might help to take a better control of the situation.

Another point had been mentioned at the level of senior management is the project plan for IS projects. It is noted that the planning stage in the public sector is subject to change during the development process, whereby senior managers attempt to change planning tasks based on unpredictable circumstances. Quick review shows that many IS initiatives face requirement changes, inadequate financing, and delay during project development. These had been referred to senior managers in the public sector organisations who preferred not to involve in the operational process. Senior managers tend to exhibit less commitment to their responsibility in the development projects, and often devolve this responsibility down to lower management levels. Then those managers who have less experience and authority to manage and make decisions are put in charge of the IS projects. The gap between the senior management level and other related management levels led to poor performance, which caused IS initiatives to suffer serious abandonment.

This extended to the government watchdog organisations (e.g., PAC & NAO) that produced a series of annual reports to review and assess the government performance of IS projects. These reports stressed to the public sector that management is the main reason for IS failure, while the technical aspect is less interesting. Much criticism of permanent IS failure is that it is caused within the organisational context, where a range of key managerial behaviour issues leads to the failure (e.g., delay and cost increase). Another point is related to the procedural processes of watchdog organisations themselves to handle such IS failure situations. There is no doubt that the efforts of the watchdog organisations were acknowledged for reporting failure. However, it is noted that bureaucratic structure governs the actions taken by the public watchdog organisations to report IS failure, providing guidance on how to cope with the situation when failure becomes difficult to avoid.

In spite of the power that the public watchdog organisation hold to blame and to determine failure, it is found that they are only make recommendations to the House of Commons. It could be claimed that the investigations held by the public watchdog organisations are important in identifying key issues and people behind such failures, but the investigations would be ineffective unless there is a proper action to take at the right time. A good example is the NOMIS project, where the project was placed in 2004, and the indications of failure (delay and cost increase) began to be reported by the project board in May 2007—one year before the delivery date (NAO 2009). The first government official document was prepared for reporting the situation in 2009 by the National Audit Office (NAO), relying on an internal organisational act for presentation to the House of Commons (under section 6 of the National Audit Act 1983). It could be argued that in order to deal with the complex government processes and unpredictable risks facing IS initiatives, the watchdog organisations need to be more dynamic to act and exert more influence over government organisations. It seems that the mechanism approach followed within these organisations showed its limitation to deal

with real-world problematic situations that have emergent properties. Also, less attention was paid by the organisations to identify multiple interdependent relations between the properties that create the whole.

The success of IS initiative will not be achieved unless government organisations join up as integrated entities and work together to successfully manage IS projects. Furthermore, regarding awareness of IS complexity, the public sector needs to consider the broader picture of the situation, rather than being focused on smaller manageable issues which can lead to messiness in the whole system. Although IS initiatives seem to be a technical project from some point of views, the clues show that they exist in a broader context that takes into account human beings' activities as vital to the context. It is the human beings who set the policies, make the decisions, and manage the organisational resources to secure successful IS projects. In this respect, the notion of organisational commitment is required in a manner that allows it to appreciate the situation as a whole, and the interactions between the components that create the whole. The organisational system must concern itself with both activities as they interrelate and influence each other. The organisational commitment should be re-established in a way that helps to produce high levels of IS project success to the beneficiaries. As a result, it was agreed that the government commitment could take a dual role: The first is that the government should be more committed to enhance the ways IS initiatives are developed, by reconstructing means that help to prevent IS failure projects in the public sector. The second is that management of public sector organisations, especially the senior management, should involve efficiently to guarantee a high degree of commitment to their organisations.

9.1.4 Learning and Reflection Commitment

The third commitment we identified to improve IS failure situations is learning and reflection commitment. Its importance derives from the nature of humans to accumulate knowledge and experience from problematic situations in a way to help him deal with new complexities. IS failure initiatives in the public sector have experienced a history of failure occurrence over the past few decades. The point to consider in regards to permanent failure is that the government put significant effort into learning lessons from the past failure situations; however, the IS failures remain high-risk projects. The strategies had been changed to cope with complexities of IS projects, new theories and methodologies were applied, and a number of official reports offering various strategies and solutions were born.

We first should mention that the daily process behaviour aim is for us to learn and experience the world surrounding us. Each person has unique experiences and knowledge to contribute when engaging in a debate about a specific matter. For example, the core of the current workshop is to debate and reflect on the knowledge and experience we possess to address a particular IS failure problem. In contrast, there are problems that may prevent learning processes from being undertaken in IS failure. It could be argued that bad communication among those who are involved in a failure situation leads to diminished learning. Regarding the learning and reflection commitment, we identified three related concepts that may help to enhance the commitment: what works in learning and reflecting, the challenges that reduce the benefits from the learned lessons, and finally, the future possibility to increase the awareness about learning and reflection. Before we started identifying these concepts, we pointed out the characteristics of IS initiatives in the UK public sector.

In the workshop, there was a consensus that an IS failure's complexity lies with its diversity and uncertainty, which led to raising a range of issues for debate among those stakeholders who involve in the problematic situation. Initially, a number of loose associations of

government organisations and private organisations (IS providers) engage in IS projects. Within this association, we could identify various stakeholders with different influences on such a situation, including policy makers, organisation managers, IS managers, and developers and consultants. There are also external players who may contribute to the learning process directly and indirectly, such as academic and IS experts and specialists. The circle of stakeholders could be enlarged depending on the learning scenario and how it is taken among those involved in the learning process.

In terms of what works in resolving IS failure, it is found that any IS project brings out lessons to learn despite the performance achieved. Poor or privileged, the performance is valuable as long as the lessons provide useful learning processes. This learning can be achieved through the dualism of knowledge and experience gained from prior IS initiatives' contexts, where theoretical and practical lessons are provided. In this sense, failures as well as successes should be considered for improving IS situations in the public sector, by supporting people's knowledge and experience. People tend to translate what they learn into meaningful experiences, and the experiences articulate themselves into new knowledge. The human perspective on learning is that neither knowledge nor experience can make sense of the world; however, this dualism takes an iterative manner that seems to be an endless. As a result, successful IS initiatives provide excellent lessons to follow and to make things seem more or less similar, while failed IS initiatives give rise to hidden issues that are not disclosed to us in successful cases. It is necessary, however, to reflect on real initiatives that develop within the public sector if we are to make an effort to improve the situations. The reflection process draws from the context of each IS situation during the development project, concerning the wide range of actions that were taken, like government strategy, organisation managers' decisions, and project management board acts. In the reflection process, we seek facts and review organisational and individual knowledge and experience. Whatever technique is used

to conduct the reflection processes, the most important point is to have a comprehensive review of the IS situation in the real world, where the situation exists. Finally, it could be proposed that reflection is seen as an appraisal procedure in which managers are able to enhance future IS initiatives by avoiding what has gone wrong, and suggesting possible changes for the future.

To promote effective learning, there might be challenges that are considered to be barriers to making sense of failure. These challenges draw from IS initiatives in the UK public sector, and they were identified based upon what the participants thought to be associated with large-scale IS initiatives. It is evident that there was less desire among those who were involved in IS projects in the public sector to learn at all levels—government, organisations, and individuals. This refers to the many tasks in IS initiatives that make the learning process considerably less useful. Furthermore, some tasks require knowledge and persons that are not necessarily required for all participants. It is difficult for the stakeholders to be aware of all information related to IS projects, particularly when different patterns of project complexity arise. For example, the management complexity is supposed to be managerial concern, while technical complexity is likely to be associated with IS specialists. Some participants also expressed a fear that learning processes would be less interesting because there is no shared language between managers and specialists. In contrast, another participant, whose view was rooted in systems approach, addressed that the learning processes yield noteworthy activities if we make use of system ideas and thinking with a holistic approach.

Another challenge being identified as a barrier for effective learning is the incentive for learning in the public sector and, consequently, its impact on career and finance. This point is raised as opposed to private sector organisations which have reward systems and promotions for skill development. It was agreed that the work culture in the public sector does not make a

difference in terms of learning, as promotion policy is not embodied among the government staff. This makes the learning less motivated. Under such circumstances the government staff found that it was a waste of time to engage in the learning process. This factor was linked to the management style in the public sector, and the way that government organisations are managed. It is the government organisations that are concerned with rigorous rules and policy implementations more than with being innovative in developing successful results for their organisations. Therefore, the public management functions are related to traditional management, which believes in discrete components and moving in a mechanistic manner to organise different parts of the organisation. Because of this, it misses the integral combination of an organisation's components, which are interrelated and influenced by each other. It was explained that this style of management is referred to as the organisational structure of traditional management, which determines the patterns of action at different levels of organisation, from the management down to the employees. Within this structure, the learning process is not a priority task in government organisations.

9.1.5 Summary

This chapter is dedicated to improving IS failure as a problematic situation in the UK public sector. We have come to identify three main commitments in order to avoid such future failure. These are political commitment, government commitment, and learning commitment. These commitment sectors demonstrate the nature of the UK context and those participants who involve in the problem situations. The political and organisational commitments are considered to be the cornerstone of IS initiatives because of the strategies and support they offer to succeed, while learning processes and reflection can become behavioural patterns for learning lessons from prior IS failure situations. It could be argued that these three commitments are proposed to reinforce the change suggested in the previous chapter.

10 Chapter Discussion

10.1 Introduction

Chapter 10 discusses research findings in a way that helps answer the research questions, which focus on large-scale information systems (IS) failures in the UK public sector. In the information age, government organisations have become increasingly reliant on IS, responding to the escalating needs of public service. Despite billions of pounds spent on establishing numerous IS initiatives, a large percentage of them have been found to be suffering, unwisely abandoned or facing various difficulties when operating. The researcher established four questions to answer in an attempt to gain a better understanding of the problematic IS situation.

