Extending Agile Systems Development: An Application of the Beyond Budgeting Model

by

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Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references given.

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Signature Date

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Abstract

The field of information systems development (ISD) is continuously evolving, with new development practices and methodologies regularly introduced to the field. It is widely recognised that one of the most recent family of methodologies, agile methods, is fast becoming one of the most commonly used. Surveys have recently shown that the majority of systems development teams worldwide are using agile practices in some form. While there is a growing body of research examining agile methods and the theoretical bases and implications of agile practices, very little research has addressed concerns raised by both academics and practitioners regarding the integration of agile practices with and within traditional organisational environments. Recent empirical evidence suggests that agile practices are not well suited to traditional organisational environments. Organisations need to consider how best to extend agile practices beyond the systems development team to facilitate the required integration with the wider organisational environment.

Beyond Budgeting is an innovation from the management accounting literature that seeks to manage organisations through flexible sense-and-respond type mechanisms, rather than the more rigid traditional command-and-control models. This study is based on the premise that the principles of the Beyond Budgeting management model are well suited to an agile systems development (ASD) environment. The study operationalises the Beyond Budgeting model and applies it in an ASD environment. The findings suggest that contemporary thinking in management accounting resonates strongly with contemporary thinking in ISD. The Beyond Budgeting model shares many similarities with ASD with both having a distinctly agile and flexible foundation.

By using the Beyond Budgeting model as a lens to examine seven ASD teams this research discovered that legacy organisational processes and mechanisms have a direct impact on the regular operations of the ASD teams. The study highlights that organisations need to consider how traditional processes and mechanisms will affect the ASD environment. Functional areas within the organisations such as human resources and budgeting need to be aware that agile practices require a change from how they traditionally operated. ASD teams find many difficulties when operating within traditional processes. Applying the operationalised model has highlighted

these difficulties and discovered where current ASD practices do not sufficiently address the issues teams face. For example, issues surrounding customer relationships, a central axiom of ASD, are far from well understood. ASD teams need to further consider and develop the complex developer-customer relationship. They need to better understand the role the customer proxy has in the development process. Relationships with other teams and with others within the organisation also have an important role in an ASD environment and are not sufficiently addressed by current ASD practices. From the findings of this study a set of nine recommendations are made to extend and improve upon current ASD practices.

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List of Acronyms

ASD	Agile Systems Development
BBIM	Beyond Budgeting Implementation Manager
BBRT	Beyond Budgeting Round Table
CAM-I	Consortium for Advanced Manufacturing-International
DSDM	Dynamic Systems Development Method
FDD	Feature-Driven Development
IS	Information Systems
ISD	Information Systems Development
ISDLC	Information Systems Development Life Cycle
ISG	Information Systems Governance
IT	Information Technology
KPI	Key Performance Indicators
KWM	Knowledge-Based Workflow Model
MBE	Management By Exception
NPV	Net Present Value
PDM	Participation in Decision Making
PMM	Performance Management Model
PMS	Performance Management System
ROI	Return On Investment
RPE	Relative Performance Evaluation
SDLC	Systems Development Life Cycle
SOX	Sarbanes-Oxley
XP	eXtreme Programming
ZBB	Zero-Based Budgeting

Chapter 1 Introduction

1.1 Background

Within the field of ISD, there has been a paradigm shift in the methods used to develop information systems. In recent years development teams have moved from using traditional big design upfront methods such as the systems development lifecycle (SDLC), to more flexible and agile methodologies. Prominent among these new methods are Agile methods, which were formally introduced in 2001 with the publication of the agile manifesto. This manifesto outlined a set of values and principles aimed at enabling system developer teams respond to a constantly changing operating environment. Recent studies have shown that agile methods are now in widespread use by the systems development community (Ambler, 2007b; Version-One, 2009). However, despite their widespread use, academics and practitioners have voiced serious concerns about the ability of current agile practices to integrate and function with and within wider organisational processes and mechanisms. Academics have continuously called for more research into extending ASD practices to a wider organisational context. As ASD practices become embedded in development team environments, it is imperative that we understand how they interact with wider organisational functions. To do this it is necessary to first get an understanding of what these wider organisational functions are and how they may impact ASD teams.

Since the establishment of modern business enterprise there have been three major evolutions in the management and structure of organisations (Drucker, 1988). The first took place between 1895 and 1905 with the introduction of professional management which distinguished management from ownership and established management as work and task in its own right. The second evolutionary change took place during the 1920s when Taylor's "one best way" and Henry Ford's assembly line production introduced the command-and-control organisations with their traditional budgeting and control mechanisms. The third evolution sees a paradigm shift from command-and-control to information-based organisations employing knowledge workers and operating in an ever changing knowledge economy (Drucker, 1988). Organisations can no longer rely on traditional budgeting and control mechanisms which were especially suited to a pre-information age era

(Drucker, 2002; Mintzberg, 2009). Researchers and practitioners in the field of management and management accounting have highlighted the issues with traditional control mechanisms, such as the budget process, and called for new and innovative approaches to managing in a knowledge based economy (Hansen et al., 2003; Hope and Fraser, 1999; McFarland, 2008; Mintzberg et al., 2002).

An innovation from the management accounting literature that addresses the concerns for organisational flexibility in a fast changing business environment is prescribed by Hope and Fraser (2003a), who present the Beyond Budgeting management model. This management model enables organisations to go beyond the budgeting process and manage performance through flexible control mechanisms more suited to a modern economy (Hope and Fraser, 2003a). Many leading figures in the ASD community have commented on the extraordinary similarity between the Beyond Budgeting model and ASD (Ambler, 2008; Highsmith, 2006; Larman and Vodde, 2008; Poppendieck and Poppendieck, 2010).

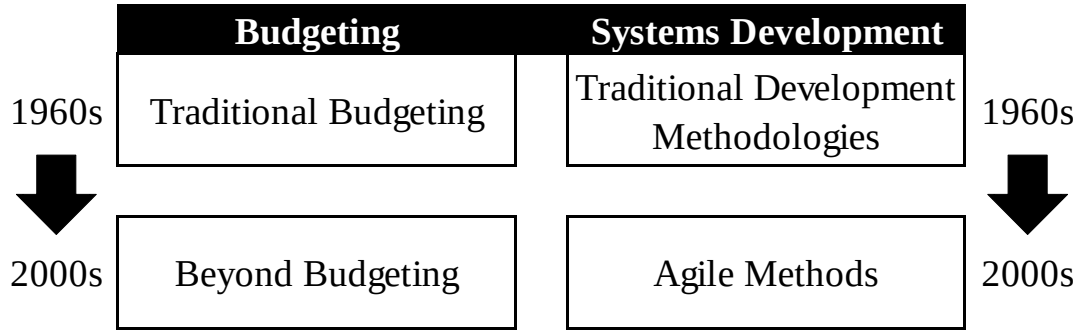

Figure 1-1 The move from Traditional to Agility in Budgeting and ISD

1.2 Motivation

With budgeting being regarded as the cornerstone of the management control process in most organisations (Otley, 2003), one of the more important factors in developing our understanding of ASD use in a wider context is understanding the role of budgeting in managing ASD projects. Budgeting has always been a problem in ISD and the statistics on budget overruns and project failure in ISD projects are alarming (cf. Conboy, 2010; EwusiMensah, 1997; Jiang et al., 2001; Keil et al., 2007; Lyytinen and Robey, 1999). Boehm and Turner (2005) argue that traditional contracts, milestones, progress measurement techniques and individual reward systems (which are driven by the traditional budgeting process) are more suited to a plan-driven, traditional rather than agile approach.

The emergence of ASD methods has undoubtedly had a huge impact on the way software is developed worldwide (Conboy, 2009; Dybå and Dingsøyr, 2008). There is evidence to suggest that between 65-90% of organisations now use ASD methods to some degree (Ambler, 2007b; Version-One, 2009) and agile techniques are fast becoming the adopted methodology commercially (Tan and Teo, 2007). However, ASD requires organisations to shift from command-and-control management to leadership-and-collaboration management models (Nerur et al., 2005). Traditional processes such as the planning, control, goal setting, rewarding, coordinating and resource allocation are, when linked with the annual budget process, more suited to a hierarchical command-and-control type relationship or an individual incentive-based relationship between the organisation and the development team and are not suited to an agile environment (Bogsnes, 2009; Fruhling and de Vreede, 2006; Hope and Fraser, 2003a; Nerur et al., 2005). As agile concepts continue to migrate into traditional organisations, there have been numerous calls for a better understanding of ASD use within a wider organisational context (Austin and Devin, 2009; Boehm and Turner, 2005; Harris et al., 2009; Moe et al., 2010; Vidgen and Wang, 2009).

In particular, researchers have called for studies to examine how best to extend agile practices beyond the ASD team level to interact with organisational functions such as accounting and human resources (Table 1-1) (Abrahamsson et al., 2009; Agerfalk et al., 2009; Conboy, 2009; Conboy, 2010; Kettunen and Laanti, 2008; Lindvall et al., 2004; Mangalaraj et al., 2009; Maruping et al., 2009a). To date, the extant literature is lacking an understanding of how traditional organisation functions such as accounting and human resources interact with ASD methodologies. Despite their undoubted popularity there is a paucity of research in this area, and a pressing need to understand how best to extend ASD within the context of a wider organisational environment.

Table 1-1 Calls for research to examine ASD in a wider organisational context

Author(s)	Calls for Research to Examine Agile Systems Development in a Wider Organisational Context
Conboy 2009, 2010	There is a lack of understanding of agile concepts and how agile systems development is conducted in practice. Researchers should identify and apply frameworks from accounting literature to further develop interesting insights into ASD in practice.
Agerfalk et al., 2009	Agile teams have to interact with many organisational functions, including legal departments, accounting, etc., the question arises as to how best to grow agile beyond the system development team to accommodate the required interactions. There is a need for studies addressing transition to agile practices at the organisational level, rather than at the team level.
Maruping et al., 2009	The extant literature offers limited guidance regarding the governance of agile systems development teams and how project leaders should manage the balance between structure and autonomy. The findings suggest the need for alignment between management strategy and team functioning. Whereas agile methodology use enables software development teams to cope with requirements change, there needs to be a supportive context for meeting such objectives.
Abrahamsson et al., 2009	Future research could examine the typical dependencies faced by agile ISD teams, current best practices regarding synchronisation of agile and non-agile functions, and strategies for organisational level implementation of agility in ISD environments. Specific functions could include finance and contracting legal and human resources.
Mangalaraj et al., 2009	Adoption of a new software development process may require changes in the organisational structure, culture, and practices, as well as in individual behaviour. Given the burgeoning interest in agile methods, an understanding of the factors that facilitate or hinder their acceptance and use in organisations would be invaluable to those considering adopting this new approach to software development.
Kettunen and Laanti, 2008	Successful software process improvement (SPI) in such new product development (NPD) environments requires wider understanding of agile organisations and their enabling factors as well as the factors that prevent large companies from achieving agility.
Lindvall et al., 2004	The challenge here lies not in applying agile practices to a project, but in efficiently integrating the agile project into its environment. To fully benefit from agile practices, organisations must better define the interfaces between the agile team and its environment, thus avoiding the double work caused by the conflict between agile practices and traditional ones.

The extraordinary budgetary failure of systems development projects coupled with the criticisms of traditional budgeting and their inappropriateness for an ASD environment suggest that traditional budgeting and the processes driven by traditional budgeting are not suited to an agile way of operating. Conboy (2010), for example, has examined budgeting in systems development and highlights the unacceptable budget overruns in systems development projects. He calls for researchers to apply other theories and frameworks from accounting literature to further develop insights into this phenomenon. Others such as Abrahamsson et al. (2009), Agerfalk et al. (2009) and Fruhling and de Vreede (2006) agree that accounting is one specific area that requires further investigation and may provide insights for extending ASD to a wider organisational context. The Beyond Budgeting model suggests that organisations move beyond the traditional budgeting process to a more flexible and accommodating management process (Bogsnes, 2009; Davila et al., 2009; Hope and Fraser, 2003a; Libby and Lindsay, 2010). The Beyond Budgeting model offers a flexible alternative to the more rigid command-and-control models and shows great potential as a suitable management model for ASD (Ambler, 2008; Larman and Vodde, 2008; Poppendieck and Poppendieck, 2010). The model is described in section 3.2, where the complementarities between it and ASD are further explored. At a glance it is a management model prescribing 12 principles that enable organisations empower teams of knowledge workers. While empowering workers it maintains the required control through relative indicators and trends with clear values, goals and boundary operating conditions.

Although identified as a suitable model for ASD, the Beyond Budgeting model has not previously been operationalised or applied to an ASD environment. By using the Beyond Budgeting model as a research lens this study will identify issues with ASD use within organisations and further our understanding of how ASD methods are and can be used or extended within a wider organisational context. The research question for this study therefore is:

How can the Beyond Budgeting model be used to extend agile systems development?

As the beyond Budgeting model has not previously been used for research in ASD, three separate research objectives are required in order to answer this research question. The research objectives for this study therefore are to:

a) Operationalise the Beyond Budgeting model within the context of an agile systems development environment
b) Apply the operationalised Beyond Budgeting model to an agile systems development environment
c) Develop a set of recommendations for extending agile systems development to a wider organisational context

By achieving these research objectives the researcher seeks to illuminate ways in which ASD may be better integrated with the wider organisation by using the Beyond Budgeting model as a lens to examine the extension of ASD concepts.

1.3 Chapter Layout

The thesis is structured as follows:

Chapter 1 is an introduction to the study. It contextualises the research, discusses the rationale and motivation behind the study and outlines the research objectives.

Chapter 2 reviews two streams of literature, budgeting and information systems development. The evolution of the budgeting process is discussed along with how criticisms of traditional budgeting culminated in the Beyond Budgeting movement. Criticisms of ISD are discussed and examples given of the extraordinary budgetary failures within the field of ISD. The Agile Manifesto is introduced and current agile systems development practices are described.

Chapter 3 discusses the Beyond Budgeting model in detail. Each of the 12 principles of the model are explored and contextualised relative to ASD. The literature in ASD and ISD related to each principle is discussed and the agile literature is reviewed and analysed through the lens of the Beyond Budgeting model.

Chapter 4 details the research approach undertaken in this study. The philosophical and methodological merits of different paradigms within information systems (IS) are discussed. The research is framed as an *interpretivist, qualitative, exploratory, multiple-case study.* Case study research tools and techniques are examined and the design and the implementation process of this research are defined.

Chapter 5 introduces the case sites and presents the findings of the study. The primary focus of this chapter is to demonstrate the application of the operationalised Beyond Budgeting model. Applying the Beyond Budgeting model to an ASD

environment highlights practices conducted by the ASD team that have not previously been considered within the ASD literature.

Chapter 6 presents a set of recommendations for extending agile systems development based on the findings from Chapter 5. These recommendations are discussed, firstly in relation to how they were developed from the case studies, and secondly in the context of the existing literature.

Chapter 7 concludes the research and reviews how the objectives of the study were met. Contributions and implications for theory and practice are discussed. Finally, the limitations of the research and avenues for future research are presented.

Chapter 2 Budgeting and Information Systems Development

The purpose of this chapter is to set the context for this study. The chapter examines the literature on budgeting and ISD, exploring how current budgeting and ISD methods evolved, and showing why the Beyond Budgeting model and ASD methods were developed. The reader will be able to follow the evolution of both ISD and budgeting, from plan driven, inflexible approaches to agile, flexible modes of operating.

Section 2.1 begins with budgeting and the budgeting process. Sections 2.1.1 and 2.1.2 give a brief overview of the traditional budgeting process and outline the criticisms aimed at this process. Section 2.1.3 describes some attempts made within the management accounting literature to handle these criticisms. Sections 2.1.4 and 2.1.5 highlight the symbiotic relationship between budgeting and performance management models. The spectrum of performance management, from command-and-control to more adaptive collaboration-and-leadership models is discussed. Section 2.1.6 discusses some attempts at developing adaptive performance management models discovered in the literature.

Section 2.2 introduces the Beyond Budgeting model, outlining its origins, and briefly discussing its theoretical foundations. This section also lists the 12 Beyond Budgeting principles and describes the professed aims of the Beyond Budgeting model.

Section 2.3 introduces ISD. Traditional ISD is discussed and the failures associated with the traditional development are highlighted. Section 2.3.3 gives a brief overview of the evolution of ISD methods that led to the publication of the agile manifesto and the formalised introduction of ASD.

ASD methods are introduced in section 2.4. The values and principles behind the agile manifesto are described along with a description of the practices employed by the two major ASD methods, eXtreme Programming (XP) and Scrum.

Section 2.5 examines the issues faced by ASD teams. Firstly, the inappropriateness of traditional budgeting processes for an ASD environment is highlighted. Section 2.5.2 then explores how the literature within both budgeting and ISD are calling for

alignment of the ISD and budgeting functions within an organisation. This section highlights the fact that while ASD methods are now used in the majority of ISD projects, organisations are still using traditional budgeting processes, which are not suited to an ASD environment. The reader will see that moving beyond the budgeting process to manage and control ASD projects will result in a better alignment of the underlying flexible concepts of both ASD and the management control process.

2.1 Budgeting

Budgeting is regarded as the cornerstone of the management control process in most organisations (Hansen et al., 2003; Otley, 1999) and is one of the most extensively researched topics in management accounting (Covaleski et al., 2003; Hansen et al., 2003; Hansen and Stede, 2004; Otley, 1999; Van der Stede, 2001). A budget is a numerical expression of a plan which deals with the future allocation and utilisation of resources over a given period of time (Tiernan et al., 2006). The corporate calendar is usually based on time, made visible and concrete (Yakura, 2002). Within this calendar the budget function is used for many purposes, including planning and coordinating an organisation's activities and allocating resources (Covaleski et al., 2003; Fisher et al., 2002), evaluating and controlling (Fisher et al., 2002; Hansen and Stede, 2004), providing information for decision making (Van der Stede, 2001) and motivating (Fessler, 2003; Fisher et al., 2003).

The literature identifies multiple uses for budgets in organisations, such as performance management and evaluation, strategy implementation, and strategy formation, etc. There is, however, no well-defined, stable, unitary meaning in prior work regarding the different uses of budgets (Hansen and Stede, 2004) and therefore some ambiguity exists regarding the exact reasons organisations budget. Hansen et al. (2004) provide some insights into why organisations budget. They provide a list of reasons-to-budget that is practice-defined and has its roots in the academic literature. The four reasons they have identified are operational planning, performance evaluation, communication of goals, and strategy formation. This list is not exhaustive, and due to restrictions imposed by the research funders, has not included certain reasons such as resource allocation, benchmarking or authorisation to spend.

2.1.1 Traditional Budgeting Process

A budget process is defined as a system of rules governing the decision making that leads to a budget, from its formulation, through its approval, to its execution (Figure 2-1) (Ehrhart et al., 2007). The budgeting process frequently consumes six months of management time in negotiations, planning and target-setting (Jensen, 2003). The process begins with a formulation of the mission statement and strategic plans of the organisation for the year. Once these are in place, budget packs are sent out from corporate centre to operating divisions and an entire process of meetings and negotiations begin (Hope and Fraser, 2003a). Once the budget is agreed upon, regular reports are required by the corporate centre to enable senior executives to control performance.

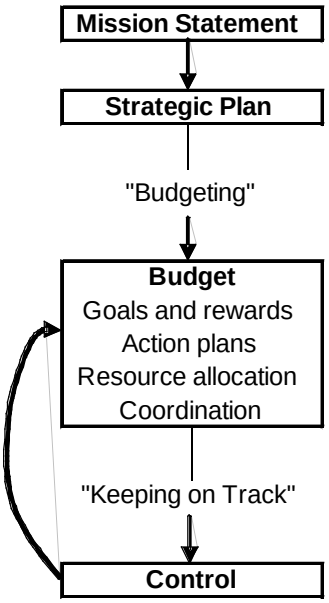

Figure 2-1 The Traditional Budgeting Process

2.1.2 Criticisms of the Traditional Budget

Despite the fact that budgeting is widely used and researched, in recent years the traditional, annual budget has been the subject of much adverse criticism (Ekholm and Wallin, 2000; Jensen, 2003). Practitioners express concerns about the process, arguing that budgets impede the allocation of organisational resources to their best uses and encourage myopic decision making and other dysfunctional budget games (Hansen et al., 2003). The findings of Hansen et al. (2004) suggest that tensions exist within firms regarding the importance of, and reason to budget. For

example, firms that face competitive conditions find the budget important for communication of goals and strategy formation but the same competitive conditions negatively affect the importance of budgets for performance evaluation.

Although relatively few organisations are planning to abandon the annual budget, it is widely accepted that the traditional budgeting model is cumbersome and ineffective (Ekholm and Wallin, 2000). Criticisms of traditional budgeting have attracted much publicity in recent years (Drury, 2008). The major criticisms are that the annual budget is incapable of meeting the demands of the competitive environment in the information age, it is cumbersome and too expensive, and the extent of "gaming the numbers" has risen to unacceptable levels (Hope and Fraser, 2003a). Ekholm and Wallin (2000), Dugdale and Lyne (2006) and Hansen et al. (2003) reviewed the literature relating to annual budgets. They identified the following criticisms relating to the annual budget process.

1. Budgets are time-consuming to put together.
2. Budgets constrain responsiveness and are often a barrier to change.
3. Budgets are rarely strategically focused and often contradictory.
4. Budgets add little value, especially given the time required to prepare them.
5. Budgets concentrate on cost reduction and not value creation.
6. Budgets strengthen vertical command-and-control.
7. Budgets do not reflect the emerging network structures that organisations are adopting.
8. Budgets encourage gaming and perverse behaviour.
9. Budgets are developed and updated too infrequently, usually annually.
10. Budgets are based on unsupported assumptions and guesswork.
11. Budgets reinforce departmental barriers rather than encourage knowledge sharing.
12. Budgets make people feel undervalued.

Others are also starting to take a closer look at the budgeting process and are beginning to question its value (Libby and Lindsay, 2007; McVay and Cooke, 2006; Neely et al., 2003; Schmidt, 1992). A series of articles in the MIT Sloan Management Review has called for a new approach to strategic management

(Gosling and Mintzberg, 2004; Mintzberg et al., 2002; Mintzberg and Westley, 2001; Quy Nguyen and Mintzberg, 2003). A *"pragmatic, coherent approach to thinking about change"* is called for (McFarland, 2008). McFarland (2008) suggests that strategic planning managers should follow the example from the software community, who realised the problems with the traditional systems development models and invented new development processes (agile methods) to confront the new realities facing them. He says that "*the insights upon which new software development approaches are based may point the way for the development of newer, faster and more effective strategy-making processes*".

2.1.3 Evolution of Budgeting

Section 2.1.1 described the conventional approach to budgeting. This is typically an *incremental* budget which means that existing operations and the current budgeting allowance for existing activities are taken as the starting point for preparing the next annual budget (Drury, 2008). The base is then adjusted for changes which are expected to occur during the new budget period. The major disadvantage of the incremental approach is the majority of expenditure, which is associated with the 'base level' of activity, remains unchanged. Past inefficiencies and waste inherent in the current way of doing things is perpetuated.

An approach that emerged in the late 1960s as an attempt to overcome the limitations of incremental budgeting is *Zero-based budgeting (ZBB)* or *priority-based budgeting* (Drury, 2008). ZBB was used as a means for organisations to adapt to a changing environment where resources are becoming scarce, profits are being threatened, and changes are occurring with increasing frequency (Duffy, 1989). By acknowledging that organisations have traditionally accepted existing plans and expenditure as necessary, without examination (Pyhrr, 1970), ZBB requires that all activities are justified and prioritised before decisions are taken relating to the amount of resources allocated to each activity (Drury, 2008). It works from the premise that projected expenditure for existing programmes should start from base zero, with each year's budget being compiled as if the programmes were being launched for the first time. ZBB is applicable to all "actionable or discretionary" activities or costs for which a cost/benefit relationship (however subjective) can be identified (Pyhrr, 1976). Examples include R & D, advertising and training costs. It

involves three stages: 1) Creating a decision package (which is a representation of the operation of a particular program) and describing each organisational activity in that package. 2) Evaluating and ranking each package and 3) allocating resources based on order of priority. Pyhrr (1976) describes it as more of a *"general management tool that companies can use to improve planning, budgeting, and operational management"*.

The process never achieved widespread adoption due to the costs and time required to identify and evaluate the decision packages. Hope and Fraser (2003a) acknowledge its usefulness as an exercise to review discretionary overheads but say that the *"process was so bureaucratic and time-consuming that few companies used it more than once. Moreover, like traditional budgeting, it was based on the organisational hierarchy. It thus reinforced functional barriers and failed to focus on the opportunities for improving business process"*. Drury (2008) suggests that many organisations tend to approximate the principles of ZBB rather than applying the full-scale approach outlined in the literature.

To manage costs more effectively some organisations have adopted *activity-based budgeting (ABB)* as a way to improve the budget. This approach aims to promote the allocation of resources to their best uses. It is demand driven and the focus is on the level of activity and related costs. In essence it is a closed loop model which creates an operationally feasible budget before generating a financial budget. The analysis of resource capacity and the increased visibility of resource consumption enable organisations to identify capacity issues and make adjustments earlier in the budgeting process than under traditional budgeting processes. Hansen et al. (2003) describe the ABB-approach as marrying *"a more complete operational model with a detailed financial model."* The resulting closed loop model yields operationally feasible budgets with activity and resource consumption highly visible and sources of imbalance or inefficiencies identified. The transparency of the activity-based budget potentially promotes the allocation of resources to their best uses in line with organisational priorities, decreases the scope for political gaming, enhances decision making and performance evaluation, and improves operational flexibility. Despite its merits, ABB has been criticised for being only a marginal refinement of traditional management budgeting techniques (Major, 2007). Researchers have highlighted the complexities involved in ABB in practice, the

behavioural problems associated with its implementation, large implementation costs and the managerial resistance they can invoke (Major and Hopper, 2005).

While budgeting continues to be a major control mechanism in organisations, there is evidence that the role of budgeting is changing (Hope and Fraser, 2003a; Otley and Pollanen, 2000). Traditionally, performance management models (PMMs) were designed to facilitate performance measurement by budgetary targets. As the role of the budget changes to adapt to modern turbulent business environments, the design of the PMMs and measurements will also change. There have been numerous calls for organisations to move beyond using traditional budgeting processes and budgeting techniques for performance management in modern turbulent operating environments (Hope and Fraser, 2003a; Neely et al., 2003).

2.2 Budgeting and Performance Management Models

Budgeting has a strong connection to performance management within an organisation. Traditionally the budget set the goals early in the year and performance was measured against those goals. Otley (1999) links performance management models to *'overall control systems'* which he reminds his readers goes *'beyond the measurement of performance to the management of performance'* (Otley, 1999). PMMs and frameworks developed by academics such as Ferreira and Otley (2009) and Broadbent and Laughlin (2009) are generic in their construction and encompass the whole spectrum of operating environments, from command-and-control to a more decentralised environment. While PMMs are complex and intertwined, research had tended to ignore the interdependencies between the differing controlling mechanisms and concentrate on simplified and partial areas of the overall PMM. Ferreira and Otley (2009) and Broadbent and Laughlin (2009) have worked on conceptualising performance management and distinguishing it from performance measurement. Their research frameworks are especially useful when researchers seek to gain an insight into the types of performance management techniques being utilised by organisations.

The literature in the area of performance PMMs increasingly recognises the need for research to be based on more coherent theoretical foundations (Broadbent and Laughlin, 2009; Chenhall, 2003; Covaleski et al., 2003; Ferreira and Otley, 2009). The tendency to focus only on specific aspects of control systems, as opposed

to a more comprehensive and integrated approach has led to spurious findings, ambiguity and a potential for conflicting results (Chenhall, 2003). There have been calls for a more integrated approach that includes the interdependency between different control mechanisms operating at the same time in the same organisation (Abernethy and Brownell, 1997).

In outlining a research framework for performance management models Otley (1999) highlight five central issues of performance management system design:

- Key organisational objectives and the processes and methods involved in assessing the level of achievement of these objectives
- The process of formulating and implementing strategies and plans, as well as the performance measurement and evaluation processes with their implementation
- The process of setting performance targets and the levels at which such targets are set
- The rewards systems used by the organisations and the implications of achieving or failing to achieve performance targets
- The types of information flows required to provide adequate monitoring of performance and to support learning

Ferreira and Otley (2009) expanded this model into 12 questions which they believe give significant insight into the various aspects of PMMs design.

1 What is the vision and mission of the organisation and how is this brought to the attention of managers and employees? What mechanisms, processes and networks are used to convey the organisations overarching purposes and objectives to its members?
2 What are the key factors that are believed to be central to the organisation's overall future success and how are they brought to the attention of managers and employees?
3 What is the organisation structure and what impact does it have on the design and use of performance management systems (PMSs)? How does it influence and how is it influenced by the strategic management process?
4 What strategies and plans has the organisation adopted and what are the processes and activities that it has decided will be required for it to ensure its

success? How are plans adapted, generated and communicated to managers and employees?

5 What are the organisation's key performance measures deriving from its objectives, key success factors, and strategies and plans? How are these specified and communicated and what role do they play in performance evaluation? Are there significant omissions?

6 What level of performance does the organisation need to achieve for each of its key performance measures (identified in the above question), how does it go about setting appropriate performance targets for them, and how challenging are those targets?

7 What processes, if any, does the organisation follow for evaluating, individual, group, and organisational performance? Are performance evaluations primarily objective, subjective or mixed and how important are formal and informal information and controls in these processes?

8 What rewards - financial and/or non-financial - will managers and other employees gain by achieving performance targets or other assessed aspects of performance (or, conversely, what penalties will they suffer by failing to achieve them)?

9 What specific information flows, -feedback and feed-forward - systems and networks has the organisation in place to support the operation of its PMSs?

10 What type of use is made of information and of the various control mechanisms in place? Can these uses be characterises in terms of various typologies in the literature? How do controls and their uses differ at different hierarchical levels?

11 How have the PMSs altered in light of the change dynamics of the organisation and its environment? Have the changes in PMSs design or use been made in a proactive or reactive manner?

12 How strong and coherent are the links between the components of PMSs and the ways in which they are used (as denoted by the above eleven questions)?

This framework was developed with underlying theory and logical reasoning and at first glance may appear to be a normative framework. This is not the case; according to Ferreira and Otley it is:

> *"Used to facilitate the description of PMMs design and use in practice, without any prior assumption as to whether the existence or absence of a particular feature is a good or bad thing. They are put forward as a heuristic tool to facilitate the rapid description of significant aspects of PMMs design and operation."*

When looking at performance management models it is possible to use Ferriera and Otley's framework to examine the performance management systems of both traditional command-and-control hierarchical organisations, which can be placed at one end of Malone's (1997) decentralisation continuum, and also decentralised and adaptive organisations which are placed at the other end (Figure 2-2). Some scholars believe that organisations are continuously alternating between command-and-control management and more decentralised adaptive management models (cf. Barley and Kunda, 1992), highlighting that different economic environments require different performance management models. Barley and Kunda (1992) suggest that over the past 150 years American organisations in particular, have constantly shifted from rational (command-and-control, coercive) models to normative (adaptive, employee empowering) models of control. Their argument stems from a study of economic expansion and contraction and the view that the introduction of normative management techniques came during times of economic contraction, while rational techniques were introduced during times of expansion. While there may be a pattern in the management techniques used in different economic environments, it is difficult to see how this amounts to cyclical forms of management. The evidence suggests that organisations are continuously seeking innovative ways of managing. So while rational techniques may be introduced during times of expansion, there is no indication that the normative techniques already in use are being discarded. Therefore, this thesis agrees with the dominant view in management, i.e. that organisations are progressively moving from rational to normative management controls. Management scholars such as Hope and Fraser (2003) and McFarland (2008) suggest that today's organisations need to move from the traditional hierarchical command-and-control model based on the yearly budgeting process to a more adaptive decentralised model in order to incorporate the required agility in their PMMs to compete in a post modern business environment.

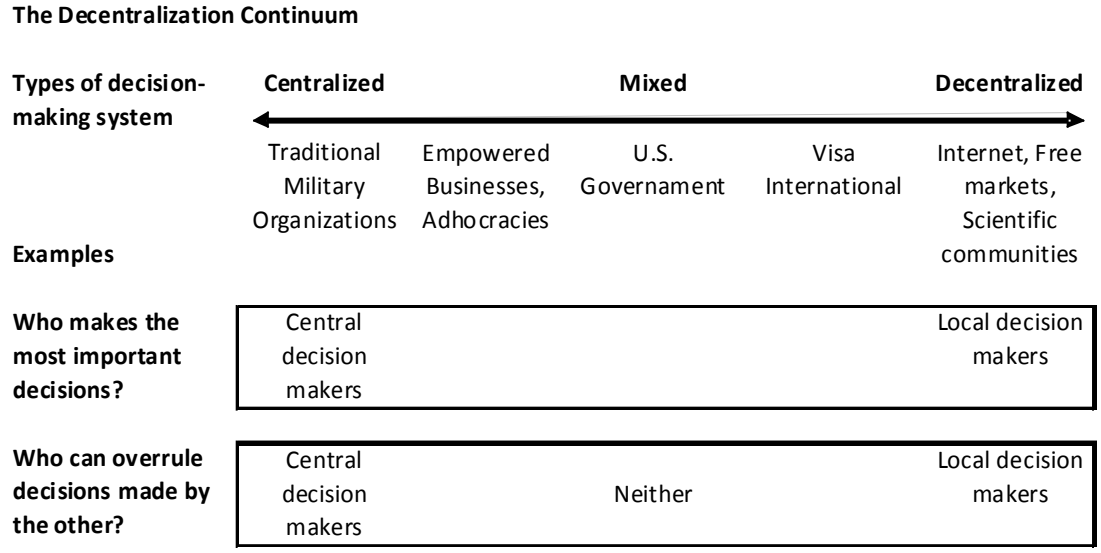

Figure 2-2 Malone's Decentralisation Continuum

Source: Malone, 2007

2.3 Spectrum of Performance Management: Principles vs. Rules

Baker and Mills' (1973) notion of the "chief programmer team", in which one person (the chief programmer) makes all decisions, and Weinberg's (1971) concept of the "egoless programming team", where decision making is distributed among team members, are instances of control through structure- through centralisation and through decentralisation, respectively. The issue of centralisation versus decentralisation is likely to be more important in a software development team context to the extent the developers view themselves as professionals; it is increasingly recognised that professional conduct in a variety of disciplines involves more than merely "following the rules" (Davis, 1999).

Arjoon (2006) discusses a rules-based vs. a principles-based approach for organisational governance (Table 2-1) stating that: *"the casuistic [rules-based] approach attempts to develop rules for each specific situation, while the principles-based approach provides general principles to apply to a variety of individual cases and situations"*. Due to the organic nature of software development, a principle-based approach to performance management and governance is seen as more effective than a rules based-approach (Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010).

Table 2-1 Rules-based Vs. Principles-based Approaches

Rules-Based	Principles-based
Complies with a specific set of procedural requirements (e.g., checklist of do's and don'ts)	Emphasises "doing the right thing" by appropriate means
Comply or else	Corporate behaviour is guided by a focus on end results (objectives-orientated)
More commonly found in organisations favouring bureaucracies	Comply or else explain
Follows the letter of the law	Found in organisations with strong and operative social controls
Represents the minimum of ethical standards	Follows the spirit of the law
Emphasises an analytical approach	Includes and extends the legal domain to issues that the law does not
Emphasises details and enforceability	Emphasises communication
Tends towards the quantitative, objective end of the spectrum	Tends toward the qualitative, subjective end of the spectrum
Necessary condition for effective governance	Sufficient condition for effective governance
Requires constant monitoring	Develops over a longer term
Focuses on detection	Focuses on prevention
Tends to be fear-driven	Tends to be values-driven
More explicit, detailed, prescriptive	More implicit, broad
Tends to consider issues in black and white	Considers issues in the ''gray'' areas
Promotes blind obedience	Promotes alignment with values
Mandatory	Discretionary
Easier to implement	More difficult to implement
Addresses proximate causes	Addresses ultimate causes

Source: Arjoon, 2006

2.4 Adaptive Management Models

The concept of agility is rooted in agile manufacturing and has influenced several other disciplines, such as supply chain management and organisation management (Sarker and Sarker, 2009). Heart et al. (2010) define organisational agility as an organisation's capacity to continuously change its strategy and competencies in response to environmental conditions. They identify several frameworks that provide management with guidelines for creating the type of adaptive organisation suited to an agile way of working. The central premise of this study is that the Beyond Budgeting model is best suited to an ASD environment. It is worth briefly discussing other attempts to develop management models for adaptive environments. While some of these models may be useful in an ASD context, various reasons discussed below eliminated them as suitable for this study.

Hauschildt and Schewe: The gatekeeper and process promoter model

Hauschildt and Schewe (2000) expand the gatekeeper concept (Allen, 1967; Allen, 1970) and the promoter model (Witte, 1977). They suggest that combining the role of gatekeeper and promoter provides a powerful management concept for supporting agility in the organisation. They put forward a solid argument highlighting the importance of key persons within an organisation. These key persons have a powerful influence on the agility of the organisation. They are traditionally regarded as making contributions to the organisation, and having the characteristics of separate standalone entities; both the contributions and characteristics of a gatekeeper or those of a promoter. Hauschildt and Schewe analysed both roles under a static view and concluded that over time the roles of the promoters within the project and the gatekeepers would take on the same characteristics. They believe that this dynamic view of the key persons in the process shows that both roles can be integrated, and combining roles is crucial to managing innovations, and securing agility in an organisation. While the logic of their arguments is succinct and theoretically valid, there is little empirical evidence provided in support of their hypothesis.

Kassim and Zain: Organisational Agility Assessment Instrument

Kassim and Zain (2004) suggested four factors of agility – enriching customers, mastering change, leveraging resources and cooperating to compete – an

organisation needs to adapt to compete in environments characterised by rapid change and hypercompetitive markets. Their instrument was developed to assess a firm's use of information technology (IT) and IS in helping to achieve the required agility. The instrument is validated to some extent and could be useful to determine the contributions IT/IS make towards a firm's agility. However, the low response (40 usable respondents) and the fact that it was tested only in Malaysia means it will need further empirical testing to refine and validate the model.

Lee, Kim and Park: Knowledge-Based Workflow Model

Lee et al. (1999) propose a Knowledge-based Workflow Model (KWM) as a mechanism for managing changes in an adaptable organisation. A standard workflow model has three main components: routes, rules and roles (Marshak, 1993). They argue that an adaptive workflow model needs to enhance these three components and suggest three principles for designing a KWM: Flexibility of workflow to handle changes in the organisations structure, business rules and procedures; Expressiveness for complex business rules to provide the constructs to represent conditional mapping relationships between roles and actors; Formality for enabling the analysis of workflow to check for the correctness of the workflow specification. Their suggested model was implemented in one application and was proven flexible enough to handle changes in an agile organisational environment. The KWM focuses on the control flow perspective of activity sequencing and coordination and may not be a suitable model for ASD where individuals and interactions take priority over processes and tools (Agile Alliance, 2001).

Morris and McManus: E-Commerce and Virtual Structures

Morris and McManus (2002) suggest that two options for an organisation seeking to improve flexibility and responsiveness are to implement electronic commerce (E-commerce) and create virtual structures. The E-commerce option is more about allowing effective transactions among suppliers, partners, employees and customers, while the virtual option is about creating virtual organisations. The E-commerce option is not applicable to this study as it cannot be used in conjunction with an ISD environment. The virtual organisation deserves a little more consideration. Virtual organisations are based on creating a trust-based cooperative relationship, which has specific competencies required to exploit an opportunity that

has arisen (Morris and McManus, 2002). Morris and McManus suggest that organisations may employ the virtual strategy on a smaller scale when they create virtual teams, i.e. teams that are created on an as-needed basis and disbanded once the job is completed. As yet there is little available evidence on the use of virtual teams within an ASD environment.

Ottaway and Burns: Agent-based Structural Self-design

Ottaway and Burns (1997) present a conceptual prototype for agent-based structural self-design in an adaptive planning and control systems. Their prototype consists of three types of intelligent agents: the job agent, the resource agent and the supervisor agent, used to automate mechanisation strategies for reducing the information content of work. In other words, replacing humans with software agents for repetitive programmable tasks. This work has gained importance in the field of decision support systems (Vahidov and Fazlollahi, 2003).

Power, Sohal and Rahman: Critical Success Factors for an Agile Company

Power et al. (2001) conducted a survey of 962 Australian organisations to determine the critical success factors for an agile organisation. They used 26 independent variables to measure the agility of an organisation and based their conclusions on an organisation being "more agile" if they scored a mean of 3.5 or greater across three separate sets of Likert scale variables and "less agile" if they scores less than 3.5 on the same group of variables. Their research was directed towards agility in supply chain management but their results suggest some important considerations for organisational agility. The "more agile" companies were characterised as more customer focused, and associating innovation with a more participative management style and continuous improvement methodologies.

Sambamurthy, Bharadwaj and Grover: Shaping Agility through Digital Options

Sambamurthy et al. (2003) argue that agility is vital to the innovation and competitive performance of firms in contemporary business environments. They theorised that dynamic capabilities and strategic processes employed by firms, impact the ability of firms to launch many and varied competitive actions, and that these actions are a significant antecedent of firm performance. They propose that agility comprises of three interrelated capabilities: customer agility, partnering ability and operational ability. While customer agility and operational agility are of

interest for this research, the study of Sambamurthy et al. is aimed specifically at the role of IT as an enabler of agility within the organisation.

Wagstrom and Herbsleb: Dependency Forecasting Model

Wagstrom and Herbsleb (2006) introduced the dependency forecasting model as a means of visualising dependencies and identifying possible communication breakdowns in a distributed agile development environment. This model works on the idea that anytime developers modify the same file within a given timeframe they are assumed to have a need to coordinate their work and are given a link in the output. This, they suggest, can influence the communication policies of the organisation (new email policies or teleconferencing for distributed members).

Van Assen – Agile-based Competency Management Model

Van Assen (2000) proposed a competence management model for an agile manufacturing environment. He suggests that agile manufacturing is largely dependent on the capabilities of its people to learn and evolve with change.

Weber – Hierarchical Variance Model

Weber (2002) proposes a hierarchical model which measures the variance in different variables positioned on differing levels as subsets of the total variance. E.g. the total variance is on level 1, one component of this is the performance variance positioned on level 2 and one component of the performance variance is the time variance on level 3, etc. This model is specifically designed for supply chain agility.

Vazques-Bustelo, Avella and Fernandez – Agile Manufacturing Model

Vazques-Bustelo et al. (2007) develop and test a conceptual model for agile manufacturing. Their findings suggest that agile manufacturing is reflected in the dimensions of agile human resources, agile technologies, value chain integration, concurrent engineering and knowledge management.

The models discussed above all have their merits, and are specifically designed for adaptive operating environments such as an ASD environment. However, the Beyond Budgeting model is used in this study for a number of reasons. Firstly, the 12 principles of the beyond Budgeting model are specifically designed for an adaptive operating environment. Secondly, the Beyond Budgeting model is based on the same concepts as ASD. Thirdly, the Beyond Budgeting model has been

recognised within the ASD literature as a complementary model for ASD environments. Fourthly, Beyond Budgeting practitioners have recognised the similarities between Beyond Budgeting and ASD and fifthly, with over 200 organisations signed up to the Beyond Budgeting Round Table (BBRT)[1] and an increasing number of academic articles being published, the Beyond Budgeting model is becoming more established as a viable alternative to traditional command-and-control models.

2.5 The Beyond Budgeting Model

There has been a move from the bureaucratic, hierarchical organisation, considered ineffective in the context of increased competition brought about by globalisation, deregulation, the emergence of powerful developing economies, and development in information technologies, towards flatter, leaner and more responsive structures (Berry et al., 2009). Many have questioned the industrial era management and government systems, and there are calls for a new model for the knowledge economy (Manville and Ober, 2003; McFarland, 2008). Others have questioned the budgeting process and its value in the post industrial era (Bogsnes, 2009; Cassell, 1999; Dugdale and Lyne, 2006; Howell, 2004; Kennedy and Dugdale, 1999; O'Brien, 1999; Schmidt, 1992). There have been calls for a more integrated approach to performance management which includes the interdependency between different control mechanisms operating at the same time in the same organisation (Abernethy and Brownell, 1997). The problems with budgeting in practice (Hansen et al., 2003) led to a series of articles and a book by Hope and Fraser (Hope and Fraser, 1999; Hope and Fraser, 2001; Hope and Fraser, 2003a; Hope and Fraser, 2003b; Hope and Fraser, 2003c; Hope and Fraser, 2003d) arguing that organisations should abandon traditional budgeting.

Beyond Budgeting originated from a research collaboration between the European Consortium for Advanced Manufacturing-International (CAM-I)[2] and the Beyond Budgeting Round Table (BBRT). It consists of a set of six leadership

[1] Members of the Beyond Budgeting Roundtable are individuals and organisations who are interested in managing without budgets. Membership in the BBRT is worldwide with the largest membership base in Europe. www.bbrt.org

2 http://www.cam-i.org/)

principles and six process principles that aim to allow companies move past budgeting to a more value enhancing management process (Hope and Fraser, 2003a). The Beyond Budgeting model proposes replacing the rigid annual budget-based performance evaluations with performance evaluations based on relative performance contracts with hindsight (Hansen et al., 2003). The model focuses on the connections between performance management and strategy. It advocates the use of methods such as rolling forecasts, balanced scorecards (Kaplan and Norton, 1992) and relative performance evaluation (Dye, 1992) with hindsight (Demski, 1967) as a way to motivate and empower employees. The objective is to engender a philosophy of doing what is best for the firm in light of current circumstances and to promote teamwork (Hansen et al., 2003). Many of the principles of the Beyond Budgeting model have their own individual theoretical grounding, (e.g. control theory, goal setting theory, rewards theory –group/individual) and the main premises of the model such as relative performance evaluation, empowerment, resource allocation and planning/control are also well grounded in theory. These are discussed in greater detail in section 3.2 and section 3.3 of this literature review. The Beyond Budgeting model as a single, coherent holistic model embraces McGregor's theory Y (McGregor, 1960) management principles.