10.2 A Restatement of the Problem of Large-Scale IS Failures in the UK Public Sector

The UK public sector has witnessed many large-scale IS failures over the past few decades. Despite the implementation of numerous strategies, the IS failure problem remains prevalent throughout a variety of organisations. This study aims to use a systems-approach strategy to improve the rate of IS failures in the public sector. In contrast to traditional approaches used to cope with IS failure, the systems-approach strategy has the ability to perceive uncertainty and diversity in its context. Therefore, the new strategy considers the problem solver's unique situation when determining which systems approach offers the best solution combination of methodology and techniques.

The methodological approach is based on a pluralism approach strategy that is drawn from six scenarios suggested in problem-solving strategies. Then we chose an appropriate research method that would efficiently solve the problem under investigation. According to Checkland's framework of research types, we decided that the most appropriate is Mode 1

research. The next step was to borrow Mingers' intervention process model to guide our intervention into the situation, assuming that the complexity can be better understood through this model. Minger's intervention process model contains four enacted phases to intervene: appreciation, analysis, assessment and action, with each phase using a different type of data collection.

10.3 Research Question I: Why has the Large-Scale IS Failure Continued in the UK Public Sector?

Existing literature on IS projects in the UK public sector reveals that the situation is highly complex, rooted in a long history of failure and is considered to be a technical matter. The pursuit of technical factors as a leading cause inadequately avoids IS failure. To answer the question, we will attempt to develop IS like the computing discipline that led to viewing IS failure as a technical complexity. The UK government strategy drew heavily on that view when dealing with IS failure cases in the public sector. This view lasted until 2000, when the UK government changed its strategy of dealing with public IT projects. The new strategy shifted the government concern toward addressing business issues for delivering more effective IS initiatives, which meant that organisational rules, such as planning and evaluating processes, were needed to better control the situation (Office 2000). The new organisation complexity was seen as a discrete, rather than complementary, approach of technical complexity. Both technical and organisational complexities in IS literally draw on the domination of scientific methods (positivist) that deal with complex issues as separate entities that can be understood through cause and effect. In order to answer this question, we will rely on the historical background of the situation to provide insight into continued IS failure.

In reviewing the early history of IS, we find a general approach to develop information systems called Information Systems Development Life Cycle (SDLC). This approach was a completely engineering process which drew on a number of staged-nature processes to

develop IS projects (Avison and Fitzgerald 2006). Further, these stages are engineering processes for analysing, designing, implementing and maintaining IS development. When a threat causes an IS failure (e.g., systems errors and work overload), the SDLC restarts to set up another IS model. Basically, IS processes are technical activities under the responsibility of software engineering practitioners who deal with IS failure situations. This singular viewpoint for defining and coping with IS ultimately proved to be too limited to adequately conceive the failure, particularly within the organisational context. In the mid-70s, researchers made an early attempt to consider the organisational aspect of the existing IS model (Lucas 1975) because of the increased use of computer-based IS in organisations. This was expressed in a number of organisational variables added to the IS model to study and analyse. For instance, the model presented by Sauer (1993) conceptualised organisational and technical activities in a triangle model for surviving IS projects. Although paying attention to the organisational context was a step toward improving IS failure, the failure rate remained high and unresolved. Another development that reduced IS failure was the management of information systems (MIS) discipline, which was originally concerned with managing technical issues. MIS provided further evidence that the technical aspect was considered the single, primary reason for all acknowledged difficulties in IS failure. Partridge (2011) clarified that MIS seemed to be substantially concerned with managing technical issues. This outlook has been criticised for focusing on separate entities of the problem under investigation and testing the cause-and-effect relationships among them. Also, it could be argued that the positivist underpinning of this way of thinking was based on rigorous scientific rules and ignored social and human accounts of IS failure situations.

In contrast to the positivist viewpoint, some IS researchers proposed an interpretive approach to study IS failure in order to understand the context of the situation and its social construction. Using the interpretive approach provides an understanding of how the social

world is constructed and reinforced by humans through their action and interaction (Mitev 2000; Mitev 2005). Consequently, interpretive explanations of IS failure were developed through sociological frameworks. However, the interpretive approach was criticised because of its limitations of conflict and contradiction in social relations.

In the UK public sector, large-scale IS projects can be understood through IS initiative strategies set out by the government over the past few decades. The appreciation phase revealed two eras of strategies of IS initiatives in the public sector. The first was before 2000, when IS projects were mainly a matter of technical vision and, therefore, IS failure was treated as such. The second era spanned from 2000 onward, when the government strategy adopted a business rule in IS projects as a radical change for modernising government IS initiatives in the public sector. The report issued by the Cabinet House in 2000 explained that thinking in terms of the IT project is itself a primary source of the problem. In reality, we could easily see that the reasons, such as project oversight, delivery dates and over budgets, do not relate to the technical perspective.

This change could be considered a turning point in understanding managerial functions that move beyond technical issues of failure. It is noted that public sector management is influenced by scientific management principles, which are based on the division of organisational tasks into manageable smaller-based entities. On this basis, a mechanism approach in public sector management to processes is based on strict rules and hierarchy and leads by bureaucratic processes (Horton and Wood-Harper 2006). This vision was apparent in the Cabinet House report's aim, which stated, "The overall aim of our work has been to make recommendations that will raise the standards of all our projects to the level of the best, and provide mechanisms to underpin the process of improvement" (Office 2000, p. 5). Brown (2001) considered the same idea in his proposition for managing IT projects in the UK public

sector, where he suggested breaking down IT projects into manageable sub-components to deal with complexity. In the two examples studied—LASCAD and NOMIS—we noted evidence was managed according to scientific management principles, which resulted in a reduction of IS projects into discrete entities without consideration of the relation among these entities. Relying on this management style, we witnessed that many IS failure studies paid less concern to the relationships and links between various project entities. Instead, we discovered the tendency to treat IS failure as a discrete factor. Flowers (1996) and Beynon-Davies (1995 & 1999), who studied the LASCAD project, tended to address the IS complexity based on the separation of technical and organisational factors.

The management style followed by the government greatly influences large-scale IS failure in the public sector, in which failure remains a high-risk project. IS projects contain a range of diversity and uncertainty that are impossible to reveal and manage under current management rules. Policy makers and managers of government organisations, as well as project managers, need to redefine the complexity in terms of whole project entities and their interaction with each other in order to better control a complex situation. The study revealed a lack of awareness toward the multiplicity and complexity inherent to the project's processes, which was missed in the two examples of IS failure in the public sector.

10.4 Research Question II: What Factors Affect Large-Scale IS in the Public Sector?

In this study, we examine IS failure in the UK public sector context through systems-based methodologies. Our research implies that the problem-solver should identify factors that shape the particular structure and influence it. The second phase of Mingers' intervention process gives rise to this point by analysing the situation as it appears. According to Mingers (1997), the analysis phase is concerned with the history that generates the situation and the specific structure of relations and constraints that maintain it. In contrast to the reductionist

approach, the systems approach rests upon the interaction between different entities in the situation under investigation as a whole system that consists of interrelated sub-systems (Jackson 2000). The holistic approach deals with a real-world problem situation where the focus is on understanding the whole system, including factors that would impact it. In our study of IS failure in the UK public sector, we distinguished four constant factors that can affect the situation and lead to failure; these factors are specific to the UK environment. In the public sector context, we have identified numerous factors—political, organisational, technical and human—that are considered to be significant risk factors of IS failure in the public sector. Furthermore, to avoid falling into the trap of reductionism, it must be assured that these factors are subsystems that constitute the larger system of government that, in turn, constitutes another, even larger system of the UK system. By contrast, in opposing viewing the system from the top down, I suggest a worldview by which to observe systems as wholes.

Political factor: in the literature in chapter 4 we disclosed that the political factor plays a vital role in impacting IS failure because it is responsible for the IS initiatives policy in the UK public sector. At this level, policy makers set out strategies that can directly affect how these IS strategies are implemented. The UK political system is comprised of a number of political parties, where the governor's party controls government policies presented to the public while the opposition parties control the parliament by monitoring and criticising government policy-making, even though the parliament has little influence on IS initiatives (Brown 2001). Within the political factor, we can identify related government departments and organisations that have different kinds of involvement in IS initiatives, such as the Cabinet House, National Audit Office (NAO) and Public Accountability Council (PAC). While the Cabinet House office establishes major government IT strategies, the NAO and PAC, which are considered the public watchdog organisations, review and report to the House of Commons. It is noted that the movement to avoid IS failure in the public sector

among these government departments and organisations is less influenced and governed by bureaucratic procedures within the public sector. NOMIS, which was set up in 2004, is a good example of bureaucracy in the government organisation. In 2009, NAO issued the first report about the failure of NOMIS, which was followed by project cost increases and delivery delays. We contend that political factors can effectively bring about change to avoid IS failure by enacting policies that respond to the increasing challenge.

It could be argued that the political system is a key issue in understanding IS failure situation in the UK public sector. It refers to the attempt that the opposition of political parties aim to optimise political advantages associated with their agenda, while a less concern is put upon public initiatives. The term “political enemies” can adequately describe this situation causing barriers for successful IS initiatives in the UK public sector. The research on IS projects reveals that there a number of government organisations can to some extent involve in the situation, each of which has its own an explicit or implicit policy of their own. The LASCAD is an obvious example to reflect on political issue in the UK policy to support this point of view. In their discussion on the environmental aspect of LASCAD whether the 1992 failure and the 1996 turnaround, though the latter identified as successful implementation project, Fitzgerald & Russo (2005) have disclosed that LASCAD witnessed similarities and differences that can highlight the importance of political aspect in relation to the IS initiatives. They mentioned that there internal attention within NHS continued to be politically charged about the modernisation of NHS and LASCAD. Another point is that the government public inquiry reports that blame the management of LASCAD for the failure, there was a less instigating to the development of the 1996 system where the pressure was put upon the government to ensure that the 1992 failure didn’t happen again. Finally, one of considerable benefits relating to the political factor is that in the turnaround of the 1996 system, the government was more attention to deliver a successful project to avoid a set of bad publicity

that may be employed in the political context. Therefore, it could be concluded that the political system is a key issue in the UK public sector in a sense that IS initiatives are deliberately affected by political parties and the way they manage and initiate their policies.

Organisational factor: IS initiatives in public sectors consist of an alliance between government and non-governmental organisations with different goals and interests. The alliance is held for temporally mutual benefits in terms of undertaking the IS project; therefore, this complex combination results in certain challenges. In the case of the LASCAD project, for example, various organisations were directly or indirectly involved in the project. London Ambulance Services owns the project, and National Health Service is the organisation that sets health system strategies and authorises health service projects, the public watchdog organisations for reviewing and reporting on the project to the House of Commons. and, finally, the IS supplier, private organization, that provides the IS (Flowers 1996; Fitzgerald and Russo 2005). When it comes to the NOMIS project, we found that another combination of organisations were participants, including the Ministry of Justice, National Offender Management Service and IS provider (NAO 2009 ; MOJ 2011). The success of this wide range of organisations depends largely on their integration, while the contrast would lead to increased risk of failure. The literature's findings showed that weak coordination and communication between the organisations resulted in each organisation using its own process to survive. Moreover, there was decreased concern about integration to facilitate coordination and communication and recognising mistakes early in the process.

Technical factor: Identifying the technical factor is important because, since the 1970s, IS initiatives were provided by outsourced IS hardware and software organisations, which brings additional complexity to the IS project. Brown (2001) argued that the use of outsourcing providers refers to various causes related to the cost and size of the project in the public

sector. Since then, system design and implementation has been outsourced by private organisations.

The concern regarding the technical factor is that we see a marked dilemma in IS initiatives caused by IS providers, thus leading to failure. In the case of LASCAD, there was a consortium of hardware and software organisations, some of which were small in size and had little experience in large-scale systems. The complexity of the systems was based on the components of the new system, which consisted of five sub-systems. At the time of implementation, these systems and sub-systems were working to automate the process of the ambulance dispatch system once the call is received by the control room. According to Flowers (1996), IS providers made major mistakes prior to and at the time of implementation, which resulted in the failure of the project. The NOMIS project witnessed more technical complexity that led to increased applications costs of up to £254 million, including an underestimation of data base requirements (NAO 2009). In both projects, we noted that IS providers failed to recognise the complexity of large-scale projects.

Human factor: The human factor is the last and most important factor of the IS initiatives in the public sector and is a key factor in their success/failure. The term ‘human,’ which refers to stakeholders who are interested in the IS situation, differs from the term ‘supporter,’ which was produced by Sauer (1993) and refers to “those who actually provide support” (p. 56). Therefore, we prefer to use the term ‘human’ to indicate those who participate in the system, whatever their form of participation and degree of influence, borrowing this idea from Habermas’s communicative action theory that forms critical theory (Scherer 2008). Jackson (2000) values this notion and its relevance to systems thinking, where all pertaining participants have the right to express their feelings, attitudes and intentions. Accordingly, Habermas intended to establish a social condition that allows an individual to speak freely.

Therefore, systems thinking tends to encourage genuine debate among participants involved in a situation without ensuring that the debate will end with a consensus about changing said situation. On the other hand, literature has shown how systems scholars develop further enhancement to the critical systems approach.

The discussion above supports the understanding of the human factor in IS initiatives. The previous three factors represent political, organisation and technical institutes in a way that helps to define the social system that maintains the IS initiative. However, it is presumed that these institutes are characterised by the human beings factor, despite the kind of power and relationships that participate in the problem situation.

10.5 Research Question III: How Can a Critical Approach Prevent Large-Scale IS Failure?

The literature review revealed that positivist and interpretivist approaches to IS failure were limited to changes. Thus, in a very complex situation, where diversity and uncertainty are present, we need to find out an alternative approach that enables us to better deal with this complexity, particularly for those problem situations consisting of messy and unstructured entities. Large-scale IS failure in the UK public sector is related to this kind of problem situation, which maintains a high failure rate according to the incidents of permanent failure over the past few decades. One of the main barriers obstructing the success of IS appears to be the paradigms conducted, which were inadequate to deal with the complex problem. The traditional paradigms, such as the positivist approach and interpretive approach, were widely used to combat IS failure but did not ultimately make the situation better. The positivist paradigm appears to barely consider IS failure, consisting of various objects that are examined to clarify cause-effect relations, while the interpretive approach aims to subjectively understand the context of IS failure and how it is socially structured in order to find an interpretation.

Tracing the two paradigms in the field of IS, we find that IS were influenced by natural scientific methods at the emergence, where the positivist was conducted using empirical research. This domination lasted until the end of the 1980s (Mingers 2001; Mingers 2003b), when there was a growing interest in examining the reality of human domain actions in the early 1990s. Walsham (2006) justified that the interpretive approach became more important in IS research, particularly for those carrying out fieldwork research. To some extent, the interpretive approach was helpful in addressing organisational processes by which IS failure can be understood through the human actors and their interaction in the social world. In contrast to mainstream IS research (i.e., positivist and interpretive approaches), the critical approach took place to overcome the limitation of prior approaches. In general, it is noted that critical IS research has the ability to work in the wider social context, focusing on power, conflict and contradiction in the social context (Mitev 2005). According to Howcroft and Trauth (2005), IS critical research is guided by the Frankfurt School's critical theory, particularly the work of Habermas' critical theory, and many ideas used in IS critical research that emanated from management studies.

The other aspect of literature review concerns management systems, and specifically, systems approaches, systems thinking and critical systems thinking, in terms of providing practical guide for social change. The systems movement has been shaped by three schools of thought regarding systems thinking: hard systems thinking, soft systems thinking and, most recently, critical systems thinking. These three systems have significantly shaped the evolution of systems ideas (Midgley 2000) and have responded to the increased complexity of problem-solving organisations. The three approaches above are considered strategies for solving problems; each strategy is guided by particular assumptions relating to the nature of the problem situation.

The hard system thinking relates more to the machine age, where the organisations were managed by reducing the systems into smaller, more easily solved components. Checkland (1981a) criticised hard systems thinking for its inability to deal with complex and real world situations. Alternatively, he proposed 'soft' systems thinking, which takes into consideration the whole system, which can only be perceived through its interconnectedness. Checkland's soft systems methodology was the first systems methodology designed to capture interrelated entities of the complex problem situation. Another soft systems thinking approaches include Churchman's 'design of inquiring systems' and Ackoff's social systems sciences approach (S3) (Jackson 2000). The last systems thinking approach that is most closely related to the research study is critical systems thinking (CST), which was developed by a number of systems thinking scholars and guided by the social thinkers work of Habermas and Foucault. Its origin refers to a set of three commitments: critical awareness, emancipation and methodological pluralism (Midgley 1995; Jackson 2000). Therefore, CST allows for the use of a variety of available methodologies, methods and techniques in a complementary manner to reach maximum benefits from system ideas to support intervention in complex problem situations. In this strand, we could identify a number of CST approaches, such as Ulrich's critical systems heuristics (Ulrich 2010), Jackson and Flood's total systems intervention (Flood & Jackson 1991), Jackson's creative holism (2006) and Midgley's systemic intervention (Midgley 2000). Despite the philosophical basis underpinning the use of different CST approaches, especially the relation between knowledge and power and how they are employed, it facilitates the participation of those stakeholders who are related to the system in making change.

In the case of large-scale IS failure in the UK public sector, we stated that the situation is a highly complex problem due to the participation of various organisations (public and private) and the potential to deal with the diversity and uncertainty of emergent properties. In addition,

every single organisation has its own complexity to cope with, and power and interests, which in their broadest sense, are associated with historical, social, political and organisational contexts.

It has been debated that it is possible to undertake the IS critical approach underpinning the situation as well as using the CST approach to perform research. However, we chose to concentrate on managing the complexity of the situation in order to achieve genuine improvement. The findings have shown that IS failure in the public was considered to be a technical project, before the strategy was changed to be a business project. Both treatments of the IS project rested on the traditional paradigm aiming to improve technical performance, which proved its limitation to reduce the failure rate. Management's perspective regarding project management notes that sloppy management is responsible for the mismanagement of IS projects, which ultimately leads to mistakes (i.e., increased cost and delay).

As a result, we assume that CST as a critical approach is more reliable because it provides a wide range of creative methodologies and techniques that can avoid future failure. CST does not necessarily represent the consensus of the participant, rather it helps the participants to engage and debate freely and without constraint.

10.6 Question IV: How Can the Public Sector Learn from Large-scale IS Failure?

In the UK public sector, large-scale IS initiatives are high-risk projects in spite of the different policies and strategies geared towards them and the large amount of taxpayers' money spent on them. In human behaviour, learning is a circular process that relies on accumulated knowledge and experiences over time, which later allows us to deal more effectively with problems. This dualism of experience and knowledge is essentially guided by research and practice activities. These two factors will be elaborated here in terms of highlighting how the public sector can learn from large-scale IS failure.