Table 2-2 The Beyond Budgeting Management Model

The Beyond Budgeting Management Model

Leadership Principles		**Process Principles**	
Customers:	Focus everyone on improving customer outcomes, *not on hierarchical relationships*	**Goals:**	Set relative goals for continuous improvement; *do not negotiate fixed performance contracts*
Organization:	Organize as a network of lean, accountable teams, *not around centralized functions*	**Rewards:**	Reward shared success based on relative performance, *not on meeting fixed targets.*
Responsibility:	Enable everyone to act and think like a leader, *not merely follow the plan*	**Planning:**	Make planning a continuous and inclusive process, *not a top down annual event*
Autonomy:	Give teams the freedom and capability to act; *do not micro-manage them*	**Controls:**	Base controls on relative indicators and trends, *not variances against a plan*
Values:	Govern through a few clear values, goals and boundaries, *not detailed rules and budget*	**Resources:**	Make resources available as needed, *not through annual budget allocations*
Transparency:	Promote open information for self-management; *do not restrict it hierarchically*	**Coordination:**	Coordinate interactions dynamically, *not through annual planning cycles*

Source: Bogsnes 2009

The model aims to promote a set of principles that lead to more dynamic processes and front-line accountability. The six leadership principles and six process

principles of Beyond Budgeting support each other in a holistic model. The relative importance of each principle might vary depending on the business in question (Bogsnes, 2009). The interest in Beyond Budgeting continues to grow with more and more organisations looking to leverage the principles to improve their own performance. The model has many similarities with models employed by organisations such as American airline company, Shamrock foods and Toyota. BBRT now includes over 200 organisations in its members list including, Siemens, Diageo, ABB, Accenture, Ernst & Young, IBM, The World Bank, Statoil and, one of its first members, Svenska Handelsbanken. There is a steady stream of case study materials and books being written that give first-hand accounts of organisations that have introduced the Beyond Budgeting model (Bogsnes, 2009; Hope and Fraser, 2003a; McVay and Cooke, 2006; Østergren and Stensaker, 2011). Many organisations that have previously used the traditional "command-and-control" management model are now looking at the Beyond Budgeting model as a way to sustain superior competitive advantage.

Beyond Budgeting is orientated towards fast changing operational environments and utilises a sense-and-respond type of control mechanism, which allows an organisation to keep pace with fast changing environments (Hope and Fraser, 1999; Hope and Fraser, 2001; Hope and Fraser, 2003a; Hope and Fraser, 2003b; Hope and Fraser, 2003c; Hope and Fraser, 2003d). The emergence of the Beyond Budgeting concept coincided with the emergence of agile methods and both concepts share many similarities with both having a distinctly agile or adaptive perspective (Ambler, 2008; Bogsnes, 2009; Highsmith, 2006; Poppendieck and Poppendieck, 2010). Table 3-1 lists the 12 principles are they are outlined by Bogsnes (2009). The goals of the Beyond Budgeting model are to sustain superior competitive performance while agile systems development is about rapidly delivering business value. The Beyond Budgeting model has been shown to benefit organisations through faster response, innovative strategies, lower costs and more loyal customers (Libby and Lindsay, 2007; McVay and Cooke, 2006; Neely et al., 2003).

2.6 Theoretical Foundations of Beyond Budgeting

There has are many differing views as to what a theory must contain or what constitutes a theoretical contribution (Gregor, 2006; Whetten, 1989). Dictionary

definitions show that the word theory can take on many meanings including an "idea or set of ideas about something" a "conception or mental scheme of something to be done, or the method of doing it; a systematic statement of rules or principles to be followed" a "mental view" or "contemplation" (OED, 2010). Gregor (2006) uses the word theory to mean conjectures, models, frameworks, or bodies of knowledge. Gregor (2006) analyses theory development in information systems and proposes a taxonomy of theory types. Her theory type III is a theory for prediction, that is, the distinguishing attributes of the theory are that it says what is and what will be. The theory provides predictions and has testable propositions but does not have well developed justificatory causal explanations. The Beyond Budgeting model as used in the context of this research belongs to Gregor's Type III theory, predictive theory, or what is referred to in the budgeting literature as normative theory. Traditional budgeting techniques springing from normative budget theory are Zero-Based Budgeting (ZBB), Management by Objectives (MBO), Target Based Budgets and Planned Programming Budgets (PBB). Normative theory is advice based on observations and its proposed solutions may be based on values rather than observations. It sets attractive goals and guides for behaviour (Rubin, 1990). Cushing (1990) says of normative theory that it: *"provides predictions that "things will be better" if its prescriptions are followed."*

Beyond Budgeting practitioners also embrace the Theory Y management model. The Theory Y model (McGregor, 1960) has been widely adopted in the management literature as the preferred management model (Bobic and Davis, 2003). Theory Y argues that management is more than simply giving orders and coercing obedience; it is a careful balancing of the needs of the organisation and the needs of the individual (McGregor, 1960) as defined by Abraham Maslow's hierarchy of needs. Modern technological industries present managers with the kinds of challenges McGregor foresaw: employees requiring greater flexibility and understanding from managers in order to produce quality products and to find creative solutions to various problems (Bobic and Davis, 2003).

Another theoretical consideration for the Beyond Budgeting model is that it is to be employed as a coherent model (Bogsnes, 2009; Hope and Fraser, 2003a). The model is developed from experience and case study research and has a large body of scientifically established knowledge underlying many of its main premises. There is

substantial research relating to relative (Dye, 1992; Janakiraman et al., 1992) and subjective (Baiman and Rajan, 1995) performance evaluations, fixed budget-based performance contracts (Jensen, 2003) and decentralisation (Brickley, 2004), along with the main tenets of each principle which are discussed in the next section.

The previous section gave an introduction to budgeting and performance management models. In times of rapid changes to business and technological environments it is argued that traditional budgeting loses its value as a performance measurement for operational performance (Hope and Fraser, 2003a). Changes are needed to PMMs designed to align with the budgeting process using metrics determined by the traditional budget. In section 2.2 Beyond Budgeting is argued to be an appropriate management model for a changing business environment where operational flexibility is required. Nowhere is operational flexibility more apparent than in the field of ISD where a group of development methods have been designed to embrace flexible and changing business and customer requirements. The next section of this chapter starts by introducing the field of ISD and how ASD methods originated. The need for ASD methods is explained and the budgetary and performance concerns expressed by practitioners and academics in the field of ASD are explored.

2.7 Beyond Budgeting in Practice

One of the more prominent organisations using the Beyond Budgeting model is the large Norwegian oil and gas company, Statoil. Bogsnes (2009) describes in detail his experience with implementing Beyond Budgeting in Statoil. He cites many of the same reasons for abandoning traditional budgeting and moving to the Beyond Budgeting model that are stated in section 2.1.2 (p24) of this study, i.e. traditional budgets are time consuming, they add little value and they are a barrier to change, etc. Bogsnes also noted that Statoil has always been a value-driven organisation that trusted its employees and gave them a wide range of responsibilities (Bogsnes, 2009 pp 104). He believed that this culture was instrumental in preparing Statoil for the Beyond Budgeting journey. While acknowledging that the implementation process is ongoing and there are many barriers to change, Bogsnes shows that Statoil has made significant progress towards removing the traditional command-and-control processes and moving to a dynamic management model (Bogsnes, 2009 pp 104).

Ostergren and Stensaker (2011) also studied the use of Beyond Budgeting in a similar environment. Although their study did not specifically name the organisation, the study was also conducted in a large Norwegian oil and gas company. Their study concentrated on how the implementation affected the practices and process of 2 major divisions within the organisation. They conclude that the Beyond Budgeting model is well received within the organisation but also suggest that there are challenges to implementation. Firstly that the competition between groups advocated by the Beyond Budgeting model may lead to top managers pushing divisional managers excessively, secondly, that although gaming associated with traditional budgeting may have disappeared, new games may arise surrounding dynamic resource allocation and finally that employees may need high levels of competency and flexibility to be able to transfer easily to high activity projects. Ostergren and Stensaker (2011) argue that ideological concerns may arise further into the implementation process as the Beyond Budgeting model may be understood to be a change from the Scandinavian decentralised ideology to a more centralised contract-based ideology. While the work of Hope and Fraser (2003a) and Bogsnes (2009) highlight the many potential benefits of Beyond Budgeting, Ostergren and Stensaker (2011) show that there are areas of concern still to be addressed. These findings highlight the need for further research into the affects of Beyond Budgeting as the model gains traction within industry.

2.8 Information Systems Development

Modern societies are finding themselves increasingly dependent on software and IS (Iivari and Huisman, 2007). IS that are designed and developed efficiently, accurately, reliably and meet the intended needs and expectations of the stakeholders are important goals of most organisations (Fruhling and de Vreede, 2006). In today's technologically evolving and globalised business environment, organisations are faced with IS projects of varying size and technical complexity. Ensuring the success of these projects is important to both firm leaders and IS project managers (Martin et al., 2007). While project performance is a multi-dimensional construct spanning different phases of the project (Yetton et al., 2000), the performance of firms in the software industry does depend considerably on the quality of their software development processes (Nidumolu and Subramani, 2003).

2.8.1 Traditional Information Systems Development

ISD is arguably the core topic for the field of IS (Russo and Fitzgerald, 2001). Early application developments of the 1960s and 1970s were developed and implemented without explicit or formalised development methods (Avison and Fitzgerald, 2003). The exact origins of the traditional Information Systems Development Life Cycle (ISDLC or SDLC) are unclear but during the late 1970s and 1980s, it became an established concept and was widely used for systems development. The SDLC can be implemented using a structured approach known as the waterfall model or by means of more iterative approaches (Marchewka, 2006). The waterfall model is the traditional means of implementing the SDLC and is widely used interchangeably with the SDLC, although strictly speaking it is one of a number of ways of implementation. It is a rigid process that assures control over the development process by following a series of phases where the completion of each is a prerequisite to the commencement of the next and where each phase consists of a predetermined list of steps. These steps can also include initiation, requirements gathering, testing, maintenance, disposition or any other activity could be regarded as part of the system development lifecycle (Figure. 2-3).

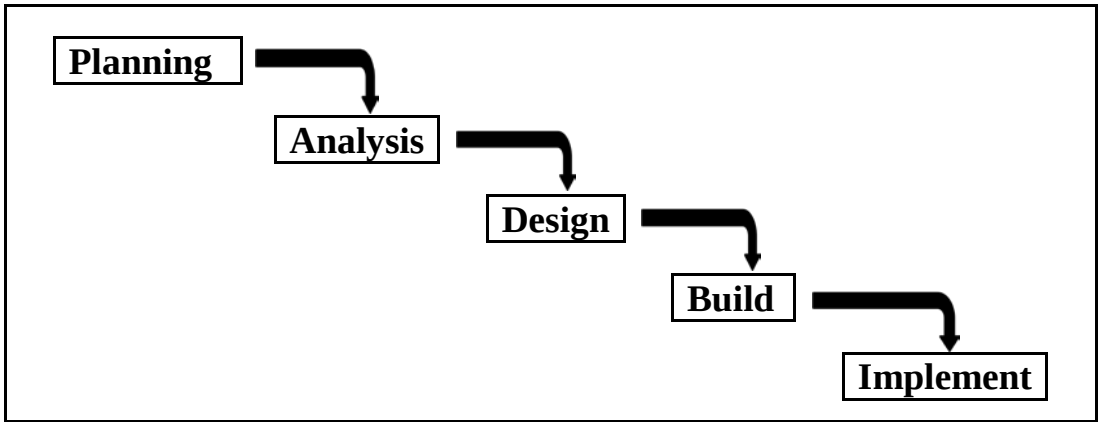

Figure 2-3.The Typical Waterfall Model

Although there is no generally accepted version of the SDLC or waterfall model this concept or approach set a template upon which a multitude of other methods were based (Davis, 1989).

2.8.2 Traditional Information Systems Development Failure

The SDLC has always been a troublesome, costly and time consuming process and the call for a more flexible development approach has been around since the

early eighties (Ahituv et al., 1984). Software projects can often spiral out of control to become "runaway systems" that far exceed original budget and schedule projections (Keil et al., 2000). Information systems (IS) projects can fail for a number of reasons and in some cases result in considerable losses for the organisations that undertake them. Lyytinen and Hirscheim (1987) suggest that the study of system failure suffers from an inadequate conceptual clarity of the information system failure notions. They define four major notions of IS failures:

1. Correspondence Failure: When the systems design objectives are not met, the information system is considered a failure
2. Process Failure: A process failure occurs when an IS cannot be developed within an allocated budget, and/or time schedule
3. Interaction Failure: The level of end-user usage of the information system is suggested as a surrogate in IS performance measurement
4. Expectation Failure: The difference between the actual and desired situation for the members of a particular stakeholder group

The usual notion of IS failure (and success) belongs to managerialist and technist discourses in which management is rational and technology is unproblematic. Mitev (2005) argues that this is a narrow view of failure and discusses IS failure along three dimensions (Figure. 2-4): their epistemologies, their originating disciplines and the focus of failure models/understandings.

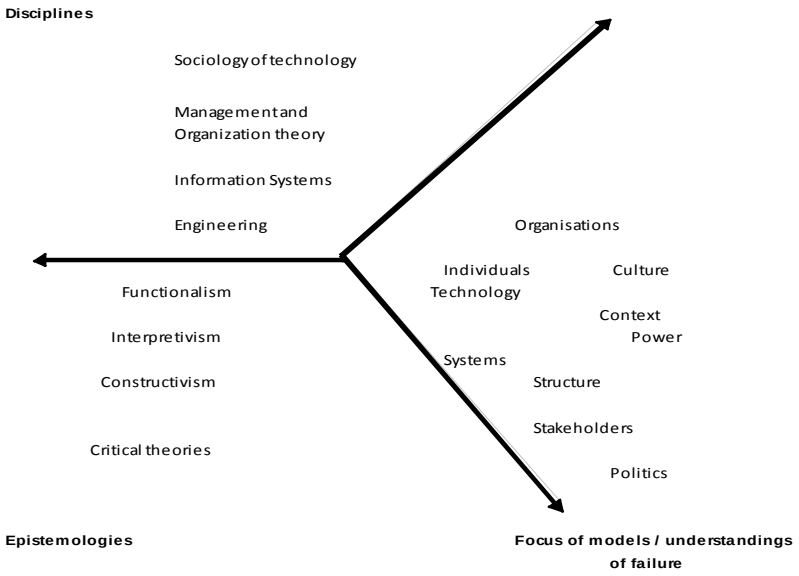

Figure 2-4 Evolution of understandings of failure

Source: Mitov, 2005

While researchers have derived a number of models to explain what makes some IS 'successful' (cf. Davis, 1989; DeLone and McLean, 2003; Petter et al., 2008), the literature is aware that the number of different modes of IS failure make it difficult to get a definitive answer to the question "what is an IS failure?". Flowers (1996) defines an information system as a failure if any of these following situations occurs:

1. When the system as a whole does not operate as expected and its overall performance is sub-optimal;
2. If, on implementation, it does not perform as originally intended or if it is so user-hostile that it is rejected by users and under-utilised;
3. If, the cost of the development exceeds any benefits the system may bring throughout its useful life; or
4. Due to problems with complexity of the system, or the management of the project, the information system development is abandoned before it is completed.

Sauer (1993) proposes that systems should be considered as failures only if there is a development or operation termination. Many researchers have studied different modes of failure, for instance Keil (1995) studied one pattern of failure, project escalation, and find that escalation is promoted by a combination of project, psychological, social and organisational factors. Others such as Ewusi-Mensah (1997) find that the cancellation of projects can be attributed to a combination of several factors, including: project goals, project team composition, project management and control, technical know-how, technology base or infrastructure, senior management involvement and escalating project cost and time of completion.

The IS literature highlights numerous examples of IS projects that failed[3]. Individual projects such as the London ambulance service *computerised dispatch systems* and the London Stock Exchange *TAURAS* have received much publicity (Flowers, 1996). The Denver airport baggage system reportedly caused an increase of $1.1M per day in operating costs (Ravichandran and Rai, 2000). The Standish

[3] See Appendix A for a list of articles discussing ISD failures. This list includes articles from 1998-2008 and is drawn from the top eight journals as listed by the AIS (www.aisnet.org)

Group's 2003 Chaos Report suggests that 43% of projects were over budget (Pan et al., 2006).

Although, there are many modes and areas of project failure that need to be taken into consideration, the performance of a software project is generally assessed in terms of its ability to attain the target cost, time and the desired level of product's quality. Therefore, a software project is considered to be successful if it delivers the product with pre-agreed level of quality within the given time and cost (Agarwal and Rathod, 2006). However, it is difficult to estimate correctly the costs involved in developing an IS, and despite the introduction of new estimation tools (SLIM, CoCoMo, FPA, SEER, etc.) there has been little improvement in software cost estimation accuracy over the past 20 years (Grimstad et al., 2006).

2.8.3 Evolution of Information Systems Development Methods

In a response to all the problems associated with traditional software development as discussed above, practitioners began experimenting with different methods of developing software. Some of the main approaches and methods introduced in the 1970s, 1980s and early 1990s include:

1976 Data Driven Development (Chen, 1976)

1981 Soft Approaches (Checkland, 1981)

1981 Information Engineering (Martin and Finkelstein, 1981)

1981 Participative Development (Mumford, 1981)

1982 Structured Development Methods (Colter, 1982)

1986 Prototyping (Agresti, 1986)

1988 Evolutionary Development (Gilb, 1988)

1988 The Spiral Model (BOEHM, 1988)

1991 Object-Oriented Development (Coad and Yourdon, 1991)

Although there were many new approaches to developing software, no single method became the accepted method. Indeed, studies find that even when there was a specified method, software developers did not adhere rigorously to it (Fitzgerald, 1998; Westrup, 1993). These methods were, however, the precursor to the

introduction of the agile manifesto (Figure 2-6) and by the late 2000s agile development methods were used by the majority of software development teams (Ambler, 2007b).

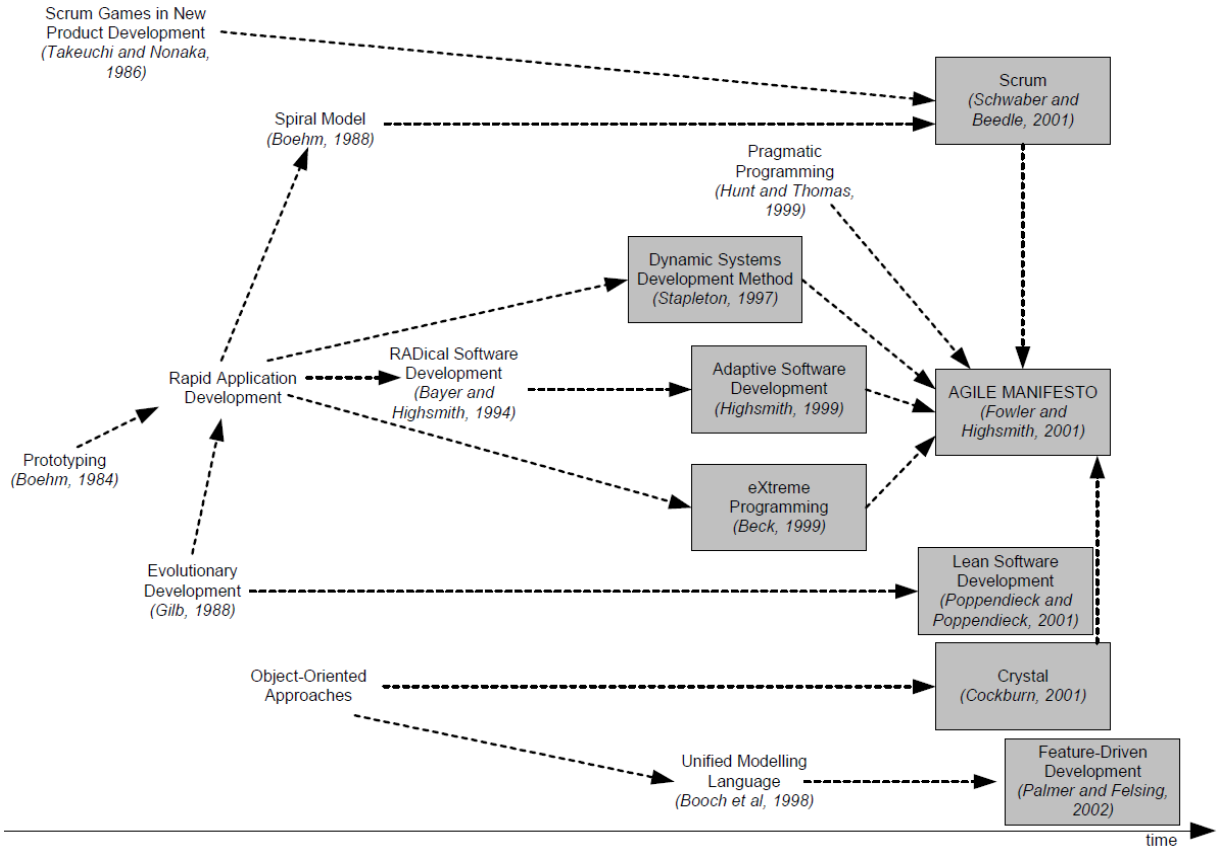

Figure 2-5 Evolution of Information Systems Development Methods

Source: Conboy, 2006

2.9 Agile Systems Development

In recent years, ASD approaches have received a great deal of attention. As described earlier, it was the continued dissatisfaction with the available development methods that led to the introduction of the various agile approaches. The agile approach seeks to help address the key problems in software development, such as quality, time and cost (Fitzgerald et al., 2006). While having conceptual roots dating from the early twentieth century it was the formation of the Agile Alliance in 2001 and the publication of the Agile Manifesto (Table 2-3) and principles behind the manifesto (Table 2-4) (Fowler and Highsmith 2001) that formally introduced the term agility to the field of software development (Conboy and Fitzgerald, 2004).

Table 2-3 The Agile Manifesto

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:
Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.

Table 2-4 Principles behind the Agile Manifesto

Agile Principles	
1) Our highest priority is to satisfy the customer through early and continuous delivery of valuable software	7) Working software is the primary measure of success
2) Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.	8) Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
3) Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.	9) Continuous attention to technical excellence and good design enhances agility.
4) Business people and developers must work together daily throughout the project.	10) Simplicity--the art of maximizing the amount of work not done--is essential.
5) Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	11) The best architectures, requirements, and designs emerge from self-organizing teams.
6) The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	12) At regular intervals, the team reflects on how to become more effective, then tunes and adjusts accordingly

Agile methods include those that have entered into the spirit of agile as espoused by the agile manifesto and generally means a family of methods under the

umbrella of the agile alliance, including eXtreme Programming (XP) (Beck and Andres, 2005), Scrum (Schwaber and Beedle, 2002), Dynamic Systems Development Method (DSDM) (Stapelton, 1997), Crystal Methods (Cockburn, 2005), Feature-Driven Development (FDD) (Coad and Palmer, 2002), Lean Development (Poppendieck, 2003), and Adaptive Software Development (Highsmith, 2002) with XP and Scrum being the two most widely used in practice (Dybå and Dingsøyr, 2008).

2.10 Agile System Development Practices

This section gives an overview of the two main agile ASD methods and outlines the practices used by those methods. Evidence suggests that almost three quarters of organisations developing software use either XP or Scrum (Version-One, 2009).

Extreme Programming

Extreme Programming is described as a light-weight methodology for small to medium-sized teams developing software in the face of vague or rapidly-changing requirements (Beck, 2000). XP comprises of five key values (Table 2-5) which initially underpinned 12 practices, summarised in Table 2-6

Table 2-5 Key Values of eXtreme Programming

Value	Description
Communication	Communication is critical in XP to provide feedback, communicate difficulties and solve problems as quickly as possible. It also helps to create a cooperative team.
Simplicity	XP recommends that a system is developed as simply as possible and to avoid any unnecessary complexity such as coding for unstated requirements
Feedback	XP recommends continuous feedback, which should occur as quickly as possible; for example, feedback on technical decisions, customer requirements or errors
Courage	Team members must face and voice any fears that they have in an attempt to address them as quickly as possible; for example, requesting help to resolve a problem, or expressing dissatisfaction with the quality of work produced by another team member, or resisting pressure to make unrealistic commitments
Respect	All team members must care about each other and what they are doing

Table 2-6 Key Practices of eXtreme Programming

Practice	Description
The planning game	A quick determination of the scope of the next software release, based on a combination of business priorities and technical estimates. It is accepted that this plan will probably change
Small releases	Put a simple system into production quickly, and then release new versions on a very short cycle
Metaphor	Guide all development with a simple shared story of how the whole system works
Simple design	The system should be designed as simply as possible at any given moment in time
Testing	Programmers continually write tests, which must be run flawlessly for development to proceed. Customers write function tests to demonstrate the features implemented
Refactoring	Programmers restructure the system, without removing functionality, to improve non-functional aspects (e.g. duplication of code, simplicity, flexibility)
Pair-programming	All production code is written by two programmers at one machine
Collective ownership	Anyone can change code anywhere in the system at any time
Continuous integration	Integrate and build the system every time a task is completed – this may be many time per day
40 Hour Week	Work no more than 40 hours per week as a rule
On-site customer	Include an actual user on the team, available full-time to answer questions
Coding standards	Adherence to coding rules that emphasise communication via program code

Source (Beck, 2000)

Five years later, Beck and Andres (2005) revised the original XP practices. The newer version of the book described 13 primary practices and 11 corollary practices for XP teams (Table 2-7).

Table 2-7 Revised Practices of eXtreme Programming

Primary Practices	Description	Corollary Practices	Description
Sit together	The whole team sits together in one open space	Real customer involvement	Make the customer part of the team and ensure they are empowered to make decisions about requirements and their priority
Whole team	Ensure the team includes people with the necessary skills, perspectives and expertise to complete the project	Incremental deployment	Deploy functionality to a production environment incrementally
Informative workspace	The workspace should inform an observer of how the project is going – use the wall space to display charts	Team continuity	Keep effective teams together. Value their relationships and what they accomplish together
Energised work	Do not work excessive overtime for long periods of time	Shrinking team	As the team becomes more experienced gradually reduce the size, but keep the workload constant
Pair programming	Two programmers work together at one machine on a single piece of code	Root cause analysis	Eliminate each defect as it is found, identify its cause and remove it.
Stories	Short description of user functionality	Shared code	Share code amongst team members. Allow all team members to modify any piece of code
Weekly cycles	Meet each week and plan the work for that week	Code and test	Maintain only the code and the test as permanent artefacts. Rely on social mechanisms to keep alive the important history of the project.
Quarterly cycle	Once a quarter reflect as a team and plan at a high level the work for the next quarter	Single code base	Keep a single code base. Avoid multiple versions of the code base.
Slack	Include some low-priority tasks that can be dropped if needed	Daily deployment	Put the new software into production every night
10 minute build	Be able to build the whole system and run all tests in 10 minutes	Negotiated scope contract	Fix the time, cost and quality of a project, but allow room to negotiate the scope of the project on an on-going basis
Continuous integration	Integrate code and test changes several times a day.	Pay per use	Charge for every time the system is used by a user
Test-first programming	Write tests before coding		
Incremental design	Develop the design as the project progresses		

Source (Beck and Andres, 2005)

Scrum

Schwaber and Beedle (2002) describe Scrum as a project management method used to manage and track ISD projects. Scrum incorporates adaptive and self-managing principles, and is based on the concept of a rugby Scrum whereby a team work together using regular sprints to achieve project goals. A sprint is a time-box of between 2-4 weeks during which the agile team works to turn a product backlog (a prioritised list of project requirements) into potentially shippable product functionality. There are five values underpinning Scrum practices (Table 2-8).

Table 2-8 Key Values of Scrum

Value	**Description**
Commitment	Teams must be willing to commit to a goal. Scrum provides teams with the authority they need to meet their commitments
Focus	Scrum recommends focusing all efforts and skills on doing the work that each individual has committed to doing
Openness	Scrum keeps everything about a project visible to everyone
Respect	Individuals are shaped by their background and their experiences. It is important to respect the different people who compromise a Scrum team
Courage	Have the courage to commit, to act, to be open, and to expect respect

Source (Schwaber and Beedle, 2002)

Scrum teams generally comprise of less than ten team members, who work in short timeframes or sprints to develop functional software (Moe and Dingsoyr, 2008). The main practices of Scrum are described in Table 2-9.

Table 2-9 Scrum Practices

Scrum Practice	Description
Sprint planning meeting	The sprint planning meeting takes place at the start of each sprint. During this meeting the team collectively define and plan tasks that must be completed during the next sprint
Daily Scrum (Stand-up meeting)	The daily Scrum is a 10-15 meeting between team members each day. The meeting is conducted with members standing up, and speaking about what they have accomplished since the previous meeting. They then outline what they hope to accomplish by the next meeting, and indicate any impediments that may prevent them from completing their tasks.
Sprint review and retrospective	The sprint review and retrospective meeting is held at the end of each sprint. Completed tasks are demoed to managers and customers, and feedback is received. The team reflects on what went well during the previous sprint and where improvements could be made for the next sprint

The emergence of agile methods as a formalised concept has had a huge impact on the way software is developed worldwide (Dybå and Dingsøyr, 2008). Although relatively new and still under-researched, there are a number of success stories regarding the use of one or other of the methods. Case studies have shown that agile methods can result in increased productivity, cost savings and improved cost control (Dybå and Dingsøyr, 2008; Karlstrom and Runeson, 2005; Lindvall et al., 2004). However, there has been some concern raised about their applicability to larger organisations and how these new practices can be integrated with existing processes and systems (Agerfalk et al., 2009; Lindvall et al., 2004; Mangalaraj et al., 2009; Maruping et al., 2009a).

2.11 Agile Systems Development Concerns

Not all organisations can or will use all the techniques of a particular method (Fitzgerald, 1998). It may be inappropriate for them to be fully agile in all aspects of development, perhaps retaining well-known and trusted elements of a more

traditional approach within an overall agile project (Qumer and Henderson-Sellers, 2008). Many managers and developers become frustrated with the difficulty of integrating agile processes into traditional, top-down development organisations (Boehm and Turner, 2005). In an attempt to reconcile the differences there have been suggestions put forward such as: apply throughput accounting rather than cost accounting in development projects (Anderson, 2003), or update contracting practices (Boehm and Turner, 2005) to support agile practices. In a report published in 2008 by the Software Engineering Institute called "CMMI or Agile: Why Not Embrace Both!" the authors call for more research and reporting on what works and in which context (Glazer et al., 2008).

2.11.1 Budgetary Concerns in Agile Systems Development

In ASD projects, the team indirectly estimates costs by first providing feature estimates to aid in release planning (Sliger and Broderick, 2008). Once there is a consensus on the release plan and other associated costs are known a project cost baseline or budget can be aggregated from cost per iteration estimates. This baseline will need to be revisited every iteration and recalculated based on changes to the release plan. The customer can authorise additional funds for extra functionality at any stage of the project. In this way, agile methods address the issue of cost overrun by allowing a scope change rather than a cost overrun for the project. If a budget is in place agile methods allow for project completion within budget by reducing the functionality if needed. Being agile though, implies ongoing scope definition which makes it difficult to fix the project's budget (Stepanek, 2005). This leads to problems associated with ISD contracts as actual development costs are imperfectly known by both supplier and customer (Wang et al., 1997). Some of the issues associated with agile development contracts such as risk exposure, opportunism, lack of trust, etc. are addressed by putting in place formal contracts. Examples of such contracts are, fixed price contracts, target cost contracts, profit sharing contracts, progressive contracts, time and materials contracts and the PS2000 (a Norwegian iterative development contract). These are not always possible to put in place and in cases where they are in place they can result in the power of an agile development methodology not being fully realised (Jamieson et al., 2006).

A more suitable alternative or addition to a contract may be cost accounting techniques, which track value added. There are also a number of mechanisms from management accounting for measuring cost performance and value associated with a project. Traditional cost management relies on cost accounting techniques to predict metrics such as return on investment (ROI), payback period or net present value (NPV) and to prepare project budgets. While it is difficult to fix a project's budget at the onset for ASD, there are techniques that may be used to measure the project performance during development. Stepanek (2005) introduces techniques such as scoping studies, feature trade-off and triage. Anderson (2003) proposes what he calls throughput accounting, which assumes fixed costs and measures efficiency as value delivered. He makes the argument that lean manufacturing does not use cost accounting anymore because it is inward thinking, caused by managers focusing on reducing cost per unit, not on increasing customer value. Sliger and Broderick (2008) and Alleman et al. (2003) advocate the use of AgileEVM (earned value management) as a way to measure cost performance. These cost accounting techniques may be useful but only serve to highlight the problems associated with traditional budgeting in ISD and ASD in particular. While the Beyond Budgeting model can cater for traditional ISD, it is regarded here as a complement (Milgrom and Roberts, 1995) to ASD. It is widely recognised that no two projects are the same and a case by case analysis will need to be conducted to find the optimum budgeting, costing and performance measurement model for each individual project. However, as certain projects will need to be completed with full functionality regardless of the budget (Yetton et al., 2000), the value of the budget and project estimation process for ASD projects is questionable.

2.11.2 The Need for a New Model for Agile Systems Development

The business value of IT and the relationship between IT investment and organisational outcomes has received a lot of attention in recent years. There is an increasing amount of literature advocating the alignment of IS strategy and processes with business strategy (Reich and Benbasat, 2000; Sabherwal and Chan, 2001; Slaughter et al., 2006; Thomas and Baker, 2008; van der Zee and de Jong, 1999). Creating complementarities (Milgrom and Roberts, 1995), partnerships and cross-unit synergies (Bassellier and Benbasat, 2004; Tanriverdi, 2005; Tanriverdi, 2006) has become increasingly important for organisations operating in a modern

environment with increased complexity and uncertainty (Brown, 1999). The traditional SDLC waterfall method shared many of the characteristics, and worked well within, the traditional strategic planning model (Figure. 2-6).

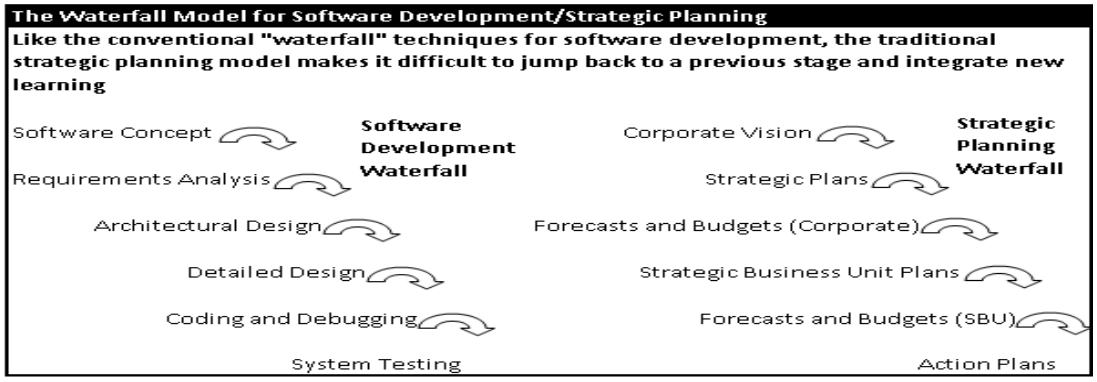

Figure 2-6 The waterfall model for ISD and Planning

Source: McFarland, 2008

Traditional management models rely on traditional accounting processes such as yearly budgets, quarterly and annual reporting (Hansen et al., 2003; Podobnik and Dolinsek, 2008). For most firms the information technology IT/IS budget represents a major element in the overall firm budget. IT budgets include expenditures directly associated with a firm's IT function, i.e., for staff salaries, payments to vendors and service firms, hardware/software purchases, training and new development associated with systems and application software portfolios (Kobelsky et al., 2008). There is still some debate among practitioners and academics as to the value of IT/IS investment and the extant literature has shown mixed results in establishing a relationship between IT/IS investment and firm performance (Kohli and Devaraj, 2003). Recent research findings suggest that IT/IS budget levels are positively associated with subsequent firm performance and shareholder returns (Kobelsky et al., 2008). Research has also shown that a firm's ability to effectively leverage its IT/IS investments by developing a strong IT capability can result in improved firm performance (Bharadwaj, 2000). IT capability includes the information systems development projects. Although the completion of a business-critical project is likely to be supported by senior management whether or not budget goals are being met (Yetton et al., 2000), in a modern, turbulent and competitive business environment the money being spent on IS projects is still a serious cause for concern. Many organisations are making large investments in information systems designed to deliver significant performance gains.

Success in IS project development is often a necessary prerequisite for realising these gains in organisational performance (Yetton et al., 2000). However, as previously discussed, software development projects are continuously running over budget. Budget performance in ISD is generally the primary concern of the project manager, rather than the business investment appraisal team (project sponsor) (Yetton et al., 2000). The effective application of project management is predicated upon accurate estimates of the project budget and schedule. Estimating the development effort for a software system is a long standing problem in software project management. The often-quoted Standish Group's Chaos report from 1994[4] and subsequent updated reports have reported huge project cost overruns. Although The Standish findings have been questioned (Glass, 2005; Glass, 2006; Jørgensen and Moløkken-Østvold, 2006) others have shown that the software industry finds it difficult to provide accurate estimates of development cost. A review of estimation accuracy studies (Molokken and Jorgensen, 2003) reports that software projects have on average a cost overrun of 30-40% and most projects (60-80%) encounter effort and/or schedule overruns. Indeed software cost estimation has been described as more of an art than a science (Krishnakumar and Sukumaran Nair, 1997). The difficult to predict development costs and technology trends make the utilisation of a traditional budgeting process questionable.

This traditional budgeting model has been questioned since the 1960s but numerous unsuccessful attempts have been made to replace it and it continues to be used widely despite its obvious shortcomings. A 2008 article in the Sloan Management Review McFarland (2008) states: *"The strategic planning model is due for a "new release," one that enables companies to keep pace with changing environments, quickly create and adapt strategy and empower people throughout the organisation to make effective choices."* This article goes on to say *"Around the same time that managers were losing confidence in strategic planning, software development went through its own crisis, as the demand for faster design and integration of increasingly robust systems began to make the traditional "waterfall" approach to software development obsolete. The crisis in software prompted a few visionaries to rethink how software gets built. They didn't abandon a process*

[4] www.standishgroup.com

approach to the problem; rather, they invented new development processes, such as rapid application development, extreme programming and agile software development, to confront the new realities."

With intellectual capital forming the greater part of company market value today (Hope and Fraser, 2003a) the question is how to develop and leverage human capital in support of business needs? (Roepke et al., 2000). The Beyond Budgeting model aims to leverage human capital by releasing the potential of employees through a different management model. This model uses tools such as the balanced scorecard (Kaplan and Norton, 1992; van der Zee and de Jong, 1999), rolling forecasts and key performance indicators to conduct performance evaluations based on relative performance contracts with hindsight (Hansen et al., 2003). Agile methods share many conceptual similarities with the Beyond Budgeting model and are a response to the same problems that triggered the Beyond Budgeting movement (Bogsnes, 2009). Beyond Budgeting and agile methods are complementary, conceptually similar and offer the best option for the agility (Sambamurthy et al., 2003), adaptability, and responsiveness (Roepke et al., 2000; Ross et al., 1996) required from the IT/Finance alignment in order to operate competitively in a contemporary business environment.

The arrival of agile methods has coincided with the arrival of the Beyond Budgeting model (Figure 2-7). The common thread across both agile methods and Beyond Budgeting is that the inability to do adequate planning in uncertain environments makes upfront estimation/budgeting less useful.

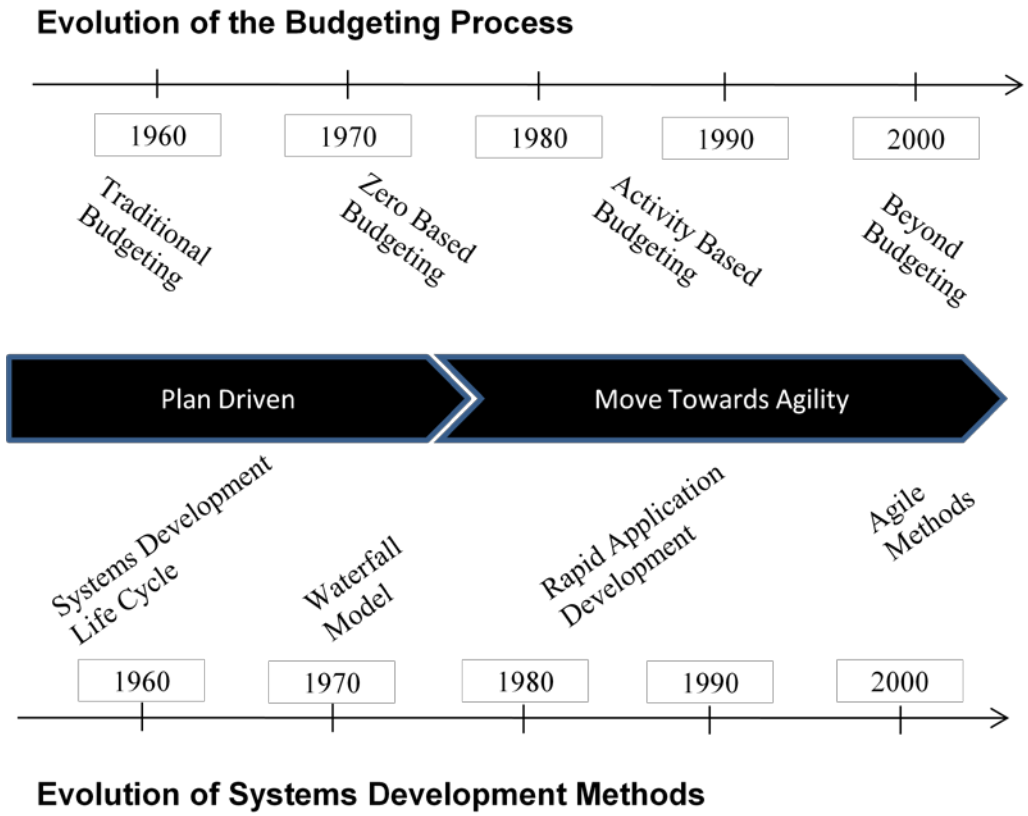

Figure 2-7 Evolution of Budgeting and Systems Development

2.12 Chapter Summary

The objective of this chapter was to place both the Beyond Budgeting model and ASD within the context of the evolution of each field. The fields of management accounting and information systems development are shown to both be moving from plan driven operating models to more flexible agile models.

In section 2.1 the reader can see the problems and criticisms with the traditional budgeting process. Some attempts to address these criticisms are discussed. Sections 2.1.4 to 2.1.6 highlight the affect budgeting has on performance and shows how performance management can be viewed along a spectrum from command-and-control to leadership-and-collaboration. In current, turbulent operating environments, organisations realise the negative effects of traditional budgeting and command-and-control models. Various attempts at more flexible and agile models have been introduced in an effort to increase organisational flexibility.

One flexible leadership-and-collaboration model that has received a large amount of attention in industry and is beginning to attract academic attention is the

Beyond Budgeting model. Section 2.2 introduces this model, discussing its history and theoretical foundations. A detailed description of each principle of the model is described in the following chapter.

Section 2.3 introduces the second stream of literature reviewed for this study. Information systems development is introduced, and the problems and issues with traditional ISD project failure. The extraordinary failure rates of traditional ISD methods led ISD to evolve and eventually led to the formation of the agile manifesto in 2001.

Section 2.4 introduces agile systems development. XP and Scrum methods are the two dominant methods within the field of ASD. This section lists the practices of XP and Scrum as described by two of the main contributors to these methods. The third objective of this study is to extend ASD; therefore this section serves to show the reader the current ASD practices.

Section 2.5 shows that while ASD methods gain traction within industry, the budgetary processes used to manage these new flexible methods are sometimes slow to change. The traditional budgeting process is considered unsuitable for modern and ever changing business environments. Within the field of ISD, the widespread budgetary failure of traditional development processes such as the waterfall model has led to the introduction of Agile Systems Developments methods. However, within the field of management accounting, despite its many criticisms, the traditional budgeting process is still the dominant process. Researchers within ASD have called for more research and understanding into how ASD methods can be extended to wider organisational contexts, and how they can interact with legacy budgeting and management processes.

This section also highlights the importance of alignment and complementarities between the budget driven management control model and the operating models. Management accounting literature has called for a more flexible budgetary process to deal with modern business realities such as ASD. The Beyond Budgeting model is proposed as the answer to this call. The next chapter introduces the Beyond Budgeting model and discusses it relative to ISD and ASD.

Chapter 3 Beyond Budgeting and Agile Systems Development

At this stage it is appropriate to remind the reader of the research question and objectives of this study. The overall research objective of the study is to illuminate ways in which ASD may be better integrated with the wider organisation by using the Beyond Budgeting model as a lens to examine the extension of ASD concepts. The research question is: How can the Beyond Budgeting model be used to extend agile systems development? To answer this question, three separate objectives are identified. These are to:

a) Operationalise the Beyond Budgeting model within the context of an agile systems development environment
b) Apply the operationalised Beyond Budgeting model to an agile systems development environment
c) Develop a set of recommendations for extending agile systems development to a wider organisational context

The purpose of this chapter is to address the first objective of this study. In order to operationalise the Beyond Budgeting model and contextualise it within the field of ASD it is necessary to look at the applicability of each of the principles to ASD teams.

This chapter begins with a review of the leadership principles from the Beyond Budgeting model. This section has a number of aims: firstly, to provide an overview of each Beyond Budgeting principle, secondly, to identify the theory and concepts underpinning each principle and point the reader to related literature, thirdly, to show how the literature relates to ASD, fourthly, to examine the extent of research in ASD on each principle, fifthly, if and where research exists, to identify the broad findings and implications and finally to produce a table showing the components, dimensions and operationalised statements for each principle.

3.1 The Beyond Budgeting Model - Leadership Principles

The Beyond Budgeting model advocates empowerment throughout the organisation. From the case studies used to build the model Hope and Fraser (2003a) found that organisations with empowered employees achieved significant and sustainable success. Based on the evidence collected from these organisations they outline six leadership principles that leaders within organisations should adopt. The following section discusses the leadership principles and their relevance to ASD.

3.1.1 Principle 1 - Customers:

Focus everyone on improving customer outcomes, *not on hierarchical relationships* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Focusing on customers rather than hierarchical relationships is the focus of an ongoing debate in the accounting literature (Caker, 2007; Guilding and McManus, 2002). Hope and Fraser (2003) argue that organisations need to focus their teams on improving customer outcomes rather than having the teams focus on a hierarchical relationship within the organisation. Caker (2007) on the other hand, argues that management accounting needs to focus on emphasising financial performance and formalised processes rather than being accountable *to* customers, arguing that accountability to customers may decrease hierarchical accountability. While both arguments agree on having accountability *for* rather than *to* customers, they disagree on what to prioritise, a customer focus or a hierarchical focus? This paradox is resolved in some sense by du Gay and Salaman (1992) who insist that the culture of the internal customer is a key element in any enterprising organisation: *"Defining internal organisational relations 'as if' they were customer/supplier relations means replacing bureaucratic regulation and stability with the constant uncertainties of the market, and thus requiring enterprise from employees"*.