For the research activity, we examined the significant studies based on different research approaches, including positivist and interpretive analyses, that have contributed to IS failure. The literature review has revised many of those whose contribution covered private and public sector failures (Lucas 1975, Sauer 1993 and 1996, Beynon-Davies 1995 and 1999, Brown 1996, Lyytinen and Robey 1999, Mitev 2000 and 2005, Fincham 2002, Fitzgerald and Russo 2005, Bartis and Mitev2008). In the public sector, there are also other important sources of knowledge—the public watchdog organisations (e.g., Public Accountability Council and National Audit Office) that provide reports on IS projects and the government bodies (e.g. Cabinet Office and House of Commons) that provide IS strategic policy reports. This type of activity rests on a theoretical basis for producing desirable knowledge toward understanding IS failure. Lyytinen and Robey (1995) insisted that knowledge plays a vital role in the evolution of IS failure. It was noted that knowledge was obtained from learning in the failure cases, while IS success cases are of less concern. We believe that both can be utilized as great lessons in IS failure.

In the other strand, practice often emanated from experiencing the knowledge gained from research and transforming it into a practical activity. This can be done through mental and physical activities that are concerned with planning, managing, decision-making, and skill. In contrast to the research activity, practical activity depends on mutual processes and the interaction among people in order to support experience, particularly those who are involved in a problematic situation. To some extent, this part of the learning cycle suffers from being an ignored factor since reliance is put on knowledge in dealing with IS failure.

IS failure in the UK public sector was found to be comprised of a large complex of organisations that include human, technical, and organisational perspectives as well as different powers and interests, which makes the learning process even more complicated.

Moreover, it was disclosed in the literature's findings that most IS failures are likely to be abandoned with no further action taken to understand what went wrong. Consequently, for those who do not want to learn from failure, abandonment is the easiest decision to be made.

In the systems movement, it could be argued that the critical systems thinking approach (CST) is substantially committed to the processes of learning and practicing as they mutually create and support each other. Whereas the learning process is theoretically supported by knowledge, practicing can be accomplished through an implication of a wide range variety of systems, methodologies, methods, and techniques. The essence of using CST is to encourage creative thinking about the problem under investigation and to find the most appropriate methodologies for dealing with it. This procedure can be achieved through the involvement of the participants by proceeding into debate about the situation. In this respect, critical social theories support the debate by eliminating power relations and their influence on conflicts and contradictions.

In the action phase of the intervention process, we suggested learning and reflection as complementary-sense action to improve IS failure situations. While learning is more related to knowledge, reflection is more concerned with how to experience our world. Neither knowledge nor experience would help reduce risk in the IS public sector.

10.7 Summary

In this chapter, research questions have been addressed, attempting to provide an insight about large-scale IS failure in the UK public sector as a real-world problem. Our answers produce different ways of thinking about how to deal with the complexity through the development of a complementary, critical systems-based approach. Previous studies have treated IS failure mostly within information systems research, and few studies adopt a critical approach like what we have done. The distinction in this current study comes from two views.

The first view is that we move the problems of IS failure to be managerial, or mostly concerned with management aspects. The second view is that we reduce the influence of technical factors as opposed to social and organisational factors. In a complex situation like large-scale IS, the most important thing needed is to identify the problem thoroughly before any intervention takes place. We then suggest what the most appropriate solutions are that would make the situation better. In the concluding chapter, we will summarise our recommendations and contributions.

11 Conclusion

11.1 Introduction

The current research has investigated the failure of large-scale information systems (IS) projects in the UK public sector. Over the past few decades, the UK public sector has witnessed several considerable failures due to a range of difficulties with IS project development. Arguably, the problem is highly complex and requires exercising different perspectives of the situation in order to bring about change. This consideration of multiple perspectives is motivated by a need to improve the success rate of large-scale IS projects in the UK public sector by proposing new techniques and tools for policymakers and problem solvers facing real-world difficulties.

In this context, the present research studies two examples of IS failure projects in the UK public sector: the London Ambulance Service's computer-aided dispatch (LASCAD) project in 1992 and the National Offender Management Information System (NOMIS) in 2008. The two example, however, reflect a high level of information system complexity because the diversity and uncertainty of governmental information technology (IT) IT projects (the term is used widely within public sector for both hardware and software projects). In 2000, the Cabinet Office, in the annual report on the major governmental IT projects, committed to improve the approaches adopted by IT projects. Despite this substantial change in government strategy, IS and IT remain considerably high-risk projects.

For an approach to underpin the research, system approaches for addressing IS failure can help to mitigate the issue's complexity. Literature addressing approaches has indicated that positivist and interpretive approaches have been widely used for studying IS failure. Although these approaches are acknowledged for their longstanding use in dealing with such failure, they also remain limited in accommodating the exceptional complexity faced in IS failure. By contrast, Systems approach are more concerned with holism in viewing situations

as wholes, including their interconnected parts, and can cope practically with highly complex situations by offering a set of ideas for intervening in real-world problems. According to Jackson (2000), Systems approach are more concerned with methodology—that is, a set of activities applied based in response to how the problem solver perceives the problem under investigation.

In offering the conclusions of the research, the present chapter starts by identifying the role of the researcher and presenting the implications of the research according to contributions to knowledge, practice, and methodology. Ultimately, the study concludes that the strengths of Systems approach stem from the diversity, efficiency, and effectiveness of the approaches in relation to real-world problems.

11.2 Critical Research's Role in Relation to the Study

In this study, the researcher adopted a critical approach for understanding the complexity of large-scale IS failure in the UK public sector because it offers a non-traditional way to accommodate the sector's increasing complexity, change, and diversity. Such characteristics are evident in existing contributions to both management and IS that show the growth of related critical studies. Critical systems thinking (CST) studies have proven the approach's ability to intervene into real-world problem situations with a broad range of assumptions fully supported by theories and systems methodologies that can work together as part of a learning cycle. In addition to systems ideas used in the critical approach, others have been proposed to distinguish CST from earlier approaches. The proponents of CST recognise three clear commitments involved with the critical perspective: critical awareness, emancipation, and methodological pluralism. A brief summary of these three principles can better articulate their role in the current study.

Critical awareness involves challenging the assumptions and status quo of reality that are dominated by functionalist ideas in management science (Jackson, 1991). Critical awareness

was advocated by early proponents of soft systems thinking (SST) such as Checkland (1981), Churchman (1968), and Ackoff (1971) who criticised the limitations of hard systems thinking that offers functionalist assumptions about real-world situations. Alternatively, these authors proposed that assumptions in social life yield multiple realities and can be shaped by how the world is experienced (Checkland, 1981). Thus, pioneers of SST began to model human activities instead in order to embody a particular worldview, or *Weltanschauung*. Within soft Systems approach, three remarkable soft systems methodologies (SSM) have been proposed: Churchman's (1968) social systems design, Ackoff's (1981) interactive planning, and Checkland's (1981) approach.

As a further developmental stage of SST approaches, CST emerged to overcome limitations noted by numerous scholars. Jackson (1991, 2000, 2006) has argued that the interpretive assumptions made by these authors concerning the nature of systems thinking precluded their methodologies from intervention in many problem situations, at least in the manner intended. His criticism has focused upon the extreme subjectivity in SSM, which considers the world by capturing all possible perceptions instead of modelling the world as it is in reality. Jackson (2000) has also pointed out two other aspects of critical awareness. One, it involves critiquing the theoretical underpinnings, strengths, and weaknesses of available systems methodologies and the usefulness of the variety of systems models, methods, tools, and techniques in the service of different methodologies; and two, it works as social awareness of the context by determining the popular use of particular Systems approach. Midgley (1995) further clarified that critical awareness, as identified in CST, aims to support two other commitments of CST: methodological through pluralism and emancipation.

The second commitment of CST is emancipation, meaning the notion of emancipatory thought, built upon the critical theory of Jürgen Habermas and Michel Foucault that has been recently appeared in literature addressing CST and provoked considerable debate among

systems scholars since the early 1980s (e.g., Brocklesby & Cummings, 1996; Flood, 1991; Jackson, 1991, 2000; Midgley, 2000; Mingers, 1980, 1992). Human emancipation is one of three commitments in CST research first introduced by Jackson and Flood (1991) and known as total systems intervention (TSI). According to Jackson (2000), 'From the emancipatory position, human emancipation is an absolute necessity for self-emancipation' (p. 350). Accordingly, he has averred that human emancipation is central to CST in how it can help all individuals to maximise the development of their potential, which increases their quality of work and life. At the same time, though appearing after Habermas's work, Foucault's thoughts on human emancipation are considered as alternative for use in the context of CST. For instance, Flood (1991) has built upon Foucauldian ideas on emancipation in *Liberating Systems Theory*. From another angle, the dedication to human emancipation in pursuing methodological pluralism in CST can also be termed *complementarianism*.

The commitment to methodological pluralism as first introduced by Flood and Jackson aims to combine different methodologies, methods, and techniques in intervening into problem situations. The practical implication of methodological pluralism as an approach is represented in TSI, or CST research developed upon Habermas's work on emancipation. The assumptions generated from CST stem from the notion that different assumptions from different methods (e.g., hard systems thinking and soft systems thinking) about problem situations can work together in complementary manner instead of being set in competition (Brocklesby & Cummings, 1996). For instance, assumptions in hard systems thinking derive from agreement about the nature of the problem situation being addressed, while with soft systems method assumptions take into account the divergence of opinion about the situation. In CST, it is therefore possible to make different assumptions by relying on different systems methodologies so that the latter can be embodied with a variety of different contexts (Midgley, 1996). This innovation paves the way for different forms of systems approaches

that are particularly designed for problem solving and practical interventions, including multimethodology or critical pluralism, coherent pluralism, pragmatic pluralism, and creative design.

The above summary of critical research's role has demonstrated the development of the current study in how it deals with large-scale IS failure in the UK public sector. This study requires identifying many systems theories and practices to view the big picture of the situation at hand. Systems ideas challenge how we think about the world as we reorganise our thinking based on systems concepts such as emergent properties, hierarchy, communication, and control. In this respect, individuals can holistically examine any problem situation of interest, especially complex ones. In management science, it is clear that by using systems ideas, users can implicitly become more capable of confronting messy real-world situations, which enables a system's participants to debate the system and its component subsystems as means to draw its boundaries.

11.3 Determining the Most Useful Approach

The principles of CST discussed highlight the vital question of how to choose an appropriate approach related to the context of the intended intervention, especially given that hard approaches are established well on the basis that the reality of the world can be objectively addressed in agreement. This would extend to soft approach whose assumptions mediating the divergence of different view of the reality to avoid imposing a particular view. While hard systems approach can be described as rigorous manner basis, systems approach is more flexible in the sense that it tempers conflicting views. Therefore, a wide range of systems methodologies can be observed to embody human activities based on sharing ideas among actors involved in the problem situations, as long as the purpose is to make desired changes.

At the same time, CST proposes to reconcile the competitive nature of hard and soft approaches to dominate over the other, suggesting that instead of competing for dominance,

they can be used in a complementary manner. This strategy can help to overcome the limiting assumptions embedded in approaches sticking to one methodology by allowing different methodologies to work together in the same situation. Although this progress seems to facilitate the different methodologies in complementary ways, the question remains which are most suited to a particular context. This question prompted Jackson and Key (1984) to propose a theoretical framework underpinning the use of different methodologies called system of systems methodologies (SOSM) that was later refined by Jackson (2000). SOSM is built upon assumptions made about the nature of problem situations and problem contexts.

Briefly, SOSM works in terms of two axes. On the one hand, the horizontal axis considers increasing the divergence of values and an interest among stakeholders concerned with or affected by a problem situation and classifies such divergence unitary, complex, and coercive. On the other hand, the vertical axis considers increasing complexity on a continuum from simple to complex. The outline produces a pluralist framework that can then be presented into six categories of problem contexts: simple–unitary, complex–unitary, simple–pluralist, complex–pluralist, simple–coercive, and complex–coercive. It can be thus claimed that by addressing two complexities of such contexts, researchers can make appropriate assumptions about a problem context. Once these assumptions are set, it becomes easy to determine the most appropriate methodologies for particular contexts. At this stage, it is recommended that in undertaking particular activities underpinning a problem context, the use of the plurality of existing systems methodologies and methods in combination can efficiently mitigate increasing complexity, change, and diversity.

11.4 Implications of the Research

The study maintains that Systems approach offer excellent opportunities for understanding the complexity of large-scale IS failure in the UK public sector. Their power lies in their practical stance toward intervention in problem situations described as complex, diverse, and

mutable. The interventions often adopted a pluralist approach in which inspiration of CST is clear. By relying on an array of methodologies, methods, models, and techniques developed by systems thinkers, pluralist approaches are appropriate responses to the complexity of contemporary problems, and Systems approach in particular promise to tackle a greater variety of problems than other approaches. As this study has shown, systems approach strategy can expand understandings toward better managing large-scale IS failure in the UK public sector based on a series of systemic interventions. Other than its combination of methodologies and methods in problem contexts, Systems approach also emphasise open discussion among participants involved about their views on the evolving situation.

ssystems approach in this study have been used to negotiate the increasing complexity of large-scale IS failure in the UK public sector and to propose better control over and understanding of such failures, chiefly by adopting a holistic approach based upon systems thinking and CST. For researchers, the examination of IS failure in reality can offer benefits to both researchers and practitioners with organisational and technical backgrounds who might need to resolve such situations in the future.

It is worth mentioning that any contribution taken from systems-based study implicitly reinforces three primary types of contribution. The first is the contribution to knowledge readily obtained from using systems approach, beginning with defining the problem until the desired change is achieved. Each step taken in systems approach appears to be knowledge intensive for both researchers and participants during the continued debate and exchange of views. The second is the contribution to practice of examining strengths and weaknesses of different methodologies associated with the problem context in order to apply the most suitable to guide the intervention. Lastly, the third is the methodological contribution, which is the core concern for systems approach. In contrast to traditional approaches, systems

approach were developed according to the logic that different methodologies can be employed based on a paradigm of diversity in guiding interventions.

11.4.1 Theoretical Contributions

11.4.1.1 A Shift in Approach to Large-scale IS Failure in the Public Sector

The current study has contributed to the knowledge of IS failure in a way that can help researchers understand large-scale IS failure in the UK public sector in a broader sense. In this respect, I have examined previous studies based on different paradigms that have paid considerable attention to conceiving IS failure according to traditional approaches, including empirical studies (i.e., positivist research) and social studies (i.e., interpretivist research). Positivist work seems more concerned with breaking down problems into smaller components as a means to control them better, while interpretivist work relies on interpreting problems and how they are socially constructed. The two approaches undoubtedly yield insights into what works, and when, for particular situations based on particular assumptions. These assumptions, however, become limited in the face of increasing complexity, which effectively reduces the efficiency of understanding failure and creates a knowledge gap.

In the past few years, critical approach studies have gained considerable traction in resolving complex problems, and from the systems thinking perspective, a set of approaches can help to clarify IS failure. For instance, the socio-technical systems thinking approach helps to identify social and technical aspects in the structural design based on the view that people and organisations are interdependent sociotechnical systems. To some extent, however, this process is possible only if the complexity of IS failure studied is defined within social and technological domains. Arguably, sociotechnical systems seem limited in that they ignore the bigger picture of the problem, which is more related to the scope of this study.

In seeking a comprehensive view, instead of one narrowed to only social and technical contexts, this study followed critical approach studies to gain a better understanding of large-scale IS in the UK public sector. Consequently, the problems could be viewed in their broader social, technical, and organisational contexts according to a CST for intervening in social systems. The CST approach, however, is a modern managerial problem-solving strategy established to negotiate highly complex real-world situations. CST practitioners assume that any complex situation is interrelated and invariably involves people, which make it highly unpredictable. The term *critical* is used by CST to distinguish critical system thinkers who draw heavily on critical social theory and soft system thinkers who apply a variety of systems' methodologies. Both build upon system idea principles, yet critical system thinkers have developed additional ideas related to Habermas's critical social theory. Lastly, the study contributes to knowledge by describing different problem-solving strategies for large-scale IS failure in the UK public sector emanating from the CST approach. In opposition to traditional approaches that make technical perspectives the core concerns of IS failure, CST is more concerned with the social system and its interrelated components as a whole. Once IS failure is perceived in this sense, the approach can improve its resolution.

11.4.1.2 Theoretical Framework

I would argue that in the way of theoretical contributions to the complexity of large-scale IS failure in the UK, two sensational issues need to be critically reflected upon, in terms of the use of systems ideas in a messy situation. The first issue is assessing what kind of systems ideas are used in the problem situation among a variety of choices in systems approaches. My individual experience seems to involve self-conscious, critical thought in the sense that research questions set at the beginning can help the researcher determine the use of particular systems approaches. I would claim that this issue is an important one that constitutes what I

call a systems-oriented world. The second issue pertains to the practical sense of intervention into the real-world situation. The issue is guided by set different systems approaches suggested (methodological pluralism such as TSI, critical pluralism, and creative holism) in order to choose an appropriate combination of methodologies, methods, and techniques that fit with a particular context. The intended intervention can be shaped through the suggestion of adequate social theories and models in the systems approach, relevant to the context of the situation. This issue is more related to the epistemological aspect for understanding the problem situation, which is why I call it reality-oriented world. I believe that the two issues are important in producing knowledge and understanding real world problems in order to change them. Before I move on to draw theoretical insights, it is important to mention that the emphasis in the current study has mostly rested on the theoretical aspect of systems approach, although it is widely known that systems approach is acknowledged for providing a powerful, practical intervention. There are a series of steps I have followed to build a new theoretical framework conceptualising the problem situation of large-scale IS failure in the UK public sector context. The primary concern is to use systems ideas for the maximum benefit of developing such a theoretical framework that can provide useful guidance on intervening in a highly complex situation of IS failure.

An initial point was how to define the system of the problem situation under investigation in terms of general systems theory (GST). It is often known that any system concept consists of a set of elements that are formed to constitute the function of such a system, whereas the behaviour of the whole system depends on the result of its interdependent elements and their effects. According to Ackoff (1981), the minimum of a system's elements are two or more elements in which the sum of the elements can produce a particular behaviour, paying attention that these elements need to be assembled in certain ways to form the system to accomplish the purpose of its structure. Thus, system properties are interrelated and interact

through regulation, processes, and feedback. The notion of the system led to exploring principles of two types of general systems theory (GST), which are relevant to the system's movement: closed system; and open system. They both have been taken into consideration when developing the theoretical framework of the current study. Briefly, the theory of closed system is a structural arrangement of the system's elements processing in casual relationships to maintain an organisation as a constant behaviour, although it is borrowed from the law of science in dealing with objectives being modelled in mathematical analysis. This kind of system is criticised for its limitation of addressing the human being's behaviour, which is of course more complex and unpredictable. So it is found that the closed system is regulated to retain a well-defined structure mode that allows for it to be regulated in a linear process until a negative feedback occurred in the dynamic behaviour, which entails new inputs into the system. According to Jackson (2000) the regulations are necessary to avoid chaos and disorder of the systems through the feedback, when part of the system's functioning goes wrong, whereby a message is generated to take an action to bring it back to the right course.