The notion of the customer is therefore fundamental to current management paradigms and a major thrust of current programmes of organisational change is to replace management hierarchical control with simulated market control, i.e. organisational departments are defined as if customers and work-colleagues relate to each other as customers (du Gay and Salaman, 1992).

Customer focus has been part of management philosophy since the early part of the 20th century (Levitt, 1960) and is recognised as one of the central pillars of the marketing concept (Deshpande et al., 1993; Narver and Slater, 1990). Allen at al. (1998) suggests that the customer focus concept provides a means to bridge the disparate literatures between the marketing concept and the total quality management (TQM) concept where customer focus is also studied in detail (Ahire et al., 1996; Issac et al., 2004; Sousa, 2003). Given the level of interest in customer focus it is surprising that there is still a lot of confusion surrounding what it means to be customer focused and how to become customer focused (Appiah-Adu and Singh, 1998; Day, 2003; Seybold, 2001; Shah et al., 2006).

In many organisations the correct structures, processes and mechanisms are not in place to take full advantage of the customer focus concept. Gulati (2007) states: *"Individual units are historically focused on perfecting their products and processes, and give little thought to how their offerings might be even more valuable to the end user when paired with those of another unit. It is not just that the status quo does not reward collective behaviour – although the right incentives are also critical. It's that the connections literally aren't in place."* Davenport et al. (1998) recognises this but suggests that finding the person with the knowledge required and then successfully transferring that knowledge from one person to another are also difficult processes. This is especially relevant in software development where customer proxies are often in place and there is a dependence on the successful transfer of customer information to the development team. A review of the customer focus literature identified five important components of customer focus relevant to ASD (Table 3-1). Two of these components, customer needs and customer knowledge, have had little previous consideration in the ASD literature and because of this, are discussed in this section rather than in the 'customer focus in ASD' section.

Customer Needs

Gulati and Oldroyd (2005) suggest a four stage process for understanding customer needs. The first stage is the collection of information on customers. This is then consolidated and analysed to gain an insight into customers based on past behaviour. This insight is then used to develop a likely understanding of future behaviour, which is used to provide real-time responses to customer needs (Liang et al., 2007). Coltman (2007) conducted field interviews and surveyed 91 executives

and found that successful organisations collected information and proactively focused on unarticulated or latent customer needs. Zultner (1993) suggests that having customer information will help the ISD team understand the customer's perspective.

Customer Knowledge Sharing

Hope and Fraser (2003) suggest that leaders should not see knowledge as a source of personal power but that all managers within a network should be able to see the same information at the same time and this information should be available instantantly and be online. To achieve the level of coordination and cooperation required from a customer focused organisation, the correct structural mechanisms, processes and incentives need to be in place. These will allow employees to focus on the customer by harmonising information and activities across units, and by encouraging people in all parts of the company to work together in the interest of customer needs. Knowledge sharing[5] in general is discussed in further detail in section 3.3.6.

Customer Focus in ISD

Liang and Tanniru (2006) suggest that meeting customer needs and having a customer focus will be of paramount importance for future ISD. They suggest that customer-centric IS are the third generation of ISD (the first being technology focused and the second process focused) and that to meet ever changing customer needs, a dynamic development process is required. A lack of customer involvement and a misunderstanding of customer requirements are identified in the ISD literature as key factors affecting the success of software projects (Byrd et al., 1992; Herbsleb and Mockus, 2003; Keil and Carmel, 1995; Kraut and Streeter, 1995; Rus and Lindvall, 2002). Tiwana and Keil (2006) show that project risks are lowered when there is a higher level of customer involvement and other studies have shown that a higher level of customer involvement leads to enhanced project outcomes (Byrd et al., 1992; Hartwick and Barki, 1994; Ives and Olson, 1984).

[5] See Dyer and Nobeoka (2000) for a study on the methods Toyota have devised to (1) motivate members to participate and openly share valuable knowledge (while preventing undesirable spillovers to competitors), (2) prevent free riders, and (3) reduce costs associated with finding and accessing different types of knowledge. Also Kankanhalli et al. (2005) produced some interesting empirical evidence on contributing knowledge to electronic knowledge repositories.

Customer Focus in ASD

Agile methods are based on empowered teams rapidly delivering value to customers (Augustine, 2005) and strongly depend on dedicated, collocated customer representatives to keep the project focused on adding rapid value. In a plan-driven method, a contract is generally in place between the developers and customers. This has some advantages in stable environments but can also be a potential stress point due to imprecise contracts, leading to unrealistic expectations or overly precise contracts leading to delays in start-up or difficulties in negotiating changes (Boehm and Turner, 2005). A close developer-customer *relationship* is viewed as crucial to success in ASD, with the highest priority of the agile team being to *satisfy* the customer (Augustine, 2005; Boehm and Turner, 2004; Cockburn, 2001; Cockburn, 2007; Highsmith, 2002; Highsmith, 2004; Larman, 2004; Larman and Vodde, 2008; Schwaber, 2004; Schwaber and Beedle, 2002).

Customer Relationships

To improve relationships customers should be involved in the product design process and be an integral part of the development process, influencing the way the system is conceived, developed and disseminated (Liang and Tanniru, 2006; Parzinger and Nath, 2000; Sousa, 2003). This involves cultivating customer relationships through direct customer contact, with face-to-face communication seen as the optimum communication type for ASD (Pikkarainen et al., 2008). Having the customer involved from project initiation through to prototyping, implementation and reviews, and aware of the project status throughout the development process is argued to lead to better systems (Balka, 2010; Kyng, 2010; Tiwana and Keil, 2006). Molokken-Ostvold and Furulund (2007) studied 18 ASD projects and found that daily communication between the developers and the customers led to less effort overruns. Other studies have found that the customer or their representatives play an informative, consultative and participative role in ASD (Hanssen and Fægri, 2006; Kautz, 2009; Misra et al., 2009; Svensson and Host, 2005). Sousa (2003) describes the customer focus construct in terms of establishing strong relationships with the customers by emphasising partnership arrangements, direct customer contacts (face

to face meetings, plant visits) and integration of the plant's operations with the customers.

However, customer involvement alone does not ensure a successful project (Jokela and Abrahamsson, 2004). The issue can be the effectiveness with which customers are engaged with, and involved in, the development of the system (Wagner and Majchrzak, 2007). Previous studies have pointed out that a distinction must be made between participation and involvement. Ives and Olsen (1984) show that involvement is influenced by the characteristics or personality of the customer. Barki and Hartwick (1994) agree that personality influences customer involvement. They separate involvement (the belief that the new system is both important and personally relevant), attitude (a psychological state reflecting the affective or evaluative feelings concerning a new system) and participation (a set of behaviours or activities performed by the customer). Grimstad at al. (2006) find that the availability of competent customers and capable decision makers are important ASD success factors. The short iteration cycles in ASD increase the customer's awareness of the project's status allowing for regular prioritisation of requirements and continuous feedback to the development team.

Customer Satisfaction

Teams should also be provided feedback on both customer complaints and on customer satisfaction surveys. This feedback is used for training if required and to improve processes where needed. Bragge and Merisalo-Rantanen (2009) emphasise the importance of customer feedback to improving products and processes. Feedback systems should capture both formal and informal complaints as well as hidden needs and novel ideas (Fundin and Bergman, 2003). In an ASD team, feedback can be communicated to team members through a number of mechanisms such as daily Scrums, planning meetings, iteration retrospectives and reviews, as well as ongoing meetings and conversations with customers and other stakeholders (Moe et al., 2010).

Capability Development

Gulati (2007) refers to this form of feedback as capability development, which is a means of ensuring that an organisation has enough people with the skills to deliver

customer-focused solutions and also has the correct processes in place to deliver those solutions.

Table 3-1 Customer Focus Components

Principle Components	Supporting Literature	Dimensions	Operations
Customer Needs	(Coltman, 2007; Gulati, 2007; Sousa, 2003; Zultner, 1993)	Information	*Information is collected on customer needs*
			Analysed information is available to the team
			Forward looking information on customer needs is available
Knowledge Sharing	(Bragge and Merisalo-Rantanen, 2009; Gulati, 2007; Davenport et al., 1998)	Structures	*Mechanisms exist to disseminate knowledge and respond to customer needs*
		Incentives	*Teams have incentives to share customer knowledge.*
Customer Relationships	(Pikkarainen et al., 2008; Liang & Tanniru, 2006; Sousa, 2003)	Involvement	*Customers are involved in the development process*
		Meetings	*Direct customer contact takes place*
Customer Satisfaction	(Moe et al., 2010; Fundin & Bergman, 2003; Ahire et al., 1996)	Feedback	*Teams receive customer feedback*
			Customer complaint information is available to teams
Capability Development	(Bragge and Merisalo-Rantanen, 2009; Gulati, 2007; Ahire et. al. 1996)	Training	*Feedback is used to train team members*
		Processes	*Feedback is used to improve processes*

3.1.2 Principle 2 - Organisation:

Organise as a network of lean, accountable teams, *not around centralised functions* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

The word lean was originally popularised in the 1990s to describe the approach to manufacturing used by the Japanese automobile industry (Benders and Van Hootegem, 1999; Poppendieck and Poppendieck, 2007). After extensive studies on lean manufacturing at Toyota, Poppendieck et al. (2007) used ideas borrowed from Toyota's lean manufacturing approach to outline a set of seven principles of lean software development: 1) Eliminate Waste, 2) Build Quality In, 3) Create Knowledge, 4) Defer Commitment, 5) Deliver Fast, 6) Respect People, 7) Optimise the Whole. While lean software development is becoming increasingly popular, the word lean as used by this Beyond Budgeting principle is not taken to mean lean software development per se, rather it is taken to mean that teams operate in a lean fashion, i.e. all resources are concentrated on adding value. Therefore, a detailed understanding of lean software development is not required and this principle as a whole is operationalised by considering it to have two major prescriptions, namely, decentralisation and accountability (Table3-2).

Decentralisation

Contingency theory posits that organisational units can be mapped into a spectrum ranging between a "mechanistic" or centralised structure and a more decentralised, flexible and "organic" structure as the uncertainty and dynamics of the organisation's business environments increase (Mendelson, 2000). In the traditional command-and-control orientated organisational structure, which is characterised by a rigid hierarchy, information flows upwards through the hierarchy. Greater decision rights are associated with a higher level of hierarchy (Radner, 1992). At the opposite end of the spectrum in what Mendelson (2000) calls information age (IA) architecture, a fast moving, information rich environment supports decentralised decision making. The organisation is designed to maximise value by giving pertinent knowledge to those responsible for decision making with the aim of pushing that decision making down to those who are closest to the action (Chang et al., 2003; Christie et al., 2003). The implicit assumption here is that the more decentralised an

organisation is, the more employees participate in the decision making process. Although there is no single generally accepted measure for assessing individual or group participation in decision making in organisations (Glew et al., 1995), measures such as spending decision rights and operating decision rights have been used in previous studies (Inkson et al., 1970).

Accountability

Accountability theory suggests that perceptions about our audiences and related rewards or sanctions serve to direct decisions and effort allocations when we face decisions or choices (Frink and Ferris, 1998; Schlenker and Weigold, 1989; Tetlock, 1985). There are built in dangers when empowered employees are held accountable for performance goals and then left to their own devices to achieve them. Simons (1995) gives some examples of how this has had disastrous consequences e.g. the Big Six accounting firms observing increases in errors and fraud due to a decrease in internal controls. Simons (1995) outlines a way of "balancing control in an age of empowerment" and his levers of control are one way of effectively managing the continually shifting balance between empowerment and control. The Beyond Budgeting model incorporates accountability mechanisms such as Simons' "Levers of Control" or Kaplan and Norton's (1992) "Balanced Scorecard" through practices such as key performance indicator (KPI) controls.

Decentralisation and Accountability in ISD

Nidumolu and Subramani (2003) conducted a study of fifty-six software firms in the United States and their results suggest that performance of software development teams is enhanced by establishing uniform performance criterion across all projects. This ensures team accountability through the measurement of KPIs as suggested by the Beyond Budgeting model. Their results also suggest that performance is enhanced by giving project teams more authority to make decisions with respect to methods. This decentralisation of methods is defined by Nidumolu and Subramani as:

"*The discretion provided to project teams to determine the methods they use for software development tasks, reflecting the extent of delegation of decision making to teams with respect to methods to be followed and latitude permitted to enable adaption to the local context.*"

It is generally accepted that the decentralisation of decision making leads to enhanced outcomes when uncertainty is high, as is the case of software development (Drazin and Van de Ven, 1985; Fry and Slocum, 1984; Henderson and Lee, 1992; Mendelson, 2000). Mendelson (2000) notes that decentralisation alone could prove detrimental if decision makers do not have an overall view of organisational objectives, as well as the incentives to optimise them. Malone (1997) argues that the knowledge-based society requires decentralised decision makers but that accountability may be addressed in the form of ongoing controls.

Decentralisation and Accountability in ASD

Practices such as stand-up meetings or collective code ownership reinforce agile teams' accountability during the project duration (Highsmith, 2004; Larman, 2004). Team members have considerable leeway in how they deliver results, but they are accountable for those results and for working within the established flexible framework (Cohn, 2004; Highsmith, 2004; McAvoy and Butler, 2009). McAvoy and Butler (2009) warn of the dangers associated with decentralised team decision making, highlighting issues such as groupthink (Janis, 1972) or the Abilene paradox[6] (Harvey, 1974). Their findings suggest that highly cohesive and empowered agile teams may make dysfunctional decisions if they place a higher value on team cohesion rather than personal choice, i.e. a developer may agree with a decision because they believe that it would benefit team dynamic, not because they believe that it is the correct decision. These findings have implications for scaling the agile concept and establishing long lasting self-organising teams. McAvoy and Butler (2009) recommend a new role of devil's advocate be assigned to the team to negate issues such as the Abiline Paradox and/or groupthink. However, while their recommendations are well grounded, there is no empirical evidence to suggest whether this would work in an agile environment.

[6] Professor Jerry Harvey tells a story about how he and his extended family are sitting contentedly on the back porch of his father-in-law's house. His father-in-law, who was looking for somewhere for the family to eat out, suggested they go to Abilene. Harvey thought it was a bad idea but under the circumstances decided to keep his views to himself. Everyone agreed to go on the trip, which turned out to be a disaster. The family blamed each other for making the decision to go saying that they had all thought it was a bad idea all along. Even the father-in-law confessed he had not wanted to make the trip but thought the others would enjoy it. This form of dysfunctional group decision making has been termed the Abilene Paradox (Harvey, 1974; Harvey, 2001)

Because teamwork and team autonomy is at the heart of ASD and the team itself decides how work is coordinated (Boehm and Turner, 2004), the objective is to understand the level of decision rights the agile team actually have regarding its day-to-day activities and the accountability attached to those decision rights. Project controls may take the form of key performance indicators for each individual project or uniform performance criteria for each project across the organisation (Hope and Fraser, 2003a; Nidumolu and Subramani, 2003). Research has shown that when team members have individual accountability while operating within a team, cooperation with team members suffers (Irlenbusch and Ruchala, 2008). Both the Beyond Budgeting literature and the ASD literature agree that teams should share accountability for project outcomes. However, the ASD literature does not have a good understanding of the correct accountability measures to adopt (Poppendieck, 2004b; Poppendieck and Poppendieck, 2008).

In ASD, the agile team is expected to adapt to changing customer requirements. These requirements will determine the resources required by the project. In a traditional project, when resources are required which were not included in the original budget, the project manager will gather all available information and present it to the project sponsor or management team. The project sponsor then makes a decision on allocating additional funds to the project. In ASD, project progress will be slowed if the management team is constantly involved in redefining project boundaries (Chin, 2004 pp. 26-29). The Beyond Budgeting model suggests that spending decisions are made by those closest to the customers. In terms of ASD, this means that when the ASD team gets an opportunity to add both business value and customer value they are empowered to make spending decisions, within a governance framework, which helps achieve this dual goal (Cohn, 2004; Highsmith, 2004). Operational decisions that may face ASD teams include deciding on performance and quality metrics, determining training requirements and having input into the decision regarding the hiring of new team members (Karni and Kaner, 2005; Nidumolu and Subramani, 2003). Decision making within ASD is a collaborative effort but research on decision making is not clear on exactly which decisions a team are or should be empowered to make (McAvoy and Butler, 2009; Nerur et al., 2005). For example Nerur (2005) states that "*Decision making in this environment is more difficult compared to the traditional approach where the project manager is*

responsible for most decisions. It may take an organisation enormous effort, time, and patience to build a culture of trust and respect among its employees to facilitate such collaborative decision making."

Table 3-2 Organisation Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Decentralisation	(Karni & Kaner, 2005; Boehm & Turner, 2004; Chang et al., 2003; Nidumolu & Subramani, 2003; Malone, 1997; Inkson et al., 1970)	Spending Decisions	*The team can spend money on new equipment*
			The team can decide on what type of equipment is to be used
		Operating Decisions	*The team decides on new team members*
			The team can decide on performance criteria
			The team can determine training requirements
Accountability	(McAvoy & Butler, 2009; Highsmith, 2004; Larman, 2004; Hope and Fraser, 2003a; Nidumolu & Subramani, 2003)	Project Controls	*Key performance indicators are in place for each project*
			Uniform performance criteria is in place across all projects
		Team Accountability	*Teams are collectively accountable for project outcomes*

3.1.3 Principle 3 - Responsibility:

Enable everyone to act and think like a leader, *not merely follow the plan* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

There is a large body of literature from leadership theory that characterises the optimal behaviours or demeanours of leaders in particular contexts (Avolio and Gardner, 2005; Fry, 2003; Rafferty and Griffin, 2004; Yukl, 2008). Hope and Fraser (2003:151) clarify the Beyond Budgeting principle, stating that the objective is to create a more entrepreneurial business whereby leadership is devolved and the aim is that *"everyone in the organisation [carries] personal responsibility for his or her part in it"*. This is called an adaptive and devolved approach to management and is in contrast to the traditional budget-based, centrally planned model (Hope and Fraser, 2003a). Building an organisation that adapts to changes in the environment requires a confrontation with legacy practices such as long-term or detailed strategic planning (Heifetz et al., 2009). The dual goal of adaptive leadership is to tackle current challenges and build adaptability so future challenges can be tackled. Moss et al. (2009) suggest that while most organisations: *"strive to recruit employees who can accommodate unpredictable changes, demonstrate adaptability, and interact effectively with a diversity of individuals"* leaders can instead *"cultivate such qualities in employees rather than merely attract individuals with these capacities"*. Their work demonstrates how employee fragility undermines adaptive performance and their framework is used to show how many leadership constructs, such as self-sacrificing, moral management, and transformational behaviour, can curb this fragility and thus improve adaptive performance.

Faraj and Sambamurthy (2006) argue that these transformational leadership skills are not as important when managing software development teams as the behaviours of the team leader and their technical skills. They build on previous work, (e.g. Cox and Sims, 1996; Pearce and Sims, 2002) to examine the empowering leadership construct. Roepke et al. (2000) suggest that IT human capital is becoming increasingly significant as IT becomes more involved as a business partner and strategic enabler for the organisation (Roepke et al., 2000). They argue that the traditional hierarchical, command-and-control management style will not work as

effectively in the information age and the era of the knowledge worker and suggest that the key to the success of this transition is the shift from a command-and-control leadership philosophy to empowering leadership.

Empowering leadership is where leaders share power with subordinates thereby raising levels of intrinsic motivation (Arnold et al., 2000; Srivastava et al., 2006). Faraj and Sambamurthy (2006) suggest that empowering leadership has an important impact on team performance under conditions of high uncertainty or team expertise. Their model used data from 69 software development teams and the results gave a strong indication that higher empowering leadership leads to stronger team performance when task uncertainty is high. For their study, measures were gathered from individual team members and aggregated to the team level. Task uncertainty was measured using a four-item scale developed by Withey at al. (1983) and customised and validated by Nidumolu (1995).

Srivastava (2006) also find that empowering leadership is positively related to both knowledge sharing and team efficacy, which, in turn, are both positively related to performance. Heifetz et al. (2009) argue that in the current environment and in a future post recession environment of urgency, high stakes, and uncertainty leaders will require new skills that will involve: *"giving people at all levels of the organisation the opportunity to lead experiments that will help it adapt to changing times"*. There are a number of studies that have used the empowering leadership construct. For example, Arnold et al (2000) constructed and validated a scale for measuring leader behaviours, they consider the empowering leadership construct as having five dimensions, leading by example, participative decision making, coaching, informing and showing concern/interacting with the team (Arnold et al., 2000). Their scales were developed using three very different organisational contexts, a clothing retailer, a building products supplier, and a telecommunications corporation. More applicable to this research is the empowering leadership construct used by Faraj and Sambamurthy (2006). Their construct was specific to the leadership of IS projects and comprised of three interrelated dimensions, encourage self-development, encourage teamwork, and participative goal-setting (Table3-3). The latter of these three, goal-setting, is discussed in the goal-setting section (3.2.1) of this study.

Encouraging Self-Development and Teamwork

Self-development involves both an organisational commitment and a personal responsibility (Antonacopoulou, 2000). Both Faraj and Sambamurthy (2006) and Arnold et al (2000) emphasise the need for leaders to encourage group members to seek out new opportunities to learn new things and to develop their skills and abilities. Employees who participate in self-development activities are viewed as more productive (Gould and Penley, 1984) and effective (Pearce and Sims, 2002; Temporal, 1982) and it is argued that self-development is beneficial to the organisation as it allows the necessary flexibility and facilitates a more immediate response to the changing needs of individuals and organisations (Stewart, 1991). Another important dimension of the self-development construct is feedback. Feedback is fundamental to the individuals self-efficacy (both positive feedback and negative feedback inform efficacy beliefs (Millward et al., 2010)) and the greater the self-efficacy, the more likely the individual will engage and persist in task-related behaviour (Chen and Bliese, 2002).

Teamwork can be viewed as a set of values that encourage listening and responding constructively to views expressed by others, giving others the benefit of the doubt, providing support, and recognising the interests and achievements of others (Katzenbach and Smith, 1993). There is a large body of literature on teamwork spanning several disciplines (Cohen and Bailey, 1997; Guzzo and Dickson, 1996; Sapsed et al., 2002). Much of the literature on teamwork has been devoted to what is described as self-managing, autonomous, empowered or self-organising teams (Guzzo and Dickson, 1996; Kirkman and Rosen, 1999; Langfred, 2000; Tata and S., 2004; Uhl-Bien and Graen, 1998).

Encouraging Self-Development and Teamwork in ISD

The Beyond Budgeting model suggests that organisations will increase their flexibility and efficiency by promoting continuous improvement among employees. A study by Faraj and Sambamurthy (2006) operationalised this premise in the ISD domain. Their statement items are used here also to operationalise the construct in the ASD domain. That is, empowered, responsible team members are encouraged to seek new learning opportunities to develop their skills and abilities. As part of this

development process, team members receive feedback on their progress which is a fundamental part of the individual's self-efficacy. Faraj and Sambamurthy (2006) outline five items used to measure teamwork within a software development environment. Their items cover the importance of leaders who encourage team members to cooperate and coordinate as a team working together towards a common goal. Research tends to suggest that the use of empowered teams results in more satisfied employees, lower turnover, and lower absenteeism (Cohen and Bailey, 1997) and that the success of innovative projects is dependent on empowered teams (Hoegl and Parboteeah, 2006; Takeuchi and Nonaka, 1986).

Encouraging Self-Developing and Teamwork in ASD

Encouraging self-development is an area that has not received much attention in the ASD literature. However, encouraging teamwork and self-organising teams is at the heart of ASD methods. ASD methods are designed around teamwork and team members are encouraged to collectively share ownership of the project (Cohn, 2004). The practice of self-organising teams (Cockburn and Highsmith, 2001; Lindvall et al., 2002) in agile development requires team cohesiveness, trust among team members and strong interpersonal relationships (Highsmith, 2000). A high level of task uncertainty is one of the key characteristics of ASD environments (Maruping et al., 2009a; Nidumolu and Subramani, 2003) and empowered, self-organising teams are fundamental to agile methodologies (Baskerville et al., 2002; Fowler and Highsmith, 2001; Highsmith and Cockburn, 2001; Moe et al., 2010).

In a self-organising team, leadership should be diffused rather than centralised (Morgan, 2006). A component of the Dickinson and McIntyre teamwork model (Dickinson and McIntyre, 1997) used by Moe et al. (2010) to study agile teams, shows that leadership can be shown by several team members and does not necessarily refer to a single individual with formal authority. Maruping et al (2009a) studied 110 agile project development teams and their findings suggest that the agile teams are more effective when they have project leaders who are enablers and give teams more autonomy. Dubinsky and Hazzan (2004) suggest that when an ASD team member has a specific role, his or her personal responsibility and accountability with respect to that aspect of the software development process represented by said role, increases. Research in this area is still in its infancy and the role of the team

leader or project manager and the affect that role has on the team's performance is still not well understood in ASD (Fernandez and Fernandez, 2008).

Table 3-3 Responsibility Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Encourage Self-Development	(Faraj & Sambamurthy, 2006; Srivastava, 2006; Arnold et al., 2000)	Opportunity	*Team members are encouraged to seek out new opportunities to learn new things*
		Development	*Team members are encouraged to develop their skills and abilities*
		Feedback	*Team members are given feedback on their performance*
Encourage Teamwork	(Moe et al., 2010; Faraj & Sambamurthy, 2006; Baskerville et al., 2002)	Teamwork	*Individuals are encouraged to work as part of the team*
			The importance of working together for a common goal is emphasised

3.1.4 Principle 4 - Autonomy

Give teams the freedom and capability to act; *do not micro-manage them* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

According to Breaugh (1985) team autonomy refers to the degree of freedom, independence and discretion given to the team in scheduling the work, determining the procedures and methods to be used, selecting and deploying resources, hiring and firing team members, assigning tasks to team members, and carrying out assigned tasks. This Beyond Budgeting principle also states that teams are given the *capability* to act, suggesting that autonomy alone is not sufficient and that teams must be capable of performing, or given the capability to perform. Team capability has been identified as one of the critical success factors in agile projects (Chow and

Cao, 2008). Empowering teams to make decisions that will affect their daily work is the capability providing mechanism suggested by Hope & Fraser (2003, pp. 149). The empowerment construct has received a large amount of recognition in the management literature and empowering teams has been shown to lead to better productivity, more proactive behaviour and higher levels of customer service, job satisfaction, and organisational and team commitment (Kirkman and Rosen, 1999; Yang and Choi, 2009).

Thomas & Velthouse (1990) identified four dimensions as the basis for worker empowerment: sense of impact, competence, meaningful and choice. Although there are variations of these dimensions they are the generally accepted empowerment construct dimensions (Spreitzer, 1995; Thomas and Velthouse, 1990; Wang and Lee, 2009a). However, some subtle differences exist between team and individual empowerment construct dimensions. Kirkman and Rosen (1997) defined team empowerment as having four dimensions which paralleled the individual constructs, namely: autonomy, impact, potency and meaningfulness (Table 3-4). As agile methodologies are dependent on teamwork, Kirkman and Rosen's dimension definitions are most suited to this research.

Team Empowerment

Kirkman and Rosen (1999) make an important distinction between self-managing (or autonomous) teams and empowered teams:

> *"Both self-managing teams and empowered teams are autonomous, but the members of the latter also share a sense of doing meaningful work that advances organisational objectives; thus, team empowerment is a much broader construct. Self-management is most analogous to only one of our empowerment dimensions- autonomy – and some scholars have even used "autonomous work teams" as a synonym for self-managing teams (e.g., (Cordery et al., 1991; Pearson, 1992; Wall et al., 1986)). In addition, measures of the two constructs are very similar"*

Many researchers have used the autonomy construct to mean empowerment or self-managing teams (Lee and Xia, 2010; Mirchandani and Lederer, 2008; Shrednick et al., 1992). While autonomy typically measures the degree of freedom teams have to make important decisions, the empowerment construct used in this study refers to

autonomy and three other dimensions, impact, potency and meaningfulness (Kirkman and Rosen, 1999).

Autonomy

Individual autonomy refers to freedom, independence and discretion in the individual task (Hackman and Oldham, 1980), while team autonomy refers to the same attributes in the task of the team (Hackman, 1987; Kirkman and Rosen, 1999). In the case of high team autonomy, the group owns the task and important decisions are made and executed by the team. Generally, a high level of team autonomy has been linked to improved quality of work life (Cohen et al., 1996; Spreitzer et al., 1999), increased work motivation (Janz, 1999; Janz et al., 1997), reduced psychological fatigue (Van Mierlo et al., 2001; Van Mierlo et al., 2007), reduced job strain (Leach et al., 2005), reduced absenteeism (Cohen et al., 1996) and increased productivity, quality of performance and innovativeness (Hackman, 1987; Yang and Choi, 2009).

Impact

Team members experience impact when they feel that they can influence outcomes and produce work that is seen as important for an organisation (Hackman, 1987). Hope and Fraser (2003) recommend that the team be involved in deciding upon any strategies that affect them and challenge any assumptions and risks in any strategies presented to them. Prior research has shown that impact is associated with higher performance and more motivated team members (Ashforth, 1989; Spreitzer et al., 1997).

Potency

Potency is the collective belief of a group that the team or group can be effective (Lester et al., 2002). This parallels the individual level dimension of competence or self-efficacy but differs in three ways: (1) self-efficacy refers to individual performance and potency refers to team performance, (2) self-efficacy experiences are private but potency experiences develop collectively, and (3) self-efficacy relates to specific task performance but potency refers to generalised effectiveness (Kirkman and Rosen, 1999). Studies have found that groups with higher levels of potency perform more effectively (Campion et al., 1993; Campion et al., 1996; Wang and Lee, 2009b).

Meaningfulness

Meaningfulness refers to a team's experiencing its tasks as important, valuable and worthwhile (Hackman, 1987). Team members collectively develop and share the meaningfulness of their tasks. Thus, team members have direct effects on the experiences of meaningfulness of other members (Kirkman and Rosen, 1999). To individual members 'meaningfulness' refers to the value of a goal or purpose, judged in relation to an individual's own ideals or standards. It reflects intrinsic interest in a task and involves a fit between work role environment and one's beliefs and values (Wang and Lee, 2009a).

Team Empowerment in ISD

Empowerment has also been suggested as being critical for ISD with the shift from power over staff to empowered staff seen as key to attaining world class quality IS (Shrednick et al., 1992). In their 1992 MISQ article, Shrednick et al. concluded that team empowerment was the key to information services world-class quality. They reported on a case study involving empowered self-managing teams (defined as: *"groups of interdependent people with responsibility, authority, and accountability for accomplishing a common mission with little or no supervision")* who substantially improved customer satisfaction, service, and productivity, while enhancing staff skills and reducing costs. Their findings suggested that a paradigm shift is required by organisations from a traditional command-and-control management model to a flatter more flexible organisation with more empowered staff and front line teams. Mirchandani and Lederer (2008) find that empowerment provided to employees for IS planning in general, predicted IS planning effectiveness and that strategy selection planning in particular, significantly predicted IS planning effectiveness.

Team Empowerment in ASD

Agile development emphasises the importance of autonomous, self-organising, self-directed, self-disciplined, software teams for achieving agility (Highsmith, 2004; Nerur and Balijepally, 2007; Sharp and Robinson, 2004). Empowering teams brings decision making authority to the hands of the people who are dealing with everyday work responsibilities and therefore increases the speed and effectiveness of problem solving (Larman, 2004; Tata and S., 2004). Lee and Xia (2010), who regarded team

autonomy as the extent to which the software team is empowered, studied agile teams. Their findings based on 10 case studies, and 399 survey responses, suggest that team autonomy or empowerment in ASD has a positive effect on response efficiency. Empowerment, autonomy, self-organising and self-managing teams are essential components for agile development culture (Chow and Cao, 2008; Cockburn, 2001; Highsmith, 2002; Highsmith, 2004; Kelly, 2008; Larman, 2004; Lee and Xia, 2010; Nerur and Balijepally, 2007). The agile team is expected and trusted to do whatever is necessary to help ensure a successful project. This includes looking for common or unnoticed tasks and completing them. In an agile culture, people feel comfortable and empowered when they have the environment and support they need (Boehm and Turner, 2005). As suggested in the previous section on responsibility, the leadership style chosen by or for the ASD team will affect the autonomy and empowerment of the team. While there is some research showing that empowered or autonomous teams perform better (Lee and Xia, 2010; Maruping et al., 2009a), this is still an under researched area and little research has addressed how differing leadership styles and different levels of empowerment affects the autonomy of the team (Maruping et al., 2009a; McHugh et al., 2008a).

Table 3-4 Autonomy Components

Principle Component	**Supporting Literature**	**Dimensions**	**Operations**
Team empowerment	(Lee & Xia, 2010; Maruping et al., 2009a; Boehm & Turner, 2005; Shrednick, 1992; Thomas & Velthouse, 1990)	Autonomy	*The group has a high degree of freedom in carrying out tasks*
		Impact	*The group has a high impact on its work environment*
		Potency	*Belief in the group capabilities is high*
		Meaningfulness	*There is strong meaning attached to the tasks*

3.1.5 Principle 5 - Values:

Govern through a few clear values, goals and boundaries, *not detailed rules and budgets* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Some components of both the Beyond Budgeting model and Agile methodologies, such as customer focus, employee empowerment and cooperation are highly susceptible to the organisation's cultural values (Kull and Narasimhan, 2010; Westrup and Liu, 2008; Westrup et al., 2003). Organisational cultural values can be expressed as being the shared level of importance placed on ideals and behaviours throughout the organisation (Schein, 2004). While it is important to note that cultural dimensions have an affect on the adoption and application of both the Beyond Budgeting model and Agile methodologies, this study is more focused on the internal information systems development context and how organisational governance or more specifically IS governance strategies and values affect ASD teams and the agile working environment.

The Beyond Budgeting model advocates a Theory Y approach to management (Bogsnes, 2009; Bostrom and Heinen, 1977; McGregor, 1960) for an adaptive and devolved governance structure. While compliance issues need to be considered and many organisations need to follow regulations such as the Sarbanes-Oxley (SOX) act (Sarbanes-Oxley, 2002), authors such as Bjarte Bogsnes make a strong case for the increasing need of flexible operating frameworks such as Beyond Budgeting. Bogsnes (2009) argues that in a time when SOX requirements and compliance issues are forcing companies to implement rigid controls and regulations, the Beyond Budgeting model allows them to comply with the regulations while still having an operational flexibility.

Governance and Internal Domain Strategy in ISD

There is a certain amount of ambiguity on the form of Information Systems Governance (ISG) within an organisation depending on the strategic role IT/IS plays within that organisation (Henderson and Venkatraman, 1999; Nolan and McFarlan, 2005; Raghupathi, 2007). Henderson and Venkatraman (1999) suggest that IT/IS strategy should be articulated in terms of an external domain – how the firm is positioned in the IT marketplace and an internal domain – how the IS infrastructure

should be configured and managed. This study looks at agile systems development teams working within the internal domain of the organisation and therefore it is the governance of the internal IS domain that is of interest for this research. This consists of three components, namely: 1) IS architecture, 2) IS processes, and 3) IS skills (Table 3-5) (Henderson and Venkatraman, 1999). IS architecture is concerned with the teams choice in defining the portfolio of applications, the configuration of hardware, software, and communication, and the data architecture that collectively define the technical infrastructure. IS processes are concerned with the team's choice in defining the work processes central to the operations of the IS infrastructure, such as systems development, maintenance, monitoring and control systems. IS skills are the choices pertaining to the acquisition, training, and development of the knowledge and capabilities of the individuals required to effectively manage and operate the IS infrastructure within the organisation. To establish how this principle can be or is used in an agile context it is important to find out what values, goals and boundaries are used or followed when the ASD team makes choices regarding IS architecture, IS processes and IS skills?

Governance and Internal Domain Strategy in ASD

It is likely that one of the biggest obstacles that has to be dealt with when implementing agile methods within a large organisation is a governance process, which requires detailed approval of product content prior to development (Poppendieck and Poppendieck, 2010). The agile manifesto clearly states the most important values of agile methods, i.e. individuals and interactions, working software, customer collaboration, and responding to change (Agile Alliance, 2001). By working with these values, the goal of delivering working software quickly and continuously to customers is achieved. Boundary conditions such as resources, functionality or timelines are catered for by prioritising requirements and responding to changes in stakeholder value propositions. ASD teams should operate within established flexible governance frameworks (McAvoy and Butler, 2009). Detailed contracts are not suitable for agile development but if some conditional rules are required (e.g. fixed time, fixed resources) then a document such as a service level agreement or similar may be suitable (Boehm and Turner, 2004).

The ASD literature has only just begun to examine how the organisations governance structures affect the adoption of agile methods (Abrahamsson et al.,

2009; Qumer, 2007; Qumer and Henderson-Sellers, 2008). Qumer (2007) suggests that an effective agile governance approach will facilitate the achievement of desired discipline and improved performance by aligning business goals with ASD goals. He developed a governance model for responsibility, accountability and business value in the context of agile development. This model has been applied in practice to two case studies by Qumer and Henderson-Sellers (2008) with the conclusion that more research is required towards the design, implementation and evaluation of governance frameworks, processes and structures to support governance in the context of agile development.

Table 3-5 Values Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Governance	(Poppendieck & Poppendieck, 2010; McAvoy & Butler, 2009; Qumer & Henderson-Sellers, 2008; Boehm & Turner, 2004)	Goals	*Project goals are clearly defined for each project*
		Boundaries	*Operating boundaries are clearly defined*
Internal Domain Strategy	(Poppendieck & Poppendieck, 2010; Raghupathi, 2007; Nolan & McFarlan, 2005; Hendersen & Venkatraman, 1999)	Architecture	*Team has input into defining the architecture*
		Processes	*Team has a choice in defining systems development process for each project*
		Skills	*Team members can get training when required*

3.1.6 Principle 6 - Transparency:

Promote open information for self-management; do not *restrict it hierarchically* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Section 3.1.4 discusses self-managing teams and what a self-managing team needs to make autonomous decisions. This section elaborates on the transparency construct and the transparency required within the organisation for teams to make informed decisions.

Traditional management often restricts information by selecting which information is made available to lower levels in the hierarchy (Bogsnes, 2009). Communication behaviour can decrease transparency and a failure to share information through practices such as screening out, can lower the ability of decision makers to make decisions (Ang et al., 2000). By restricting and controlling information leaders believe they have more power over their subordinates (O'Toole and Bennis, 2009). Hope and Fraser (2003a) suggest that this is counterproductive and that organisations should open their information systems to give their employees more access to strategic, competitive and market-based information. Although it is not desirable to have complete transparency and certain strategic secrets may be necessary, deciding where to draw the line between what information must be revealed and what should be withheld is one of the most important judgments leaders make (O'Toole and Bennis, 2009).

IS is seen as an enabler of transparency by helping to keep information up-to-date, fresh and dynamic (Alavi and Leidner, 2001; Schwartz and Te'eni, 2000). Through their study Beech and Crane (1999) succinctly describe the need for transparency for high performing self-managed teams, advocating a more cohesive, empowering and transparent leadership style. Berggren and Bernshteyn (2007) emphasise the importance of having a well defined strategy, broken down into clear goals, upon which teams can act upon. They describe differing levels of transparency, from the first level, where the organisation does not reveal its strategy to its own employees, to the fourth level where the organisation has a strategy that is clearly communicated and broken down into actionable goals. They emphasise the link between organisational transparency, goal setting and performance related pay,

suggesting that transparency aligned with correct goal setting and reward schemes are the key to successful organisational performance. Mankins and Steele (2005) agree and discovered that organisations lose forty percent of the potential financial value of their strategies due to poor performance and talent management of their employees.

O' Toole and Bennis (2009) argue that organisational transparency makes sense rationally and ethically, and it makes businesses run more efficiently and effectively. Hope and Fraser (2003a) suggest that organisations embracing the Beyond Budgeting concept have information systems based on the highest ethical values. They elaborate on this point by stating that:

"Leaders in adaptive and devolved organisations believe in having only one set of numbers that is transparent throughout the whole organisation. Maintaining one set of books is the key to high levels of ethical practice."

Transparency in ISD

A review of the transparency literature in IS has discovered two distinct constructs of organisational transparency, internal transparency and external transparency (Street and Meister, 2004). External transparency corresponds to the outcome of communication behaviours directed outside the organisation. E.g. in supply chain management transparency is discussed as the information exchange between supply chain partners (Lamming et al., 2004), in the marketing literature, information flow from the customer is seen as valuable (Narver and Slater, 1990). Internal transparency corresponds to the same behaviours as external transparency but is applied within the organisation, e.g. (Alavi and Leidner, 1999). For agile development, we are only concerned with the internal transparency construct as it is applied to ISD teams. Internal transparency is a multi-layered construct with *strategic transparency* covering high-level long-term goals and *operational transparency* covering daily and monthly goals (Table 3-6).

Strategic Transparency

Berggren and Bernshteyn (2007) highlight the importance of strategic transparency, indicating that employees who are in secure jobs look to their work as a means to fulfil needs that are higher up in the Maslow Hierarchy of Needs pyramid. Strategic transparency may allow these employees to look to long-term

goals as a means to fulfil these higher needs. Street and Meister (2004) define internal transparency to be: *"an outcome of communication behaviours within an organisation that reflects the degree to which employees have access to the information requisite for their responsibilities"*. An example of this is when supervisors hold frequent meetings to share information with subordinates to disseminate requisite information to meet individual, team and organisational goals (Beech and Crane, 1999). Street and Meister (2004) conducted a six month participatory action research study and find that a decrease in internal transparency can be caused by decreases in cross-functional communication that are caused by increased managerial pressures. Their research site was going through a growth period and the resultant decrease of internal transparency led to a crisis of planning as insufficient information was readily available. Managers were too caught up in their day-to-day operations and had less time to inform their colleagues of what was happening in their part of the company. Raghupathi (2007) suggests that transparency and accountability in corporate IS governance are critical to stakeholder confidence and creating a positive image with the general public.

Transparency in ASD

While agile development methods such as Scrum and XP foster an environment of operational transparency through regular communication, they do not address the issue of long- term strategic plans. As the execution of strategy is the key driver of an organisation's financial performance (Bossidy et al., 2002) and employees represent the most valuable variable in the execution of business strategy (Berggren and Bernshteyn, 2007; Hope and Fraser, 2003a) it is important to understand how strategy is communicated and understood by agile teams.

For operational transparency, the iterative nature of development and daily communication fosters an open information culture (Larman, 2004; Schwaber, 2004). Project progression is highly visible and self-organising teams are a key concept. Retrospectives help an agile team identify where improvements are required. Agile methods have been shown to improve accessibility to project information and increase a developers awareness of work going on around them (Chong, 2005). The literature in ASD does not give much detail on the level of organisational transparency required by the ASD team, nor how access to relevant information affects team performance, nor indeed what information *is* important for

team performance. This is an under researched area and future studies are required to gain a better understanding of these issues (Chong, 2005).

Table 3-6 Transparency Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Strategic Transparency	(Berggren & Bernshteyn, 2007; Mankins & Steele, 2005)	Strategy	*There is an explicit ISD strategy*
			This strategy clearly outlines the goals of the ISD teams
	(O' Toole & Bennis, 2009; Hope & Fraser, 2003a)	Ethical	*There is one set of numbers used to manage ISD projects*
	(Street & Meister, 2004; Beech & Crane, 1990)	Dissemination	*Regular meetings are held to disseminate requisite information*
Operational Transparency	(Chong, 2005; Larman, 2004; Schwarman, 2004; Hope & Fraser, 2003; Alavi & Leidner, 2001)	Access	*Teams have timely access to all relevant information*
			Teams can see their own progress data
			Teams can see other similar teams progress data
			Teams can see their targets and current positions

3.2 The Beyond Budgeting Model – Process Principles

Processes take many forms within an organisation (Garvin, 1998). Garvin (1998) outlines three approaches to organisational processes; work processes, change processes and behavioural processes. Work processes are seen in this context as the ordering of activities across time and place and agile methods may be classified as a work process. Change processes examine the antecedents and consequences of change and how an organisation changes over time, an example is dynamic capabilities theory which adopts a process approach to argue that dynamic capabilities are the process mechanisms responsible for the continuous development of firm resources to address changes in the business environment (Heart et al., 2010). This section of the study focuses on what Garvin defines as behavioural processes. Schein (1988) elaborates on behavioural processes stating:

"The key to understanding what makes an organisation more or less effective is how it does things… One must understand various processes, how goals are set, how the means to be used are determined, the forms of communication used among members, their process of problem solving and decision making, how they run meetings and groups, how superiors and subordinates relate to each other, and ultimately how leaders lead"

This study is investigating how the process principles outlined by the Beyond Budgeting model can be operationalised and applied to an ASD environment. These processes are seen in this context as behavioural processes as outlined by Schein. The six process principles of the Beyond Budgeting model are discussed in further detail below.

3.2.1 Principle 7 - Goals

Set relative goals for continuous improvement; do not *negotiate fixed performance contracts* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Goal setting theory outlines the important dimensions associated with good goal setting (Latham and Locke, 1991). The core of goal setting theory asserts that performance goals lead to the highest level of performance when they are both clear (specific) and challenging. Specific hard goals lead to higher performance than easy

or vague goals, such as trying to "do your best." (Locke, 2005). Hope and Fraser (2003) suggest that employees should embrace continuous improvement by continually striving for stretch goals that challenge them to think outside the box. Stretch goals or targets are those that are achievable but will be challenging to achieve in the given timeframe (Thompson et al., 1997)

Stretch targets when used in conjunction with other work environment changes (such as empowerment, autonomy, and management support for innovative thinking) have been shown to enhance motivation, performance and creative decision making (Thompson et al., 1997). The aspects of goal setting theory that are considered under the Beyond Budgeting model are; the specificity of the goals, how challenging the goals are to achieve, how relevant they are to current operating conditions, are they set participatively and are they decoupled from initial plans.

Continuous Improvement

To promote continuous improvement, goals should be specific and challenging. Goal specificity facilitates focus and clarifies what constitutes effective performance (Latham, 2000). A clear goal requires a very specific metric that indicates where the team (in this case, the agile team) should be and suggests ways to get there." (Thompson et al., 1997). The specificity of the goal also facilitates feedback (Latham, 2000). In dynamic tasks, feedback plays a crucial role in affecting decision strategies as well as performance. For feedback to be effective, it should not only identify the need to adjust action, but also provide specific information concerning how to adjust (Abdel-Hamid et al., 1999). Outcome feedback will provide information on the need to adjust but for effective performance in complex environments, subjects also need access to process feedback (such as cognitive feedback).