On the other hand, the open system is suggested as an alternative in organisations to overcome the limitation of the closed system in terms of human behaviour, stability, relationships, and emergent properties. In addition, an environment of the open systems appears flexible in the sense that it is always seen as a part of a wider system, which makes it more open to interrelate with different systems within the environment. As a result, the environment in the open system can be recognised by identifying elements of another system that is set out of direct control of the system and therefore have an impact on the behaviour of the system (Skyttner, 2001). This progress in GST started with the work of von Bertalanffy and Kenneth Boulding on general systems theory in the middle of the last century, which gave birth to the type of systems thinking that looks at the problem situation in a different way, especially the problems characterised as ill-structured.

The redefinition of GST based on the view that organisations and societies are open systems was essential in the system science in the way it enables the system to be more productive in dealing with the sort of complexity consisting of hierarchy levels and wider, interrelated elements. This is expressed in the open system, which is constantly exchanged in growth and expansion in its environment. I could argue that the major differentiation between the closed system and open system is a critical point to rethink in terms of an alternative theoretical framework that can overcome the limitations existing in the closed system while proposing an open system design to fit properly with the real-world problem situation of large-scale IS failure in the UK public sector. By demonstrating this viewpoint, I designed two theoretical frameworks of the problem situation. The first design was developed based on an ordinary closed system model while the second was developed in light of an open system model as introduced in systems science. The intention is to clarify how a complex situation is captured through the theoretical framework shift that is suggested by the researcher.

11.4.1.3 Closed System Framework of Large-scale IS Failure in the UK Public Sector

As was pointed out, the closed-system behaves in a steady state structure through inputs, process, and outputs that work to perform purposive work. Because of the regulations of the mechanistic manner of a closed system, it is expected that such a system moves in closed-loop, based on structural relations among its entire objects. Any deviation occurring in the system's desired state can be informed through a negative feedback message that is responsible for changes in the system, which entails correcting that deviation for ongoing behaviour. In this dynamic condition of mechanism processes, the system's behaviour can be easily reset as much as possible until the purpose of the system is achieved. Thus, the steady state of the system is important to sustain the efficiency of the repeated process between inputs and outputs for survival. A further point related to the characteristic of the closed system is its lack of integration between the system and its external environment in which it

is isolated from environmental influences that allow such interactions or the ability to affect each other. From this point of view, the key issues in the closed system can be seen either as advantageous for those observing scientific phenomena to gain a high validity of research, or disadvantageous in the sense that it eliminates the human factor that would be meaningfully interpreted in social science. In spite of the claim that this type of reductionism approach yields success for producing knowledge in natural science, it has less impact on social sciences. In the organisational aspect, for example, systems theorists tend to conceptualise the organisation based on the closed system process, which consists of a number of objects, while people's involvement—an inevitably fundamental part of the organisation—appears to be ignored. When it comes to the IS failure situation, the influence of a closed system is more apparent, whereas the mainstream IS literature treats the failure by drawing on rigorous solutions of the closed system, although the presence of human contribution is inevitably obvious. This might explain the limitation of these solutions to offer capable strategies for better dealing with IS failure. The assumption suggested that the pattern of the closed system based on a reductionist view needs to be shifted toward adopting a more integrated approach to IS failure, analysing the situation through the interaction among its elements.

In fulfilling the current study, I have attempted to shift the reductionist way of thinking that is concerned with separating objects of the problematic situation and offered a holistic way of thinking of the development of a new framework. It is claimed that the new framework is able to overcome the constraints of mechanistic thinking and takes into consideration the integration between different elements of the problem. To do so, it was preferable to clarify how the problem situation looks within the reductionist view model in large-scale IS in the UK public sector failure. The study's findings pointed out that there are four distinguished elements that are important to better understand the situation in which they can constitute the proposed framework. The four elements were designed and processed as separated parts that

make up what is called the reductionist model, as shown in figure 11.1. In terms of the environment of the system, the mechanism behaviour of the model existing in the closed environment where transformation processes entail internal operations, despite external conditions that affect and are affected by the system's environment. This gap of congenial relationships between the system and its environment becomes the major obstacle for closed system to achieving remarkable progress in organisations.

A quick look at the framework shows that the four elements in figure 11.1 (Initiative owner, Organisational culture, IS Design & Implementation, Users) are considered objects conceptualising large-scale IS failure. In a reductionist way, these complexities and their potential treatment are partially observed without considerable attention paid toward an implicit or explicit interrelation among these complexities. People, therefore are treated and modelled like other system elements. As a result, it is found that the solutions proposed seem to lack efficiency to capture the core concern of the problem, which is laid at the interrelation between the four elements and in the involvement of human beings in the system. In addition, the increasing complexity is more complicated than it looks, depending on the reductionist framework when realising the humans engaged in the problem situation. In reality, the real-world problem can be addressed on the basis of involving human beings who need to be treated differently. In fact, there is a need for a more productive way to understand the problem situation that stems from the nature of socio-technical system of the IS failure situation. Such a complexity can only be understood through the behaviour of the four elements and the engagement of human beings who act and interact within these elements. In the next sub-section, I am going to set out a new framework for IS failure design based on a systems approach that pays appropriate attention to the whole, including its interactions within the problem context.

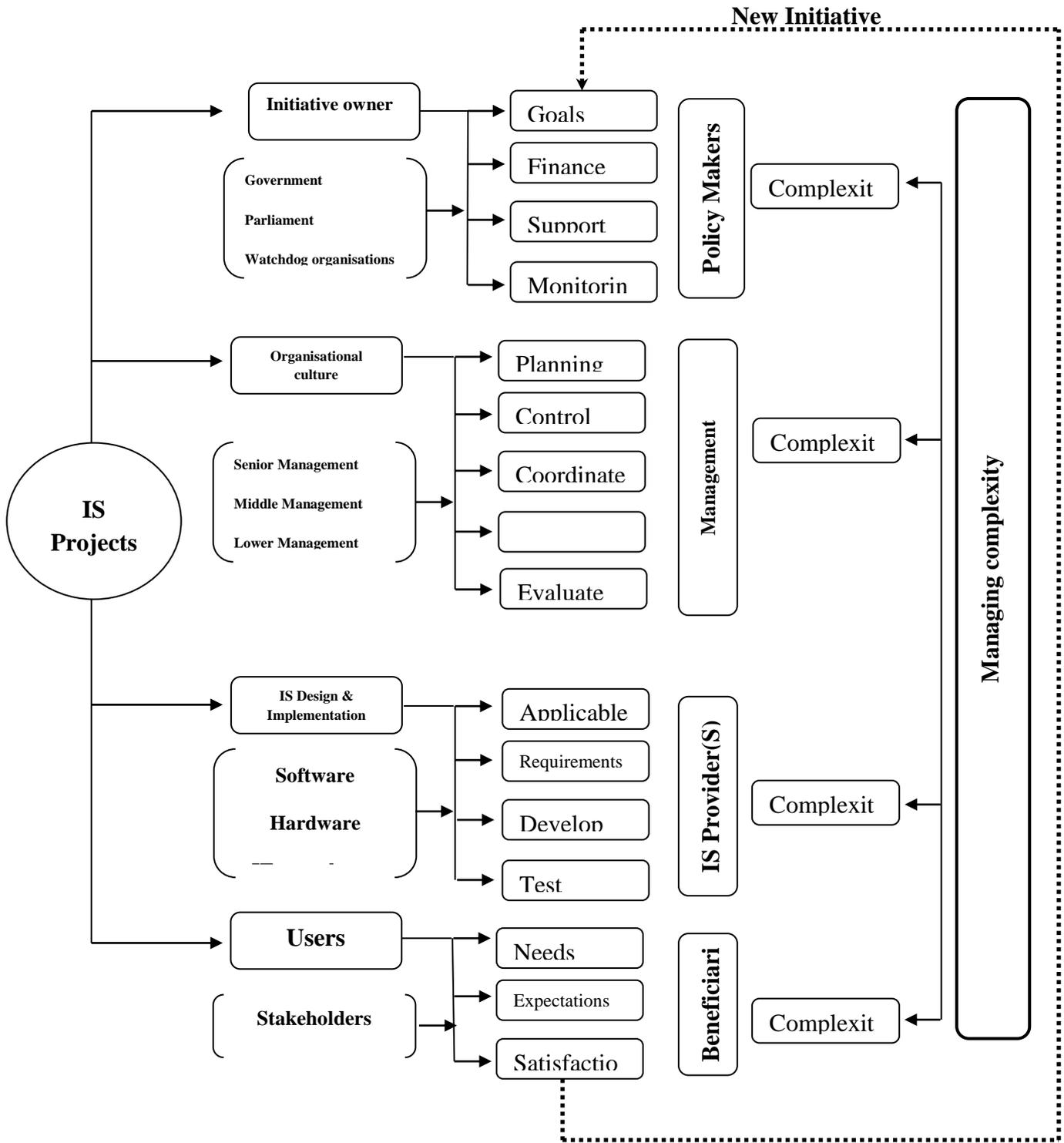


Figure 11-1 A reductionist view for conceptualising large-scale IS in the UK public sector