Challenging goals facilitate pride in accomplishment. By definition, challenging goals are difficult and when setting challenging or 'stretch' targets the team should have a supportive and encouraging environment, which allows them to reach these targets. To be able to reach stretch targets, Thompson et al. (1997) recommend the team: have autonomy, be empowered, be structurally accommodated, have bureaucratic immunity and be continuously supported and encouraged in order to achieve stretch goals.

Relativity

To ensure goals are relative they should be set by the team, visible across the organisation and benchmarked against industry best-in-class performance measures, direct competitors or internal prior year results (Hope and Fraser, 2003a). Relative performance standards potentially increase motivation because the performance bar adjusts naturally to be challenging, yet achievable when there is an appropriate benchmark group (Hansen et al., 2003). In contrast, budget targets derived in traditional budgeting processes often create tension between what upper management identify as desirable and what lower-level managers' claim is feasible. The relative goals component sets targets using benchmarked performance targets or goals, where the benchmarks are either internal (e.g., different units in the same organisation) or external (e.g. performance in comparison with leading competitors). Benchmarked performance targets are difficult to argue against (e.g., "if others can do it, why can't we") and allow adjusting for uncontrollable factors. This transparency is likely to increase the perceived fairness of performance evaluations, thereby reducing gaming behaviours and motivational problems. Benchmarking encourages an "if they can, so can we" belief (Latham, 2000). It is important that benchmarks used are identifiable to the team. In dynamically complex task environments such as software development (Rasch and Tosi, 1992) the relevance of the benchmark becomes more important. If external benchmarks are not available, then internal benchmarks can be used or measures such as improvement on the previous year's results. Having a set of visible goals encourages the performance of self-organising teams and enhances reputations. Goals of teams should be highly visible and can be easily compared with others. Making a public commitment to the goal enhances commitment, presumably because it makes one's actions in one's own eyes and in the eyes of others (Hollenbeck et al., 1989).

One factor that can affect goal commitment or determination to reach a goal is the manner in which goals are set (Abdel-Hamid et al., 1999). Generally speaking, goals can be assigned to an individual or set participatively. The use of participation in decision making (PDM) was originally thought to be a major factor in gaining goal commitment (Erez et al., 1985). This was shown to be incorrect when all factors (e.g. efficacy enhancing instructions given) were controlled and PDM had no advantage over assigned goals (Latham et al., 1988). However, Locke and Latham

(2005) report that PDM is useful when the objective is to work smarter rather than harder. Communication, coordination, and improvements in self-efficacy and sharing task strategy information have been shown as a result of PDM. Therefore, in the overall context of this framework it is regarded as an important dimension of the relative goal-setting construct.

Performance Contract

Hope and Fraser (2003) suggest not having a fixed performance contract. The explicit goals that guide a project should be decoupled from the (often unreliable) initial estimates. Instead, goals should be set with a view to affecting the strategy that the manager chooses to follow (Chesney and Locke, 1991). In practical terms, this entails setting the appropriate behavioural metric to guide the manager's decision (Abdel-Hamid et al., 1999). The goals set should be specific and challenging but it is the performance that should be rewarded (Hope and Fraser, 2003a). Loosening the tie between goals and rewards allows hindsight evaluations to take place, which take into account the full context in which the goal is pursued. Factors such as resources, obstacles and market conditions may be included in the evaluation (Locke, 2004).

Goal Setting in ISD

Hoegl and Parboteeah (2003) studied the influence goal setting has on the performance of software development teams and find it is positively related. Their team performance measures were effectiveness (quality of the product) and efficiency (adherence to budget and schedule) and they find that goal setting is more strongly correlated to effectiveness. They also find that the quality of the team collaboration is a moderating variable in the relationship between goal setting and team performance. Abdil-Hamid et al. (1999) note that a micro-empirical analysis of how goals affect managerial decision behaviour is not well understood. Their simulation game project suggested that given specific software project goals, managers make planning and resource allocation choices in such a way that will meet those goals. When requirements are constantly changing Robinson and Pawlowski (1999) recommend a requirements dialog meta-model to handle the changing requirements and associated goals.

Goal Setting in ASD

As requirements are continually changing in an agile environment, setting long-term goals, which include having finished functionality, is often not feasible. In agile development, the teams will have sprint planning meetings and review meetings where short-term goals will be discussed. Setting relative goals can be a strong motivator to encourage teams to outperform competing teams (Poppendieck and Poppendieck, 2010). As ISD changes from a traditional plan-driven approach to an agile philosophy to accommodate an environmental change from stable to unpredictable, the goal of problem solving changes from optimisation to responsiveness (Nerur and Balijepally, 2007). Table 3-7 shows the components, dimensions and operations of the Beyond Budgeting goal principle. There is little empirical evidence available examining how goals are suited to an ASD environment and what type of goals are suited to ASD.

Table 3-7 Goal Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Continuous Improvement	(Locke & Latham, 2002; Latham, 2000; Abdel-Hamed et al., 1999; Thompson et al., 1997)	Specific	*Long term and short term goals are clear and precise*
		Challenging	*Stretch targets are always set*
		Feedback	*Mechanisms include outcome and process feedback*
Relativity	(Latham, 2000; Hollenbeck et. Al. 1989; Erez et. Al. 1985)	Benchmarking	*Goals are benchmarked against relative peer groups*
		Transparency	*Targets are visible across the organisation*
		Participation	*Teams participate in setting their own goals*
Performance Contract	(Hope & Fraser, 2003; Locke 2004; Chesney & Locke, 1991)	Decoupled	*Targets are decoupled from performance review*
		Behaviour	*Behaviour metrics are an integral part of goal setting*

3.2.2 Principle 8 - Rewards

Reward shared success based on relative performance, *not on meeting fixed targets* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Relative performance evaluation (RPE) entails evaluating individual or organisational unit performance relative to the performance of others. Economic theory provides a rationale for RPE based on sharing common external risks (Gibbons and Murphy, 1990). Individuals are rewarded not just for their own performance but also for their performance relative to the performances of their co-workers or best in industry standards (e.g. explicit contests and tournaments, bonus schemes, promotion of one group member, etc.) Random factors beyond the control of the individual usually affect the performance of the individual and can affect the performance of the individuals against whom they are measured. RPE can provide incentives while partially insulating the individuals from common uncertainty (Dye, 1992; Holmstrom, 1982). The downside is that RPE generates incentives for dysfunctional behaviour (collusion, sabotage, picking weaker co-workers to work with, etc.) and is less desirable when relative measures are expensive or difficult to apply or when there are production externalities, as in the case of teamwork, where shirking or free riding is an issue (Gibbons and Murphy, 1990; Holmstrom, 1982).

Teamwork, though, is increasingly seen as an appropriate structure to organise various labour environments (Ishida, 2006; O'Leary-Kelly et al., 1994) and the suitable provision of incentives for teams appears to be one of the most challenging tasks in labour economics (Irlenbusch and Ruchala, 2008). Hope and Fraser (2003) suggest that instead of the fixed performance contract, team performance should be evaluated by a peer review group (using relative measures) with hindsight. The downside is that because there is no fixed target, evaluations conducted by peer review are subjective. However, there are some formulas that may be used to provide some structure to these peer reviews. One popular reward scheme used in the Beyond Budgeting literature is to get rid of individual performance bonuses and operate a group wide profit sharing scheme. (Bogsnes, 2009; Hope and Fraser, 2003a). Bogsnes (2008) suggests that individual bonuses are counter-productive for long term relationships and lead to dysfunctional behaviour, such as lack of

cooperation or what is termed the crowding out effect (Irlenbusch and Ruchala, 2008).

Research supports designing a reward system which provides group or team rewards based on relative performance, with team incentives (i.e. team rankings) which motivates individuals through peer sanctions (Irlenbusch and Ruchala, 2008; Ishida, 2006; Knight et al., 2001). The main premise of the Beyond Budgeting reward principle is that performance evaluation is disconnected from a fixed target (i.e. is relative), is carried out with hindsight and benchmarked against internal or external key performance indicators, is based on group performance and is performed by subjective peer review (Table 3-8) (Hope and Fraser, 2003a).

Rewards in ISD

Much of the work on rewards in IS research is based on control modes or forms of control. These insights into behavioural, clan and outcome control are important (McHugh et al., 2008a) but rather than taking a control aspect, the Beyond Budgeting model is more interested in developing conditions that illicit cooperation and providing incentives for team members to cooperate rather than to control team members. Tenenberg (2008), using an institutional analysis perspective, presented the Institutional Analysis and Development framework (Ostrom, 2005) as a means for developing cooperation and reducing free riding or shirking. His findings suggest that face-to-face communication, long-lasting teams, multi-level, mutual and public monitoring and the threat of sanctions, combined with a reward scheme that is 70% based on group performance enhances cooperation and reduces free riding.

Rewards in ASD

Detailed fixed performance contracts are not suited to agile development because of work breakdown structure inadequacies and the flexibility time-boxing requires (Boehm and Turner, 2005). Hope and Fraser (2003) recommend a *relative performance* contract. Relative performance evaluation with hindsight is carried out by measuring team performance at the end of a period and then measuring against historical data or other *benchmarks*. The actual operating and economic circumstances of the period are incorporated into readjusted targets and rewards are based on subjective performance evaluations with an emphasis on *group* rather than individual performance (Hansen et al., 2003). Beyond Budgeting also suggests that

teams should be peer reviewed by other groups. That is, the performance of the team is judged by other groups within the organisation. Perhaps due to the relatively recent emergence of ASD, the complexity of rewarding teams and individuals within teams and the sometimes sensitive nature of reward systems, it is unsurprising that the ASD literature has not produced much empirical evidence regarding reward systems and the affect these have on team performance. Anecdotal evidence points to understanding the needs of the individuals working in a group environment and having reward processes in place that take into account the technical and collaboration skills of the individual (Smith and Sidky, 2009). Others have suggested establishing clear promotion criteria, tying profit sharing to economic drivers and de-emphasising the focus on monetary incentives (Poppendieck, 2004a; Poppendieck and Poppendieck, 2008).

Table 3-8 Rewards Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Relative performance	(Chillemi, 2008; Irlenbusch & Ruchala 2008; Ishida, 2006; Boehm & Turner, 2005)	Relative Performance Evaluation	*Rewards are not based solely on meeting a fixed target*
			Hindsight evaluation is used
Benchmarking	(Poppendieck & Poppendieck, 2008; Hansen et al., 2003; Hope & Fraser, 2003)	Benchmarking	*Goals are benchmarked against peer groups or other appropriate benchmarks*
Group evaluation	(Bogsnes, 2009; Smith & Sidky, 2009; Irlenbusch & Ruchala, 2008; Ishida, 2006)	Group Evaluation	*The team is evaluated as a group*
		Peer Review	*Groups are reviewed by peers*

3.2.3 Principle 9 - Planning

Make planning a continuous and inclusive process, *not a top down annual event* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

The Beyond Budgeting model argues that annual budget-driven planning processes are time-consuming, add little value and prevent managers from responding quickly to changes in today's business environment. Hamel (2009) argues that the next generation of management (what he terms management 2.0) will require major changes to the traditional command-and control models of the past. He explains that highly collaborative systems will outperform traditional adversarial win-lose systems. By win-lose systems he means senior executives and capital providers winning while employees lose. Hamel argues that *"only a participatory process can engender wholehearted commitment to proactive change"*. To promote a participatory process, organisations must engage in participatory long-term planning. Grant (2003) finds that in turbulent and unpredictable environments strategic plans have become more goal focused and less specific with regard to actions and resource allocations. There is general agreement in the literature that in order to adapt to a changing environment, the formal annual calendar-driven strategic planning process needs to be revised (Grant, 2003; Hamel and Prahalad, 2005; Hope and Fraser, 2003a; Mintzberg, 1994; Philip, 2007).

In the context of long-term planning for teams, Guzzo and Dickson (1996) suggest that familiarity and understanding among team members has the greatest utility early in the team's existence through fostering the rapid integration and coordination of team members' efforts (Guzzo and Dickson, 1996). They also indicate that familiarity has value at times of high stress and high demand. However, question marks remain over how long a team should be kept together. Team member familiarity may eventually become a liability as a lack of membership change can contribute to stultification and entropy within teams. Katz (1982) also suggests that communication between team members declines as teams age.

The Beyond Budgeting model argues that, rather than having a single top-down fixed plan that determines actions for the year ahead, the devolution of the planning process would allow for a continuous adaptation of short-term plans to meet strategic

objectives. This emergent process of strategic planning is in contrast to formal, rational, strategic planning processes and means a change of roles for senior executives who will be employed in a more supporting role for bottom-up strategic initiatives (Hamel, 2009; Philip, 2007). The executive group will outline strategic guidelines and set the strategic vision for the organisation and then create the conditions in which new strategies can emerge and evolve (Hamel, 2009). To operationalise the strategic vision of the organisation, the planning process needs to be devolved to lower levels of the organisation.

Planning in ISD

As the speed of business continues to accelerate, organisations are also requiring faster feedback/response cycles in the planning process (Reiff, 2001). Reiff (2001) discusses how the use of internet and other web-enabled collaborative tools can help speed up this iterative feedback and response cycle. The objective is to have a real-time system that is always up to date (Hope and Fraser, 2003a). Traditionally in ISD, projects were planned using the SDLC as a means of planning out and controlling each phase of the project. The most common method used to implement the SDLC was the waterfall method with each phase of the project was planned and documented before development commenced. However, as organisations faced increasingly turbulent and dynamic business operating conditions, and as technologies rapidly changed, customers' requirements also began to change during the development process. ISD teams found that planning out complete projects upfront was often problematic as the end product was not always of relevance to the customer.

Planning in ASD

The Beyond Budgeting model suggests outlining flexible strategic and operating guidelines. Given the iterative nature of ASD and the capacity to embrace requirement changes late in the development process, flexible guidelines are more appropriate than a fixed, inflexible annual plan. Long-term planning is not emphasised in ASD as much as short-term planning and the affects of long-term planning or lack of long-term planning (i.e. plans for beyond any given project) on ASD is unclear from the current ASD literature.

Bogsnes (2009) suggests that planning is about specifying actions to achieve forecasts. These actions are reviewed continuously to ensure they are up to date with moving forecasts. The iterative nature of ASD provides the opportunity to adjust project plans or actions so that they are more flexible and suitable to achieving these moving forecasts (Li et al., 2010). While short-term *continuous* and *inclusive* planning is implicit in ASD and ASD managers are generally happier with the planning process, 85% of managers would still like improvements to be made to the process in ASD (Ceschi et al., 2005). Table 3-9 outlines the main components, dimensions and operations of the planning principle.

Table 3-9 Planning Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Long-Term Planning	(Hamel, 2009; Grant, 2003; Mintzberg, 1994)	Guidelines	*Guidelines are used rather than fixed, inflexible annual plans*
Inclusive	(Philip, 2007; Hope & Fraser, 2003; Reiff, 2001)	Team Involvement	*Team members have input into their own strategic plans*
			Team members may be involved in local strategic planning
Continuous	(Hope & Fraser, 2003; Reiff, 2001)	Continuous Review	*Forecasts are updated on a monthly basis*
			Trends are analysed and monitored
			Key performance indicator boundaries are used
Action Planning	(Li et al., 2010; Bogsnes, 2008; Hope & Fraser, 2003)	Adjustable Plans	*Action plans are continuously updated to account for any future performance gaps identified*

3.2.4 Principle 10 - Controls

Base controls on relative indicators and trends, *not variances against a plan* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Control in organisations has been studied by researchers for many years and it is generally recognised that control mechanisms are of critical importance in helping organisations achieve their goals (Kirsch, 1996; Ouchi, 1979). As discussed previously, it is possible to view planning and control techniques as a spectrum. At one end is a focus on command-and-control type management, with formalised annual plans and control mechanisms in place to ensure that preset plans are realised. At the other end is a focus on agility where long-term planning becomes so unreliable that it is essentially eliminated and the control focus is moved toward rapid response once actual operating conditions are observed (Brown, 1999; Hansen et al., 2003; Malone, 1997).

Hope and Fraser (2003) suggest that decentralisation is the way forward and in their studies most of the companies have switched their measurement instrument from central control to a more multilevel control, where multilevel control means knowing what's going on and only interfering when absolutely necessary. Cisco's CEO John Chamber echoes this sentiment saying: *"from a business-model and leadership perspective, we're seeing a massive shift from management by command-and-control to management by collaboration and teamwork. Business processes are being turned upside down to better compete in a global environment."* (Fryer and Stewart, 2008).

There are numerous reasons for this shift in management practices, e.g. see (Sambamurthy and Zmud, 1999). One main reason however, is that traditional budgetary controls and associated management control processes fail to create a high performance climate based on competitive success because a fixed target is the definitive measure of success (Hansen et al., 2003). Multilevel controls require a multifaceted control system that provides information based on a wide range of key indicators and forecasts. All information is aggregated at different levels and the same information is available at the same time to all those with a relevant interest (Hope and Fraser, 2003a). Higher-level management uses a Management-by-exception (MBE) type of control mechanism, only interfering when KPIs are outside of set boundary limits. MBE has received some criticism in the literature as the stress put on investigating unfavourable variances may induce dysfunctional behaviours (Brownell, 1983). Simons (1995) argues that use of MBE tools such as diagnostic or interactive control systems alone is not adequate to ensure effective control (Simons,

1995). He recommends the use of other controlling mechanisms such as boundary systems and belief systems as complementary controlling mechanisms. Hope and Fraser (2003) and Bogsnes (2008) agree and recommend that a holistic approach be taken by organisations when adopting the Beyond Budgeting principles. Adopting complementary mechanisms such as RPE, boundary systems and belief systems will enhance the benefits of MBE systems.

Control in ISD

For organisations developing software it is important for the performance of the organisation to understand how their development teams are controlled (Nidumolu and Subramani, 2003) and also important to understand how the control process affects the performance of the team (Mathieu et al., 2008). In the field of project management Sambamurthy et al. (1999) recognise that organisational IT/IS governance frequently moves through recurrent centralisation/decentralisation cycles and use the theory of multiple contingencies to examine how contingency forces influence the mode of IT/IS governance. They identify how reinforcing or dominating contingency forces induce either a centralised or a decentralised mode of IT/IS governance and where there are conflicting contingencies a federal mode of governance is induced. An example given of conflicting contingencies is one where a corporation operated in diverse markets and therefore had a decentralised mode of corporate governance. However, a strategic decision to implement common applications and share common resources and knowledge led to conflicting contingencies. This resulted in IT/IS infrastructure and projects being managed by corporate IS whereas divisional IS managed IT use, leading to an overall federal mode of IT governance. Research on control modes in ISD is well established under vertical control mechanisms, however, as more lateral relationships are becoming important in systems development, control theorists are continuing to shed new light on informal control modes (Kirsch, 1996; Kirsch, 1997; Kirsch et al., 2010; Kirsch et al., 2002).

Control in ASD

Control in agile projects can utilise KPIs such as burn down charts (a trend showing the work remaining across time in a sprint), velocity rates (the speed at which the team is completing tasks) or product backlogs. In each iteration, the team

refines its forecast, updates the release plan, the release backlog and the cost estimates (Sliger and Broderick, 2008). The frequent and continuous release of working software allows upper management to view all relevant data and manage by exception. For individual team members the empowerment envisioned by the Beyond Budgeting model will be effective when it is accompanied by a mechanism of control known as clan control (Hansen et al., 2003). Clan control represents cultural values almost the opposite of bureaucratic control. Clan control relies on values, beliefs, corporate culture, shared norms, and informal relationships to regulate employee behaviours and facilitate the reaching of organisational goals. Recent research has extended control theory to include control modes for agile systems development. For example, Harris et al. (2009) find that increased uncertainty of the software product market and the technology leads to the use of more flexible control approaches. They also find that control in flexible software development projects is facilitated by emergent controls such as scope boundaries and dynamic feedback. Maruping et al. (2009a) find that under conditions of high requirements change, control modes that provide team autonomy in development activity are most effective in promoting increased project quality. Examining how differing control modes are effectively used in an ASD environment is a relatively new and still an under researched area (McHugh et al., 2008b). Table 3-10 outlines the components, dimensions and operations of the control principle.

Table 3-10 Controls Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Control	(Harris et al., 2009; Maruping et al., 2009; Bogsnes, 2008; Hope & Fraser, 2003; Simons, 1995)	Key Performance Indicators	*KPIs are outlined before the project commences*
			Variance limits of these KPIs are known to the team
			All relevant information for these KPIs is available to the team
Management		Management By Exception	*Higher level management do not interfere unless a KPI is out of bounds*

3.2.5 Principle 11 - Resources

Make resources available as needed, *not through annual budget allocations* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

Complex and turbulent markets require organisations to be highly adaptable. Under such conditions, a major source of sustained competitive advantage is the dynamic capabilities by which a firm "integrates, builds, and reconfigures internal and external competencies to address rapidly changing environments" (Teece et al., 1997). Dynamic capabilities theory arose from the resource-based view of the firm (Barney, 1991) and suggests a buffer between the firm's resources and the changing business environment. This buffer allows a sense-and-respond approach to be utilised by the development team (Haeckel, 1995; Haeckel, 1999; Haeckel, 2004; Mathiassen and Vainio, 2007). Haeckel (1999) suggests that strategy should be focused on creating and developing mechanisms that enable the responses to change rather than on planning specific actions that implement the stated goals. Structures should consist of dynamic networks of modular, collaborative capabilities rather than static hierarchies of tasks and responsibilities and governance should be achieved through coordination based on shared values and information rather than dedicated command-and-control activities. In terms of ASD this form of resource allocation mechanism would allow agile teams the freedom to respond efficiently and effectively to changing requirements while operating within boundary conditions and KPIs. The Beyond Budgeting model suggests that resources are made available as required to add business value. To calculate the business value and *justify* the resources required, the resource costs are available to the team and the team is able to calculate the *impact* those costs have on the project outcomes. Operating guidelines are in place which will dictate the *boundaries* within which the team can make resource acquisition and resource allocation decisions. Table 3-11 outlines the main components, dimensions and operations of the resources principle.

Resources in ISD

The availability of resources is a critical factor impacting ISD success (Ein-Dor and Sergev, 1978; Siau et al., 2010; Tait and Vessey, 1988) and is deemed a critical element of the software development project (Pressman, 1997; Sommerville, 1996).

Tait and Vessey (1988) showed that the availability of resources leads to a better chance of success and they also find a significant negative relationship between resource constraints and the success of systems development. There is general agreement that when resource constraints exist, the chances for success of a system implementation is low (Ein-Dor and Sergev, 1978; McConnell, 1996; Tait and Vessey, 1988). Ein-Dor and Sergev (1978) identified two major types of resource constraints for information systems development: internal versus external resources.

Internal resources refer to internal organisational constraints such as time restrictions and limited funding. If there is insufficient time or funding then the development team may not follow normal development procedures, thus increasing the risk of system failure (Ein-Dor and Sergev, 1978; Tait and Vessey, 1988).

External resources refer to constraints such as lack of suitable professionals, hardware or software, which are external to the organisation. Sarker and Sarker (2009) suggest people-based agility refers to the availability and flexibility of suitable professionals when a team needs to ramp up or ramp down and also the ability of those professionals to play different roles within the organisation. They also highlight the need for suitable technology to be available and outline a set of tactics, which can be used to counter the negative affects of external resource constraints in a distributed software development environment.

Resources in ASD

In a study of distributed ASD teams Sarker and Sarker (2009) recognised that ISD agility should be viewed as a multifaceted concept having three dimensions: resource, process and linkage, with resource agility being the team's access to necessary human and technological resources. Agile teams will sometimes need a resource that is required by more than one team. Resources such as servers and routers or human resources such as database administrators or technical writers may have to multitask between teams. The iteration release planning can help plan for when these resources are required. Usually an agile team is finalised when the project begins and a change in scope will result in a time change or visa-versa. Other resources are allocated dynamically as the project progresses (Boehm and Turner, 2004; Highsmith, 2004). Sarker and Sarker (2009) also highlight the importance of cross training team members and recognise multi-skilled team members as a people

based agility resource. However, little empirical evidence exists which examines the suitability of differing resource acquisition processes for ASD.

Table 3-11 Resources Components

Principle Components	Supporting Literature	Dimensions	Operations
Justification	(Sarker & Sarker, 2009; Bogsnes, 2008; Boehm & Turner, 2004; Highsmith, 2004; Hope & Fraser, 2003)	Availability	*Additional resources are available if they are justified*
		Costs	*The cost of resources is available team members*
Impact		Impact	*How the cost impacts KPI is known to the team*
Boundary		Limits	*The limit for resource costs is known*

3.2.6 Principle 12 - Coordination

Coordinate interactions dynamically, *not through annual planning cycles* (Bogsnes, 2009; Hope and Fraser, 2003a; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010)

According to the Beyond Budgeting model, coordination is about integrated performance management, from overall strategies and strategic objectives, to KPIs, actions and forecasts; and further into team and personal goals, evaluations and rewards (Bogsnes, 2009). Hope and Fraser (2003a) suggest that managers must coordinate commitments according to the pace of market demand stating: *"In organisations that have abandoned budgets, market-facing business units become customers of upstream processes and central service providers, and suppliers to external customers. The ultimate objective is to match resource needs to prevailing customer demand"*. They see the organisation as coordinating dynamically through both vertical (business units coordinating with customers and upstream supply units) and horizontal (team to team and within unit coordinating) mechanisms.

Coordination has been defined as: the management of dependencies between activities (Crowston, 1997; Malone and Crowston, 1994), the act of integrating each task with each organisational unit (Carmel and Agarwal, 2001) or the integrating or linking of different parts of an organisation to accomplish a collective set of tasks

(Van De Ven and Delbecq, 1976). Coordination theory shows that actors in organisations face coordination problems that arise from dependencies that constrain how tasks can be performed (Crowston, 1997; Gosain et al., 2004; March and Simons, 1958).

Coordination in ISD

Nidumolu (1995) identified two distinct types of coordination, *horizontal coordination* – coordination through mutual adjustments and communication and *vertical coordination* – coordination through authorised entities. These findings are based on the coordination between software development teams and users and suggest that higher levels of both vertical and horizontal coordination led to higher levels of overall project performance. Research has also shown that coordination improves when there is social interaction between teams who compete with each other for market share. However, social interaction has no perceivable affect on knowledge sharing among teams who compete with each other for internal resources and a formal hierarchical structure has been shown to have a negative impact on intra-firm knowledge sharing (Tsai, 2002).

Faraj and Sproull (2000) conducted a study of 69 software development teams and their research found that coordinating expertise played a significant role in team performance. They highlighted that expertise presence alone on a team was not sufficient to affect performance effectiveness if team members could not coordinate their expertise. Team members must be familiar enough with each other's experiences, skills, and specialised knowledge to facilitate the emergence of expertise coordination processes. The use of knowledge management *repositories* to capture and disseminate knowledge from management, teams, products and customers has also been shown to increase the performance of the organisation (Tanriverdi, 2005). While the benefits of knowledge sharing are well documented, it is unclear from current ASD literature what *incentives* are required for ASD teams to participate in this knowledge sharing.

Coordination in ASD

Agile development involves intensive teamwork and high task interdependence. As task interdependence increases, the need for coordination becomes greater (Cao and Ramesh, 2007). Van De Van and Delbecq (1976) find that as task uncertainty

increases horizontal coordination mechanisms such as group meetings and personal communication increase significantly and vertical hierarchical, impersonal mechanisms decrease. Agile approaches may achieve horizontal coordination through mechanisms such as multi-team coordination and within team coordination and through *formal* (e.g. formal scheduled group meetings) and/or *informal* (e.g. unscheduled phone calls) means.

Mishra and Mishra (2009) find that an appropriate workspace environment has a positive impact on ASD team coordination. Moe and Dingsoyr (2008) suggest that teams coordinate using mechanisms such as shared mental models, closed-loop communication and mutual trust. While there is an emerging body of research on how agile teams coordinate within their own team (Faegri et al., 2010; Maruping et al., 2009b; Mishra and Mishra, 2009), the increasing use and scaling up of agile methods has meant that ASD teams are often dependent on other teams to get their work done (Holmstrom et al., 2006). Key textbooks have sought to address the issue with Larman and Vodde (2008) suggesting coordination meetings and/or Scrum of Scrums as a mechanism for multi-team coordination. They also state: *"healthy self-managing teams are themselves responsible for their coordination with other groups"*. Others such as Shalloway et al. (2009) suggest the formation of product coordination teams which include members of the ASD team itself as a means to improve coordination. ASD research has also used coordination theory to examine the communication issues surrounding larger development projects with Pikkarainen at al. (2008) finding that a mismatch of adequate communication mechanisms can sometimes hinder communication in larger projects with multiple stakeholders. However, understanding the affects coordination and coordination mechanisms have in projects, particularly when ASD teams have a dependency on other teams is not well understood in the ASD literature (Abrahamsson et al., 2009; Dybå and Dingsøyr, 2008; Holmstrom et al., 2006; Pikkarainen et al., 2008).

Table 3-12 Coordination Components

Principle Components	**Supporting Literature**	**Dimensions**	**Operations**
Horizontal Coordination	(Shalloway et al., 2009; Larman & Vodde, 2008; Hope & Fraser, 2003)	Intra-team coordination	*Teams members coordinate activities within their own team*
		Inter-team coordination	*Team to team communication takes place*
Vertical Coordination	(Highsmith, 2004; Hope & Fraser, 2003; Van De Van and Delbecq, 1976)	Management Coordination	*The team coordinates with management*
		Customer Coordination	*The team coordinates with customers*
Formal Coordination	(Faegri et al., 2010, Maruping et al., 2009, Mishra and Mishra, 2009)	Formal Communication	*Team members use formal means of communication*
Informal Coordination	(Faegri et al., 2010, Larman & Vodde, 2008)	Informal Communication	*Team members participate in informal communication*
Knowledge Repositories	(Tanriverdi, 2005; Faraj and Sproull, 2000)	Knowledge repositories	*Knowledge repositories are used to capture and disseminate knowledge*
Incentives	(Tanriverdi, 2005; Faraj and Sproull, 2000)	Incentives	*Teams have incentives to use knowledge repositories*

3.3 Chapter Summary

This chapter introduced the Beyond Budgeting model. The major theoretical propositions underpinning each of the 12 principles were discussed. Each principle was then operationalised relative to ASD thereby fulfilling one objective of this study. The operations or practices that represent each principle in the context of ASD were chosen based on their previous use within the literature. Operations were chosen firstly if they had previously been used within ASD, secondly if they had previously been used within ISD and finally, if little previous research existed in the fields of ISD or ASD, then the operations were based on previous use within the related fields of management and management accounting.

The operationalisation of the model highlights the appropriateness of Beyond Budgeting for an ASD environment and emphasises the conceptual similarities between Beyond Budgeting and ASD (Lohan et al., 2010a). The review of the ASD literature shows that much of the extant literature within the field of ASD focuses on ASD methods within the micro context of the ASD environment itself. As the Beyond Budgeting model was designed as an overall organisational management model, conceptualising and operationalising it relative to ASD has highlighted areas where the ASD literature is lacking with regards to an understanding of the organisational structures and processes that facilitate or hinder their use.

The second objective of this study is to apply the Beyond Budgeting model to an ASD environment and the third objective is to extend ASD methods based on this application. The next step in this process, therefore, is to apply the operationalised model to an ASD environment. This application will determine where legacy organisational processes and mechanisms impact on the ASD team and how ASD practices can be further developed or modified to handle these impacts. These findings will extend ASD methods thus fulfilling the third objective of this study and answer the calls for more research to examine and understand ASD methods within a wider organisational context (Abrahamsson et al., 2009; Agerfalk et al., 2009; Kettunen and Laanti, 2008; Moe et al., 2010) The next chapter describes the research approach and the methodology used in applying the operationalised Beyond Budgeting model and collecting the empirical data.

Chapter 4 Research Approach

This chapter begins with a review of the epistemology of information systems research, looking at the two dominant viewpoints of positivism and interpretivism. Following this review, the philosophical beliefs and working assumptions which underpin this research project are declared. In section 4.3, the advantages and disadvantages of a number of IS research methods, such as surveys, case studies, experiments and action research are briefly discussed. Section 4.4 elaborates on why a case study research approach was chosen for this study. Section 4.5 then describes the case study research approach and discusses the main considerations when choosing this approach. The procedures used to develop the operationalised Beyond Budgeting model, design the case study, and to analyse the resultant data are then described in sections 4.6.

4.1 Research Paradigms

A good research-undertaking starts with the selection of the topic, problem or area of interest, as well as the research paradigm (Groenewald, 2004). Many philosophical paradigms exist- positivism, interpretivism, critical research, neo-humanism and radical structuralism - to name but a few. However, the two dominant philosophical paradigms within IS research are interpretivism and positivism (Chen and Hirschheim, 2004; Mingers, 2003). Weber (2004) produced a characterisation of the different assumptions generally associated with both paradigms. He outlines the differences between positivism and interpretivism (Table 4-1) and suggests that both paradigms share many commonalities.

Table 4-1 Interpretivism vs. Positivism

Assumptions About	Interpretivism	Positivism
Ontology: The nature of existence or reality	Reality-for-us is an inter-subjective construction of the shared human cognitive apparatus (Internal realism) Each person constructs his or her own reality (Subjective realism) Person and reality are inseparable	Reality exists independent of our construction of it (External realism) Person and reality are separate
Epistemology: The nature of knowledge claims	Facts and values are intertwined and both are involved in scientific knowledge (Non positivism) Knowledge of the world is intentionally constituted through a person's lived experience Scientific knowledge is ideological and inevitably conducive to particular sets of social ends (Normativism)	Facts and Values are distinct Scientific knowledge consists only of facts Objective reality exists beyond the human mind
Research Approach	Phenomenology, Ethnomethodology, Philosophy of language, Hermeneutics	Statistics, Content analysis
Validity	Defensible knowledge claims	Certainty: data truly measures reality
Reliability	Interpretive awareness: researchers recognise and address implications of their subjectivity	Replicability: research results can be reproduced

Source: Webber, 2004

While commitment to one or other of the dominant research paradigms does not exclude the use of particular research methods for any given study, the choice between interpretivism and positivism is an important issue for any researcher. Therefore it is useful to discuss both of these dominant positions within IS research.

4.1.1 Positivist Paradigm

From a positivist perspective objective reality exists beyond the human mind. All phenomena can be explained through models and measurements that are premised on the existence of a priori relationships which are capable of being identified and tested via hypothetic-deductive logic and analysis (Orlikowski and Baroudi, 1991; Paré, 2004). To research and understand this objective reality, the researcher develops measurement instruments that can quantifiably measure the constructs and dimensions of any phenomena. These measurement instruments produce data, which is a true measurement of reality. Positivist research studies, such as those using large scale surveys, cover a wide range of people and events and therefore more generalised conclusions can be made from the findings. The positivist paradigm is the most widely used research approach in the IS field (Table 4-2).

Table 4-2 Methods and Paradigm Use in IS Research

	U.S Journals	European Journals
Methods		
Quantitative	71%	40%
Qualitative	20%	49%
Mixed	9%	11%
Paradigms		
Positivist	89%	66%
Interpretivist	11%	34%

Source: Chen and Hirscheim, 2004

Despite the dominance of the positivist paradigm it is often viewed as an unsuitable philosophical approach for IS research. This is perhaps not surprising given that social and organisational issues are so important in IS. Positivists believe that social science research should emulate how research is done in the natural sciences, however, IS is very much a human enterprise and it is important that contextual issues are addressed rather than relying solely on statistics and mathematical observations (Denzin and Lincoln, 2003; Klein and Myers, 1999; Lee, 1999; Walsham, 1993; Walsham, 1995a).

4.1.2 Interpretivist Paradigm

The only real alternative paradigm to positivism that is observable in numbers in IS research is interpretivism (Chen and Hirschheim, 2004). Interpretive research helps researchers in IS to understand human thought and action in social and organisational contexts (Klein and Myers, 1999). Interpretivists view the people (researchers) and reality as inseparable. From an ontological perspective our perceptions of the world are bound to the experiences we have had throughout our lives and the world of the interpretivist has both subjective and objective characteristics. The subjective characteristics reflect the meanings we put on our experience and the objective characteristics reflect that we constantly negotiate this meaning with others with whom we interact. The interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors (Walsham, 2006). Consequently, the epistemological stance of the interpretivist recognises that the knowledge built reflects the researchers' particular goals, culture, experience, history, and so on. The researchers' knowledge of the world is intentionally constituted through their lived experience and researchers cannot assume a value-neutral stance in the research as they are always implicated in the phenomena being studied. Strands of thought in interpretivism include:

- Phenomenology (cf Zuboff, 1988), where the researcher is concerned with the lived experiences of people involved or who were involved with the issue being researched (Groenewald, 2004).

- Ethnomethodology, how human beings make sense of the world in interaction with others and in relation to the objects they encounter (Marcon and Gopal, 2008; Suchman, 1987).
- Hermeneutics, described as: the first order art and the second order theory of understanding and interpretation of linguistic and non-linguistic expressions (Stanford, 2005) e.g. Lee (1994) studied the email exchanges between managers in a corporation using hermeneutic interpretation.

Interpretivism emphasises the development of a rich understanding rather than the formation of casual laws. Researchers within IS have argued that interpretive research has the potential to produce deep insight into IS phenomena (Klein and Myers, 1999; Walsham, 2006). Therefore interpretive research places emphasis on the use of research data collection methods such as case studies, interviews, action research and/or ethnography.

4.2 The Research Paradigm for this Study

The previous two sections outlined the positivist and interpretivist paradigms which often have their own set of research methods. The differences between both paradigms are, however, often spurious and the commonalities often compelling (cf Weber, 2004). Still, interpretive researchers believe that before deciding on the research method to use for a study, the ontological and epistemological position of the researcher must be articulated. Zuboff (1988) believes that every researcher has an epistemological stance or belief which underlines their chosen research method stating that *"researchers must have a theory of reality and of how that reality might surrender itself to their knowledge-seeking efforts"*. Walsham (1995b) states that *"researchers need to reflect on their own philosophical stance, which should be stated explicitly when writing up their work"*. Accordingly the philosophical beliefs which underpin this research project are explicitly declared as interpretivist. The reasons for this are:

- Both the Beyond Budgeting model and ASD methods were introduced as formalised concepts in the early 2000s and the application of the Beyond Budgeting model to an ASD environment is a new and unexplored area. Interpretivist research makes a contribution to this underexplored area through rich, descriptive insights.

- By using the Beyond Budgeting model as a lens to examine ASD teams the researcher examines the meaning attached by team members to their environment from a human perspective through their own lived experience. An interpretivist approach is argued to be a superior approach when it comes to studying human behaviour and perceptions within an organisation (Lee, 1994; Walsham, 2006).

When conducting interpretive field research a useful guide is given by Klein and Myers (1999). They outline seven criteria for conducting interpretive case research (Table 4.3). Their approach is based on the hermeneutic approach (Lee, 1994) and involves a critical reflection of the social and historical background of the research setting and how the data was collected (i.e. the researcher's role in collecting the data). They also give guidance for dealing with multiple interpretations and contradictions to the theoretical preconceptions guiding the research design. This paper is widely cited and popular among interpretive researchers but comes with a warning, both from Klein and Myers themselves and from Walsham (2006) who argue that it is important that researchers are not misled to confuse process with outcome. Walsham notes that: *"It is insufficient to say 'I have applied the principles'. It is essential to say 'Here are my interesting results'"*. The application of the research design for this study is discussed further in sections 4.5 and 4.6.

Table 4-3 Summary of Principles for Interpretive Research

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

Source: Klein and Myers, 1999

4.3 Research Methodology

As distinct from a particular research method a research methodology may refer to a) the general study of research methods, b) the methodology of a particular research study which includes the overall research process or c) a combination of methods used together many times in practice (e.g. Grounded Theory may be referred to as a methodology) (Mingers, 2001). The choice of research methodology is influenced by both the research paradigm adopted by the researcher and the research approach. The research paradigms outlining the ontological and epistemological philosophies for this research are discussed in the previous section. In this section the two major approaches to research, i.e. quantitative and qualitative are introduced and a brief overview of various research methods is given. The section ends with a discussion about why a case study research method was chosen for this study.

4.3.1 Quantitative Vs. Qualitative

Research approaches in IS can be either qualitative or quantitative or a combination of both (Dubé and Paré, 2003). The word qualitative is defined in the Oxford English Dictionary as: of or relating to quality or qualities; measuring, or measured by, the quality of something. …often contrasted with ***quantitative*** (OED, 2010)**.** Denzin and Lincoln (2003 pp 4-5) offer a generic definition of qualitative research stating it is:

"A situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meaning people bring to them".

Kaplan and Duchon (1988) state that:

"Qualitative methods are characterised by (1) the detailed observation of, and involvement of the researcher in, the natural setting in which the study occurs, and

(2) the attempt to avoid prior commitment to theoretical constructs or to hypotheses formulated before gathering any data".

While qualitative research and interpretivism are intrinsically linked, a qualitative research approach may also be used within the positivist paradigm. For example, Yin (2003), Benbasat (1987) and Miles and Huberman (1994) come from a positivist tradition yet have views on case study research which are relevant to interpretivist researchers. Lee (1994) says that: "*interpretivism simply offers a type of scholarly knowledge that is qualitatively different from that which positivism offers. Interpretivism offers scholarly knowledge in the mode of verstehen*[7]*; positivism offers scholarly knowledge in the mode of erklären*[8]*"*. In contrast to a quantitative approach, a qualitative approach is used to interpret and place emphasis on the qualities of entities and on processes and meanings that are not examined or measured by quantifiable data. Thick, descriptive data is collected by the researcher which provides rich insight into the phenomena being studied (Walsham, 1995b).

Quantitative research approaches are based on the testing of hypothesis and models through the collection of quantifiable data. Quantitative techniques are based on establishing correlations between variables and providing proof of hypotheses through statistical and mathematical techniques. Quantitative researchers argue that generalisability can only be achieved through statistical means and qualitative methods should be used to either complement quantitative research or when the research is at a less advanced or scientific stage (Kaplan and Duchon, 1988). Quantitative research is generally linked with the positivist paradigm, believing that objective reality exists beyond the human mind and can be measured independently of the researcher (Weber, 2004).

4.3.2 Research Methods

An examination of eight major IS publications between 1991 and 2001 by Chen and Hirschheim (2004) shows that surveys and case studies are the two major research methods used for empirical research within the field of IS. The other main

[7] Verstehen is associated with the connotation of mutual understanding or shared understanding, where one of the parties to the mutual/shared understanding is a scholarly observer.
[8] Erklären is associated with the connotation of causal explanation in the manner of the theories of the natural sciences.

methods they found in use were experiments (field and laboratory) and action research Fig. 4-1.

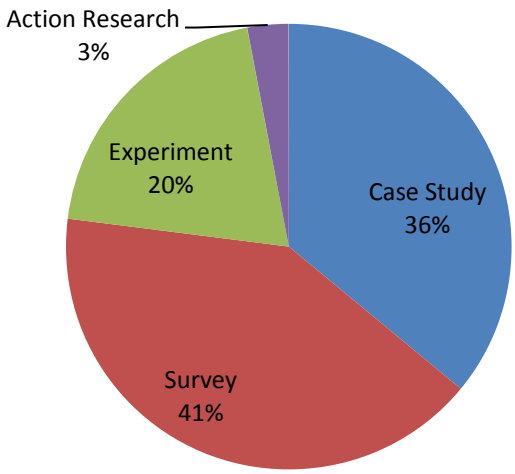

Figure 4-1 Research Methods

Source: Chen and Hirsheim, 2004

1. Surveys

Surveys are used to gather data by means of a questionnaire which is usually distributed via post or the web. They are used to collect large amounts of empirical data that can be used for statistical testing and analyzing (Weber, 2004). Survey designs are usually based on the positivist model of controlling or measuring variables and testing hypotheses (Kaplan and Duchon, 1988). The advantage of conducting a survey is that it offers broad generalisability and provides statistical validation of the research hypotheses. The research results can be reproduced and this ability to replicate the study provides reliability. A downside of using surveys is that unless they are longitudinally administered, they may only provide a snapshot of the phenomena being studied and may not provide any in-depth contextual or causal insight.

2. Case study

Case research is particularly appropriate for problems in which research and theory are at their early, formative stage. It is well suited to capturing knowledge from practitioners and developing theories from it. It is possible to study the research

phenomena in a natural setting, learn about state-of-the-art and generate theories from practice. Case studies allow the researcher to answer "why" and "how" questions and understand the nature and complexity of the processes taking place. It is also suited to an appropriate way to study an area in which few previous studies have been carried out (Benbasat et al., 1987). Case studies require access to numerous sources of data and require a large investment of time and resources. While statistical generalisability is not possible, case studies can provide analytical generalisability.

3. Experiment

Laboratory experiments account for 18% of experiments, while collecting empirical data and field experiments account for 2% (Chen and Hirschheim, 2004). Laboratory experiments include studies that take place within a designed, controlled environment control groups to contrast relationships between variables (Galliers, 1991). Field experiments are similar to laboratory experiments except that they are conducted in a real-world setting. They have the advantage of being conducted in a more realistic setting; however there may be reduced ability to control variables. Experiments are suited to well-defined problems and are generally used within a positivist paradigm.

4. Action Research

Walsham (1995a) makes the distinction between an outside researcher and an involved researcher. An outside researcher has no direct involvement in action in the field whereas an involved researcher is a participating observer actively involved. Action research is similar to ethnography, where the researcher seeks to understand the world from the subjects point of view (cf Baskerville and Myers, 2004; Van Maanen, 2011).The researcher immerses themselves into the world of the subject. This approach can utilise surveys, interviews, content analysis, conversation analysis and a range of other research methods. An action researcher tries consciously and explicitly to change things in the way they feel best while and outside observer tries to be neutral and not be perceived by people in the field as being aligned with any particular group or individual within the organisation.

4.4 The Research Method for this Study

Case studies are particularly suited to IS research and are increasingly used in the IS discipline (Paré, 2004; Walsham, 2006) and a case study method was chosen for this study for a number of reasons. According to Benbasat et al. (1987) case study research is useful in a number of situations such as the following:

- Phenomenon is examined in a natural setting.
- Data are collected by multiple means.
- One or few entities (person, group, or organisation) are examined.
- The complexity of the unit is studied intensively.
- Case studies are more suitable for the exploration, classification and hypothesis development stages of the knowledge building process; the investigator should have a receptive attitude towards exploration.
- No experimental controls or manipulation are involved.
- The investigator may not specify the set of independent and dependent variables in advance.
- The results derived depend heavily on the integrative powers of the investigator.
- Changes in site selection and data collection methods could take place as the investigator develops new hypotheses.
- Case research is useful in the study of 'why' and 'how' questions because these deal with operational links to be traced over time rather than with frequency or incidence.
- The focus is on contemporary events.

While all of the situations suggested by Benbasat were present for this study, there are a number of particular reasons why a case study approach was chosen:

1) The focus is on contemporary events and the phenomenon is to be examined in a natural setting. This research applies a management model to the field of ASD. ASD has only recently been introduced and both of the case sites chosen for this study have implemented the Scrum methodology within the past three

years. There is no previous research examining the application of Beyond Budgeting to an ASD environment.

2) Data are to be collected by multiple means. By collecting data through interviews, onsite observations and document analysis, the researcher gains a richer understanding of how ASD methods may be extended. This level of understanding may not be possible through other research methods.
3) One or few entities are examined intensively. The researcher examines the ASD team and their environment through the lens of the Beyond Budgeting model. Collecting data and studying the teams in their natural environment allows us to gain a deeper insight and understanding of ASD teams and we get what Benbasat et al. (1987) describes as "a strong handle on what real life is like".

4.5 Research Design

Once the research paradigm and methodology are clarified then the next step is planning the data collection method or designing the research. Yin (2003) calls the research design the *"logic that links the data to be collected (and the conclusions to be drawn) to the initial questions of the study"*. The purpose of a research design is to ensure that the empirical evidence addresses the initial research objective. Nachmias and Nachmias (1992, pp. 77-78) describe it as a plan that *"guides the investigator in the process of collecting, analyzing, and interpreting observations. It is a logical model of proof that allows the researcher to draw inferences concerning causal relations among variables under investigations"*. A carefully developed research design is particularly important for case studies and where the study is broad and exploratory (Cooper and Schindler, 2003; Yin, 2003). The case study research method is chosen for this study and several issues regarding case study methods need to be addressed prior to entering the field. These include the type of case study method to use, the unit of analysis to use, the selection of software packages to store and retrieve research information, the selection of case(s), the negotiation of cases and privacy agreements, the data collection methods, the data analysis methods and issues surrounding the study reports. While there is room for flexibility during the course of a case study (e.g. if new information is discovered during data collection then the original design may be modified or altered (Yin,

2009)), careful consideration should be given to all these issues in order to avoid potential issues further into the research study.

4.5.1 Types of Case Study

In the interpretive tradition there are no correct and incorrect theories but there are interesting and less interesting ways to view the world (Walsham 1993, pp 6). Case studies can be used at any stage of a theory building process or in various phases of research within a discipline (Benbasat et al., 1987; Eisenhardt, 1989) and the type of case study design to use will depend on the research objective and the current state of research in that area. While the terminology used by researchers for any particular stage might differ (cf. Table 4-4), case studies are generally regarded as appropriate for the exploratory, hypothesis generation or the hypothesis testing stage of research and can take the form of a multiple- or single-case research design (Bonoma, 1983; Eisenhardt, 1989; Yin, 2009).

Table 4-4 Case Study Design Stages

Traditional Phases of Knowledge Accrual	Yin's Framework	Bonoma's Framework	Number of Cases
Exploration	Description	Drift	Single or multiple case(s)
Hypothesis generation	Exploration	Design	Multiple cases
Hypothesis testing			
Confirmation	Explanation	Prediction	Multiple cases
Disconfirmation	Explanation	Disconfirmation	Single critical case

Source: Benbasat et al., 1987

Theory may be used at any stage of a study (Table 4-5). The exploratory study is comparable to grounded theory in that no a priori theory is used. Tentative a priori constructs may be specified to better focus the research design and these can be dismissed or further developed as the research progresses (Eisenhardt, 1989).

Generally an exploratory study follows an inductive logic whereby conclusions are inferred through analysis of the data with examples and evidence from individual cases. While there are some criticisms regarding the scientific generalisability of such conclusions, exploratory case studies offer analytical generalisation (Flyvbjerg, 2006; Yin, 2009).

Table 4-5 Theory Use in IS Case Studies

Use of Theory	**Interpretive IS Case Study**
As an initial guide to design and data collection	Walsham (1993) drawing on Pettigrew (1987; 1990)
As part of an iterative process of data collection and analysis	Orlikowski (1993) using grounded theory
As a final product of the research	Orlikowski & Robey (1991)

Source: Walsham, 1995b

Descriptive case studies are used to describe a phenomena and the real-life context in which it occurred. Descriptive case studies are often viewed as similar to exploratory studies (Miles and Huberman, 1994). However, while exploratory studies seek to generate conclusions, hypotheses and interesting findings, descriptive studies seek to illuminate the research object by telling a story about it. Miles and Huberman (1994) see descriptive studies as a precursor to explanatory studies arguing that *"it is hard to explain something satisfactorily until you understand just what the something is"*.

Explanatory studies are used to explain the presumed causal links in real-life interventions (Yin, 2009). These are generally considered deductive or hypothesis testing studies where the researcher begins with a theory or hypothesis and seeks to confirm or disconfirm this through an explanatory study. Popper (1969 pp. 55) believed that deduction and falsification are the key to developing solid theory. He argued that induction cannot be logically justified. However, as pointed out by Mingers (2004), theories often need to be developed despite initial failures and this relies on inductive reasoning. Strauss and Corbin (1998 pp. 137) believe that in all

science, there is an interplay between induction and deduction and explanatory interpretations need to be validated by constant comparison with emerging data.

4.5.2 Single case Vs. Multiple cases

Case studies are used to inductively develop theory and theoretical insights. The theory is emergent in the sense that it is situated in and developed by recognising patterns of relationships among constructs within and across cases and their underlying logic (Eisenhardt and Graebner, 2007). When choosing a research design a researcher has a number of options and can choose to use either a single or multiple case study design and either a holistic or embedded design (Fig. 4-2). A single case study is chosen because they are unusually revelatory, extreme exemplars, require the collection of empirical evidence over time (as in a longitudinal study), or opportunities for unusual research access (Yin, 2009). Single case studies can be very persuasive and richly describe the existence of a phenomenon (Siggelkow, 2007). Single case studies can also involve more than one unit of analysis. When subunits within the case are examined the research design is called an embedded case study design. For instance, if a study is about a single organisation but the analysis includes outcomes about different departments or functions within the organisation then the study design would be an embedded case study design. An embedded case study design offers opportunities for extensive analysis and more significant insights into the single case. However, if too much attention is given to the subunits then the larger holistic aspect of the case may be ignored but if the researcher chooses a holistic single unit of analysis design then the study may be conducted at an unduly abstract level.

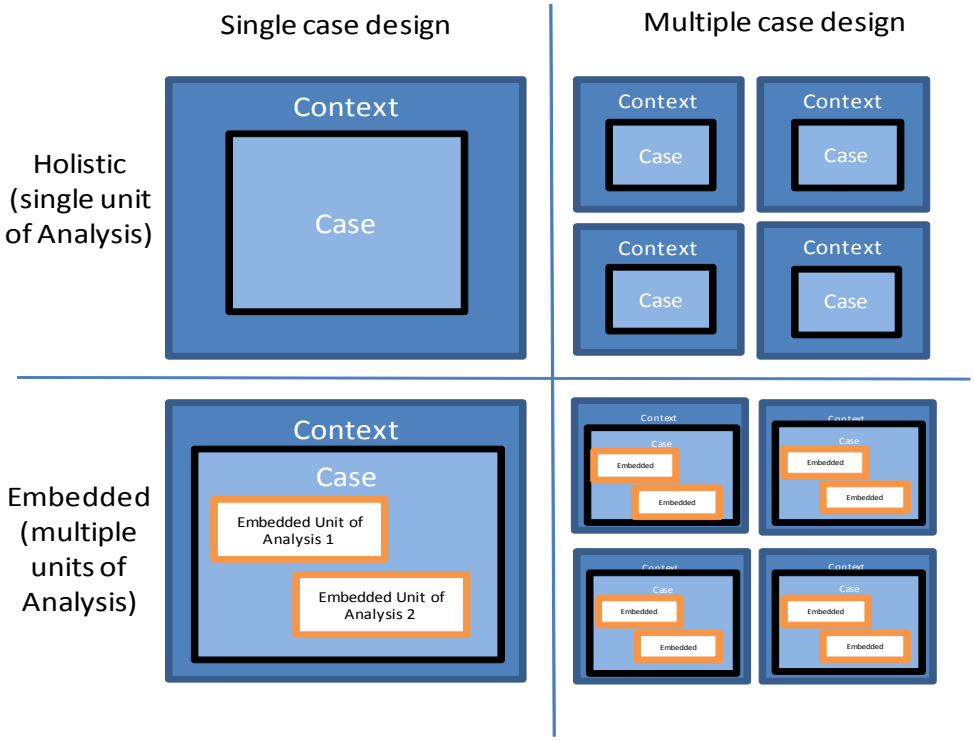

Figure 4-2 Types of Case Study Designs

Source: Yin, 2009

The decision to choose a holistic or embedded design is applicable to both single and multiple-case study designs. A multiple-case study design has a number of advantages over a single-case study design. The evidence from multiple cases is often more compelling and regarded as more robust (Yin, 2009). Multiple-case designs offer literal and theoretical replication and are preferred over single-case designs when the researcher has the choice.

4.5.3 Unit of Analysis

Defining the unit of analysis is an important issue in designing the case study. It is the major entity that is being analyzed in the study. The unit of analysis is likely to be at the level being addressed by the research questions and can range from individuals, groups, organisations and partnerships to less concrete case study topics such as communities, relationships, decisions and projects (Yin, 2009).

4.5.4 Selection of Cases

Interpretive researchers need to gain and maintain good access to appropriate organisations for their fieldwork. As outlined in previous sections, cases are chosen depending on the nature of the research. The number of cases to be used in a study is decided by the researcher and takes into account the research objective, the research design to meet this objective, the level of access and other practical concerns such as time and resource constraints. When selecting suitable cases for the research study Miles and Huberman (1994) suggest outlining a strategy for the selection of informants prior to data collection. Walsham (2006) suggests that when researchers request access from a particular appropriate case site they need to be willing to accept *"no"* for an answer and try to gain access elsewhere. Good social skills and the ability to connect with suitable organisations, along with recognising and grasping lucky or serendipitous opportunities are also important when it comes to gaining and maintaining access to suitable sites for case study research (Walsham, 2006).

4.5.5 Data Collection

Multiple data collection methods are typically employed in case research studies. Ideally, evidence from two or more sources will converge to support the research findings (Benbasat et al., 1987; Yin, 2003). A variety of data sources can be used in case study research. These include: Interviews- both open ended and focused; Documentation- formal reports, newspaper clippings, organisational procedures, etc.; Archival records- organisation charts, service, personnel or financial records, etc.; Direct observation- absorbing and noting details, actions, or subtleties of the field environment; Physical artefacts- devices, outputs, tools (Eisenhardt and Graebner, 2007; Walsham, 2006; Yin, 2009).

With respect to case studies as an outside observer, interviews are the primary source of data (Walsham, 1995b). Myers and Newman (2007) describe the interview as a drama and offer the 'dramaturgical' model for researchers to follow to ensure high quality interviews are conducted (Table 4-6). Interviewing is an art-form and an interviewing style will vary depending on the personality of the interviewer. It is important to seek a balance between excessive passivity and over direction when interviewing informants. The interviewing style adopted by Zuboff (1988) was what

she called "a non-judgemental form of listening" and when she felt an "implicit, felt sense of an issue" she helped people "through the process of finding words for it". She also asked people to draw pictures that conveyed their thoughts on an issue. The main issue for the researcher is not to direct too closely so that valuable information is lost and not to passively let the interviewee take a new direction in speaking about issues not related to the research objective.

Table 4-6 The Qualitative Interview as a Drama

Concepts	**Description**
Drama	The interview is a drama with a stage, props, actors, an audience, a script, and a performance
Stage	A variety of organisational settings and social situations although in business settings the stage is normally an office. Various props might be used such as pens, notes, or a tape recorder
Actor	Both the interviewer and the interviewee can be seen as actors. The researcher has to play the part of an interested interviewer; the interviewee plays the part of a knowledgeable person in the organisation
Audience	Both the interviewer and the interviewee can be seen as the audience. The researcher should listen intently while interviewing; the interviewee(s) should listen to the questions and answer them appropriately. The audience can also be seen more broadly as the readers of the research paper(s) produced
Script	The interviewer has a more or less partially developed script with questions to be put to the interviewee to guide the conversation. The interviewee normally has no script and has to improvise
Entry	Impression management is very important, particularly first impressions. It is important to dress up or dress down depending upon the situation
Exit	Leaving the stage, possibly preparing the way for the next performance (finding other actors – snowballing) or another performance at a later date (e.g. perhaps as part of a longitudinal study)
Performance	All of the above together produce a good or a bad performance. The quality of the performance affects the quality of the disclosure which in turn affects the quality of the data

Source: Myers and Newman, 2007

When conducting interviews, a crucial aspect of the experience is the tacit, non-verbal elements of the interview. As Walsham (2006) states: *"We may not know exactly how we assess people, as human cognition remains something of a mystery, but we do know that we do not judge people's view or attitudes solely on what they say"*. It is important therefore to make notes, either during or after the interview, which captures information that is not explicit in the interview dialogue. A final point on conducting interviews is that if the interviews are in a different country the researcher must be able to communicate effectively with the interviewees, either by speaking a common language or through an interpreter. Walsham (2006) suggests doing plenty of homework about the country beforehand and during the research. The researcher should try to be 'there' in both body and mind when carrying out the interviews. Data Analysis

According to Miles (1979) the most serious and central issue in the use of qualitative data is that methods of analysis are not well formulated. A number of differing ways have been put forward as a way to analyse case study data. Broadly speaking, data analysis consists of examining, comparing, contrasting, categorising or otherwise recombining evidence, to draw empirically based conclusions (Miles and Huberman, 1994; Yin, 2009). Yin (2009) suggests following a general analytic strategy when conducting case study research. This strategy should be decided upon in advance and while there is no set list of strategies to choose from, Table 4-7 lists a number of possibilities.

Table 4-7 Analytic Strategies

Strategy	Description	Recommended By:
Use theory to analyse the data	Develop a theory-data link either by using theory to guide data collection or using theory to view the data	Walsham (2006); Yin (2009);
Learn from the data itself	Through coding concepts and themes as data is being collected	Miles and Huberman (1994); Walsham (2006)
Use a case description	Use a descriptive framework to organise the case study analysis	Yin (2009)
Use a looser, unplanned approach	Impressions are written up after each interview and themes generated after each field visit	Walsham (2006)
Use both qualitative and quantitative data	Qualitative data used for higher level exploration or explanation and quantitative data used for embedded units or outcomes	Yin (2009)
Examine rival explanations	Define and test rival explanations	Yin (2009); Klein and Myers (1999)

Once an analytical strategy had been chosen the researcher must then decide on which analytical techniques will be used. Here again a range of techniques are offered to aid in the data analysis. Miles and Huberman (1994 pp.56-60) suggest that in the early stages of analysis the researcher should create codes to capture words, phrases or paragraphs connected with specific settings. Their preferred method is to create a list of initial codes or "seed categories" which may come from the conceptual framework and provides a starting point for initial coding. Another technique for creating codes comes from the school of grounded theory (Glaser and Strauss, 1967). Grounded theory uses an inductive coding technique whereby the data is first collected, then written up line by line and codes then emerge from the data (Strauss and Corbin, 1998). This is known as open coding and is an unrestricted coding of the data. As more data is collected, sub-categories begin to emerge and the

axial coding technique is then used to put the data back together by making connections between the categories and sub-categories. Apart from the fact that in grounded theory no initial codes are created prior to going into the field, the grounded theory techniques of open and axial coding are conceptually similar to the coding techniques outlined by Miles and Huberman. Whether codes are created early or late is less important than whether they have some conceptual and structural order (Miles and Huberman, 1994). The process of analysis is the same (Strauss and Corbin, 1998 pp.293) and the recommended procedures for grounded theory were designed not to be followed dogmatically but rather to be used creatively and flexibly by researchers as they deem appropriate (Strauss and Corbin, 1998 pp. 13).

Reflexive remarks, memos and notes made during both the interview stage and the analysis stage also help to interpret and analyse the data. These usually strengthen coding, point to deeper or underlying issues that deserve analytic attention and add substantial meaning to the write up (Miles and Huberman, 1994).

Within-case analysis involves detailed case study write-ups for each case. These may be either descriptive (Eisenhardt, 1989) or more analytical (Miles and Huberman, 1994) but the central idea is to generate insight into the case findings. These write-ups can later be used as part of the cross-case analysis. Cross-case analysis is used to search for patterns that emerge across both cases. This allows for literal or theoretical replication of the findings (Yin, 2009). When a multiple-case research design is utilised, each case is treated as an individual study. Findings are aggregated and patterns matched across cases which results in more robust conclusions. The researcher must develop strong, plausible and fair arguments that are supported by the data.

For a high-quality analysis the researcher must show that all the evidence was examined, all major rival interpretations were addressed if possible, the analysis addressed the most significant aspect of the study and the researcher's own a priori expert knowledge was used (Yin, 2009). Analysis techniques such as coding, reflexive remarks, memos and notes and within- and cross-case analysis are some of the major techniques that may be utilised by the researcher (Miles and Huberman, 1994; Yin, 2009). There are, however, a large number of other techniques available (cf. Creswell, 1998) which may be used if required.

To further establish the reliability and validity of the case study evidence, three principles of data collection are outlined by Yin (2003).

- *Use multiple sources of evidence:* Develop converging lines of enquiry through a process of triangulation and corroboration. Evidence can be from interviews, archival records, documents and observations.
- *Create a Case Study Database:* This database is used to store case study notes, documents, narratives and other materials associated with the case.
- *Maintain a Chain of Evidence:* An external observer should be able to follow the derivation from the initial research objective to the case study conclusion.

4.5.6 Case Report Format

The final stage of the research is composing a case study report. Yin (2009) and Walsham (2006) suggest that particular attention should be paid to the audience for the report. When composing the case study, thought should be given to who will be reading the findings e.g. academic colleagues, non-specialists, a thesis committee or research funders. For studies that involve multiple cases the researcher has the choice of whether to report on each case individually or write up the study without reporting on single cases. Eisenhardt and Graebner (2007) believe that presenting a "relatively complete and unbroken narrative of each case is infeasible for multiple-case research" and the challenge is to stay within spatial constraints while conveying the rich empirical evidence that supports the emergent theory. In describing the empirical data and analysis the researcher should provided a coherent and interesting story for the reader (Eisenhardt and Graebner, 2007; Siggelkow, 2007; Walsham, 2006; Yin, 2009)

4.6 Implementation of the Research Design

This section discusses how the research design was implemented. As stated previously this is an interpretive, exploratory, qualitative field inquiry. The researcher seeks to illuminate ways in which ASD may be better integrated with the wider organisation by using the Beyond Budgeting model as a lens to examine the extension of ASD concepts.

The objective is to operationalise and apply the Beyond Budgeting model to an agile systems development environment with a view to extending agile methods based on this application. Figure 4-3 gives an overview of the research process followed to achieve the research objective. The first step of the process was to develop the initial research topic and objective. This was done through an extensive review of the literature within agile systems development. The failing of ASD methods to move beyond the micro context of systems development and interact with the wider organisational environment was identified as an area that needed further study.

The Beyond Budgeting model was identified from the management accounting literature as a complementary model for ASD, and viewed as suitable model to use in this study. In order to operationalise the Beyond Budgeting model within the context of ASD an initial wide ranging literature review was conducted. The key words from each principle were inputted into the Web of Science database. To capture relevant articles within the fields of management, management accounting and information systems development, articles returned were filtered by using the subject areas of ‘business economics’ and ‘computer science’. Each search was analysed and appropriate articles were retrieved. Seminal articles and major contributing authors for each principle were discovered by examining the highest cited articles for each search. A general overview of each principle was achieved by reading the seminal articles on each principle from the management, management accounting and information systems literature. An in-depth analysis of each principle was then conducted within the field of ASD if and where research existed.

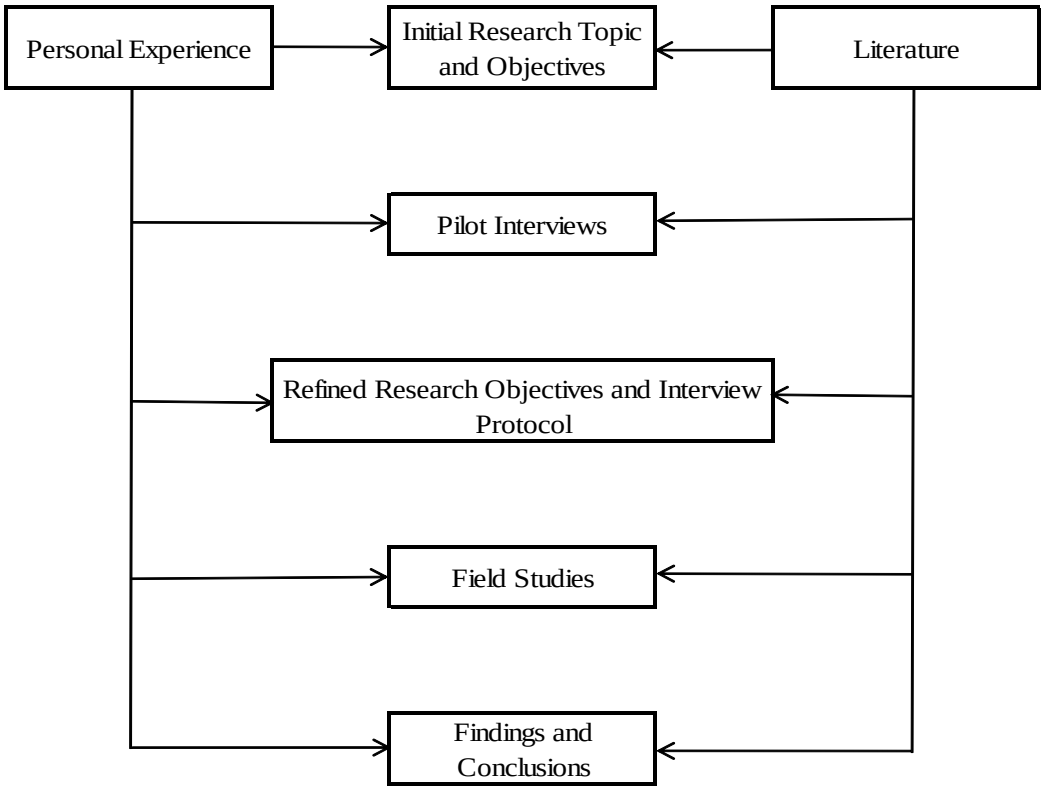

Figure 4-3 Research Process

Once the research objectives were finalised, and the Beyond Budgeting model operationalised, the case study method was chosen as the research method (Fig. 4-4). The remainder of this chapter discusses why a particular case study design was chosen and how it was implemented.

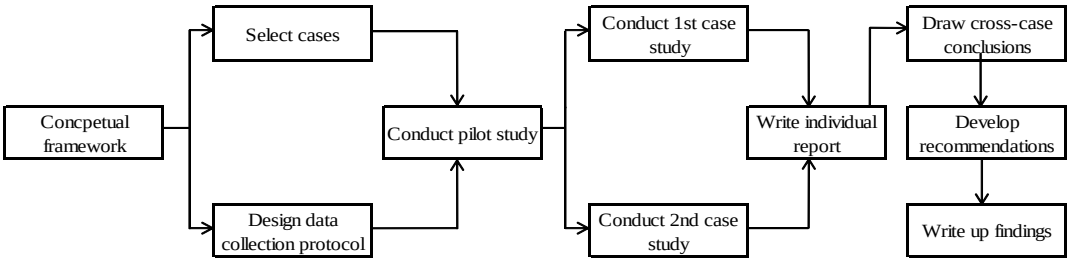

Figure 4-4 Case Study Method

4.6.1 Design and Refinement of the Case Study Protocol

A two-case embedded design was used for this study. Yin (2009) suggests that when possible, a multiple-case design should be used rather than a single case study.

Using two cases resulted in more powerful analytical conclusions than would have come from using a single case alone. A two-case design allows for replication logic, that is, the analytical conclusions from both cases can be compared to produce more robust conclusions.

Agile systems development teams typically consist of five to nine members. Rather than collecting data from only one team, the researcher decided to collect data from three teams within the IS department of each case site. This ensured that the conclusions from the study would be more representative of the IS department as a whole. It also helped to compare, contrast and triangulate information received from different team members and incorporate contextual and situational factors into the conclusions. For example, in the first case site, one team was having particular difficulty integrating their product with their customer's product. The researcher noted that this was not the norm in this organisation and took this into account when analyzing the findings and drawing conclusions. Had this been the only team examined then the findings would not necessarily be representative of the case site.

To enhance the reliability and validity of case study research Yin (2009 pp. 41) recommends that a case study database is developed prior to data collection and a chain of evidence be maintained throughout the research process. For this, a data management software tool developed solely as a computer aided qualitative data analysis system (CAQDAS) called NVivo 8 was used to store all data collected from the case studies. NVivo is a reputable tool for managing and supporting this type of analytical work. It was developed by Lyn Richards (2005) of QSR international (QSR International, 2008) and offers reliability and validity through the maintaining of a clear audit trail throughout the data collection and analyzing process. While Walsham (2006) warns of the disadvantages of using such packages and reminds Ph.D. students that *"the software does not remove the need for thought"*, he does recognise that such packages can be useful. This researcher found the NVivo software a useful and efficient tool for storing, retrieving and coding data.

A large amount of time was spent in designing and refining the interview protocol used for this research. The interview protocol is divided into five parts (see Appendix B). The first three parts are designed to contextualise the research. The fourth part is the major part of the interview, the themes and questions asked in this section are developed from the operationalised framework discussed in chapter two

and in Lohan et al. (2010a). Part five is a reminder to get clarification and follow up information if and when needed.

4.6.2 Pilot Study

Interviews are a key way of accessing the interpretations of informants in the field (Walsham, 2006). Miles and Newman (2007) suggest that qualitative interviews are "*fraught with difficulties*". Issues associated with interviewing include, ambiguity over the interview questions, the interviewees feeling shy, awed or fatigued, the interview not flowing smoothly, awkward silences, the interviewee drifting off the themes of the research objective, the interviewer asking leading or biased questions and the interview running over time. Qualitative interviewers should be aware of these difficulties and prepared to deal with them if and when they arise. Therefore before going into the field to interview the study participants, four pilot interviews were conducted. These were conducted between February and April 2009. All interviews were recorded and part transcribed. The first two interviews were with senior industrial practitioners, one a senior software developer with over 15 yrs experience and the other a senior project manager with over 20 yrs experience. Both had over three years experience working with the Scrum methodology. These interviews lasted approximately one and a half hours each and the participants provided excellent feedback. This included pointing out areas where the interview questions were not clear or where similar themes could be explored within the same section. This helped refine the interview protocol and gave the researcher confidence that the protocol was sufficiently designed to capture data which would help answer the research question and achieve the research objectives of this study.

A further two interviews were conducted with academics within the National University of Ireland, Galway. Both of these were with lecturers from the Business Information Systems Discipline who were familiar with the field of ASD. During these interviews one of the researcher's supervisors took notes on the researcher's interviewing style and technique. Comments were provided on how the interviewer engaged with the interviewee, how the questions were asked, what body language was used and how the overall interview was conducted, from introductions to the final thanking of the interviewee and the closing of the interview. This valuable

feedback allowed the researcher to reflect and work on his interviewing skills prior to entering the field for formal interviews.

4.6.3 Identification and Negotiation of Case Accesses

Miles and Huberman (1994) suggest outlining a strategy for the selection of informants prior to data collection. This research used what they call a comparable case selection strategy which allowed for replication of the results and added to the validity and analytical generalisability of the findings (Miles and Huberman, 1994; Yin, 2003). In selecting the potential case sites for this study it was important that the following two requirements were met: a) One of the agile family of methods must be in place. While any particular method is inevitably tailored for an individual organisation's needs, this research required that the organisation had formally introduced a specific method that embraced the spirit of ASD and b) access to both developers and team leaders within the development team was provided. The research objective is to operationalise and apply the Beyond Budgeting model to an ASD environment and extend ASD methods based on this application. Through applying the model to an ASD environment the researcher gains insights into the ASD team as experienced by the team members themselves. It is important that the data collected from participants is representative of the team; therefore both team members and team leaders are interviewed to get a more balanced representation.

FCF[9] was the first case site chosen for this study. FCF is a large multinational operating in the financial services sector. Their ISD division in Ireland had implemented the Scrum methodology within the past three years and their Scrum teams built customised software applications for internal clients. Initial contact was made with the organisation through one of the researcher's supervisors. The research objective was discussed on-site with a senior project manager. The project manager was very enthusiastic about the research and recommended three suitable ASD teams for the study. On three separate occasions a project manager either phoned or e-mailed the researcher to inform him that a meeting or training session was taking place that may be of interest. Having the research site nearby meant that the

[9] Organisations used in this study requested that pseudonyms be used. All information gathered was treated in accordance with the Irish Data Protection Act 1988 and subsequent amendment in 2003 and used only for academic purposes.

researcher could attend these sessions at short notice. The researcher was given permission by the organisation to regularly interact with the teams and observe them operating in their daily work environment.

Both Walsham (2006) and Yin (2009) suggest that luck, chance and serendipity may play a role in gaining access to a site. An element of luck was involved in negotiating access to the second site. In October and November 2008 the researcher was in SINTEF[10] in Norway working with qualitative ASD researchers as part of a Ph.D. development program. During this time a large Norwegian oil and gas organisation (SCC) was in the process of implementing the Beyond Budgeting model. The Beyond Budgeting implementation manager (BBIM) was speaking at the Scandinavian Agile conference in October 2008 about the similarities between ASD and Beyond Budgeting. A colleague from SINTEF attended this conference and spoke to the BBIM about this research. A series of email exchanges followed and the researcher arranged to meet the BBIM in May 2009 at the XP2009 conference. The BBIM was very enthusiastic about the research and introduced the researcher to the Scrum implementation manager within SCC, who in turn suggested four suitable ASD teams within this organisation to take part in the study. While a number of alternative potential case sites were available to the researcher, this site proved to be the most suitable for a number of reasons. Similar to the first site their ISD department had implemented the Scrum methodology within the previous three years. They also developed customised solutions for in-house customers. This allowed for replication and analytical generalisability across both sites. An added motivation for using this site was that upper management within the organisation had made a conscious decision to begin implementing the Beyond Budgeting model and believed Beyond Budgeting complemented ASD.

Both sites chosen for this study had traditionally used the waterfall method and the transition to agile development processes raised questions on the suitability of the supporting processes. Organisational structures which had supported the use of the waterfall method meant that emphasis on customer collaboration, collective ownership, product backlogs, iteration meetings, etc. which are the norm in agile development was a relatively new area for these ASD teams.

[10] SINTEF is the largest independent research organization in Scandinavia

4.6.4 Data Collection

Data were collected over a 20 month period from April 2009 to January 2011. The team leaders gave guided tours of the facilities within the sites, including offices, conference rooms, meeting rooms and work areas. The researcher attended daily team meetings, iteration sessions and training sessions. Team members and management were open and responsive to any queries or requests and were enthusiastic and proactive in providing information and suggestions regarding the research.

Data collection consisted of formal and informal interviews, document reviews, workshops and on-site observation at iteration meetings and daily Scrums. In total 19 formal interviews were conducted (Table 4-8). Each interview was recorded and transcribed and the transcriptions were imported into NVivo for coding. Notes were taken during each interview and the notes were written up as soon after the interview as possible, often on the same day as the interview. In FCF, three different Scrum projects were studied and 18 site visits were conducted. In SCC four Scrum projects were studied. Due to the time and financial costs involved with site visits all formal interviews were carried out during October 2009. Along with formal interviews, a large number of informal interviews were carried out with key informants within both organisations. Numerous discussions and further enquiries were conducted with interviewees and other key informants both during site visits and through emails and telephone calls after site visits. For example, the lead software process improvement advisor was not available during the site visit to SCC but proved an invaluable source for corroborating and clarifying findings in the months following the interviews.

Table 4-8 Interviewees Profile

Organisation Pseudonym	Project	Project Description	Customer	Interviewees	Average Interview Time
FCF (Case A)	Project A	A back end to mid tier web service	Technology group building on top of the teams technology	1 project manager and 2 team members	1 Hour 15 Mins
FCF	Project B	A customised project management tool	Proxy group representing 20 business unit project management offices	1 project manager and 2 team members	1 Hour
FCF	Project C	Trading system maintenance application	Senior developer team	1 project manager and 2 team members	1 Hour 10 Mins
SCC (Case B)	Project D	A secure collaboration technology platform	3 organisational departments	1 project manager and 2 team members	1 Hour
SCC	Project E	The Organisations Intranet	Communication department representing the entire organisation	1 project manager and 1 team member	1 Hour
SCC	Project F	An organisational services provider platform	Global business services department representing entire organisation	1 project manager and 1 Scrum master	1 Hour 20 Mins
SCC	Project G	A financial accounting system	Product owners representing organisational areas	1 project manager, 1 Scrum master and 1 team member	1 Hour

To establish the reliability and validity of the case study evidence this study followed the three principles of data collection outlined by Yin (2003).

- *Use multiple sources of evidence:* Data was collected through on-site observation at iteration meetings, training sessions and daily Scrums, review of documentation, three workshops and 19 formal interviews, seven informal interviews and a continuous dialogue that was established with

key informants through emails, phone calls, site visits and conference meetings.

- *Create a Case Study Database:* All formal interview transcripts were recorded and transcribed. The transcriptions were imported into QSR NVivo for coding. A tree structure of codes was developed using each of the 12 principles of the Beyond Budgeting model as the initial coding nodes. All notes, documents, interview protocols, and narratives were stored in this NVivo database.
- *Maintain a Chain of Evidence:* A clear link was established between each step of the process. The case study objective was linked to the interview protocol questions, which are linked to the evidentiary sources in the NVivo database, which are in turn linked to the case study reports provided to the participating organisations and finally to the findings discussed in this study.

4.6.5 Data Analysis

Coding is often used in qualitative research as a means to categorise chunks of words, phrases, sentences or whole paragraphs compiled during the data collection process. Codes are tags or labels for assigning units of meaning and are useful in providing structure to the data collected and for analyzing the data (Miles and Huberman, 1994; Rubin and Rubin, 2005; Stake, 1995; Wengraf, 2001). The data analysis was conducted in a systematic manner described in the following ten steps.

Step 1: A provisional start list of codes was created prior to entering the field (Fig 4-5). These codes were developed from the Beyond Budgeting operationalised framework and created in NVivo 8 as tree nodes.

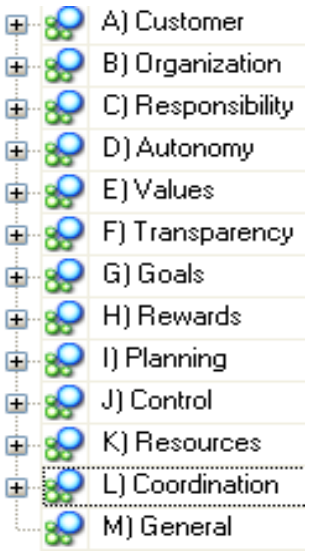

Figure 4-5 Start List of Codes

Step 2: Tree nodes are based on a hierarchical structure with one root or master node having one or many children. The master nodes initially created were further broken down into sub-codes (Fig 4-6) based on the literature discussed in Chapter 3.

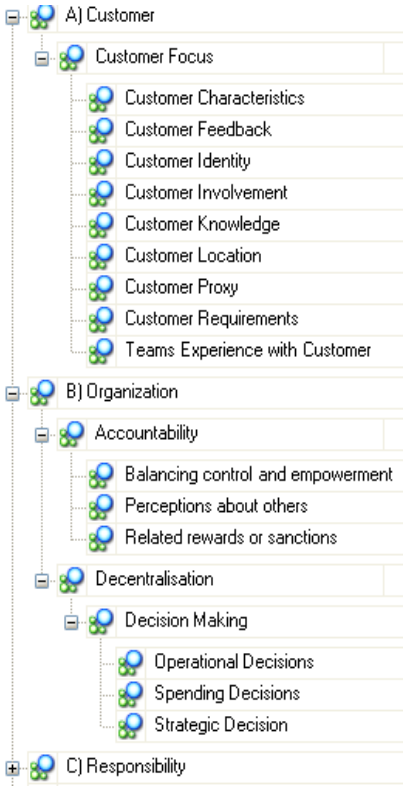

Figure 4-6 Sub Codes

Step 3: As suggested by Silverman (2005 pp. 152) data analysis began as soon as the first interviews were conducted. Interviews were transcribed by the researcher as soon as possible after the interview took place.

Step 4: Interview transcripts were read several times by the researcher. All interviews were formatted so they could be automatically coded in NVivo under each main heading.

Step 5: Following the first round of auto-coding in NVivo each transcript was reviewed to identify overlaps across master codes. Key words were entered into NVivo to find relevant sections of transcripts which were not included in the automatic coding process. For example, a search for 'customer' revealed many instances where the interviewee spoke about the customer while talking about the goals for a specific project.

Step 6: Notes taken at each interview describing the interview setting and observations made by the researcher during the interview were reviewed and attached to the interview transcripts. Walsham (2006) recommends that the researcher spends time thinking and reflecting on what was learnt throughout the process. Reflexive remarks and memos and impressions made during both the research and after each interview were also imported into NVivo. NVivo 8 proved a very useful tool for storing, structuring and restructuring coding schemes throughout the data collection and analysis process (Fig 4-7).

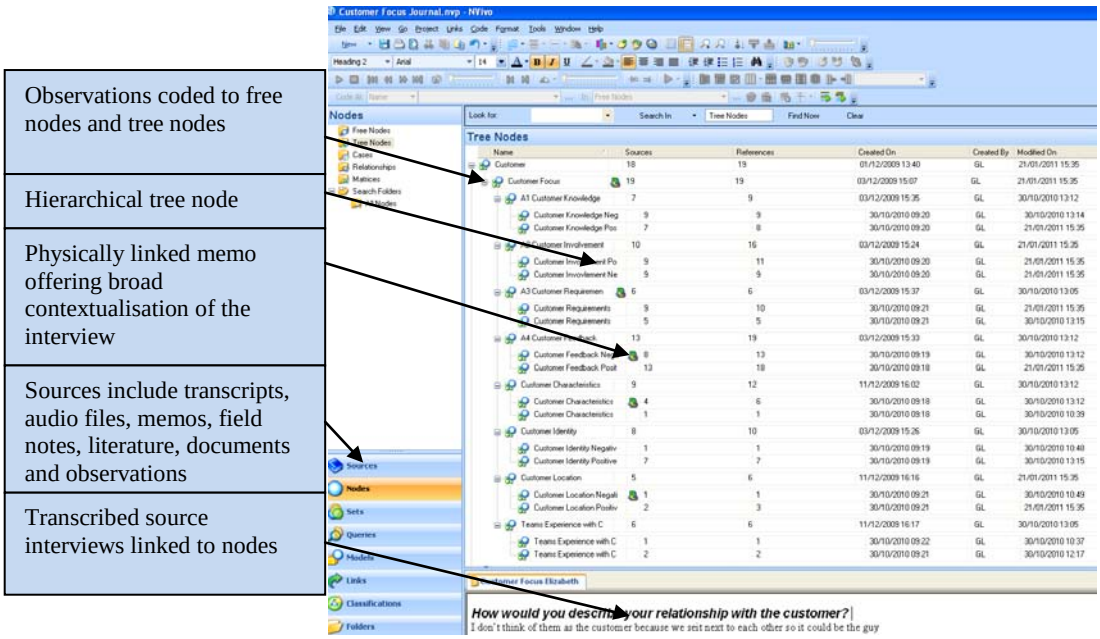

Figure 4-7 NVivo 8 Screenshot

Step 7: The next round of coding identified distinct practices employed by the ASD teams under each dimension of the operationalised Beyond Budgeting model. Follow up telephone calls, emails and site visits were arranged where possible and

further documentation obtained when further information was needed or clarification was required.

Step 8: The researcher then determined whether these practices contributed to the operationalised dimensions of the principle as described by the operationalised model discussed in Chapter 3. The next step was to establish whether the practices were considered agile or not. The agile practices described in Chapter 2 combined with a list of 58 agile practices used in a 2007 survey by Ambler (2007a) which have previously been used in ASD research (Abbas et al., 2010), were used to determine current ASD practices (see Appendix C). When a practice discovered during the study was on this list a ✔was place in the box next to it. When the practice was not on this list an ✖ was placed in the box. Sometimes practices were partially agile and then a • was used in the box, and the following narrative described the practice in as used in the site. The data provided evidence for over 154 different practices carried out by the team, and 38 of these were not previously defined in the literature as agile practices.

Step 9: Findings were checked for representativeness by examining them across participants, for example, team members' reports of their experience with their customers were checked against the reports from other team members and the project managers or Scrum masters. Provisional findings were also discussed with key informants in each of the case sites which helped to further corroborate the findings.

Step 10: A further round of coding helped develop the main recommendations to emerge from the data. These recommendations were first grouped under each principle and then analysed and amalgamated where deemed appropriate. Literature was then used to further support the recommendations. Reports based on initial recommendations were developed and discussed with key informants. A version of these reports were also submitted to conferences and feedback was obtained which further aided the development of chapters 5 and 6 for this study (Lohan et al., 2010b; Lohan et al., 2010c).

4.7 Summary

This chapter highlights the researcher's awareness of the different ontological, epistemological and methodological positions adopted within the IS field. The ontological, epistemological and methodological stances of the researcher are discussed and justified. A rationale is given for the selection of a case study research method for this study. This is followed by a discussion of the factors to be considered when conducting case study research in general. The chapter ends by detailing the research process and the procedures followed when developing the operationalised model, designing the research instrument, and gathering and analysing the data. The next chapter presents the findings of this research.

Chapter 5 Findings and Analysis

The Beyond Budgeting model was operationalised in Chapter 3. The second research objective of this study is to apply this operationalised model to an ASD environment. The primary focus of this chapter therefore is to demonstrate the application of the operationalised model. By doing this the reader can see that applying the Beyond Budgeting model to an ASD environment highlights practices conducted by the ASD team that have not previously been considered within the ASD literature.

The chapter begins with a table (Table 5-1) showing each principle, principle component, component dimension and operationalised dimensions of the Beyond Budgeting model from Chapter 3. This is to remind the reader of the operationalised model and its components. Each of the 12 principles is then presented individually. Exemplars of practices (if any) conducted by the ASD teams that contribute to the operationalised dimension of the principle are shown in each table. Practices conducted which contribute to the operationalised dimension and were previously deemed to be agile practices are marked with a ✔. Where ambiguity exists and the practices conducted by the team are deemed agile in certain respects but not in others a • symbol is used. When the practices are clearly not agile practices then an **X** is used to denote that the team is using a practice not previously considered an agile practice according to the criteria outlined in section 4.6.5 in chapter 4.

The text following each table describes how the practices were used within the sub-headings of each principle component. Some practices contribute to more than one operationalised dimension. For example using a project road map is a practice that aids in gathering information on customer needs, planning purposes and also helps coordinating activities. In the case of a practice being used for more than one purpose it is discussed relative to the operationalised dimension at that particular section of the chapter.

The chapter concludes with a summary and a table of all the practices discussed. These are a list of all practices discovered through the application of the operationalised Beyond Budgeting model to the seven projects across the two case sites. Analysing these practices provides a platform and a rationale for the recommendations discussed in chapter 6.

Table 5-1 The Operationalised Beyond Budgeting Model

Beyond Budgeting Principles, Components, Dimensions and Operationalised Dimensions			
Beyond Budgeting Principle	Components of the Principle	Dimensions of each Component	Operationalised Dimensions Relative to an Agile Environment
Customer Focus	Customer needs	Information on customer needs	Information is collected on customer needs
			Analysed Information is Available to the Team
			Forward Looking Information on Customer Needs is Available
	Customer knowledge sharing	Structures in place to collect and disseminate knowledge	Mechanisms exist to collect and disseminate customer knowledge
		Incentives to share knowledge	Teams have incentives to share customer knowledge
	Customer relationships	Customer involvement	Customers are involved in the development process
		Customer meetings	Direct Customer Contact takes Place
	Customer satisfaction	Customer feedback	Teams receive customer feedback
	Capability development	Team training	Feedback is used to train members
		Process improvement	Feedback is used to improve processes
Organisation	Decentralisation	Spending decisions	The team can spend money on new equipment
			The team can decide on what type of equipment is to be used
		Operating decisions	The team decides on new team members
			The team can decide on performance criteria
			The team can decide on development method
			The team can determine training requirements
	Accountability	Team accountability	Teams are collectively accountable for project outcomes
		Project controls in place	Key performance indicators are in place for each project
			Uniform performance criteria is in place across all projects
Responsibility	Encourage self development	Opportunity for self-development	Team members are encouraged to seek out new opportunities
		Development of skills	Team members are encouraged to develop their skills and abilities
		Feedback for self-development	Team members are given feedback on their performance
	Encourage teamwork	Teamwork	Individuals are encouraged to work as part of a team
			The importance of working together for a common goal
Autonomy	Team empowerment	Autonomy of team members	The group has a high degree of freedom in carrying out tasks
		Impact of ISD team tasks	The group has a high impact on its work environment
		Potency of the team	Belief in group capabilities is high
		Meaningfulness of daily tasks	There is a strong meaning attached to the tasks
Values	Governance	Project goals	Project goals are clearly defined for each team
		Boundary operating conditions	Operating boundaries are clearly defined
	Internal domain	Architecture decisions	Team has an input into defining the architecture
		Process choice	Team has a choice in defining the systems development process
		Skill development	Team members can get training when required
Transparency	Strategic transparency	ISD Strategy	There is an explicit ISD strategy
			This strategy clearly outlines the goals of the ISD team
		Dissemination of the strategy	Regular meetings are held to disseminate requisite information
		Ethical issues	There is one set of numbers used to manage ISD projects
	Operational transparency	Access to relative information	Teams have timely access to all relevant information
			Teams can see their own progress data
			Teams can see other similar teams progress data
			Teams can see their targets and current positions
Goals	Continuous improvement	Specific goals	Long term and short term goals are clear and precise
		Challenging goals	Stretch targets are set
		Feedback to team members	Mechanisms include outcome and process feedback
	Relativity	Benchmarking goals	Goals are benchmarked against relative peer groups
		Goal Transparency	Targets are visible across the organisation
		Participation in goal setting	Teams participate in setting their own goals
	Performance contract	Decoupled targets	Targets are decoupled from performance reviews
		Behavioural goals	Behaviour metrics are an integral part of goal setting

Beyond Budgeting Principles, Components, Dimensions and Operationalised Dimensions			
Rewards	Relative	Relative performance evaluation	Rewards are not based solely on meeting fixed targets
			Hindsight evaluation is used
	Benchmarking	Benchmarking	Benchmarking is used in the rewarding process
	Group evaluation	Group evaluation	The team is evaluated and rewarded as a group
		Peer review	Teams are reviewed by peers
Planning	Long term planning	Planning guidelines	Guidelines are used rather than fixed, inflexible annual plans
	Action planning	Adjustable plans	Action plans are continuously updated
	Inclusive	Team involvement in planning	Team members have input into their own strategic plans
			Team members are involved in local strategic planning
	Continuous	Continuous review of plans	Forecasts are updated on a monthly basis
			Trends are analysed and monitored
			Key performance boundary indicators are used
Control	Control	Key Performance Indicators	KPIs are outlined before the project commences
			Variance limits of these KPIs are known to the team
			All relevant information for these KPIs is available to the team
	Management	Management by exception	Management do not interfere unless a KPI is out of bounds
Resources	Justification	Availability of resources	Additional resources are available if they are justified
		Cost of resources	The cost of resources is available to team members
	Impact	Impact of additional resources	How the costs impact KPIs is known to the team
	Boundary	Cost limits for additional resources	The limits for resource costs is known to the team
Coordination	Horizontal Coordination	Intra team coordination	Team members coordinate activities within their own team
		Inter team coordination	Teams coordinate with other teams within the organisation
	Vertical Coordination	Management coordination	The team coordinates with management
		Customer coordination	The team coordinates with customers
	Formal Coordination	Formal communication	The team uses formal communication means
	Informal Coordination	Informal communication	The team uses informal communication means
	Knowledge Repositories	Knowledge repositories	Knowledge repositories are used to capture and share knowledge
	Incentives	Incentives to share knowledge	Teams have incentives to use knowledge repositories

5.1 Leadership Principles

5.1.1 Customer Focus

Customer Needs

Table 5-2 Customer Focus - Needs

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Customer needs	Information on customer needs	Information is collected on customer needs	The team works with the customer and gathers customer information during the development of the requirements document and project roadmap	✔
			Customer information is collected prior to the mobilisation of the team	✖
			The team gathers customer information from the customer during the development process	✔
			The customer proxy provides the team with further information on the customer's needs during the project	•
			The team has previous experience working with the same customer	✖
		Analysed information is available to the team	A requirements document is developed outside the team which includes analysed customer information	•
			Up-front analysis is conducted by the team	✔
		Forward Looking Information on Customer Needs is Available	The requirements document is further refined when the team begin to develop	✔

Information is collected on customer needs

Section 3.1.1 shows that in order for an ASD team to have a customer focus they should, if possible, collect information on their customer's needs and have access to analysed and forward-looking information on the customer's needs. For the teams in this study, the first step in collecting information on customer needs was the development of a project roadmap and a requirements document. Every team examined, utilised a project roadmap and a requirements document which were developed for each individual project. In five out of the seven teams studied, team members were directly involved in the development of the project roadmap and requirements documents. The project manager in project D highlights the importance

of having team members working with the customers to develop these documents stating that "*it would have been really difficult*" to understand the customer's needs and gather the correct information if this had not been the case.