11.4.1.4 Open System Framework of Large-scale IS Failure in the UK Public Sector

The new framework represents the researcher's contribution to understanding large-scale IS failure in the UK public sector, which takes into account a holism approach; the whole system is the result of the interdependence of its parts. The systems approach, it is argued, is an innovative approach emerging to overcome the limitation of the reductionist view, based on natural science roles in dealing with complex real-world problems set in social systems. A wide spectrum of systems ideas has been developed to meet the new challenges in management problems particularly those described high complexity. The systems approach problem solving strategy conducts new principles by relying on practical activities, including methodologies, methods, and techniques to tackle increasing complex situations of the contemporary world. In such situations, systems thinkers advocate using the systems approach rather than the old fashion method of reductionism. Therefore, they rejected the claim of the single view of the world in which the problem can be expressed within different viewpoints among those who participated in the situation in order to produce multiple world views, and the possibility of agreement and contrast become possible between different views about the action taken. In contrast to the traditional approach where reductionism is dominant, the implications of the systems approach in organisations draw heavily on the interaction between people and their environment. This comes from the thought of system principle that sees organisations existing in a community where different communities can come together to make a society. The environment and the system interchangeably influence each other, and the attempt of separation can reduce the potential effort in understanding the complexity of problematic situations. Thus the system's behaviour within the systems approach is seen as an open system in which involved parts of the systems can be recognised through the interaction between the existing system and its environment. Another concept of the systems approach is the use of social theory in systems studies, arguing that social theory can give

further insight into identifying the nature of the social context in problem situations. In fact, the influence of social theory begun to spread over the limitation of both functionalist 'reductionist' and interpretive systems thinking approaches to deal with difficulties of the real world, although the systems thinking rested upon the systems ideas of holistic thinking. Nevertheless, it was widely appreciated that social theory is significant in applied systems thinking, especially in emancipatory and critical systems approaches over the last four decades. Historically, the use of social theory in systems thinking referred to the early stages when systems thinkers needed to find a way to deal with the sociological context in organisational analysis. A Burrell and Morgan's framework (1979) classification of sociological paradigm was basic in social studies and in the organisational analysis field that related to wider social contexts. Its success led systems thinkers to employ the framework in order to intervene in and change the social reality.

In the systems approach, the latest version in systems thinking, there was criticism from systems thinkers about the use of Burrell and Morgan's framework on the basis of how to view the social world. This allows us to turn to the critical theory of the Frankfurt school as an alternative to the use of social theory in the systems approach. The most influential social theories in the field have rested on the work of Habermas's social theory of knowledge and then later on Foucault's work on power of knowledge. Both theorists' contributions were supportive in identifying what social theories systems practitioners needed before they could adequately employ different systems methodologies. The considerable impact of social theory on systems ideas has led to distinguishing the third research approach in management science in addition to the traditional and soft management science (positivist, interpretive, and critical), and have resulted in a number of different systems approaches that have been suggested in tackling what is addressed in highly complex problem situations.

The above key issues of systems and relevant social theory have been intensely discussed in the literature on systems approach. However, I attempt here to briefly revise these ideas again before moving forward to the proposed new framework. The intention of using the systems approach in the current study is to challenge the narrow view of reductionism in facing real-world difficulties. My assumption is that large-scale IS failure in the UK public sector needs employment of more effective ways to deal with real-world problematic situations, and that understanding the increasing complexity problems requires a new kind of thinking in order to improve problems found. This stems from the consideration that the IS failure under investigation is a complex real-world problem situation set in a social system, and is a unique situation based on the fact that it belongs to a particular context, which has its particular relationships tied among the systems components. While the IS failure has continued to happen in the UK public sector, the old strategies yield very limited results. One of the main reasons for the limitation is that old strategies failed to define the problem in terms of the interaction that occurs between the parts of the problem within the context it existed. By applying the systems approach I would argue that the problem of IS failure can be systemically well-defined in terms of its uniqueness and its interconnections in the way of changing the situation.

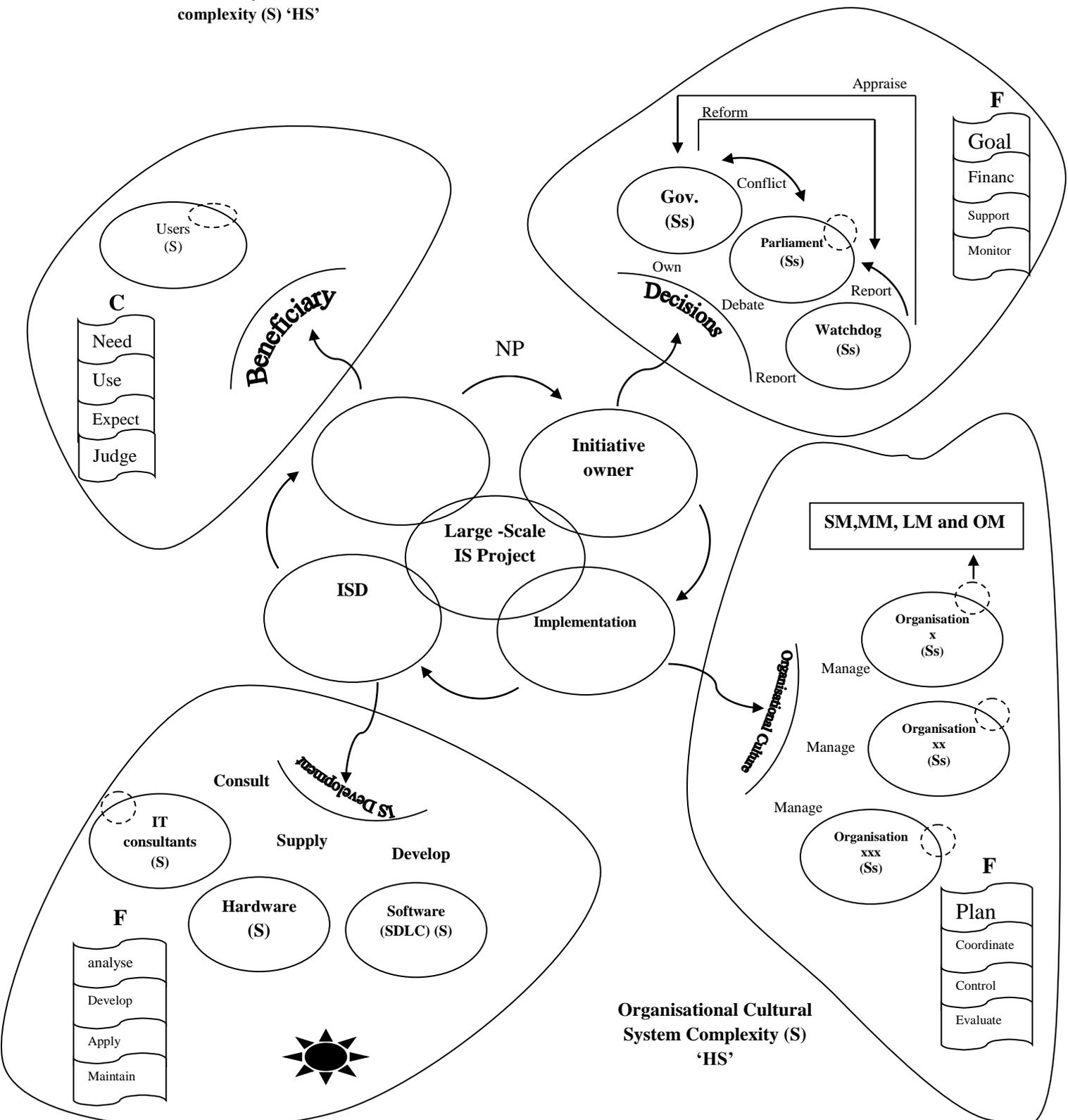
The new framework shown in figure 11.2, I argue, offers a new model for conceptualising large-scale IS in the UK public sector in which it can improve the way of understanding the problem situation in terms of four identified elements proposed (Initiative owner, Organisational culture, IS Design & Implementation, Users). The four elements reflect political, organisational, technical, and user domains of the problem situation. These components are designed in an open system manner in which they can mutually interact with the environment where the problem exists in order to guarantee continual debate between those affected by the system. This sometimes leads to recognising conflicts and the different

interests of those already benefitting from the system, but it mostly does not avoid a level of agreement about the changing situation.

In light of human beings, the framework, rather, seems to address the variety of beliefs and interests of the people who are importantly involved in the situation. The success of the whole system relies on managing the relationships between the four elements to make sense of the world in which they operate. Interestingly, in order to characterise the system type, whether a human system or technical system, it is found that most systems recognised are human systems, including the technical system that seems reliant on the influence of humans. Finally, the hierarchical nature of the system is considered as either a sub-system that constitutes such a system or as a system that makes up the whole system of the large-scale IS in the UK public sector projects.

Users Systems complexity (S) 'HS'

Political System Complexity (S) 'HS'



IS design system complexity (S) HTIS

- C criteria
- F function
- HS human system
- HTIS human & technical integrated system
- ISD information systems development
- LM lower manager
- MM middle manager

- NP new project
- OM organisation members
- S system
- SDLC system development life cycle
- SM senior managers
- Ss sub-system

Internal debate, conflict and decision made

Outsource Supply

Figure 11-2 A proposed framework for conceptualising large-scale IS in the UK public sector

11.4.2 Practical Contributions

This study can effect change in solving IS failure because it furnishes a practical guide for managers for coping with problems of increasing complexity and diversity. Its importance derives from its challenge to current techniques used in the UK public sector.

The study has revealed that organisational managers in the UK public sector work in a highly bureaucratic environment in which management is favoured over problem solving. The term *manager* here refers to public sector officials with positions as senior managers or policymakers: people with the power to manage and make policies. Relationships in bureaucratic management often emphasise orderly hierarchies that refer to scientific management in which regulations are restricting.