Surprisingly however, team members were not always involved in working with the customer to develop the project roadmap or the requirements document. In two of the projects a project roadmap and requirements document were developed prior to the mobilisation of the team. Given the emphasis on shared mental models in software development it seems counter intuitive to not have team members involved in developing initial project roadmaps and requirements documents. Indeed a member of one team pointed out the problems with this:

"It was kind of a haphazard way of doing things. Before we even got the project, they drew up a list of very high level ideas, but they hadn't really thought about it. They threw in some crazy estimates about how long it would take to do this...that was a major problem with the project. We spent a huge amount of time trying to match up their requirements, some of which we didn't even understand. They didn't really make sense."

Team member, project C

However, this team was a junior team within this case site and as explained by the project manager, the team members were expected to "*use this project as a learning curve*"; therefore this was not the normal process for development projects within this site. Another project where the requirements document was developed prior to the mobilisation of the team was project G. The project manager here explained that the project roadmap may be developed without any input from team members early in the development process when business units work with product owners to develop a roadmap, the team is then mobilised and work directly with the product owners to *"refine or grill the product backlog"*. In this instance customer information was collected and a project roadmap was developed without input from team members. The team then worked off this roadmap and collected other relevant customer information during the development process.

When team members required clarification of the requirements they either contacted the customer directly or requested clarification through the customer proxy. Contacting the customer directly to clarify requirements worked well in

project B, where the developers had built up a relationship with individuals within the customer group over a number of years and would contact specific individuals they knew when they required clarification of a requirement. However, developers within other projects examined communicated only through customer proxies and were often unhappy with the clarity provided by the customer proxy regarding complex queries. Six out of the ten team members interviewed across both sites expressed concern at the timeliness and quality of requirements they received from customer proxies. For example, a team member in project C stated that *"The proxy often responds hesitantly to queries or says that they will come back to you when they find out"*. In project D a developer commented that the customer proxy was *"sometimes filtering the requirements before coming back to us"* and that the customer proxy did not understand or communicate the customer requirements correctly.

This study also found that the teams who had previous experience working with their customer found that that they had deeper understanding of their customer needs and could anticipate what their customer would need going forward. Two of the seven teams had previously worked with the same customer and members in these teams stated that they *"got to better know their customer"* and *"would know what they* [the customer] *would want"* as a direct result of having worked with this customer over a number of years (in the case of project B this was 4 years, in project G it was 2 years).

Analysed and forward looking information is available

As stated earlier, and in line with agile practices, five of the seven teams worked with their customer to develop project roadmaps and initial requirements documents. Analysts on these teams helped develop an understanding of customer needs by analysing future requirements in conjunction with the customer and providing developers on the teams with this analysed information. Further analysis and refinements of the requirements were carried out during iteration meetings and sprint kick off sessions. A project manager describes how this typically works:

"We have a consistent vision, we know what should be in the product or not in it, so if anything arises during the development or during the iterations that could be

somewhat controversial or look like it's not common, we would then engage future clients to actually get their feedback on it."

Project manager, project A

Customer Knowledge Sharing

Table 5-3 Customer Focus - Knowledge Sharing

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Customer knowledge sharing	Structures in place to collect and disseminate knowledge	Mechanisms exist to collect and disseminate customer knowledge	The team use Wikis and sharepoints for each project	✔
			Teams use the requirements document to gather customer knowledge	✔
			The project manager shares information through email	✔
			Teams have informal communication with other teams	•
	Incentives to share knowledge	Teams have incentives to share customer knowledge	The teams use the wikis and sharepoints when they require customer information	•

Structures in Place to Collect and Disseminate Knowledge

Both organisations used mechanisms such as wikis, Sharepoint sites and Scrum dashboards during the project development cycles. Although these were not specifically designed to store or capture customer only information, the teams used these mechanisms when they required such information. All the projects in this study also used a requirements document to collect customer information and all the teams used this requirements document as a means to collect and disseminate information on the customer. In some cases where the team was part of a larger group, the project manager attended meetings with the customer and then emailed information to the team members. Teams also communicated informally with other teams who may have previously worked with the customer. For example one team member stated that he heard from fellow team members that a team in India had worked with this customer before. He then arranged an informal chat with members of this other group to discuss the customer and get their views on them. None of the cases studied employed a specific customer knowledge repository to collect and store customer

specific information. The developer in the previous example just happened to hear that another team had worked with this customer previously. There was no formal structure in place to retrieve this information.

Incentives to share knowledge

When it came to incentives to share customer information, the teams used project knowledge repositories if they knew that these would give them the information they were looking for. There were no incentives for the teams to share or record any information they may have gathered on the customer during the development cycle. While team members were usually expected to record best practices and technical issues, sharing mechanisms were generally not seen to be used for the collection and sharing of customer information. Therefore most of those interviewed had not previously considered nor were incentivised to share any knowledge they had acquired about their customer during the development process.

Customer relationships

Table 5-4 Customer Focus - Relationships

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Customer relationships	Customer involvement	Customers are involved in the development process	The team has built up a relationship with the same customer over a period of time (Project B - 4 Yrs; Project G - 2 Yrs)	✖
			The team works with the customer to develop the project roadmap	✔
			The team frequently interact with the customer during daily Scrums and sprint reviews	✔
	Customer meetings	Direct Customer Contact takes Place	The customer is on-site	✔
			The customer attends sprint reviews in person	✔

Customer Involvement

In both case sites there were teams who had worked with the same customer for a number of years. These teams stated that they had built up a relationship with their customer over the years. This helped them develop a better insight into their customers' likely requirements and gave them a deeper insight into the

characteristics of their customers. One team member on project B pointed out that through their experience with the customer they have developed an understanding of the customer that gives them an advantage over teams that have not had the time to build up the same relationship.

"We would know that there are some customers who are really eager, really involved, they really know the area and they know the tool, so from our experience with them we are used to saying look, he's not going to be happy with that, I know he will want X, Y and Z. From knowing them we will know what they will want from the tools and that is purely from experience, not anything based on analysis."

Team member, project B

As can be seen from Table 5-4 above, the Scrum methodology used in both sites offered several mechanisms to enhance customer involvement in the project. In five out of seven projects across both sites the team members had worked with the customer to develop a high-level project roadmap prior to running the first iteration. When customers were onsite this facilitated a continuous involvement in the development process as developers could interact with the customer whenever the need arose. Teams also reported that customers frequently interacted face-to-face with the team members during sprint reviews and daily Scrums.

Customer Meetings

Direct customer contact happened in both sites. This was facilitated through the customer being on-site or during sprint reviews when the customer or customer proxy attended and met with team members face-to-face.

Customer satisfaction and capability development

Table 5-5 Customer Focus - Satisfaction and Capability Development

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Customer satisfaction	Customer feedback	Teams receive customer feedback	Feedback is received on a weekly basis	✔
			Feedback is given at sprint retrospectives	✔
Capability development	Team training	Feedback is used to train members	Team members make training suggestions to the project manager	•
	Process improvement	Feedback is used to improve processes	Team members make suggestions for process improvements to the project manager	•

Customer Satisfaction

In terms of customer satisfaction, frequent customer feedback was facilitated through continuous interaction with the customers. Teams received feedback during sprint retrospectives and demos. Although not all teams were satisfied with the level of interaction and feedback they received from their customer, this was more to do with the perceived personality of the customer and the circumstances the customers found themselves in, rather than an issue with the methodology used. For example, project G's customer (another development team) were not ready to integrate with the product they were developing. This meant that the team received relatively little feedback from their customer.

Capability Development

The Scrum methodology clearly emphasises that feedback sessions and retrospectives are used to develop capability and improve team effectiveness. This was true to some extent of the teams studied in both sites. The team members in general, could make suggestions and these suggestions were taken on board by the project manager and discussed at a higher level. When additional finance or time was required by the team to complete training courses that they believed would be beneficial, then it is understandable that the other stakeholders would need to be involved and a decision made on what needed to be prioritised. The project manager brought the team request to the attention of the other stakeholders (e.g. customer or

product owner). A decision was then made by the project manager and the customer based on available resources and other criteria such as project status and criticality of the training.

In terms of using feedback to improve processes, all the teams could use feedback to make suggestions regarding process improvements. Although in both sites the Scrum methodology was mandated, team members stated that the project managers were supportive, with comments such as *"you can always make suggestions and they will take those suggestions on board"*. However, the Scrum method calls for the team to make suggestions *and* decisions. In both of the sites studied for this study, the concept of a single project manager taking onboard suggestions and making decisions was still at the heart of the development process.

5.1.2 Organisation

Decentralisation

Table 5-6 Organisation - Decentralisation

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Decentralisation	Spending decisions	The team can spend money on new equipment	A business justification form is filled in to get new equipment	✔
			Team members requested new equipment through project managers	✖
		The team can decide on what type of equipment is to be used	Projected hardware and equipment requirements are submitted by the project manager at the beginning of the year	✖
			Teams choose from a set list of tools and equipment	✔
			Teams required authorisation for new tools, licences, software, etc.	✔
	Operating decisions	The team can decide on performance criteria	Guidelines for project metrics are in place and these can be queried by the team	✔
			Teams prioritised daily planning and ran it by the customer	✔
		The team can decide on development method	The methodology is approved outside the team	✖
			The team tailor the method	✔
			Scrum practices were adjusted	✔
		The team can determine training requirements	Training is requested through the project manager	✔
			Training depends on the time demands of the project	✖
			Training is determined on an individual basis	•
		The team decides on new team members	The team is informed of new members joining the team *after* they are hired	✖

Spending Decisions

New equipment

In both sites, the teams studied followed a formal in-house procedure when they required new equipment to help them in their work (e.g. Project A team members required a UNIX machine which would help them with testing). A business justification form or similar document was filled in by the team member or members and this was reviewed by budget holders. In most instances the team member would

make this request for new equipment through the project manager. In the first organisation the project manager submitted projected costs for hardware and equipment at the beginning of each year. If, during the course of the year, additional hardware, equipment or personnel was required by the team then the project manager would submit a request for additional resources. Managers did not like going back for additional funding as one project manager points out:

"If something arises during the year, as it has in a previous year where we needed additional people and we have to go back and look for additional funds, you would probably have bandwidth to do it once a year but if you have to go back looking for additional funds you don't go back looking for them a second time."

Project manager, project A

A similar process was in place for the second site. Team members identified new resource requirements and the project manager or Scrum master discussed these with the budget holders, in this case the product owners.

Equipment Type

Within both sites there were set lists of tools, equipment, licences, etc. from which the team were expected to choose from to develop the product. If resources not on this list were required then the team applied, through the project manager or Scrum master, for permission to use this new resource. These restrictions were in place because of a) worries over unauthorised use of software or licences and b) additional costs associated with these new resources.

Operating Decisions

Performance Criteria

Teams within both sites had operating rules within which they were expected to operate. These rules included the high level project performance criteria (e.g. delivery dates, quality and budget targets). All performance criteria were open to questioning and if any team member did not agree that the expected targets were realistic they would raise this concern with their project manager. Short-term performance criteria were generally discussed during daily stand-up meetings and these were decided upon by the team in conjunction with the customer.

Development Method

The teams in this study were not given a choice when it came to which development methodology they could use. All teams used Scrum and this was compulsory. However, the teams could make operational decisions such as tailoring the methodology, for example in project B, the team decided with the customer to demonstrate their product every week rather than every four weeks as specified by the method. They also decided, with the customer, which tasks to prioritise and what their weekly and monthly goals would be.

Training Requirements and New Team Members

While the teams had autonomy in their daily operational decisions there was a consensus among team members that larger decisions that affected the team were decided higher up the management chain. None of the team members interviewed had any choice when it came to what training budget or time was available or what new team members were to join the team. Team members could make suggestions regarding some of these but ultimately the decision rights lay elsewhere. For example when team members wished to receive training they could not decide, as a team, what training they could receive. Training requests were usually placed with the project manager and the project manager then made a decision with the customer on whether or not to grant the training. During the interviews team members often used phrases such as *"that was mandated from further up the food chain"* and *"that was decided way up"* or *"this is not decided at our level"*. The surprising fact was that the decisions being made had a direct affect on the teams, yet the teams did not appear to have any ownership of them. Teams accepted that they must use a specific methodology, they must work with whomever their manager (working with human resource departments or equivalent) selects for the team and that decisions could be made outside the team that they had little or no influence on. When asked whether management was supportive or directive at mid and senior level one team member replied:

"They would be quite supportive, if we have issues or are working on something. But at the same time we are told you are working on this, this is your area of focus, we're going to be doing this. We've had planning sessions where we've developed our plan and at the end of the day there might be a note handed out saying we have

to drop this and we are going to be doing this instead. It doesn't happen on a regular basis but it does happen and those decisions are frustrating, sometimes you feel it's made over my head and there is nothing I can do ...it can be frustrating."

Team member, project B

According to one Scrum master in Case B *"Mid and senior level management are almost completely absent"* and they *"have nowhere to turn to with impediments"*. Another Scrum master with over 20 years of experience within the organisation asked the question "*how do we get the whole organisation to support ASD, how do we define roles and responsibilities in our government structure that actually fits the ambition of delegating responsibility further down in the organisation, while at the same time during the last five to ten years we have moved the authority upwards in the organisation?"*

Accountability

Table 5-7 Organisation - Accountability

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Accountability	Team accountability	Teams are collectively accountable for project outcomes	Teams carry out peer reviews of coding	✔
			Teams participate in sprint retrospectives	✔
	Project controls in place	Key performance indicators are in place for each project	Quality, within budget and on time delivery are used as key performance indicators	✔
			Key milestones are put in place for each project	✔
			Customer satisfaction results are used at the end of each sprint	✔
			Daily plans and deliveries are highly visible	✔
		Uniform performance criteria is in place across all projects	Subjective manager opinions on team performance	✖

Team Accountability

While the teams were somewhat restricted when it came to larger decisions that affected them, they also had limited accountability when it came to project outcomes. Team accountability was practiced to some degree through peer reviews

of coding, sprint reviews, retrospectives and daily Scrums. However, there was no evidence to suggest that teams in this study had any accountability as a unit for project outcomes. Managers on both sites used the performance evaluation process (see section 5.8) to determine accountability on an individual basis by subjectively evaluating individual team members. Team accountability was not formalised in any way in either site. A project manager in case B describes the typical process:

"It doesn't really go down into every single individual in the project. I would say it is fairly informal how this happens in a Scrum project when it comes to each individual. The team gets the applause definitely from customers and those who lead the project when everything goes well. When the blame comes it is usually on those who steer the project and the product owner."

Project Controls

Key Performance Indicators

All teams knew that they had high-level performance indicators which could be budget, time or quality related. Key milestones were in place for each project and most team members also viewed customer satisfaction at the end of each sprint as an important indicator. The project planning tools allowed teams to see their targets which they had set at the sprint start up session, and also to see how they compared against these.

Uniform Performance Criteria

While the Beyond Budgeting model suggests that having uniform performance criteria in place across all teams will result in healthy competition between teams, this is difficult to do in ASD due to the organic nature of software development. One example where this was tried was for a junior team in the first case site. They held a competition and rewarded teams based on velocity achieved during a sprint. The team members viewed this unfair as the velocity was dependent on the completion of tasks which were of differing complexity for different teams.

These findings highlight that teams are given certain operational decision rights and are held accountable to the project manager for their performance. While there is relatively little literature exploring the level of decision rights and accountability required or used by an ASD team, the findings from this study suggest that the Scrum teams are still operating in a traditional way with a project manager making

the major decisions and being the one accountable for these decisions. Rather than a self-organising and self-managing team being accountable for project outcomes, the processes in both case sites are set up to support project managers controlling projects and being the ones who have more to gain and more to lose when project performance is measured.

5.1.3 Responsibility

Encourage self development

Table 5-8 Responsibility – Self-Development

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Encourage self development	Opportunity for self development	Team members are encouraged to seek out new opportunities to learn new things	Internal website is used by developers to update skills profile and market themselves for new opportunities	✖
			Books and magazines are distributed to team members to encourage them to keep abreast of new developments in ISD	✖
	Development of skills	Team members are encouraged to develop their skills and abilities	A training manager is located on site for training requirements	✖
			Team members request training through project manager	✖
			Manager recommends training courses	✖
			A budget for the project dictates whether training is allowed	✖
			Consultants are trained by their own organisations	✖
			Only Scrum masters receive training	✖
			The Scrum master trains members	✖
			Team members transfer knowledge within teams	✔
	Feedback for self development	Team members are given feedback on their performance	In theory there are regular one-to-ones with managers. This does not always happen due to project pressures	✔

Opportunity for Self Development

To provide an opportunity for self development, the first case site in this study employed an internal website which was used by developers to market their skills to a wider internal organisation audience. Developers who wished to seek out new opportunities used this site to search for openings within the organisation and to upload their curriculum vitaes and update their profiles when they developed new

marketable skills. Within the site, books and magazines were available in communal areas which, for example, discussed the latest technologies and methodologies used in the IS field. Because the second site in this study used consultants to staff their teams meant that there were differences between how they regarded team members compared to the first site, where the team members were full time employees of the organisation. There was little evidence to suggest that the organisation provided opportunity for the self-development of the team members. Team members were hired for the duration of a project and their self development was regarded as a matter for the member's consultancy firm not something the organisation that hired them for the duration of a specific project.

Development of Skills

The first case site employed a training manager who was located on site and handled training requests from the team members, i.e. those who wished to develop their skill and abilities. These requests were relayed through the project manager. Approval was given based on both manager recommendations and time or budget constraints in place at any given time. The second site expected team members to be trained by their respective consultancy firms. However, all Scrum managers within this site received Scrum training, and when required, could give training to team members. Another method of training team members was by transferring process and technical knowledge between team members at daily Scrums and project meetings. Within both sites this helped team members develop new skills and abilities through learning from other team members, as one project manager said *"within the team we have knowledge transfer between team members to try to get every team member up and running at a basic level."*

Feedback for Self Development

While both sites had a mechanism in place whereby team members received feedback on their individual performance from their project manager, in practice this was not done on a regular basis. Performance reviews are discussed in more detail in section 5.8, but in terms of self development, team members in the first case site previously had one-to-ones with their managers which they found were a positive experience. However as project pressures mounted, these one-to-ones became less frequent and ended up being incorporated into the end of year reviews.

Encourage teamwork

Table 5-9 Responsibility - Teamwork

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Encourage teamwork	Teamwork	Individuals are encouraged to work as part of a team	Daily Scrums, iteration planning and close down sessions	✔
		The importance of working together for a common goal is emphasised	Project milestones and delivery dates are emphasised	✔

Teamwork

In terms of encouraging teamwork, project managers and Scrum masters in both sites recognised the importance of soft skills such as the ability to work well in a team and cooperate with other team members. All the projects studied used Scrum practices such as daily Scrums and iteration retrospectives which further highlighted the cooperation and teamwork required from team members. The following excerpt from an interview with a project manager captures the importance of teamwork for ASD:

"What I realised when I started working with Scrum, was the competence required in cooperation and teamwork. I have started to value that much, much higher than individual performance because we can have several people in the project who are very, very clever, they are very, very good but when it comes to teamwork they are not productive because they don't work together."

Project manager, project E

A Common Goal

Agile practices such as daily Scrums (a short status meeting held each day by the team), iteration planning sessions (a one-day meeting that initiates each sprint) and close down sessions (a half day meeting held at the end of each sprint)

encouraged teamwork by highlighting the interdependence between team members working on the same project and working towards the same project delivery dates. Team members were constantly aware of the project status and conscious of the key milestones and delivery dates. Knowing the key milestones and delivery dates helped a lot in this regard allowing teams to know not that they are *"not only making bricks, they know what kind of cathedral they are going to build"* Scrum master, project F

5.1.4 Autonomy

Team empowerment

Table 5-10 Autonomy – Team Empowerment

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Team empowerment	Autonomy of team members	The group has a high degree of freedom in carrying out tasks	Team members have a high degree of freedom carrying out their daily tasks	✔
			Prioritisation of tasks is made during discussions with customers and product owners	✔
			The management level directly above the team is supportive	✔
			Managers manage by exception	•
	Impact of the ISD team tasks	The group has a high impact on its work environment	Project roadmaps and visions are communicated to the teams	•
			Some team members help create the project roadmaps and visions	•
			Some teams have little input into these visions and roadmaps	✖
			A program road show tours the organisation sites and keeps teams updated on the impact their work is having	✖
	Potency of the team	Belief in group capabilities is high	The team believes they can accomplish something every iteration	✔
	Meaningfulness of daily tasks	There is a strong meaning attached to the tasks	Project visions, roadmaps and practices such as the program road-show keep teams updated on the impact their work is having	✖
			Team members pick their own tasks	✔

Autonomy of Team Members

By following the Scrum methodology team members in both sites had a great deal of autonomy with regards to the way in which they carried out their daily tasks.

In the majority of teams, task prioritisation occured through team discussions with the customers or product owners. Daily tasks were discussed during stand-up meetings and team members then had the freedom to choose their own tasks.

All of the team members interviewed indicated that the project managers on their teams were supportive and promoted an environment whereby team members had a large degree of freedom. A management-by-exception style was used by project managers. This was perhaps because the project management tools in both sites gave a quick and clear indication of the status of the project at any given time, managers also met regularly with their teams during daily Scrums and iteration or sprint planning and close down sessions and were constantly informed of how the project was progressing. One developer gave a typical comment of how team members viewed the level of autonomy they had over their daily tasks:

"We were given a very high level of autonomy… a lot of free reign. We did have to discuss things with the customer to get their trust so that they know what we are doing but we came up with our own proposals about what we were going to do in terms of code coverage and things like that, we were able to come up with our own approach, ran it by them and they were very happy with it so. I don't think really at any point I felt hampered on anything we did"

Team member, project C

Impact of ISD Team Tasks

In terms of the impact the work the team does has on the organisation, most teams understood the value of their work. Generally high-level project roadmaps were created with project owners and project sponsors. In some cases, team members then became involved in further developing the roadmaps and creating a vision for the project. This was not usually the case, and in most instances, high level project roadmaps and visions were created and then communicated to the teams. All teams were aware of the overall vision for the project they were working on and what its use would be. While most teams used workshops, project initiation meetings and other usual project mechanisms to communicate the higher level project vision, one project introduced what a developer described as a project road-show to impress the value of the project upon the teams.

"We had visitors over last week, our boss's boss and somebody else within the IT transformation. It's like a road-show; they are talking about the goals, what's happened, what's been going on, the bigger picture, not just our own little world. It was really good."

Team member, project B

Potency of the Team

Using the Scrum method allows the team to set their estimates each sprint. Therefore, in terms of potency, the team set themselves challenging but achievable targets each sprint. They were encouraged to set targets that they could realistically reach. So for daily operational tasks, the teams had a high belief that they could achieve the targets they set for themselves.

Meaningfulness of Daily Tasks

Project visions, roadmaps and practices such as the programme road-show helped give more meaning to the daily tasks carried out by the teams. All teams were aware that their tasks had meaning and were a valuable part of the overall project. Team members in both sites usually picked their own tasks and understood the value of each task to the overall project goal. For example, a developer in project E states: *"The first priority is to deliver the secure platform for a specific solution... it's interesting, we have a huge list of requirements and we are defining what we know is needed for the first version"*. That is not to say that there was always a strong meaning attached to each task that team members choose or were sometimes assigned. For example, the following interview excerpt demonstrates that developers were sometimes required to do tasks with little or no meaning attached to them.

"There are some things where, you are like 'Oh God' why am I wasting my time. You do feel sometimes like you are wasting your time doing a particular thing and you are like, I know this is such a waste of time or I know this isn't going to be used but generally you do feel like ok we are feeding into this or trying to get this done."

Team member, project B

As can be seen from the comments above, the iterative nature of the Scrum methodology used helps reinforce the value and meaning of the tasks. In general

throughout both sites, team members enjoyed getting something done on a regular basis and this, combined with a clear understanding of how their work tied into the overall project vision gave them a sense that their work was important and meaningful.

5.1.5 Values

Governance

Table 5-11 Values - Governance

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Governance	Project goals	Project goals are clearly defined for each team	Visions and project roadmaps are created for each project	✔
			Project milestones and release dates are clearly defined	✔
			Sprint goals are clearly defined	✔
	Boundary operating conditions	Operating boundaries are clearly defined	Teams must choose from a set list of tools and technologies	•
			Team members get clearance to use tools and technologies not on a pre-approved list	•

Project Goals

In both case sites, each project studied had a project roadmap created. These roadmaps clearly outlined the development teams' goals in terms of major project milestones, such as release dates and go live dates. Monthly sprint goals were developed at the sprint planning session and these clearly outlined the expected story points that the development teams expected to achieve that month.

Boundaries

Teams within both sites could choose from a number of tools and technologies. If a team required a new tool, technology or software licence then there was a procedure in place where they could put a request in to get this added to the list of approved tools, technologies or licences. Usually this was not an issue for team members and they could add additional items to the approved list without any delays. However one member did again highlight the fact that decisions were made outside

the team that affected the team but which the team had little influence upon. The following excerpt highlights the point.

"*The versioning control system is one very good example. We are using xxxxxx and it sucks for lack of a better word. We have complained quite a few times about that but the relevant discipline advisor is not too keen on changing it. I think many of the resources, especially on this floor would like to move to a different version control system. But that's typically one of the things that we just have to stick with.*

Team member, project G

Internal domain

Table 5-12 Governance - Internal Domain

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Internal domain	Architecture decisions	Team has an input into defining the architecture	Teams meet and communicate with the architecture team	✔
			Architecture is well established and understood by the team	✔
	Process choice	Team has a choice in defining the systems development process for each project	The team uses a defined process	•
			The team can suggest changes to the overall development process	✔
			The team makes changes to the process to suit a particular project	✔
	Skill development	Team members can get training when required	Team members request training through the project manager	✔
			Training depends on the time demands of the project	✖
			Scrum masters train the team	✖
			Training is determined on an individual basis	✖

Architecture Decisions

Both case sites used specific architecture groups who interacted with the development teams. Across both sites the teams were comfortable with the level of interaction and communication they had with their respective architecture groups. The level of understanding the teams had of the project or program architecture was dependent upon the length of time the project was in development. On some projects

the architecture was well established and understood by the ASD team while on others the architecture group were in regular contact with the ASD team and communicating any changes with team members. All of those interviewed had a good relationship with the architecture group.

Process Choice

In terms of the teams having a choice in defining the development process for the project, an overall defined project process was mandated (in both case sites this was the Scrum method). While the decision to use Scrum was made by the IS department in both sites, the teams had no input in the development process choice. They could suggest changes to the process and were encouraged to do so. Both sites explicitly stated that they used the Scrum methodology, yet as known from previous studies (section 2.7.3, page 47) only a small number of developers follow any particular method rigorously. Both the sites showed a sign of this tailoring of methods, as each project was developed in the spirit of the Scrum methodology but teams were encouraged to make changes to the process to suit projects on an individual basis.

Skill Development

Internal IS domain also consists of a skills component. This has been discussed previously in the encouraging self development section (section 5.1.3, page 162-164). To recap, training is requested through the project manager and depends on the time and budget constraints attached to each project. In the second case site, the Scrum master received training and was expected to train other team members if required. Both sites determined training on an individual rather than a team basis.

5.1.6 Transparency

Strategic transparency

Table 5-13 Transparency - Strategic

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Strategic transparency	ISD strategy	There is an explicit ISD strategy	A high level steering committee outlines the ISD strategy	✖
			Team members are involved in developing this strategy	•
		This strategy clearly outlines the goals of the ISD team	Major project milestones and release dates are clearly outlined	✔
			The strategy is understood to be flexible	✔
	Dissemination of the strategy	Regular meetings are held to disseminate requisite information	Project kick off meetings, workshops, presentations, newsletters and emails are used to disseminate information	✔
	Ethical issues	There is one set of numbers used to manage ISD projects	Teams use project planning tools which use only one set of numbers	✔

ISD Strategy

Both case sites had strategies for each project studied. These strategies were developed sometimes with input from the teams and sometimes prior to the mobilisation of the team. The project roadmaps clearly outlined the important milestones and goals of each project. The development teams considered that these high level dates and goals could be flexible if required. As on project manager states: *"we try to work to these predefined timelines but if there are things that have to be done due to whatever, we can approach it differently."*

Project manager, project F

In the first case site where team members were full-time organisation employees, an ISD strategy was in place for each team. Team members and project managers had limited involvement in developing this strategy. For example, a high-

level IS steering committee outlined the ISD strategy for each project and while the team, through the project manager, could provide input and feedback on those strategic plans, they would have minimal impact. A project manager describes how he is more involved in aligning strategic plans that he receives from higher-level management in the IS department with those of the team:

"I would have an input into those 3-5 year strategic plans, for example, how they would relate to one of the team's goals or the goals of someone higher up. I would have an input into them and there would be a reasonable amount of alignment but things change continually. I would say to you that my ability to change a 3-5 yrs plan which has come down is probably not going to be huge."

Project manager, project B

For the second case site, strategy for the current project was the only strategy team members were concerned with or involved in developing. This strategy was driven by both the project and the yearly budget. While the organisation is beginning a move towards creating long-lasting teams by ordering products, rather than projects, this had not happened while this research was being conducted. Teams had at most, a project strategy, and because the projects were driven by the annual budget, sometimes a strategy that only covered one year. Longer term strategic planning was not something the team concerned themselves with. Longer term strategies *were* in place for the project but due to a) the yearly outlook driven by yearly budgets and b) the projects being staffed by consultants, team members did not consider long-term strategic planning. The following quote is typical of the views of team members within the second case site.

"I've seen the roadmap and that is at least 2-3 years ahead but we're not looking at that because we have got to go for the next release that is what we are looking at now."

Team member, project E

Dissemination of ISD Strategy

Across both sites, information was disseminated through a range of mechanisms. Teams used project kick-off meetings, workshops, presentations, newsletters, emails, project road-shows, etc. to ensure the team had requisite information required for their daily tasks.

Ethical Issues

The Beyond Budgeting model suggests that a high *ethical* standard is set for information flow. For ASD teams, the ethical dimension is handled through the continuous updating of the project planning tools used in the projects. All those interviewed agreed that the planning tool, combined with the close cooperation required from team members meant that project data was transparent and correct. The project status was updated daily and visuals such as burn-down charts and graphs from planning tools depicting actual versus estimated story points completed ensured that bad news was circulated rapidly. This allowed for corrective actions to be taken immediately, if required.

Operational Transparency

Table 5-14 Governance - Operational

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Operational transparency	Access to relative information	Teams have timely access to all relevant information	The project planning tools used by teams in both sites give operational transparency. These tools give the teams access to all relevant information and are updated regularly (usually daily but at a maximum weekly). All the teams studied could get access to information on other teams when and where required.	✔
		Teams can see their own progress data		✔
		Teams can see other similar teams progress data		✔
		Teams can see their targets and current positions		✔

Access to Relative Information

The project planning tools used by teams in both sites ensured operational transparency. These tools gave the teams' access to all relevant information and were

updated regularly (usually daily but at a maximum weekly). All the teams studied could get access to information on other teams when and where required. The following quotes highlight these points:

"You can see what everyone else is doing and the burn down rate and how the iteration is progressing and whether it's on track or not."

Team member, project A

"I don't have admin access, but I have access to everything I need. We can see the burn down charts, we can go into other tracks and see their stories, you can pretty much edit as much as you want, you can put in new tasks."

Team member, project B

"We use task board, an electronic Scrum wall. I like it, I think it's good because you can get reports and stuff on it as well. It is updated daily; you can go on everyday and have a look if you want"

Team member, project D

5.2 Process Principles

5.2.1 Goals

Continuous Improvement

Table 5-15 Goals – Continuous Improvement

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Continuous improvement	Specific goals	Long term and short term goals are clear and precise	Scrum meetings, sprint and iteration sessions set clear and precise short term goals	✔
			Project milestones are used as longer term goals	•
			There are no long-term goals made available for the team	•
	Challenging goals	Stretch targets are set	Aggressive but possible targets are set at the beginning of each sprint	•
	Feedback to team members	Mechanisms include outcome and process feedback	Iteration reviews are used to improve processes	✔
			Managers have one to one feedback sessions with team members	✖

Specific Goals

In terms of setting specific short-term goals for the ASD teams, the Scrum methodology used in both sites enabled team members to set clear and precise short-term goals. These goals were produced at every iteration or sprint planning session and involved the team members themselves deciding iteration goals which aligned with the overall project goals. The project goals were seen by all team interviewed as the major long-term goals of the ASD team. It was interesting to note that none of the informants of this study had any formalised goals which ran beyond one year. A project manager in project C captured the general consensus when it came to looking at longer term goals for the team by saying: *"It's difficult in this project to look at that (longer term goals) because we have a yearly cycle."*

Challenging Goals

Both case sites used stretch targets when setting their short term goals. Case site A had a formalised process whereby aggressive but possible targets were set in conjunction with highly probable targets at the beginning of each sprint. Case site B

also claimed to set stretch targets but there was no formal process in place to document or capture these.

Feedback to Team Members

The Scrum methodology in both sites provided mechanisms such as iteration retrospectives and review sessions to provide outcome and process feedback. Teams used this to improve processes, for example in project B the team decided to improve the development process by conducting weekly show-and-tells to their customer rather than waiting until the sprint finished. Project managers also had one to one feedback sessions with team members to provide them with feedback on their performances.

Relativity

Table 5-16 Goals - Relativity

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Relativity	Benchmarking goals	Goals are benchmarked against relative peer groups	Story points completed are compared with other groups	✖
	Goal transparency	Targets are visible across the organisation	The planning tool is open to those who require access	✔
	Participation in goal setting	Teams participate in setting their own goals	Iteration and sprint kick-off sessions are used for short-term goals	✔

Benchmarking Goals

From the seven teams studied for this study, the only team that used benchmarking to compare against other ASD teams was the junior project team in project C. This team competed with other teams to complete story points at the end of every iteration. The organisation supplied a prize of dinner vouchers for the team that completed the most story points. The obvious disadvantage of this system is that it is the team itself that estimates the time required for their story points. This may lead to a form of what is known as “gaming the numbers” (section 3.2.1 Page 92).

For example, in project C, the team members knew that other teams within their program and against whom they were being benchmarked, used estimates for story points that were padded excessively. One team member describes the problem with this form of benchmarking:

"The thing is, you can have a look and see the stories the other tracks have and the times they have and yes they did complete those things. But I know when I worked with the database track for example; you'd be waiting a long time for them to do something very small. They'd be racking in 6 or 8 hours and you'd think well, if I had actual access to that system, I know how to do that in minutes. So you'd wonder sometimes."

Team member, project C

Goal Transparency

No other team in this study used a formal benchmarking mechanism to compare and motivate teams, although as pointed out by a project manager in the second case site, the project planning tools used allowed a transparency that meant other teams could at any stage examine the velocities, burn down rates, target estimations, etc. of other teams.

"Everyone knows the velocity on the different teams so they can see how other teams are doing. We don't push people to do it but we are encouraging them to understand why their velocity is lower than the other teams', but we are not running a process, a formalised process.

Project manager, project F

Participation in Goal Setting

Teams participated in setting their own goals by attending daily Scrums, iteration and sprint kick-off sessions. During these sessions the teams worked with product owners, customers, Scrum masters and project managers to develop or refine weekly and monthly goals. Team members clearly articulated what they would aim to achieve during a particular sprint and these goals were then stored in the project management tool.

Performance Contract

Table 5-17 Goals - Performance Contract

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Performance contract	Decoupled targets	Targets are decoupled from performance reviews	Performance reviews are on an individual basis and incorporate hindsight	•
	Behavioural goals	Behaviour metrics are an integral part of goal setting	All teams use behavioural goals	✔

Decoupled Targets

While none of the teams studied had a formal team-based performance review, the individual reviews that were carried out on team members were decoupled to a certain degree from original targets. Usually the team managers reviewed the individual team member, using their personal knowledge of how the member performed during the review time period. Both managers and team members interviewed across both sites agreed that the reviews conducted incorporated hindsight. Members were reviewed based on how they performed and circumstances affecting their performance which were outside the control of the team members were taken into account when evaluating their performance.

Behavioural Goals

Managers also placed a lot of emphasis on the soft or behavioural skills of the team members. The emphasis on teamwork in the Scrum methodology meant that managers emphasised the importance of communication and teamwork skills as part of the performance requirements of the team members. The following quotes from team managers exemplify the performance review process found within both sites.

"As part of those skills and competencies, you'd have things like communication, and leadership, you'd also have team based skills, so we would review them based on their performance on team based activities. So we'd look actively and monitor actively on how they would be team players, you can pick out somebody who is not a team player and you can pick out somebody who is a strong

team player and recognise them that way. So part of their goals is to be a team player even though you actually meet with them on a one to one basis."

Project manager, project C

"Yeah both, it's actually both technical and behavioural. Especially when we introduced the Scrum teams, we were very focussed on personal skills, attitude, working in teams, helping people and stuff like that."

Project manager, project F

5.2.2 Rewards

Table 5-18 Rewards – Relative Performance and Benchmarking

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Relative performance	Relative performance evaluation	Rewards are not based solely on meeting fixed targets	Rewards are not based solely on meeting fixed targets	•
			Rewards are based on meeting targets set out by the team member and manager at the beginning of the year	✖
			Rewards are based on a mix of technical and behavioural abilities	✔
		Hindsight evaluation is used	Managers recognise operating conditions during the year	✔
Benchmarking	Benchmarking	Benchmarking is used in the rewarding process	Team members are rated against each other on a C curve reward scheme	✖

Relative Performance and Benchmarking

As discussed in the previous section under the performance contract component, relative performance evaluation was carried out within both case sites. Rewards were not based solely on meeting fixed targets as team members were rewarded based on a number of criteria. In the first case site the team members met individually with their team managers to develop a list of yearly goals (which included both technical and behavioural goals). At the end of the year the manager reviewed the initial goals and based on hindsight, evaluated the performance of the team member. A form of benchmarking was used in the sense that team members received an overall rating

from their manager. This rating was either: **N** (needs improvement) **P** (proficient) **E** (exceeds expectations) or **O** (outstanding). The manager must distribute these rating based on a curve, meaning that a certain percentage of developers must be rated under each rating. The project manager from project A describes the process and the difficulties associated with rewarding team members in this way:

*"someone either gets an **N** (needs improvement) **P** (proficient) **E** (exceeds expectations) and an **O** (outstanding), and unfortunately they are allocated on a curve, so I am theoretically only allowed to give 5% of people an N. What tends to happen is that some teams are higher performing than other teams so some teams will be slightly skewed more towards the E and the P rather than the N and the P. Managers just have to go in and bare knuckle fight it out with other managers because every manager is going to think the people on their team deserve higher ratings and is going to want to, for their own peace of mind because no manager is going to want to be coming back dishing out Ps and Ns to their team... ... it's a piece of crap to be honest. When you have a team where everyone is exceeding it's difficult... so I could have a team of people who are all outstanding but I still at the end of the day I have to go in and give someone a P or a score that I effectively didn't give to them but they have been marked down to if you adhere to an office wide curve, and you can imagine all the crap that comes out of that."*

Project manager, project A

Team managers and team members across site A generally thought that this form of reward system was unsuitable for ASD. Words such as *frustrating, de-motivating, delusional* and *unfair* were used by informants to describe their feelings on how the system worked. The second case site operated a different reward system because the projects were mainly staffed by consultants. The product owners and/or project managers listed a set of competencies required by potential team members. These included both behavioural and technical capabilities. The human resources or line management department then sourced team members from a set list of consultancy firms. These team members are then paid a rate agreed with their consultancy firm and the consultancy firm is paid a rate agreed with the organisation. Evaluations of the member's capabilities are made by the project managers within each project. A project manager from site A elaborated on this:

"I don't think we are verifying whether these, let's say characteristics, are there but we are expecting that they are there, and if we experience that they are not there through the daily work we will report it back immediately and probably not pay for the person either. So we are quite clear on that, if we receive people who we have been told have the qualification we ask for and then we experience they don't have it."

Project manager, project F

Group Evaluations

Table 5-19 Rewards - Group Evaluations

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Group evaluation	Group evaluation	The team is evaluated and rewarded as a group	*This does not happen	✖
	Peer review	Teams are reviewed by peers	*This does not happen (Individuals are reviewed by their managers)	✖

Group Evaluations

Group evaluations did not happen in any of the cases studied in this project. Both case sites used a reward process based primarily on the reviews of team management. Managers accepted that this may lead to inappropriate or dysfunctional behaviour on the part of team members and generally relied upon their own observation skills to ensure a fair review process. One manager observed:

"You need to recognise also that some people put so much emphasis in managing their career and fronting up and making things looks good that they don't do what they are actually supposed to do."

Project manager, project B

Peer Reviews

Peer reviews did not happen in either of the case sites. Within both sites it was the responsibility of the project managers to carry out the reviews of the team members. While managers themselves agreed that the review process was subjective, they stated that good management skills enabled them to perform fair reviews. There was a mixed response from team members regarding the subjectivity of their managers when it came to performing reviews. Some stated that the managers were in a good position to review both the behavioural and technical performance of the team members while other stated that the managers did not have enough information and because they did not work closely enough with the team could not do this fairly. All team members interviewed agreed that group rewards should be at least part of the reward system for ASD teams. A sample of quotes is given below showing what members thought about this:

"I know that we are graded against each other and it's never communicated to us but I know that that's how it's done. So if there was a team or group reward or if there was at least a certain element of it, if the team performance was plugged into your overall end of year benefit, it would lead to more... not that there is competition among us but I just even think from a moral perspective or whatever it would be more positive."

Team member, project B

"*The project manager generally wouldn't know who is doing the most work. I think really the only people who know are the other developers on the team."*

Team member, project C

"*Who really cares* [about individual rewards]*? It is what the team is doing that is what is best for the end result. So there is no point of me going solo because I think I am going to be the best one."*

Team member, project D

"I think it is good to focus on the team because that is what means most in the end, total production"

Team member, project E

5.2.3 Planning

Long Term Planning and Action Planning

Table 5-20 Planning – Long Term and Action Planning

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Long term planning	Planning guidelines	Guidelines are used rather than fixed, inflexible annual plans	High-level plans are in place which include expected release dates	•
			These plans may be changed depending on the nature of the project	✔
			There is flexibility within high-level plans	✔
Action planning	Adjustable plans	Action plans are continuously updated to account for any future performance gaps identified	Potential future problems and required actions are discussed within teams and escalated to higher management if needed	•

Planning Guidelines

Long-term planning within both of the case sites was not something the ASD teams were involved with. Generally, long-term planning was carried out at programme level and these plans were disseminated to the team in the form of project roadmaps or project visions. At the ASD team level, the input of team members was in the form of feedback to those roadmaps and project visions. If the teams felt that the plans were unrealistic then they voiced their concerns through the project manager.

In case site A, the team managers submitted a project budget every year outlining the expected costs and timelines of the projects. They tried to stay within those costs and timelines, and as discussed in section 5.2, knew that while timelines were sometimes flexible, requesting additional funding during the year was not encouraged. The second case site had the additional problem of ramping up and ramping down personnel and the project budget imposed a myopic planning process. One Scrum master stated that they do not *"think longer than one year ahead"* because *"we only have a budget for one year"*. Another remembered when he had to break up a team that were together for two years and were *"doing so well and*

probably at their peak" because the budget had run out. A manager on a different project describes the problems:

"You get a budget, i.e. you need to run this for 12 months and that ends on December 1st. But then somebody says, but we should get another phase that starts on February 1st. What do you do in the meantime? We have a really good team, should we just dismantle it and try to assemble it in 2 months? Maybe we should drive a little bit slower and make it last those extra 2 months so we have a momentum going?"

Project manager, project D

Adjustable Plans

An advantage of using ASD practices is that deviations from the high-level plans can be discovered quickly and actions can be taken immediately. A developer describes how the team had decided that a release was not ready and relayed that information to the manager, who made the decision (with the product owner) on whether to release the product. This highlights the fact that even though high-level plans are in place, when the development teams could not meet the milestones the plans were open for revision and could be adjusted when required.

"A formal decision was not made by the team but we felt there's not much use for us to actually deliver something into production in June. We said it again in about August or September that it would be difficult. The manager had two options, he could postpone the second release or he could say that 'we'll deliver something in June and it won't be released until September'."

Team member, Project G

An interesting point to note here is that every project within both sites depended on annual budgeting mechanisms, i.e. projects (even ongoing projects) needed to be funded and authorised every year to proceed into the new budget year. Once the projects had cleared the annual budgeting mechanisms, which were designed to capture costs and timelines, the ASD teams viewed these as guidelines and there was flexibility within these guidelines. Teams were encouraged to meet the project milestones as outlined by the project roadmap (feeding into the budgeting process) but when, for example, a sprint did not achieve all expected story points then the

high level milestones would have to be adjusted (either the timelines revised or the cost/functionality of the system revisited).

Inclusive Planning and Continuous Planning

Table 5-21 Planning - Inclusive and Continuous Planning

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Inclusive	Team involvement in planning	Team members have input into their own strategic plans	Management decide on timelines and release dates	•
		Team members are involved in local strategic planning	The Scrum team coordinates with management to provide estimates	✔
			Plans are communicated to the team and they can provide feedback and input	✔
Continuous	Continuous review of plans	Forecasts are updated on a monthly basis	Forecasts are reviewed at the sprint close down session	✔
		Trends are analysed and monitored	Burn down charts are used to monitor trends	✔
			The Scrum planning tools give transparent access to each project allowing for continuous monitoring	✔
		Key performance boundary indicators are used	Two levels of KPIs exist, the first level has the major release dates and the second level has the monthly sprint targets	•

Team Involvement in Planning and Continuous Review of Plans

In terms of inclusive and continuous planning, as discussed earlier, team members were not involved in long-term strategic planning. In some instances the project milestones were decided prior to the formation of the project team and in others the team coordinated with the management team to provide project estimates. In all cases the plans were communicated to the project teams and the teams could provide feedback on these if they wanted. The use of the Scrum methodology in

both sites ensured that the short-term planning process was both inclusive and continuous. Team members were involved on a daily basis during stand up meetings and on a monthly basis during sprint and/or iteration retrospectives. Burn-down charts were used to monitor trends in both sites. The planning tools used on both sites gave clear indicators when velocity rates declined or when targets were not reached. Forecasts were updated usually on a daily basis but at most on a monthly basis. In terms of key performance indicators (KPIs), the teams used two forms; one was the high level KPIs which included meeting release dates with a quality product and within budget. The second was the daily targets and monthly sprint targets set by the teams themselves. One project manager elaborated on this:

"The only thing we're ultimately being measured on is that we've met the high level milestones. All the interim milestones [iteration goals] *we kind of are but the major ones we are really graded against are the high level ones."*

Project manager, project A

5.2.4 Control

Control

Table 5-22 Control

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Control	Key Performance Indicators	KPIs are outlined before the project commences	Two levels of KPIs are used, the first level has the major release dates and the second level has the monthly sprint targets	•
		Variance limits of these KPIs are known to the team	The project planning tools show estimated versus actual completion of story points	✔
			Teams follow their progress on burn down charts	✔
		All relevant information for these KPIs is available to the team	The KPIs may change over the course of the project and these changes are related to the team	•

Key Performance Indicators

In both case sites, the project teams were controlled through outcome controls, i.e. they were given specific targets (delivery dates, functionality, etc.) and expected to meet those targets. These KPIs were outlined in the project roadmaps. The teams then broke these high-level KPIs further down into monthly sprint targets, designed to align with the higher level KPIs. Project planning tools were used in all projects to track targets versus completed story points during each iteration or sprint. Teams could see at a glance how they compared with the expected targets through burn down charts and other visuals.

Teams found that project milestones could sometimes change. For example, the previous section on planning gives an example from project G where delivery dates were constantly being pushed back to allow for unforeseen circumstances. Changes such as these originate from within the team and the team is usually the first to become aware that decisions on changes to functionality, cost or delivery dates will be required. In other instances, the product owners or higher level management will decide that one or other of the high-level KPIs needs to be changed. This information is relayed to the project manager first and the project manager then informs the team. A project manager describes how the KPI changed on his project:

"In the beginning it was functionality and quality but it has changed. In the first few months of the project they changed the focus to costs. So in order to make everyone happy we have to focus on that. We have this triangle of cost, functionality and resources and we are pretty stuck on resources because that's the main cost. So we need to take out the functionality, we have de-scoped and de-scoped"

Project manager, project D

Management

Table 5-23 Control - Management

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Management	Management by exception	Higher level management do not interfere unless a KPI is out of bounds	Status reports show red when tasks are behind and management will monitor these	✔
			Managers can partake in sprint reviews	✔
			Managers do not get involved in sprint reviews	•
			Managers are forbidden by the Scrum master from interfering during a sprint	✔

Management by Exception

All teams examined, used managing by exception as a form of control. Teams worked to meet high-level KPIs and had considerable flexibility and autonomy within those high-level milestones. Within these milestones, the project tools helped quickly identify problem areas. For example the tool used in case A highlighted tasks in red when the task was behind target. Managers (those not directly involved in the team, for example, a program manager or in the case of project G where there were 18 Scrum teams, the overall project manager) would generally attend review meetings if a problem was identified and work with the team to seek a solution for the problem. In the second case site, the Scrum masters did not allow managers to interfere during a sprint, although there were emergency procedures in place should this become an imperative. The Scrum master spoke about higher level management intervention:

"They are not allowed, they try to but they are not allowed. I, as a Scrum master, have told the management or the product owner that this is not the way we are going to do it. If you are going to do it you have one instrument, you can abort the sprint and start the sprint all over again, and after that it has become a little better but it has a long way to go because they are used to interrupting people and doing things like that."

Scrum master, project F

5.2.5 Resources

Justification

Table 5-24 Resources - Justification

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Justification	Availability of resources	Additional resources are available if they are justified	Teams request additional resources through their managers	•
			The customer is contacted and makes the decision regarding additional resources	✔
	Cost of resources	The cost of resources is available to team members	Teams liaise with their manager to establish costs	•

Availability of Resources

A project budget existed across both case sites which determined planned resources for the budgeting year. The process for acquiring additional resources was similar across all projects examined. Additional resources were available if those funding the projects (i.e. the customer) agreed to pay the costs. Teams generally requested additional resources through their project manager or in some instances discussed it directly with the customer.

Cost of Resources

If, during the course of the development process, a team required additional resources then the cost of these resources were calculated (in some instances by the team) and a decision was made to determine if the additional resources were justifiable. A team member from each site describes the typical process:

"At one stage I needed to use an external library xxxxx component and that required a developer and deployment licence. I just went to the customer and went to the architect as well and spoke to them about it. They got an evaluation version to do my work with so I had all that set and then after the project finished it was a task left for them to go out and secure the licence and things before it went into production, so there was never any problem there."

Team member, project C

What would happen is that we [the team] *would approach the head of programme office and she would take it from there. She will check if it is very expensive. She handles all that. You would get an approval or decline, depending for instance on the time or cost savings.*

Team member, project G

However in two of the project teams examined, acquiring additional non-budgeted resources was troublesome. The project budgets in project A and project D were, as the project manager in project A said, *"set in stone"* and the teams were not encouraged to look for additional resources. A team member from project A described the difficulties:

"You would have to go through an awful lot of hoops to get what you want and even then you could be wasting a lot of time. I mean an example at the moment is where, as a team, we are looking for an xxxxx machine where we can use it as almost a testing system. We've been trying to get that for 3 months now and we still haven't got it."

Team member, project A

In project D, product owners ordered that the budget be fixed and the project manager began to use off-the-shelf products in an effort to uphold cost, functionality and quality.

"We have a budget, so if we need an additional resource we have to prioritise, how is the budget? Do we have the space for it? That means that if we really have to do that, that functionality is important, more important than something else, we look at what lies at the bottom."

Project manager, project D

Impact and Boundaries

Table 5-25 Resources - Impact and Boundaries

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Impact	Impact of additional resources	How the costs impact KPIs is known to the team	Experienced team members are aware of the impacts	•
			Actual v planned costs are shown to the team every month	✔
			Teams liaise with their manager to establish costs	✔
Boundary	Cost limits for additional resources	The limits for resource costs is known to the team	The actual versus planned costs are shown to the team each month	•

Impact and Cost Limits of Additional Resources

For the projects where the budget was flexible or if a buffer was available for additional resources, team members were generally aware of the costs of the additional resources and the impact it would have on the project's KPIs. Some team members would check the costs of the additional resource themselves, while others would liaise with their managers to establish costs and viability. In project F the project manager would inform the team of the actual costs versus planned costs on a monthly basis. While the budgets were, in theory, the spending limit for each team, the teams had mechanisms whereby they could acquire additional resources if the justification was strong enough. For example in project A, one team member noted that: *"obviously if we thought something was quite important we'd relay this to the manager. Look it is important, we need to get this done otherwise if we don't then we'll have to do X, Y and Z and that will obviously take more time."*

5.2.6 Coordination

Horizontal Coordination

Table 5-26 Coordination – Horizontal Coordination

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Horizontal Coordination	Intra team coordination	Team members coordinate activities within their own team	Teams use the daily stand ups to coordinate	✔
			Co-location enables coordination	✔
			Scrum planning and close down sessions are used to coordinate	✔
	Inter team coordination	Teams coordinate with other teams within the organisation	Videoconferencing is used during iterations	✔
			Team members have informal ad hoc chats with other teams	✔
			An online forum is used to coordinate	✔
			One off handover to another team	✖
			Teams coordination only at integration	✖
			Team members move from one team to another	✔
			A Scrum of Scrums is used to coordinate activities	✔
			A designated individual coordinates teams	✖

Intra and Inter Team Coordination

All teams in the study used Scrum practices such as daily stand-ups, planning and close down sessions to coordinate activities *within the team.* For *team-to-team* coordination, teams used technologies such as videoconferencing, conference calls, online forums or other real-time communication tools. When teams were co-located, team members noted that they could *"pop down the hall"* to members from other teams. In project A, the team only coordinated with other teams when it came time to integrate their product with the other team. A manager from the second case site stated that moving team members from one team to another helped horizontal coordination as this person brought their knowledge with them and this enabled the second team to learn from the new member. In project G, the project manager was responsible for 18 Scrum teams all working under the same programme umbrella. This project manager used a Scrum-of-Scrums to help achieve cross team

coordination. He also designated one individual specifically to the role of coordinator across project teams. Despite this he still regarded coordination as *"one of the biggest challenges I have"* and *"coordinating across teams is one of my biggest concerns."*

Vertical Coordination

Table 5-27 Coordination - Vertical Coordination

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Vertical Coordination	Management coordination	The team coordinates with management	The project roadmap is used as a coordination mechanism	✔
			Management coordinate through the project manager	•
			Informal communication occurs with key personnel	•
			Formal requests for resources are a form of coordination	✔
			High project visibility enables management view how the team are performing	✔
	Customer coordination	The team coordinates with customers	Onsite customer enables coordination	✔
			Feedback is received from the customer regularly	✔

Management and Customer Coordination

Vertical coordination occurred within both organisations with both *management* and *customers*. Management groups (such as program managers, steering committees or senior IT executive groups) coordinated with the teams through project roadmaps and project vision and formal meetings with project managers. Some project managers reported that they had informal communication with key personnel in the management groups. The teams in turn coordinated with management groups through the project manager and formal processes such as the resource request process. The use of Scrum project planning tools also provided a transparency regarding the project status. Teams found that having a customer onsite enabled coordination. When coordinating with customers, teams used practices such as sprint reviews and demonstration sessions to receive feedback from the customer.

Formal and Informal Coordination

Table 5-28 Coordination - Formal and Informal Coordination

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Formal Coordination	Formal communication	The team uses formal communication means	The formal process for acquiring resources is used as a coordination mechanism	✔
			Formal workshops organised to increase interaction between teams	✔
			Common demonstration sessions between the team and management	✔
Informal Coordination	Informal communication	The team uses informal communication means	Social events (included in project budget)	✖
			Friday morning coffees	✖
			Informal ad hoc chats	✔
			Team events at sprint planning	✖
			Monthly technical presentations	✖

Formal Coordination

In terms of formal coordination, both organisations in this study had a number of mechanisms which provided a platform for formal communication. Processes and procedures were in place for a number of coordination requirements such as requesting new resources, highlighting issues and problems with the project, suggesting new ideas and arranging meetings with team members or with the customer. One innovative idea was seen in Project F where a formal workshop and demonstration session was organised to increase interaction between teams.

Informal Coordination

In terms of informal coordination, teams used a number of means of communicating at an informal level. In every project examined, there were a number of informal social events organised throughout the year where team members could get together with other teams and chat informally. These events ranged from large social gatherings that included hundreds of personnel from across the organisation to Friday morning coffees with the team. There was a mixed reaction to these events but they were all voluntary, and most team members stated that they were enjoyable

and beneficial. One team member explains why she thought informal social gatherings were helpful:

"If you had a coffee and some cake and just started chatting with someone about what you are doing this weekend, you get to know people and then it's easier to go and ask for some help if you need it."

Team member, project D

Other forms of informal coordination used by team members were informal chats with other personnel within the organisations, team events at planning sessions, such as going for dinner after the session, to help team building and voluntary presentations such as a monthly technical presentation where a new product or application would be presented and discussed.

Knowledge Repositories and Incentives

Table 5-29 Coordination - Knowledge Repositories and Incentives

Principle Component	Dimensions	Operations	Case Study Practices that Contribute to the Operationalised Principle Component	Contributing Practice is part of Agile Methods?
Knowledge Repositories	Knowledge repositories	Knowledge repositories are used to capture and share knowledge	Forums, wikis, sharepoints	✔
			Monthly technical presentations	✖
			Consultants use their own company blogs	✖
Incentives	Incentives to share knowledge	Teams have incentives to use knowledge repositories	Teams are asked to participate	✖
			Team members enable others to be self serviced	✖
			Team members use repositories so that they won't be dependent on one other person for information	✖
			Team members use repositories to encourage self- development	•

Knowledge Repositories

Both organisations employed a number of mechanisms to help capture and share knowledge within the ASD teams. Wikis, discussion forums, Sharepoints and project specific repositories were used across both sites along with emails, presentations and feedback sessions as a means to discuss, collect and disseminate information with other developers and colleagues across the organisation. In case site B where

projects were largely staffed by consultants, the consultants also used their own company blog as a means of gathering and disseminating knowledge.

Incentives to Share Knowledge

In terms of incentives to use knowledge repositories to share information, neither organisation provided any formal incentive to participate or to contribute. Teams were asked and encouraged by their project managers to initiate discussions when an issue arose which the team felt required such a discussion. Some team members contributed to a wiki site because they believed that it encouraged others to be *"self serviced"* and found that the site allowed them to find solutions to problems they encountered without having to depend on one another person for an answer. The project manager of project C encouraged his team to participate in online discussions and forums because it encouraged self development. In both sites teams used knowledge repositories sporadically, and did not have much incentive to participate in knowledge dissemination. According to one team member:

"Participating in the technical forum is encouraged as long as it doesn't affect work."

Team member, project B

A project manager stated that:

"I see sometimes that we have enough on our plates, we can't cope with also thinking about all these things. Our intention is good, we would like to think in a holistic perspective and think integration and ensure everyone have the same understanding and so on but the amount of work makes us focus on what is closest to us and that is the small group of people we are working with and that also goes for the Scrum teams."

Project manager, project F

5.3 Chapter Summary

This chapter sought to achieve the second research objective of this study, i.e. *Apply the operationalised Beyond Budgeting model to an agile systems development environment.* Table 5-30 below shows that many practices in the operationalised model were already being carried out by the ASD teams within both sites. This gives reasonable cause to believe that the operationalisation and application of the Beyond Budgeting model in the context of an ASD environment has been successful and that the operationalised Beyond Budgeting model is appropriate for an ASD environment. While adjustments and further improvements are always possible, this first attempt at applying the operationalised Beyond Budgeting model to an ASD environment highlights the many similarities between Beyond Budgeting and ASD and also indicates a number of areas where ASD practices may be extended.

As can be seen previously from the tables in sections 5.1 and 5.2, the ASD teams in this study used a variety of practices which were not previously part of the formal agile toolset. By using the Beyond Budgeting model as a lens to examine ASD practices this research finds that agile methods, as used within these two large organisations, require far more practices to be used when integrating with the wider organisation than just those prescribed by the methods themselves. From the 154 practices observed across the two case sites, 39 of these could be considered to not have previously been considered agile practices (Table 5-31). These practices are analysed and present a platform for the recommendations discussed in the next chapter.

As well as that, some practices outlined by the operationalised Beyond Budgeting model as being suitable for an ASD environment were not being employed by the ASD teams in this study. For example, there was little evidence to suggest that Beyond Budgeting principles advocating that teams utilise knowledge sharing incentives, group rewards and dynamic resource allocation processes were being employed by the ASD teams. So while the findings discuss practices carried out by the ASD teams and these provide a platform to develop the recommendations developed from this study, another platform for developing recommendations is an analysis of the Beyond Budgeting practices that are not carried out by the teams in this study. When teams are not employing a practice that is suggested by the Beyond Budgeting model, the researcher sought to understand why this was the case. If there

was evidence to suggest that this should be a practice employed by the team then a recommendation is made and this recommendation is supported by the relevant literature. Tables 5-30 and 5-31 give an overview of the findings. Table 5-30 lists the set of operationalised Beyond Budgeting principles from chapter 3. Again, when evidence was found that the case site used a particular dimension of the principle component a "✔" is placed beside that dimension. When there is no evidence that the dimension was used an "✖" is used and a "•" when the dimension is partially used.

Table 5-30 Summary of Findings

Beyond Budgeting Principles					
Principle	Principle Component	Dimensions	Operationalised Dimension	Site A	Site B
Customer Focus	Customer needs	Information	Information is collected on customer needs	✔	✔
			Analysed Information is Available to the Team	✔	✔
			Forward Looking Information on Customer Needs is Available	✔	✔
	Customer knowledge sharing	Structures	Mechanisms exist to collect and disseminate customer knowledge	✔	✔
		Incentives	Teams have incentives to share customer knowledge	•	•
	Customer relationships	Involvement	Customers are involved in the development process	✔	✔
		Meetings	Direct Customer Contact takes Place	✔	✔
	Customer satisfaction	Feedback	Teams receive customer feedback	✔	✔
	Capability development	Training	Feedback is used to train members	•	•
		Processes	Feedback is used to improve processes	•	•
Organisation	Decentralisation	Spending decisions	The team can spend money on new equipment	•	•
			The team can decide on what type of equipment is to be used	✔	✔
		Operating decisions	The team decides on new team members	✖	✖
			The team can decide on performance criteria	✔	✔
			The team can decide on development method	•	•
			The team can determine training requirements	•	•
	Accountability	Team accountability	Teams are collectively accountable for project outcomes	•	•
		Project controls	Key performance indicators are in place for each project	✔	✔
			Uniform performance criteria is in place across all projects	✖	✖
Responsibility	Encourage self development	Opportunity	Team members are encouraged to seek out new opportunities	•	✖
		Development	Team members are encouraged to develop their skills and abilities	✔	✔
		Feedback	Team members are given feedback on their performance	✔	✔
	Encourage teamwork	Teamwork	Individuals are encouraged to work as part of a team	✔	✔
			The importance of working together for a common goal	✔	✔
Autonomy	Team empowerment	Autonomy	The group has a high degree of freedom in carrying out tasks	✔	✔
		Impact	The group has a high impact on its work environment	•	•
		Potency	Belief in group capabilities is high	✔	✔
		Meaningfulness	There is a strong meaning attached to the tasks	•	•

Beyond Budgeting Principles					
Principle	Principle Component	Dimensions	Operationalised Dimension	Site A	Site B
Values	Governance	Goals	Project goals are clearly defined for each team	✔	✔
		Boundaries	Operating boundaries are clearly defined	•	•
	Internal domain	Architecture	Team has an input into defining the architecture	✔	✔
		Processes	Team has a choice in defining the systems development process	✔	✔
		Skills	Team members can get training when required	•	•
Transparency	Strategic transparency	Strategy	There is an explicit ISD strategy	•	✖
			This strategy clearly outlines the goals of the ISD team	✔	✖
		Ethics	There is one set of numbers used to manage ISD projects	✔	✔
		Dissemination	Regular meetings are held to disseminate requisite information	✔	✔
	Operational transparency	Access	Teams have timely access to all relevant information	✔	✔
			Teams can see their own progress data	✔	✔
			Teams can see other similar teams progress data	✔	✔
			Teams can see their targets and current positions	✔	✔
Goals	Continuous improvement	Specific	Long term and short term goals are clear and precise	•	•
		Challenging	Stretch targets are set	✔	•
		Feedback	Mechanisms include outcome and process feedback	✔	✔
	Relativity	Benchmarking	Goals are benchmarked against relative peer groups	•	✖
		Transparency	Targets are visible across the organisation	✔	✔
		Participation	Teams participate in setting their own goals	✔	✔
	Performance contract	Decoupled	Targets are decoupled from performance reviews	•	•
		Behaviour	Behaviour metrics are an integral part of goal setting	✔	✔
Rewards	Relative	Relative performance evaluation	Rewards are not based solely on meeting fixed targets	•	•
			Hindsight evaluation is used	✔	✔
	Benchmarking	Benchmarking	Benchmarking is used in the rewarding process	•	✖
	Group evaluation	Group evaluation	The team is evaluated and rewarded as a group	✖	✖
		Peer review	Teams are reviewed by peers	✖	✖

Beyond Budgeting Principles					
Principle	Principle Component	Dimensions	Operationalised Dimension	Site A	Site B
Planning	Long term planning	Guidelines	Guidelines are used rather than fixed, inflexible annual plans	•	•
	Action planning	Adjustable plans	Action plans are continuously updated	✔	✔
	Inclusive	Team involvement	Team members have input into their own strategic plans	•	•
			Team members are involved in local strategic planning	✔	•
	Continuous	Continuous review	Forecasts are updated on a monthly basis	✔	✔
			Trends are analysed and monitored	✔	✔
			Key performance boundary indicators are used	✔	✔
Control	Control	Key Performance Indicators	KPIs are outlined before the project commences	✔	✔
			Variance limits of these KPIs are known to the team	✔	✔
			All relevant information for these KPIs is available to the team	✔	✔
	Management	Management by exception	Management do not interfere unless a KPI is out of bounds	✔	✔
Resources	Justification	Availability	Additional resources are available if they are justified	•	•
		Costs	The cost of resources is available to team members	•	•
	Impact	Impact	How the costs impact KPIs is known to the team	•	•
	Boundary	Limits	The limits for resource costs is known to the team	•	•
Coordination	Horizontal Coordination	Intra team coordination	Team members coordinate activities within their own team	✔	✔
		Inter team coordination	Teams coordinate with other teams within the organisation	•	•
	Vertical Coordination	Management coordination	The team coordinates with management	•	•
		Customer coordination	The team coordinates with customers	✔	✔
	Formal Coordination	Formal communication	The team uses formal communication means	✔	✔
	Informal Coordination	Informal communication	The team uses informal communication means	✔	✔
	Knowledge Repositories	Knowledge repositories	Knowledge repositories are used to capture and share knowledge	✔	✔
	Incentives	Incentives	Teams have incentives to use knowledge repositories	✖	✖

Table 5-31 lists all the practices employed by the ASD teams identified in this study. Based on the findings discussed in this chapter and reinforced by previous literature discussed in chapter 3, a list of recommendations is developed for extending agile methods. These recommendations are discussed in the next chapter.

Table 5-31 Practices Employed by the ASD Teams

Practices Employed by the ASD teams in this Study	Practice is Agile?
The customer proxy provides the team with information on the customer's needs	•
The team has previous experience working with the same customer	✖
Customer information is collected prior to the mobilisation of the team	✖
The team gathers customer information during the development of the project roadmap	✔
The team gathers customer information during the development process	✔
Up-front analysis is conducted by the team	✔
A requirements document is developed outside the team which includes analysed customer information	•
The requirements document requires further refinement when the team begin to develop	✔
Teams use the requirements document to gather customer knowledge	✔
The team use Wikis and sharepoints for each project	✔
The project manager shares information through email	✔
Teams have informal communication with other teams	•
The teams use the wikis and sharepoints when they require customer information	•
The team works with the customer to develop the project roadmap	✔
There are frequent interactions during daily Scrums and sprint reviews between the team and the customer	✔
The customer attends sprint reviews in person	✔
Feedback is received on a weekly basis	✔
Feedback is given at sprint retrospectives	✔
Team members make training suggestions to the project manager	•
Team members make suggestions for process improvements to the project manager	•
A business justification form is filled in to get new equipment	✔
Team members requested new equipment through project managers	✖
Projected hardware and equipment requirements are submitted by the project manager at the beginning of the year	✖
The team has freedom to choose tools from within a set list	✔
New tools, licences, software, etc. required authorisation	✔
Guidelines for project metrics are in place and these can be queried by the team	✔
Teams prioritised daily planning and ran it by the customer	✔
The methodology is approved outside the team	✖
The team tailor the method	✔
Scrum practices are adjusted	✔
Training depends on the time demands of the project	✖
Training is determined on an individual basis	•
The team is informed of new members joining the team *after* they are hired	✖
Teams carry out peer reviews	✔
Teams participate in sprint retrospectives	✔
Quality, within budget and on time delivery are used as key performance indicators	✔
Key milestones put in place for each project	✔
Customer satisfaction results are used at the end of each sprint	✔
Daily plans and deliveries are highly visible	✔
Subjective manager opinions on team performance	✖
Internal website is used by developers to update skills profile and market themselves for new opportunities	✖
Books and magazines are distributed to team members to encourage them to keep abreast of new developments in ISD	✖
A training manager is located on site for training requirements	✖
Team members request training through project manager	✖

Practices used by the ASD teams in this Study	Practice is Agile?
Manager recommends training courses	✖
A budget for the project dictates whether training is allowed	✖
Consultants are trained by their own organisations	✖
Only Scrum masters receive training	✖
The Scrum master trains members	✖
Team members transfer knowledge within teams	✔
In theory there are regular one-to-ones with managers. This does not always happen due to project pressures	✔
Daily Scrums, iteration planning and close down sessions	✔
Project milestones and delivery dates are emphasised	✔
Team members have a high degree of freedom carrying out their daily tasks	✔
Prioritisation of tasks is made during discussions with customers and product owners	✔
The management level directly above the team is supportive	✔
Managers manage by exception	•
Project roadmaps and visions are communicated to the teams	•
Some team members help create the project roadmaps and visions	•
Some teams have little input into these visions and roadmaps	✖
A program road show tours the organisation sites and keeps teams updated on the impact their work is having	✖
The team believes they can accomplish something every iteration	✔
Project visions, roadmaps and practices such as the program road-show keep teams updated on the impact their work is having	✖
Team members pick their own tasks	✔
Visions and project roadmaps are created for each project	✔
Project milestones and release dates are clearly defined	✔
Sprint goals are clearly defined	✔
Teams must choose from a set list of tools and technologies	•
Team members get clearance to use tools and technologies not on a pre-approved list	•
Teams meet and communicate with the architecture team	✔
Architecture is well established and understood by the team	✔
The team uses a defined process	•
The team can suggest changes to the overall development process	✔
The team makes changes to the process to suit a particular project	✔
Training depends on the time demands of the project	✖
A high level steering committee outlines the ISD strategy	✖
Team members are involved in developing this strategy	•
Major project milestones and release dates are clearly outlined	✔
The strategy is understood to be flexible	✔
Project kick off meetings, workshops, presentations, newsletters and emails are used to disseminate information	✔
Teams use project planning tools which use only one set of numbers	✔
Scrum meetings, sprint and iteration sessions set clear and precise short term goals	✔
Project milestones are used as longer term goals	•
There are no long-term goals made available for the team	•
Aggressive but possible targets are set at the beginning of each sprint	•
Iteration reviews are used to improve processes	✔
Managers have one to one feedback sessions with team members	✖
Story points completed are compared with other groups	✖
The planning tool is open to those who require access	✔
Iteration and sprint kick-off sessions are used for short-term goals	✔
Performance reviews are on an individual basis and incorporate hindsight	•

Practices used by the ASD teams in this Study	Practice is Agile?
All teams use behavioural goals	✔
Rewards are not based solely on meeting fixed targets	•
Rewards are based on meeting targets set out by the team member and manager at the beginning of the year	✖
Rewards are based on a mix of technical and behavioural abilities	✔
Managers recognise operating conditions during the year	✔
Team members are rated against each other on a C curve reward scheme	✖
Individuals are reviewed by their managers	✖
High-level plans are in place which include expected release dates	•
These plans may be changed depending on the nature of the project	✔
There is flexibility within high-level plans	✔
Potential future problems and required actions are discussed within teams and escalated to higher management if needed	•
Management decide on timelines and release dates	•
The Scrum team coordinates with management to provide estimates	✔
Plans are communicated to the team and they can provide feedback and input	✔
Forecasts are reviewed at the sprint close down session	✔
Burn down charts are used to monitor trends	✔
The Scrum planning tools give transparent access to each project allowing for continuous monitoring	✔
Two levels of KPIs are used, the first level has the major release dates and the second level has the monthly sprint targets	•
The project planning tools show estimated versus actual completion of story points	✔
Teams follow their progress on burn down charts	✔
The KPIs may change over the course of the project and these changes are related to the team	•
Status reports show red when tasks are behind and management will monitor these	✔
Managers can partake in sprint reviews	✔
Managers do not get involved in sprint reviews	•
Managers are forbidden by the Scrum master from interfering during a sprint	✔
Teams request additional resources through their managers	•
The customer is contacted and makes the decision regarding additional resources	✔
Teams liaise with their manager to establish costs	•
Experienced team members are aware of the impacts	•
Actual v planned costs are shown to the team every month	✔
Teams liaise with their manager to establish costs	✔
The actual versus planned costs are shown to the team each month	•
Daily stand ups help teams coordinate	✔
Scrum planning and close down sessions are used to coordinate	✔
Videoconferencing is used during iterations	✔
Informal ad hoc chats with other teams	✔
An online forum is used to coordinate	✔
One off handover to another team	✖
Teams coordination only at integration	✖
Team members move from one team to another	✔
A Scrum of Scrums is used to coordinate activities	✔
A designated individual coordinates teams	✖
The project roadmap is used as a coordination mechanism	✔
Management coordinate through the project manager	•
Informal communication occurs with key personnel	•
Formal requests for resources are a form of coordination	✔

Practices used by the ASD teams in this Study	Practice is Agile?
High project visibility enables management view how the team are performing	✔
Onsite customer enables coordination	✔
Feedback is received from the customer regularly	✔
The formal process for acquiring resources is used as a coordination mechanism	✔
Formal workshops organised to increase interaction between teams	✔
Common demonstration sessions between the team and management	✔
Social events (included in project budget)	✖
Friday morning coffees	✖
Informal ad hoc chats	✔
Team events at sprint planning	✖
Monthly technical presentations	✖
Consultants use their own company blogs	✖
Teams are asked to participate	✖
Team members use repositories to enable others to be self serviced is an incentive	✖
Team members use repositories so as not to be dependent on one other person for information	✖
Team members use repositories to encourage self- development	•

Chapter 6 Recommendations

In chapter 2 of this study the Beyond Budgeting model was presented as a suitable management model for ASD teams. ASD and Beyond Budgeting are conceptually similar and both are designed for flexible and changing operating environments. The Beyond Budgeting model was operationalised in an ASD context in chapter 3. This operationalised model presented a theoretical lens through which ASD team practices can be examined. Through case study research and the application of this lens to ASD teams in practice, this study uncovered a number of practices that contributed to the Beyond Budgeting principles but were not heretofore part of the agile toolbox. The findings from chapter 5 show that teams are already employing practices not previously discussed in the agile literature. These practices along with practices outlined by the Beyond Budgeting model but not employed by the ASD teams lead to a set of recommendations which discuss how ASD may be extended to interact and integrate with a wider organisational environment. Therefore, in order *to answer the third research objective* and for extending ASD practices, this chapter presents a set of nine recommendations. Each of these recommendations is supported by the literature discussed in chapter 3 and the empirical findings presented in chapter 5.

The first four recommendations to emerge from this study are linked to the customer and the customer team relationship. Therefore these recommendations are grouped under the heading “6.1 More emphasis on the role of the customer and customer proxy”. The next five recommendations receive their own heading from 6.2 to 6.6.

Section 6.7 provides a summary of the chapter. Table 6-1 is presented at the end of the chapter. This table lists the recommendations developed from this study and also provides a summary of the empirical findings associated with each recommendation.

6.1 More Emphasis on the Role of the Customer and Customer Proxy

While previous research in ISD suggests that projects are more successful when there is more developer-customer interaction, insights from the management accounting literature suggest that financial performance may suffer if teams focus more on satisfying individual customers rather than on achieving overall organisational goals. This presents a paradox for ASD teams who seek to satisfy customers but must still operate within the governance mechanisms of the organisation. In the teams studied, the findings in section 5.1.1 show that the interface between the team and the customer is a source of problems for the ASD teams.

The case sites sought to overcome the problem of teams focusing more on individual customers rather than organisation goals by employing a customer proxy. The role of the customer proxy was to represent both the individual customer needs and the organisation's needs. The role of the customer was played by either a customer representative or the product owner and this customer proxy acted as both a conduit and filter for information and ideas. Figure 6-1 shows a typical information flow which was found to be deployed in projects within both of the case sites.

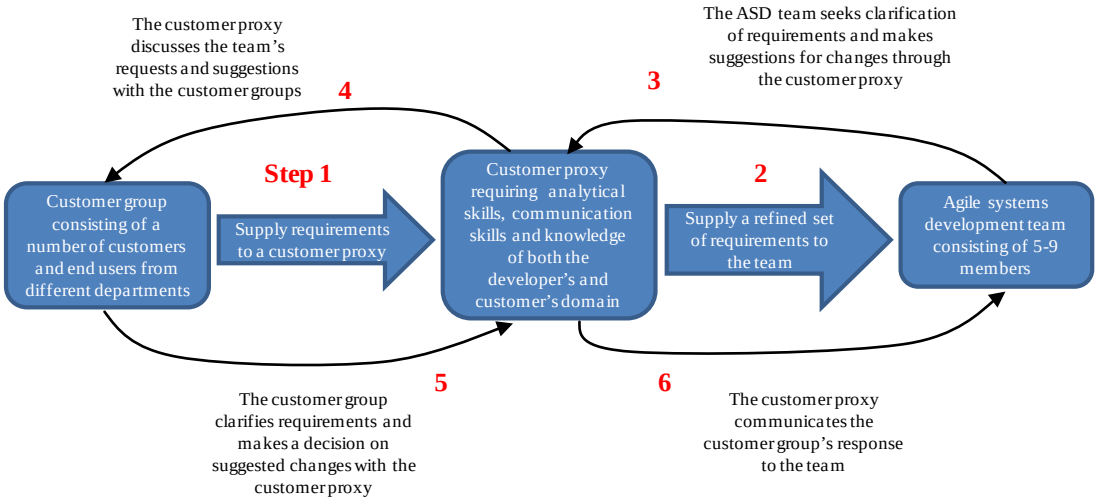

Figure 6-1 Typical Customer Proxy Role

R1: Encourage developer-customer interaction while maintaining control over prioritised project decisions through the use of customer proxies

The findings highlight that in many instances the suggestions made by team members were being filtered by the customer proxy while others team members complained that they did not receive quality and timely responses to their issues with customer requirements. A solution for this may be found in the practices employed by Project B (section 5.1.1) in this study. Here the ASD team began the project by interfacing with the customer proxy. As the project progressed they purposely developed links with individual members of the customer groups. While the customer proxies still attended monthly planning sessions, the developers could contact customers directly when they needed extra information about the user stories they were working on during a sprint. According to the developers, this allowed them to receive requirements in a timely manner and helped them to understand any ambiguous requirements. Any major changes needed clearance from the customer proxy, (who had a wider view of the overall customer needs) and were put into the product backlog at sprint planning sessions. Figure 6.2 is a graphical representation of the process.

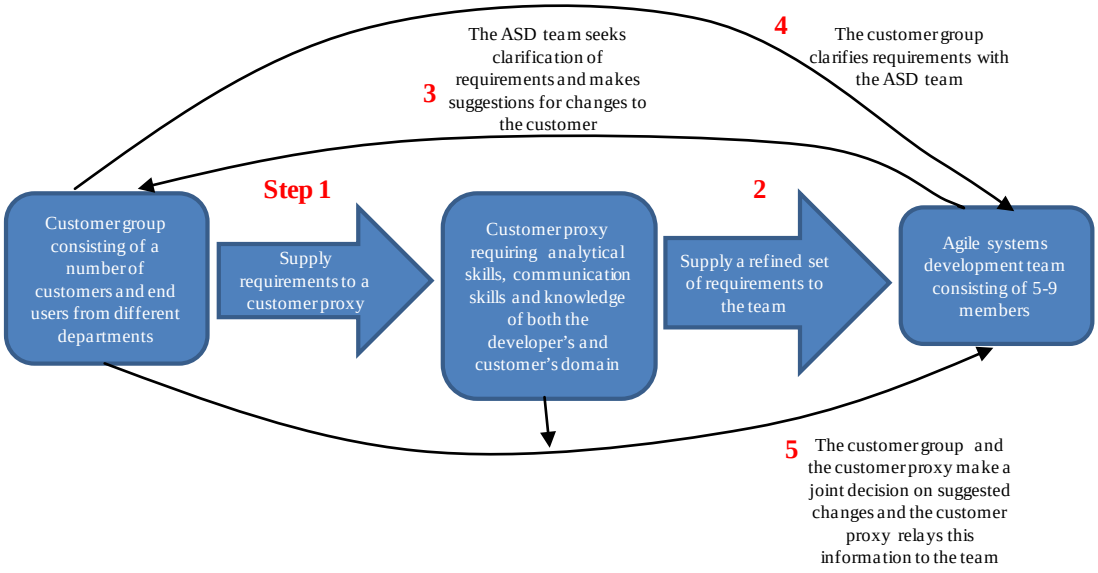

Figure 6-2 Recommended Customer Proxy Role

In this situation the customer proxy could ensure that individual customer requirements were not compromising overall organisation goals. The customer proxy

attended sprint planning sessions and once the month's development was planned the team could interact directly with individual customer groups and end users to clarify requirements. This meant that the customer proxy did not present a bottleneck for information flow while still maintaining an overall influence on the project. Therefore the first recommendation from this study is to encourage developer-customer interaction while maintaining control over the project through the use of customer proxies **(R1)**.

R2: Provide customer proxies with training on the operating processes and communication requirements of an ASD environment.

Another big cause for concern among interviewees was the ability of the customer proxy. The researcher found that in four of the seven projects examined, interviewees had complaints about the customer proxy (section 5.1.1, page 152). Previous studies have highlighted the pressurised, demanding and stressful role the customer has to play in ASD yet surprisingly, ASD research in this area is limited. The findings from this study suggest that ASD requires knowledgeable customers who are familiar with both the customer's business domain and the ASD teams working environment. The customer proxy is a vital link between the developer and the customer group and good communication skills are also necessary for successful projects. When the ASD teams worked with customers who did not appear to understand the way an ASD team operated (e.g. Project C, page 151) and did not communicate effectively with the team, the team found it difficult to build a relationship with that customer. On the other hand, when customers understood the agile process, the team members found them to be beneficial to the process.

It is also desirable that the customer proxy is knowledgeable in the customer's business domain and possesses good communication skills. Several developers commented on the lack of knowledge the customer proxy had in the customer's domain and their inability to articulate requirements. While the ASD teams can request that the customer proxy possesses this skill-set, this was not possible in any of the projects in this study as the teams were assigned a customer proxy without consultation. However, while the ASD team may not have control over the choice of customer proxy, by introducing a practice of training customer proxies when required, they can help improve the proxy's ability to interact with the team. Therefore the second recommendation from this study is that customer proxies are

provided training on the operating environment and communication requirements of the ASD team **(R2)**.

R3: Develop customer specific knowledge repositories to store information valuable to ASD teams

While all of the teams studied had specific project repositories where they could store and retrieve project information, there were no knowledge repositories designed specifically for storing and retrieving customer information. Management research has shown that having specifically designed customer knowledge repositories helps develop a better understanding and relationship with customers (section 3.1.1, page 64-65). Given the importance of the customer to ASD it is interesting to note that this was not considered in any of the case sites in this study.

Having a customer specific knowledge repository designed to store information valuable to ASD teams is arguably more beneficial when the teams develop products for in-house customers, as is the case in this study. It is likely that the same customers will be ordering products again and again (for example projects A & G were ongoing customers from within the organisation) and future ASD teams may gain valuable time-saving insights by accessing customer specific information from previous projects. This customer specific information can range from information regarding the customer's domain to less tangible information such as customer characteristics (section 5.1.1, page 154-155). While previous literature in ASD places a large amount of emphasis on customer involvement in the development process, there is no previous recommendation to utilise specific customer knowledge repositories. A recommendation from this study is that customer-specific knowledge repositories are designed to store customer information that may be valuable to the ASD team **(R3)**. Storing this knowledge in a well-designed customer knowledge repository will enable future ASD teams research the profile of the customer before and during the development process, thereby helping them gain a better understanding of the customer and their needs and requirements.

R4: Encourage long-lasting customer-team relationships

The findings from this study also show that when teams have prior experience working with their customer they believed they had a better relationship with their customer (section 5.1.1, page 152 & 154). This was achieved through building up a profile of their customer through their working experience with them. Team

members with prior experience of their customer knew which customers were proactive and which ones showed a certain amount of apathy or were unable to participate in the development process. They uncovered certain traits and idiosyncrasies of particular customers and used this knowledge when engaging with the customer. Having this knowledge may also enable future teams to better manage the developer-customer relationship. Therefore the fourth recommendation from this study is to encourage long-lasting customer relationships **(R4)**. However, it should be noted that in one of the projects, the ASD team was familiar with the product and had worked with the customer on a previous project. The team had found the customer apathetic before and still found the customer apathetic when it came to getting feedback and giving input into the development process. This highlights the importance of developing productive relationships with the customer over time.

6.2 A Wider Understanding of Agile Systems Development within the Organisation

R5: Promote agile concepts to senior management and other pivotal figures within the organisation

Empowerment and autonomy are seen as essential components for agile development and people feel comfortable when they have the environment and support they need. Across all projects in this study, team members had a certain degree of autonomy and control over their daily working practices. They could make decisions within the team regarding daily operations, prioritising of tasks, scheduling of tasks etc (sections 5.1.2, 5.1.3 & 5.1.4, pages 158-168). However, a central axiom of ASD is that the team also has a supportive environment which understands how agile teams work. A notable finding from this study was the perceived "agile bubble" within which all the teams believed they operated (see, for example, the quotes on page 159, 160 & 161).

As can be seen from the findings and subsequent narratives in Tables 5.6 - 5.10 (pages 158-168), the team has minimal input into decisions not directly linked with their daily tasks. Team members in both sites expressed concern that top management support and understanding of an ASD environment was lacking. Project managers accentuated this concern and in all seven projects studied, all the project managers expressed concern about a lack of understanding from higher level management of how agile teams function. Several mechanisms and practices that

were required to be used by the teams could not be classed as supportive to agile, e.g. yearly budgeting requests for hardware and equipment, new members designated to the team without consulting the team, training dependant on the project timescales and performance reviews carried out by the project manager not the team. The decision to use mechanisms and practices such as these were made outside of the team. The findings show that developers used phrases like *"that was decided above our heads"* and *"that decision was made at a higher level"* when asked if they had input into decisions such as these. This highlights a lack of autonomy and empowerment for the ASD teams.

By encouraging top management buy-in to ASD concepts and permeating ASD understanding throughout the organisation it will be easier to create the supportive environment ASD teams require. This may be done by having senior agile practitioners promote agile concepts to senior management and other pivotal figures within the organisation **(R5)**. For example, in case A of this study, a senior group of individuals monitoring the introduction of agile into the organisation pitched the agile philosophy to the head of the organisation. They requested that all projects across the organisation be moved from traditional development methods to agile methods. A similar situation happened in case B where the lead software process implementation manager continuously promoted the agile idea throughout the organisation. He received backing from the performance management development vice president who in turn received the support of the chief executive officer and the chief financial officer. However, despite top-management understanding of agile concepts, in both organisations supporting functions such as human resources and budgeting were still structured for traditional development methodologies. Senior project managers in both sites suggested this was because organisations of the size of those in this study take years to change their way of thinking and operating.

6.3 A Shared Reward System

R6: Integrate shared team rewards as a part of the overall reward system

It was noticeable within both the case sites for this study that team members were not as accountable for project outcomes as the project managers. As highlighted in section 5.2.1, page 162, when a project goes well, the team receives the applause but when something goes wrong it is usually those who steer the project

that get blamed. While ASD practices such as collective code ownership and self-organising teams promote shared ownership and joint responsibility, the findings from this study show that this does not always happen in practice.

A reward system that rewards shared success is promoted by both the Beyond Budgeting and ASD literature (section 3.2.2, page 95-97). However, this was not how the reward systems worked in either of the case sites in this study. The team members were reviewed individually by their managers and reports were then sent to either higher management or another department. In case A the organisation worked on a curve reward system and project managers found this to be problematic for team work (section 5.2.2, page 181). Case B had individual contracts in place with each consultant but had only non-monetary rewards in place for team success.

Research on shared reward systems shows that when long term coordination is required, the optimal system is one where the team is rewarded based on relative performance. Individuals are motivated through peer sanctions and teams are incentivised through team rankings. It is surprising that while a shared rewards system is appropriate for ASD, both the case sites used individual-based reward mechanisms thus running the risk of promoting dysfunctional behaviour and destroying intrinsic motivation (as can be seen from the comments on page 181). Based on the negative responses to individual reward systems discovered in this study (section 5.2.2, page 179-183), and augmented by previous insights from the literature (section 3.2.2, page 96), this study argues that, by including shared rewards as part of the development process, responsibility will be more evenly distributed among team members. To ensure a higher degree of joint responsibility and joint project ownership, a recommendation from this study is that a shared reward system is incorporated into the reward mechanism employed by the ASD teams **(R6)**.