Accordingly, the present study was designed to consider both IS failure as a problem situation for management and managers facing real-world difficulties. It has proposed four elements of complexity in management: the IS initiative, the organisational culture, the IS complexity, and the IS users. Since each component breeds a different kind of complexity, the focus falls to managing these complexities as they interact and impact each other. The critical approach provides a means to effectively help managers to tackle problems, thereby enabling them to design practical solutions before involving themselves in the situation.

11.4.3 Methodological Contributions

In this research, I applied the CST approach given that large-scale IS failure appears to be a complex problem situated in different social contexts and pose a high degree of diversity and uncertainty. From theory, I applied a combination of systems methodological processes to investigate and improve the situations. Based on different management scenarios suggested for problem solving (Flood, 1989; Jackson, 1992), I decided to apply a pluralist approach and I used the methodological framework adopted by Checkland and Holwell (1997) for identifying the three relevant elements of research: the framework of the idea (F),

methodology (M) and areas of concern (A). The framework produced different types of research based on which one of these three was most salient. The current study, as articulated in the research methodology, was guided by a framework more related to producing knowledge.

We then identified the problem context by relying on Jackson's (2000) system of systems methodology (SOSM). Because the study's basis was critical, the methodology was supported by Habermas's communicative action theory under the umbrella of critical theory in a way that facilitates free debate among participants. In the practical sense, I adopted Mingers's (1997) intervention processes model as a chief systems methodology, which consists of four phases for intervention in any situation: appreciation, analysis, assessment, and action. Each phase enacts process-based activities aimed at meaningful intervention, and for each, we applied different techniques and data types. In addition to secondary data and interviews in the first and second phases, we employed the KETSO creative thinking tool for changing the situation in the third phase. Altogether, it was an organised workshop undertaking collective debate.

11.5 Limitations of the Study and Recommendations for Future Research

Having addressed the complexity of large-scale IS failure in the UK public sector, this study has acknowledged a few limitations.

- The study has been examined and developed in a theoretical sense. Although it has offered insights for the researcher and participants, I were unable to measure changes in the reality. For future research, it might be possible to change how governmental IS initiatives are managed by adopting CST. Most reports published on IS projects explored in the current study reveal the managerial challenges facing IS public sector projects in the United Kingdom (e.g., CPA 2007 and NAO 2009).

- The number of participants involved in the interview and workshop was fairly low due to circumstances that made it impossible to conduct more effective activities and because some participants were incapable of participating in both activities. Researchers interested in applying CST for solving problems especially in the public sector need to make sure that the number of participants is large enough to prevent similar problems.
- The research methodology was designed as a Mode 1 type of research suggested by Checkland and Holwell (1997), which is driven by the framework of ideas for producing knowledge and for which activities were chosen from several methodologies and techniques depending on the researchers' knowledge, experience, and method of intervention. In addition to theoretical issues underpinning the research methodology, KETSO creative thinking tools were used during the workshop activity and found to be a good technique with which participants quickly became familiar. This part of the research was interested in challenging experience. For the methodology, choosing another type of research—for example, Mode 2—for producing knowledge is recommended. In the context of research methodology, it is possible to construct a particular methodological approach suitable to the problem context based on a combination of methodologies, methods, techniques, and tools as suggested, for example, by Flood and Jackson's (1991) total systems intervention, Jackson's ((2006)) creative holism, and Mingers and Brocklesby's ((1997)) critical management.

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Appendix A

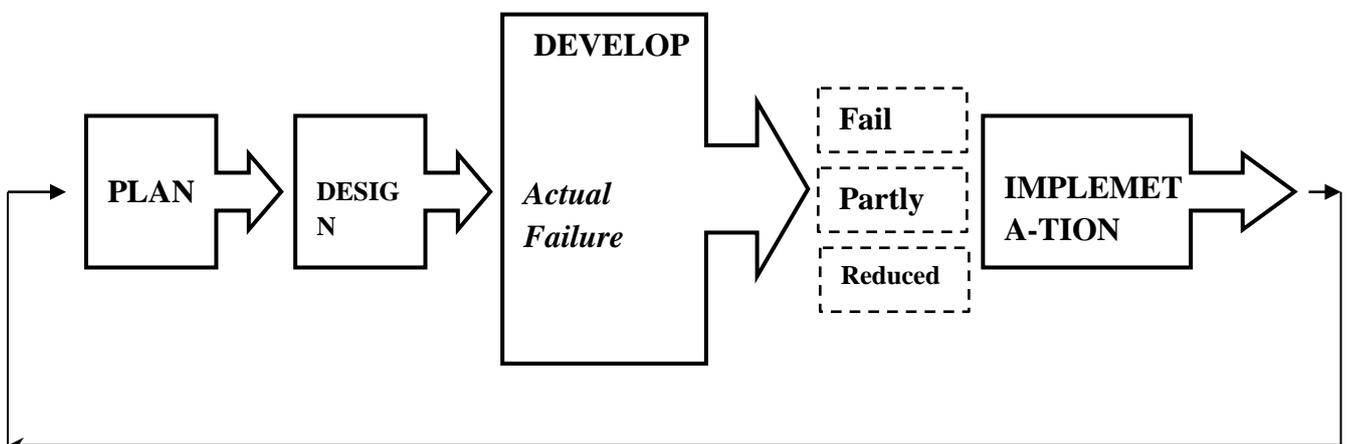
Managing the Complexity of The Large-scale Information Systems Failure in the UK

The term *large-scale*, in this study, is used to highlight primarily information systems failures that are associated with different parts involved of a situation, either government departments as the project tends to be for the public sectors or those external sectors that participate in one way or another in the project, such as information systems providers, professionals, media, etc.

The research cases have been explored from situations occurred in the public sector within a period of three decades. For example:

- 1- London Ambulance Service Computer Aided Despatch (LASCAD) 1992.
- 2- The National Offender Management Information Systems (NOMIS) 2012.

The Process of Information Systems Project



Questions:

- 1- In general, why does a large-scale information system fail?
- 2- From your point of view, when can the project be labeled as a failure?
- 3- How do you view the impact of managerial concerns in IS failure? What difficulties are related to the managerial perspective?
- 4- Which one of these issues is the most important?
- 5- How do you evaluate IS project supporters?
- 6- Are there any marginalized issues we need to consider?
- 7- IS failure remains a high risk proposition. Do you think we learn from continued IS failures? Are there any possibilities for improvement?
- 8- What are other factors related to IS failure that have not been taken into account?
- 9- Who else should be included in IS failure situations?

Appendix B

Managing the Complexity of the Large-Scale Information Systems Failure (LSISF) in the UK

Study's Summary

Information systems (IS) failure in organizations is increasingly a central concern of practitioners and scholars. A real-world problem, IS failure challenges traditional approaches of coping with organizational problems. Several cases of IS failure in the UK during the last few decades show that the ability of managerial influence to bring about change is still limited. Most current efforts to address IS failure are focused on technological perspectives, while managerial perspectives are the focus of less concern. This may be preventing the achievement of considerable progress. Hence, new strategies are needed to benefit from developments in systems science and to look at IS from a managerial standpoint.

A gradual shift toward alternative approaches to dealing with IS failures during the last few decades is addressed by focusing on the analysis of issues that are related to the managerial aspect. This shift is underpinned by management systems studies, to provide a comprehensive insight into the real-world problem of IS failure. Critical systems thinking, as an advanced movement in systems science, delivers a kind of critical approach that is based upon assumptions usually different from traditional approaches to IS failure. The critical systems thinking approach seeks to identify social context and organizational issues and to use a combination of methodologies, methods, tools and techniques to help problem-solvers better control problematic situations. Because more traditional approaches pose barriers to understanding IS failure, the critical systems approach is applied in this study, to facilitate understanding of the contradictory issues, related to power, conflict and culture, that come with IS failure. It cannot be claimed that all solutions to IS failures are applicable to other situations. Nevertheless, the discovery of such solutions leads to the accumulation of knowledge that contributes to reductions in the rates of IS failure in organizations.

In this study, the term large-scale, is used to highlight primarily information systems failures associated with different parts of any number of situations, either within government departments, as this project will be more focused on the public sectors, or other external sectors, such as information systems providers, companies, professional organizations, the media, etc. The research cases to be examined in this research have occurred in the public sector over the past few decades.

Workshop details

The workshop is a half-day meeting aiming at understanding factors of IS failure in the public sector in the UK. The participants represent various backgrounds and experience in academic and practice, so it is expected that each participant has a view to share and debate with others. During the workshop there is several activities based on systems methodology will be conducted, such as the KETSO and rich picture creativities tools. Finally outcome of the workshop will be analyzed for the purpose of the PhD thesis, under the supervision of Dr. Jennifer Wilby, senior lecturer and researcher in Management Systems and Sciences department in the Business School, University of Hull.

Workshop Program

Activities	Time	Details	Presenter
Presentation	13:00- 13:20	An introduction and the scenario of the workshop	The researcher
Session 1 KETSO creativity tool	13:20 - 15:00	Two group are divided randomly to engage with the KETSO tool and discussion	Managed by Dr. Fraser How and Saad AlQarni
Tea break	15:00 15:15	Break	
Session 2 Rich Pictures	15:15 16:15	Emerging a picture of the situation by participants through the creation of rich pictures	Managed by Saad AlQarni
General discussion	16:15 17:00	- Focus on aspects previously ignored. - Ways of improving the situation.	Managed by Saad AlQarni