6.4 Long-Lasting Teams

R7: Promote long-lasting teams

All interviewees agreed that the Scrum methodology used in both sites ensured that short-term planning is a continuous and inclusive process. Although the teams were not part of any long-term planning process in Case A, team members could have some influence on long-term plans if they needed to change them. Once a project got the go-ahead, high level, long-term plans were outlined. These plans were

presented to the teams and the team members were provided with the opportunity to discuss the plans and contribute ideas and suggestions.

In Case B, long-term planning was not considered by team members as they were mainly consultants hired for the duration of the project. A budget was put in place and they were given a contract based on this budget. They did not know where they would be once their current contract finished. This induced myopic thinking among team members, as indicated by one Scrum master who stated that the team could not think about more than one year ahead because of the budget (section 5.2.3, page 184).

It is clear from the findings of this study that the ASD teams were not expected to participate in long-term and strategic planning (e.g. section 5.1.6, page 173 & section 5.2.3, page 184). None of the interviewees from the study were aware of the long-term plans for the team beyond what was described in the current project plan. This is understandable to some degree given the unpredictable nature of ASD. However, to get what is described as a *'wholehearted commitment'* to the project and the organisation (section 3.2.3, page 98) this study recommends that the ASD teams get involved in discussions regarding the long-term plans for the team, i.e. that teams will be kept together for longer periods than the duration of a single project**.** While the nature of ASD is very much orientated towards short-term and changeable plans, the nature of responses from interviewees in sections 5.2.1 & 5.2.3 coupled with the literature suggests that teams need to be more involved in longer term plans.

Promoting long-lasting teams will also help reduce start-up costs associated with the beginning of any project. For example, one Scrum master estimated that it took almost three months for the ASD team to begin functioning efficiently as a team. Team members require time to get to know each other and develop productive working relationships (section 3.2.3, page 98) and managers expressed a sense of frustration at having to disband high performing teams once a project reached its finish date. A recommendation from this study therefore is that ASD teams promote the concept of teams remaining intact over longer terms **(R7)**. This will enable team members develop a better understanding with others within their team and also discourage myopic thinking among individuals. However, it is important that teams do not become isolated and that new team members and ideas are introduced to the teams regularly to avoid homogeneity and increase innovation and creativity. Section

6.6 outlines some mechanisms used by teams within this study to avoid this happening.

6.5 Flexible Budget Control Mechanisms

R8: Use flexible budget control mechanisms

In both sites, high-level project milestones were driven by the project budget. These project budgets were outlined at the project initiation phase. By using the Scrum methodology, teams were provided with clear indicators as to where the project was against these high-level milestones. If these were in danger of not being met then the project management had to make a decision about what actions to take depending on the constraints of the project. In some projects the budget was not the main constraint. Functionality and quality were regarded as more important than the project budget. In these instances the delivery dates could be pushed back to accommodate unanticipated delays.

The use of flexible budgeting control mechanisms allowed the teams deliver the required functionality without compromising the quality of the system. These flexible budgets needed to be approved by the customer. As ASD provides the customer with working software on a regular basis, the customer was then in a position to decide on whether to release funding for additional functionality. The Beyond Budgeting literature recommends the use of rolling forecasts to manage costs in changing business environments (section 3.2.5, page 104-106). Rather than be constrained to fixed and rigid budgets, evidence from this study suggests that using flexible budgeting mechanisms such as rolling forecasts will benefit both the customer and the ASD team.

The literature provides some guidance on flexible budgeting. For example, the use of a buffer is suggested by the resource-based view of the firm and dynamic capabilities theories (section 3.2.5, page 104-106). By building a buffer into the project budget a sense-and-respond approach can be utilised by the ASD team. Once teams identify areas where extra resources such as new machinery or training for team members are required they can access this buffer, thereby increasing value to the team and the customer. The issue of course is the potential for teams to use this buffer regardless of whether the resource is required or not. However, advocates of Beyond Budgeting argue that the transparency of the Beyond Budgeting model will

encourage teams to use only what they require. When teams see that their budget is not dependent on what they spent the previous year, a greater sense of trust is developed. The whole concept of Beyond Budgeting is about enabling employees and trusting them to do what is in the best interest of the organisation. This is a sentiment echoed by many within the management literature (cf Bogsnes, 2009; Drucker, 2002; Erickson and Gratton, 2007; Fryer and Stewart, 2008; Hamel, 2009; Heifetz et al., 2009; Hope and Fraser, 2003a; Mintzberg, 2009).

Another potential issue identified in the ASD literature is the possibility of groupthink or a re-enactment of the Abilene paradox (section 3.1.2, page 71). Again the Beyond Budgeting model argues that the inherent transparency of the model will allow management or other ASD teams to quickly identify and question when teams appear to be engaging in behaviours such as these.

Project managers and Scrum masters pointed out the issues they had with yearly fixed budgets and in some cases managers had to break up high performing teams because of the budgeting process employed by the organisation (section 5.2.3, page 184-185). Here again the use of flexible budgeting control mechanisms would allow teams to ramp-up and ramp-down their capacities depending on customer demand, not on the calendar-driven budget mechanism. The issue with this is that if teams are to be involved in long-term planning then what is to happen with team members once a project has finished? One solution used in the second case site was to employ consultants on a project basis. The organisation had a core group of full-time team members. Once a project was underway, consultants with agile skill-sets were employed for the remainder of the projects. Another solution may be to use teams on a product basis rather than on a project basis. Teams could remain with the same product line over a longer period of time than they could if they were formed for one specific project.

For example, multi-skilled team members are a form of people-based resources and something agile methods encourage. Both the case sites recognised this and encouraged cross training of team members, however a fixed project budget meant teams could not always receive the training they required. In Case A, one manager emphasised how small the training budget was and in Case B the use of consultants meant that the responsibility for providing most of the training was with the consultants own organisation. In both sites a fixed resource budget was assigned for

each project and while there were mechanisms in place to apply for additional funding for either training or new equipment, the ASD teams were not encouraged to do so (section 5.1.2, page 159). Teams found that the inflexibility of the budgeting systems hindered their ability during the year to respond to change. Whether or not to up-skill team members or purchase new equipment was often not dependent on the value this would add for the customer but on whether it was covered in the budget. For the reasons outlined above, the next recommendation from this study is that teams employ flexible budgeting control mechanisms for ASD projects **(R8)**.

6.6 Inter-Team Relationships

R9: Promote and develop relationships with members of other teams

In both of the case sites, the organisations provided both formal and informal communication mechanisms. The co-location of a team meant that intra-team coordination was carried out on a daily basis. This has already been shown to be beneficial to ASD teams and an appropriate workspace environment is shown to have a positive impact on ASD team coordination (section 3.2.6, page 108). In this study there was concern raised about inter-team communication and coordination (section 5.2.6, page 193-194).

Actors in organisations face coordination problems that arise from dependencies that constrain how tasks can be performed (section 3.2.6, page 106-109). To help minimise constraining dependencies, knowledge repositories such as wikis and intranets, and real-time communication facilities such as video conferencing, etc. were used to facilitate inter-team coordination within both sites. Previous research within IS shows that this use of knowledge management repositories to capture and disseminate knowledge is beneficial for inter-team coordination (section 3.2.6, page 107).

In Case B a Scrum-of-Scrums was used as a coordinating mechanism on one project and this was found to be beneficial for coordinating and communication between teams. However the project manager stated that inter-team coordination on large projects was still one of the main areas of concern. This study concurs with previous findings that team members must be familiar with each other's experiences, skills and knowledge to facilitate the emergence of expertise coordination processes (section 5.2.6, page 107). Due to the logistics involved it may be difficult for team

members to become fully familiar with the expertise of personnel within other teams. However, the teams within the two case sites stated that it was beneficial to develop relationships with members from other teams **(R9)**. They stated that this helped them become familiar with the expertise of the other team members and they could approach them for help with a particular problem when the need arose (section 5.2.6, page 193-197).

A number of mechanisms were used in the case sites to achieve this familiarity. Firstly, organised social events meant that team members interacted with members from other teams and got to know them on a personal level. This facilitated a naturally occurring informal relationship between members from different teams, something which has been shown to benefit coordination. However, when social events were held outside of working hours, it was difficult to get team members to participate. Therefore, social events within office hours are recommended to foster informal social interactions, which in turn lead to improved coordination between teams (e.g. section 3.2.6, page 107-108). Secondly, coordination workshops were organised where teams were invited to demonstrate their products. This helps teams become familiar with the skills and knowledge of other teams. Thirdly, a team member spent time working with a different team, thereby transferring their knowledge to the new team and gaining knowledge from the new team members.

6.7 Summary

This chapter has presented nine recommendations for improving and extending ASD. The recommendations are based on an analysis of the practices used by the seven ASD teams in this study. Previous literature was then used to add further insights into the recommendations. The recommendations provided are underpinned by the empirical data collected during this study. So while certain recommendations such as “promote agile concepts” and “integrate shared rewards” are generally recommended in agile texts, the data from this study provides further evidence and further insight into why the recommendation is given. They are, therefore an extension of our current knowledge of how and why these practices can be operationalised. Other recommendations such as those surrounding the role of the customer proxy and “design customer specific knowledge repositories” are new to ASD. Again both the data and literature provide a strong rationale for their inclusion

as recommendations for extending ASD from this study. Table 6-1 provides a summary of the recommendations and the related empirical findings. The next chapter discusses the main points of this study and concludes the research.

Table 6-1 Recommendations

Empirical Findings and Related Recommendations	
Recommendation	Empirical Findings that Support Recommendations
R1: Encourage developer-customer interaction while maintaining control over prioritised project decisions through the use of customer proxies	Teams receive timely, quality requirements when they communicate directly with the customers. Customer proxies represent the entire customer group. They have a macro view of the project and can make informed decisions regarding scope, functionality and project cost.
R2: Provide customer proxies with training on the operating processes and communication requirements of an ASD environment	Teams find it difficult to build relationships with customers who did not fully understand the ASD methodology and ASD practices. Teams find it is beneficial to the process to have customers who understood the process. The team receive poor quality requirements when the customer proxy is unable to clearly articulate the customer's requirements.
R3: Develop customer specific knowledge repositories to store information valuable to ASD teams	The same customer group requires projects on an ongoing basis. During the development process tacit customer information can be gathered and stored on the customer groups and made available for future projects.
R4: Encourage long-lasting customer-team relationships	Teams get to understand their customers' needs better when they have previous experience working with the same customer. Teams feel more comfortable communicating with customers they have worked with previously. During the development process, customer information can be gathered and stored on the customer groups and made available for future projects.
R5: Promote agile concepts to senior management and other pivotal figures within the organisation	Teams express frustration at a lack of understanding of ASD concepts within other organisational functions such as human resources and finance. Teams require flexible resource and budgeting mechanisms which is a change from the traditional yearly resource and budgeting process.
R6: Integrate shared team rewards as a part of the overall reward system	When teamwork is required, reward systems that reward the individual and do not include any form of shared rewards promote dysfunctional behaviour. Team members agree that shared rewards should be part of the reward system.
R7: Promote long-lasting teams	Team members have a myopic view of their working environment and do not consider implications for future projects. Team members require time to get to know each other and develop a productive working relationship. Team managers feel frustrated at having to disband high performing teams at the end of a project.
R8: Use flexible budget control mechanisms	ASD teams require flexible resource and budgeting mechanisms which is a change from the traditional yearly resource and budgeting process. Teams are restricted in their ability to add value for customers when working within a fixed budget.
R9: Promote and develop relationships with members of other teams	Developing relationships with other teams helps with the exchange of ideas and techniques. Team members find it helpful to know who to contact from other teams when they require information or advice on specific issues.

Chapter 7 Discussion and Conclusion

This chapter summarises the findings of this study and specifies its contribution. The research objectives are revisited and how the objectives were achieved are discussed. The suitability of the Beyond Budgeting model for an ASD environment is discussed along with how the model was operationalised and applied in this study. This is followed by a review of the recommendations that emerged from the research. The limitations of the study and the research approach are then discussed, followed by a discussion of the implications of the research for theory, practice and education. Future research directions are suggested and a conclusion summarises the findings of the study.

7.1 A Review of the Research Objectives

This study developed a set of recommendations for extending ASD practices in the context of wider organisational processes and mechanisms. In order to do this, a management accounting framework was used as a lens to analyse the practices of seven ASD teams within two case sites. The management literature and management accounting literature suggests that in current operating environments, organisations need to move away from traditional, budget-driven, command-and-control management models to more flexible models better suited to turbulent and changing business environments. A recent innovation to emerge from the management accounting literature is the Beyond Budgeting model. This model is espoused by many to be a management model well suited for ASD teams. However, most evidence thus far is anecdotal. So while there is a growing interest within both academia and industry in the concepts and principles of the Beyond Budgeting model, little empirical evidence exists examining the model in practice. Only one academic study to date has examined how the Beyond Budgeting model is applied in practice (Østergren and Stensaker, 2011) and this study focuses on the corporate level of organisational management. Many have commented on the similarities between Beyond Budgeting and ASD, yet no previous study within the field has used the Beyond Budgeting model to examine ASD practices. To the best of the researcher's knowledge this is the first study within the field of ASD to examine ASD practices using the lens of the Beyond Budgeting model.

The need to extend ASD practices has been well documented in the literature. As ASD methods become increasingly popular, researchers have voiced serious concerns about their ability to integrate with wider organisational functions, with many arguing that ASD methods require a change in the structures, processes and mechanisms associated with traditional organisational practices (Agerfalk et al., 2009; Conboy, 2010; Maruping et al., 2009a). Traditionally, functions such as human resources, accounting and management are designed to integrate with an annual budget-driven process. The argument set forth by the ASD community is that ASD methods are designed for flexible and changing customer needs and require a paradigm shift in management philosophy, from traditionally rigid management systems to more flexible and accommodating systems. However, there is little guidance provided by the ASD community regarding how traditional systems can be changed to incorporate and complement ASD teams. This research is a first step in filling this void. The Beyond Budgeting model is a holistic model incorporating all aspects of management control and therefore well suited as a lens to examine how ASD practices work within a wider organisational context.

The research question stated in chapter 1 (page 18) was: "How can the Beyond Budgeting model be used to extend agile systems development?" In order to extend ASD practices by using the Beyond Budgeting model as a research lens, the model first needed to be operationalised relative to an ASD environment (chapter 3, page 62-110 and chapter 5, table 5-1, page 148-149). This operationalisation enabled the researcher to develop the case study design and interview protocols for this study (section 4.6, page 133). Two case study sites were chosen and the operationalised model was then applied to seven ASD teams operating in their natural environment. This application led to a set of nine recommendations for extending ASD practices (table 6-1, page 221).

The overall research objectives guiding this study (page 19) were to:

a) Operationalise the Beyond Budgeting model within the context of an agile systems development environment

b) Apply the operationalised Beyond Budgeting model to an agile systems development environment

c) Develop a set of recommendations for extending agile systems development to a wider organisational context

By achieving these research objectives the researcher sought to illuminate ways in which ASD may be better integrated with the wider organisation by using the Beyond Budgeting model as a lens to examine the extension of ASD concepts.

To address the first research objective, each principle of the Beyond Budgeting model was examined. The model consists of 12 principles, divided into six leadership principles and six process principles. Each principle addresses a different area of organisational management, with each having a relatively distinct theoretical base. An overview of each principle is given in chapter 3 and the major theories underpinning each principle are introduced. The reader is given an understanding of each principle and pointed to the major literature in each area. A section on each principle then discusses what research, if any, has been conducted to date within the field of ASD. This gives an understanding of where the field of ASD currently is regarding ASD practices within a wider organisational context. Some Beyond Budgeting principles such as autonomy, transparency and rewards are under-researched in ASD with very little empirical evidence examining how they work within a wider organisational context. Others, such as customer focus, planning and control have received a relatively large amount of attention within the field of ASD, yet are still under-researched with respect to ASD practices in a wider organisational context. By examining each principle and exploring how each is understood within an ASD environment, a table of dimensions and operations was developed. These dimensions and operations achieve the first research objective of this study and an operationalised Beyond Budgeting model is presented at the end of Chapter 3.

The second research objective was to apply the operationalised model to an ASD environment. The operationalised model developed in chapter 3 was used to guide the development of an interview protocol. Chapter 4 outlines the research strategy used for this study which includes the choice of research method and the site selection strategy. Once case sites were chosen, the researcher visited both sites and conducted onsite interviews with project managers, Scrum masters and team members from 7 ASD teams. These interviews were guided by the interview protocol, which had been pilot tested on both academics and practitioners prior to entering the field. The interviews were the major source of data collection and informed the findings and recommendations produced from this study. However, other data sources such as documentation, informal interviews, on-site observations,

notes taken during site visits and interviews, data collected at workshops, presentations and training seminars, and post site-visit emails and follow-up phone calls were used to corroborate the findings when necessary. A full description of the data collection process is given in Chapter 4.

The third research objective of this study was to extend ASD practices based on the application of the Beyond Budgeting model. Studies suggest that ASD practices are now used by the majority of systems developer, yet, as pointed out by many researchers, little research exists which explores how they interact with wider organisational structures, processes and mechanisms. Through the application of the operationalised Beyond Budgeting model this study sought to gain a deeper understanding of how ASD teams operate within a wider organisational environment. As the Beyond Budgeting model was designed as a holistic management model, by operationalising it relative to ASD and applying the principles to ASD teams in practice, the researcher gained an understanding of the issues facing ASD teams when operating within legacy, organisational management structures, processes and mechanisms. The findings in chapter 5 show that ASD team members raise many concerns about current processes which they find are counter-productive to an ASD environment. These findings were analysed and a set of nine recommendations were developed which will help ASD teams better integrate with the wider organisational environment. Chapter 6 presents the recommendations, describing the findings that motivate them and the insights from literature that are used to underpin them.

7.2 Operationalising Beyond Budgeting

With an increasing interest within both academia and industry in the principles of the Beyond Budgeting model (Bogsnes, 2009; Davila et al., 2009; Ferreira and Otley, 2009; Hansen, 2011; Hansen et al., 2003; Hansen and Stede, 2004; Hope and Fraser, 1999; Hope and Fraser, 2000; Hope and Fraser, 2003a; Hope and Fraser, 2003b; Hope and Fraser, 2003c; Libby and Lindsay, 2007; Libby and Lindsay, 2010; McVay and Cooke, 2006; Neely et al., 2003; Østergren and Stensaker, 2011), organisations that are seeking to move away from traditional command-and-control models to more flexible models better suited to the information age are looking to accounting innovations such as Beyond Budgeting as a means to do this. Educators

also are recognising the paradigm shift from command-and-control models to more flexible models within management accounting with textbooks such as Management and Cost Accounting (Drury, 2008) and Management Accounting (Atkinson, 2007) now including descriptions of the Beyond Budgeting model within their text.

The philosophies and concepts of the Beyond Budgeting model are recognised to be very similar to those espoused by the ASD community (Ambler, 2007a; Bogsnes, 2009; Highsmith, 2006; Larman and Vodde, 2008; Lohan et al., 2010a; Poppendieck and Poppendieck, 2010). However, very little evidence exists to validate these claims. What evidence there is that supports these claims is mainly anecdotal and there is a paucity of empirical evidence that applies the Beyond Budgeting model to an ASD environment. A reason for this may be that the Beyond Budgeting model is designed as a strategic management model and generally implemented at a strategic management level. Therefore, while it may be conceptually similar to ASD it has never been explicitly utilised at the operational level of the ASD team.

This study operationalises the model within the context of ASD. In order to do this the researcher examines the main premises of each Beyond Budgeting principle. That is, the main theories underpinning each principle are identified and their relevance to an ASD environment described. The overall theory guiding the Beyond Budgeting model is Maslow's theory Y which is discussed in Chapter 2. Chapter 3 then takes each individual principle and outlines how the principle can be operationalised relative to ASD. The process involved a systematic review of each principle and the relevance of each one to ASD. While every care was taken to ensure that each principle was operationalised in a systematic and logical manner, it must be noted that this is the first attempt to operationalise the model in the context of an ASD environment. The operationalised model is open to scrutiny and others may have a different interpretation of any principle and how it can be operationalised. Table 7-1 is a list of the theories and concepts identified by the researcher as underpinning each Beyond Budgeting principle. As described in section 4.6, the researcher endeavoured to first, systematically identify the main authors within each area and secondly, operationalise each principle relative to an ASD context. So while every care was taken to do this in a systematic and rigorous manner, the operationalised model is just one way of operationalising Beyond

Budgeting and in some ways subjective to the interpretations of the researcher. For example, some principles were based on well developed theories and little ambiguity exists. Goal-setting, for example, has a sound theoretical foundation and operationalising goal-setting relative to an ASD context involved using the dimensions of goal-setting and defining them in an ASD context. On the other hand, the principle organisation states that teams should be organised in a lean, accountable and decentralised manner. Here the author used accountability and decentralisation concepts to guide the dimensions and operationalise the model. Others could use lean principles or other theories to operationalise this principle. Where ambiguity such as this existed, the researchers tried to explain the rationale behind the dimensions and operationalised statements. The 12 operationalised principles shown in Table 3-14 represent the operationalised model and are used as the basis of the interview protocol developed for this study.

Table 7-1 Theories Underpinning the Beyond Budgeting Principles

Beyond Budgeting Principles		**Underlying Theory**	**Key Articles Contributing to the Theory**
Leadership Principles			
Customers:	Focus everyone on improving customer outcomes, *not on hierarchical relationships.*	Customer Focus	Caker, 2007; Deshpande et al., 1993; du Gay and Salaman, 1992; Gulati, 2007; Levitt, 1960
Organization:	Organize as a network of lean, accountable teams, *not around centralized functions.*	Decentralisation	Glew et al., 1995; Inkson et al., 1970; Mendelson, 2000; Radner,1992
		Accountability	Frink and Ferris, 1998; Schlenker and Weigold, 1989; Tetlock, 1985
Responsibility:	Enable everyone to act and think like a leader, *not merely follow the plan.*	Empowering Leadership	Cox and Sims, 1996; Faraj and Sambamurthy, 2006; Pearce and Sims, 2002; Srivastava et al., 2006)
Autonomy:	Give teams the freedom and capability to act; *do not micro-manage them.*	Team Empowerment	Breaugh, 1985; Kirkman and Rosen, 1997; Thomas and Velthouse, 1990
Values:	Govern through a few clear values, goals and boundaries, *not detailed rules and budgets.*	Governance	Bostrom and Heinen, 1977; Schein, 2004; McGregor, 1960
Transparency:	Promote open information for self-management; *do not restrict it hierarchically.*	Transparency	Ang et al., 2000; Beech and Crane, 1999; Berggren and Bernshteyn, 2007; O' Toole and Bennis, 2009
Process Principles			
Goals:	Set relative goals for continuous improvement; *do not negotiate fixed performance contracts.*	Goal Setting	Abdel-Hamid et al., 1999; Latham and Locke, 1991; Thompson et al., 1997
Rewards:	Reward shared success based on relative performance, *not on meeting fixed targets.*	Relative Performance Evaluation	Dye,1992; Gibbons and Murphy, 1990; Holmstrom, 1982; Irlenbusch and Ruchala, 2008
Planning:	Make planning a continuous and inclusive process, *not a top down annual event.*	Continuous Planning	Grant, 2003; Hamel and Prahalad, 2005; Hope and Fraser, 2003a; Mintzberg, 1994
Controls:	Base controls on relative indicators and trends, *not variances against a plan.*	Control	Kirsch, 1996; Ouchi, 1979; Simons, 1995
Resources:	Make resources available as needed, *not through annual budget allocations.*	Dynamic Capabilities and Resource-based View of the Firm	Barney, 1991; Haeckel, 1995; Teece et al., 1997
Coordination:	Coordinate interactions dynamically, *not through annual planning cycles.*	Coordination	Crowston, 1997; Gosain et al., 2004; March and Simons, 1958; Van de Ven and Delbecq, 1976

7.3 Application of the Model

The second research objective of this study was to apply the Beyond Budgeting model to an ASD environment. To do this an interview protocol was developed from the operationalised model. This interview protocol was pilot tested and refined before being taken to the field. After a number of iterations, the final protocol (Appendix B) was produced. Two case sites and seven ASD teams were chosen as the subjects of this research. The criteria for case selection are outlined in chapter 4. The major reason for the use of the case study methodology was the exploratory nature of the research. This was the first attempt at operationalising the Beyond Budgeting model and applying it to an ASD environment, and the case study method was deemed the optimum research method for this.

During the interviews the interview protocol changed slightly as some principles received more of a focus than others. The reason for this was because team members had more to say about some principles than others. For example, everyone interviewed had their own understanding of customer focus, how the customer should be involved, and what issues they had with the customer. Interviewees were very forthcoming in their responses. However, when asking questions about some principles such as transparency or resources, some interviewees responded with simple one word or one line answers and were unable to elaborate. Team members simply stated that this was the way the resource allocation process worked or this is the level of transparency we have. When this happened the researcher would ask their opinions on the processes, and while they did give opinions, there were times when interviewees spoke more about certain principles and less about others.

7.4 Extending Agile Systems Development

The third research objective of this study was to extend ASD practices. The operationalised Beyond Budgeting model is a holistic model attempting to incorporate all aspects of organisational management. By operationalising it relative to ASD this study was able to gain an understanding of the main issues faced by ASD teams when integrating with wider organisational functions. As the unit of analysis was the team, the findings and recommendations are based on the perspective of the ASD team. This is a limitation of this study which is discussed later. It should also be noted that the ASD teams may have been unaware of potential

issues surrounding the use of ASD practices and their potential long-term implications. That is not to say others are not currently thinking about these potential issues. For example, one senior programme manager at a training session attended by the researcher noted: *"We need to make sure that ASD does not turn into a sweat-shop methodology"*. Also, in their study of Beyond Budgeting in practice, Østergen and Stensaker (2011) comment on the possibility that: *"perceptions of ideological clash may appear later in the implementation process"*, pointing out that interviewees may not yet be aware of the long-term implications of Beyond Budgeting. As with Østergen and Stensaker's study, the interviewees in this study expressed no such concern and the findings and recommendations provided are based solely on the evidence and data collected.

The findings are presented in Chapter 5, with the findings discussed and analysed under each principle. A table is provided after each section which states whether the practice employed by the teams are considered to be part of the current ASD practices as outlined by Beck and Anders (2005), Schwaber and Beedle (2002) and Ambler (2007a). Section 4.5.6 details the process. The findings were grouped under each principle and after several iterations a set of recommendations was developed. While it is not claimed by the researcher that this is an exhaustive list, they are an extension of current ASD practices, and a starting point for further understanding of ASD practices in a wider context. The recommendations are those which are underpinned by the most empirical data. Table 7-2 lists the Beyond Budgeting principles, giving an overview of what the application of the operationalised model uncovered and listing the recommendations that resulted from this application.

Table 7-2 Recommendation for Extending ASD

Beyond Budgeting Principle	**Findings from the Application of the Beyond Budgeting Principles**	**Recommendations for Extending Agile Systems Development Practices**	**Rationale**
Customers: Focus everyone on improving customer outcomes, not on hierarchical relationships. **Chapter 3 Page 63**	Teams tried to focus on the customer but sometimes the customer (or their proxy) was not available or was not ready to respond to the teams' requests. When working well, a customer proxy provided regular feedback to the team enabling the team to focus on the customer's needs. **Chapter 5 Page 150**	R1: Encourage developer-customer interaction. R2: Provide customer proxies with training on ASD environments. R3: Develop customer specific knowledge repositories. R4: Encourage long-lasting customer-team relationships. **Chapter 6 Page 208**	Teams find it easier to communicate with customers who understand that ASD is an iterative process that requires constant customer interaction.
Organisation: *Organise as a network of lean, accountable teams*, not around centralised functions. **Chapter 3 Page 69**	Teams had control over daily operational decisions but minimal input into larger organisational decisions. **Chapter 5 Page 158**	R5: Promote agile concepts to senior management and other pivotal figures within the organisation. R7: Promote long-lasting teams. **Chapter 6 Page 212 & 214**	It takes time for team members to get to know and understand each other. Other functions within the organisation can disrupt the working environment of the ASD team. E.g. when HR introduces a new team member or Finance requires that a team disband because a project budget is spent, then this disrupts the ASD teams' working environment.
Responsibility: Enable everyone to act and think like a leader, *not merely follow the plan.* **Chapter 3 Page 74**	Teams were enabled and encouraged by their supervisors. Short-term contracts did not encourage diffused leadership practices. **Chapter 5 Page 163**	R4: Encourage long-lasting customer-team relationships. R6: Incorporate shared team rewards as part of the overall reward system. R7: Promote long-lasting teams. **Chapter 6 Page 211, 213 & 214**	Team members engage in myopic thinking when they are employed only for a short term. By promoting longer term thinking and linking part of the compensation package to team results, team members will assume more responsibility for the longer term performance of the team.
Autonomy: Give teams the freedom and capability to act; *do not micro-manage them.* **Chapter 3 Page 78**	Teams had autonomy in daily operations. **Chapter 5 Page 166**	R5: Promote agile concepts to senior management and other pivotal figures within the organisation. **Chapter 6 Page 212**	Teams will be empowered to make proactive decisions for the improvement of the teams' performance when they have an input into decisions made that affect the team.

Beyond Budgeting Principle	**Findings from the Application of the Beyond Budgeting Principles**	**Recommendations for Extending Agile Systems Development Practices**	**Rationale**
Values: Govern through a few clear values, goals and boundaries, *not detailed rules and budgets.* **Chapter 3 Page 83**	Management outline clear operating guidelines at the project initiation stage. **Chapter 5 Page 169**	R5: Promote agile concepts to senior management and other pivotal figures within the organisation. **Chapter 6 Page 212**	The ASD team require a flexible operational environment so they can reflect upon and improve processes and practices each iteration
Transparency: Promote open information for self-management; *do not restrict it hierarchically.* **Chapter 3 Page 86**	Continuous update of plans mean project information is available when requested. **Chapter 5 Page 172**	R4: Encourage long-lasting customer-team relationships. R7: Promote long-lasting teams. **Chapter 6 Page 211 & 214**	Dysfunctional behaviour is inhibited when information is transparent and team members are involved in longer term thinking.
Goals: Set relative goals for continuous improvement; *do not negotiate fixed performance contracts*. **Chapter 3 Page 90**	Aggressive but possible targets are set by the team. The goal setting process is open and valued by team members. Behavioural and technical goals are set for continuous improvement. **Chapter 5 Page 176**	R7: Promote long-lasting teams. **Chapter 6 Page 214**	Incorporating longer term goals for the team will mean more commitment from team members. (not necessarily project specific goals)
Rewards: Reward shared success based on relative performance, *not on meeting fixed targets.* **Chapter 3 Page 95**	Success is shared through non monetary rewards. Relative performance reviews are carried out by team leaders. Bell curve reward structure is problematic. Success is shared through non monetary rewards. **Chapter 5 Page 180**	R6: Integrate shared team rewards as a part of the overall reward system. **Chapter 6 Page 213**	ASD team members are required to work together closely during a project. Individual goals without any form of team based compensation will encourage dysfunctional behaviour.

Beyond Budgeting Principle	**Findings from the Application of the Beyond Budgeting Principles**	**Recommendations for Extending Agile Systems Development Practices**	**Rationale**
Planning: Make planning a continuous and inclusive process, *not a top down annual event.* **Chapter 3 Page 98**	The short –term planning process is both continuous and inclusive. Teams have little involvement in long-term planning. **Chapter 5 Page 184**	R4: Encourage long-lasting customer-team relationships. R7: Promote long-lasting teams. **Chapter 6 Page 211 & 214**	While short-term planning is inherent in ASD practices, promoting long-term planning for teams will help gain a better commitment from members.
Control: Base controls on relative indicators and trends, *not variances against a plan.* **Chapter 3 Page 100**	Agile methodology ensures indicators and trends are highly visible. **Chapter 5 Page 187**	R8: Use flexible budget control mechanisms. **Chapter 6 Page 216**	Indicators and trends are highly visible in an ASD environment. However, fixed budgets are not suited as a control mechanism for ASD teams.
Resources: Make resources available as needed, *not through annual budget allocations.* **Chapter 3 Page 104**	Budget mechanisms allow for additional resources to be obtained when required. **Chapter 5 Page 190**	R8: Use flexible budget control mechanisms. **Chapter 6 Page 216**	Making resources available when needed through flexible budgeting mechanisms, allows the ASD team to create extra customer value.
Coordination: Coordinate interactions dynamically, *not through annual planning cycles.* **Chapter 3 Page 106**	Coordination and dynamic interactions are encouraged. **Chapter 5 Page 193**	R9: Facilitate and develop relationships with members of other teams. **Chapter 6 Page 218**	Team members find solutions and improve their practices when they develop relationships with other team members.

One of the major findings from this study was the prominence of issues with customer focus. This was surprising given that the main aim of the agile manifesto is to satisfy customers. Yet, this study found that, from the teams' perspective, the interface with the customer group posed many problems. Team members voiced their concern regarding the suitability of the customer proxy, questioning their knowledge of the customer's domain, their ability to quickly supply quality requirements and their understanding of the agile process. Four of the recommendations made in this study concentrate on the improvement of the customer focus of the ASD team.

7.4.1 Supporting Developer - Customer Links

Recommendation: Encourage developer-customer interaction while maintaining control over prioritised project decisions through the use of customer proxies

Beyond Budgeting driving principle(s): Focus everyone on improving customer outcomes, not on hierarchical relationships.

Previous research has recognised that projects are more successful when there are more developer-customer links and less use of customer representatives (Keil and Carmel, 1995). This is because the exchange of information between customers and developers is important to develop mutual understanding and this understanding diminishes when communication channels are distorted by intermediaries. However, in many organisations customer representatives or proxies may be the only option. This study highlights the importance of having knowledgeable customer proxies who are able to communicate effectively with the development team. An interesting aspect of this was the differing leadership styles employed by project managers. Some project managers encouraged direct developer-customer interaction while others *policed* teams and demanded they interact with the customer only through the customer proxy, who represented the broader needs of the organisation and not just individual customer preferences. A strategy that worked well for project B was developing several developer-customer communication channels while still having a customer proxy prioritising the requirements backlog with the team. This allowed the developers get clarity on requirements directly from knowledgeable customers while not adding to the scope or complexity of the project. Any additional requirements or requirement changes were handled through the customer proxy.

7.4.2 The Customer Proxy

Recommendation: Provide customer proxies with training on the operating processes and communication requirements of an ASD environment.

Beyond Budgeting driving principle(s): Focus everyone on improving customer outcomes, not on hierarchical relationships.

Results from this study show that clearly identifying the customer is an important impacting factor of customer focus. This seems obvious but when an ASD team is required to build systems for other technology teams who in turn build for the customer it becomes less clear where responsibilities lie. When possible the project manager should seek to get clarity about who the ASD team are to regard as the customer and what communication channels are open to them to interact with the customer.

The study also found that the perceived customer's personality affects the customer focus of the team. It must be noted, however, that this is from the point of view of the team. A customer may not be interested or committed to a project for a number of reasons. They may not have time to participate or may have other priorities and/or commitments. Previous studies by Koskela and Abrahamson (2004) and Martin et al. (2004) recognise the stressful role customers are expected perform in ASD. However, this study sheds new light on this by approaching the subject of poor customer commitment from the team's perspective. If the team are to become customer focused then they need to be aware that customers' circumstances will differ for each project. If the customer is unable or unwilling to commit sufficient resources to the project then the customer focus of the team will suffer. Highsmith (2004) suggests that project managers need to be savvy due to the criticality of having customers involved in the development process, even going as far to suggest that project managers should turn down projects where there is no customer buy-in. However, this is often not an option and in the case of in-house development, where in-house politics often plays a key role, project managers and development teams can become customer focused through other means, such as collecting and analyzing customer needs, providing training to the customer so that they are aware of the needs of the ASD team and creating teams who are have experience with the customer or their business domain.

7.4.3 Capturing Customer Specific Information

Recommendation: Develop customer specific knowledge repositories to store information valuable to ASD teams

Beyond Budgeting driving principle(s): Focus everyone on improving customer outcomes, not on hierarchical relationships.

The empirical evidence suggests that customer focus is a multi-dimensional concept far more complex that previously envisaged within the ASD literature. Both of the case sites employed agile practices such as on-site customers, iteration planning and review sessions and the establishment of direct communication channels between customers and developers in a bid to become customer focused. However, the literature also suggests that having specific customer repositories to store customer information, providing incentives to share customer information and mechanisms to disseminate this information also contribute to having a customer focus (section 3.1.1, page 64-65). The case sites did have Sharepoints and wiki pages set up for each project but these were used to store project specific information rather than customer specific information. Project managers in ASD projects should consider customer specific repositories, especially in cases where the customer is internal and/or there is likelihood that this customer will order products in the future. Having a customer specific repository will allow future teams to utilise customer information even if customer buy-in is problematic.

7.4.4 Long-lasting Customer Relationships

Recommendation: Encourage long-lasting customer-team relationships

Beyond Budgeting driving principle(s): Customers: Focus everyone on improving customer outcomes, not on hierarchical relationships.
Responsibility: Enable everyone to act and think like a leader, *not merely follow the plan*
Transparency: Promote open information for self-management; *do not restrict it hierarchically.*
Planning: Make planning a continuous and inclusive process, *not a top down annual event.*

Another interesting point is the team's experience with the customer. In this study most of the teams that worked with customers over a long period had developed better communication channels with their customer. They understood their customer's needs and developer-customer relationships improved over time. If possible, project managers should seek to keep the same team working with the same customer. However, it should be noted that in one of the projects the ASD team was

familiar with the product and had worked with the customer on a previous project. The team had found the customer apathetic before and still found the customer apathetic when it came to getting feedback and giving input into the development process. This highlights the importance of developing *productive* relationships with the customer over time and care should be taken to ensure this is so.

The recommendations from this study pertaining to the customer are based on findings from the team perspective and an interesting avenue for future research would be to examine the role of the customer from a customer or customer proxy perspective. Another possible avenue for exploration is to compare the findings from this study with findings from other studies where the customer is not in-house. The management accounting literature offers some insight into the issues surrounding customer focus when work colleagues are required to become customers of others within the same organisation (du Gay and Salaman, 1992). The four remaining recommendations are now discussed.

7.4.5 Promoting ASD Concepts

Recommendation: Promote agile concepts to senior management and other pivotal figures within the organisation

Beyond Budgeting driving principle(s): Organisation: *Organise as a network of lean, accountable teams,* not around centralised functions.
Autonomy: Give teams the freedom and capability to act; *do not micro-manage them.*
Values: Govern through a few clear values, goals and boundaries, *not detailed rules and budgets.*

There was agreement across both sites that teams had autonomy in their daily tasks but that there were decisions made that affected them which were out of their control. Decisions surrounding the use of tools, technologies and methodologies, the hiring of staff, training budgets, long term planning, etc. were made outside of the team. Developers often used phrases like *"above our heads"* and *"at a higher level"* when asked if they had input into decisions which would affect them. There was a consensus that the ASD teams were working within an agile bubble and they did not have sufficient support of the agile concept from mid and senior level management (section 5.1.2, page 160-161). Many of the decisions within the organisation that affected the ASD teams were made without any input from the teams. The literature however, suggests that decision making rights should be decentralised and the team should have a greater say over decisions that affect them (section 3.1.2, page 69-70).

Promoting ASD concepts also requires that changes are made to structures, processes and mechanisms surrounding and supporting the ASD environment (section 3.1.4, page 82). Although top- and mid-level management stated they were happy with the Scrum methodology, they had not changed surrounding processes and mechanisms to facilitate an ASD environment. Without a change to these, then the full potential of ASD may not be realised.

7.4.6 Shared Rewards

Recommendation: Integrate shared team rewards as a part of the overall reward system

Beyond Budgeting driving principle(s): Responsibility: Enable everyone to act and think like a leader, *not merely follow the plan.*
Rewards: Reward shared success based on relative performance, *not on meeting fixed targets.*

A reward system that rewards shared success is promoted by both the Beyond Budgeting and to a lesser extent, the ASD literature (section 3.2.2 page 95-97). However, this was not how the reward systems worked in either of the case sites. The team members were reviewed individually by their managers and reports were then sent to either higher management or another department. In Case A the organisation worked on a bell curve reward system and team members found this to be problematic (section 5.2.2 page 181). Case B had individual contracts in place with each consultant but had only non-monetary rewards in place for team success.

Neither of the sites used a reward system that incorporated shared rewards as part of the incentives package. A body of research points to having shared rewards incorporated into the reward system, especially when long-term cooperation is required (section 5.2.2 page 96). However, it is possible that the organisations in this study are unsure about the longevity of any particular ASD team. One programme manager pointed out that hypothetically, he may only need 10% of the team members he currently employs on his programme for the following year. The organisation may also view the complexities of incorporating shared rewards as inhibitive. So it is worth noting again that the recommendations from this study are from the perspective of the ASD team. Future research could further examine the complexities of incorporating a shared rewards system and include the perspective of other stakeholders.

7.4.7 Long-lasting Teams

Recommendation: Promote long-lasting teams

Beyond Budgeting driving principle(s): Organisation: *Organise as a network of lean, accountable teams,* not around centralised functions.
Responsibility: Enable everyone to act and think like a leader, *not merely follow the plan.*
Transparency: Promote open information for self-management; *do not restrict it hierarchically.*
Goals: Set relative goals for continuous improvement; *do not negotiate fixed performance contracts*.
Planning: Make planning a continuous and inclusive process, *not a top down annual event.*

A particular concern in Case B was that teams that are performing well generally disband at the end of a project lifecycle even though they may be performing well. The main influencing factors were the project budget and the way the project management is structured. In order to create long lasting teams it may be better to focus more on the product and have teams working on a product rather than on a project by project basis. More of a focus on the product, rather than a number of individual projects to be staffed and resourced individually, may allow for the creation of longer lasting teams.

The use of consultants gives case site B considerable flexibility to create and disband teams when a project begins or ends. This has the negative effect of inducing myopic thinking among team members who are working on a contract by contract basis. Another issue here is the length of time it takes to get a team working well together within the Scrum methodology. One Scrum master estimated that it took 12 weeks (3 * 4 week sprints) to get a team working well together. Creating and disbanding teams according to the budget or project timeline creates problems for the Scrum masters who are often the interface between the Scrum team, working within a Scrum bubble, and other functions outside the team, such as the staffing department (line management), the project management office and the business units. Core teams with expertise in many areas, which may be expanded by consultants as required, may be the way forward. If these teams were to become long-lasting teams focused on products rather than single projects at a time, then organisations could move easily onto the next step of implementing agility at a wider organisational level.

7.4.8 Flexible Budget Mechanisms

Recommendation: Use flexible budget control mechanisms

Beyond Budgeting driving principle(s): Control: Base controls on relative indicators and trends, *not variances against a plan.*
Resources: Make resources available as needed, *not through annual budget allocations.*

A fixed budgeting process was still dominant in the two cases studied. Project budgets impacted the ASD team directly by dictating planning, resource allocation and setting project goals. Previous research has noted that the traditional budgeting process is not suited to ASD and suggests further research is needed into budgeting in an ASD environment (Conboy, 2010; Fruhling and de Vreede, 2006) and this research further highlights the problems with budgeting in ASD.

The main premise of the Beyond Budgeting model is that organisations move beyond the traditional, rigid budgeting process. The findings of this study highlighted the problems associated with a rigid budget. Highly efficient teams had to disband because of a rigid budget; fixed budgets did not facilitate training or the purchase of new tools which should have improved the development process and teams engaged in myopic thinking because of the budget deadline. The argument for not moving beyond the budgeting process is often that the organisations simply do not have an endless supply of resources to finance extra, unplanned activities. However, as ASD focuses on creating customer value, these extra, unplanned activities should ensure an economic return for organisations, thereby turning a situation where the organisation is resourcing the team into one where it is investing in the team.

7.4.9 Developing Relationships with Other Teams

Recommendation: Promote and develop relationships with members of other teams

Beyond Budgeting driving principle(s): Autonomy: Give teams the freedom and capability to act; *do not micro-manage them.*
Coordination: Coordinate interactions dynamically, *not through annual planning cycles.*

In order to optimise team performance it is necessary for team members to familiarise themselves with the skills, characteristics and abilities of others within the team. Once this familiarisation has been achieved there is then the danger that lethargy will set in. The team members may begin to know each other so well that

they will be merely going through the motions each day. The recommendation to interact and develop relationships with other teams will help maintain a fresh and innovative atmosphere within teams. It can also provide a platform for the exchange of ideas and methods within the ASD teams in an organisation. For example, one team in this study regularly sent team members to work for periods of time with other teams and this helped keep ideas fresh within the team (section 5.2.6 page 193).

7.5 Limitations

This study has a number of limitations, which are highlighted here. Firstly the limitations of the study itself are identified and secondly the limitations associated with the chosen research approach are discussed.

7.5.1 Limitations of the Study

The first limitation of this study is that as a holistic management model, the Beyond Budgeting model covers a wide spectrum of management principles. Many different theoretical bases are utilised, e.g. customer focus, decentralisation, autonomy, governance, goal setting, relative performance evaluation, control theory, dynamic resources, etc., all of which can be considered under the broad umbrella of management. Although this results in a broad focus it is a necessary first step in determining the paths we need to follow to pursue our understanding of agile in a wider context (Agerfalk et al., 2009; Lyytinen and Rose, 2006) and to synchronise ASD practices with different contextual levels within the organisation (Abrahamsson et al., 2009; Kautz et al., 2007). Another limitation is that, due to the number of concepts and theories underpinning the Beyond Budgeting model and given the time restrictions for each interview, it was not possible to examine each principle and theory in great detail. A third limitation is that the study focuses on ASD teams producing systems for internal customers and this reduces the context in which the findings are relevant. Teams producing systems for external customers may use different practices than the ones identified in this study. Fourthly, while the two major ASD methods are XP and Scrum, this study examined ASD teams using only the Scrum methodology. One of the initial criterions for site selection was that the organisation had formally introduced one of the major ASD methods. Once the first site was chosen it was important for analytical purposes that the second site used the

same methodology. Therefore only the practices of ASD teams using Scrum were examined in this study. However, when developing the recommendations for extending ASD practices, the researcher referred to both the Scrum practices outlined by Schwaber (Schwaber and Beedle, 2002) and the XP practices outlined by (Beck and Andres, 2005).

Finally, the study is based on the views of the ASD team members, Scrum masters, and project managers. As the unit of analysis was the ASD team, it was a conscious decision to interview only those who were regarded as team members. However, this means that the recommendations are based on the findings from the perspective of the ASD team. Others within the organisation may have a different view.

7.5.2 Limitations of the research approach

In an effort to increase the reliability and validity of this research the researcher followed the three principles of data collection outlined by Yin (2003), namely, he used multiple sources of evidence, created a case study database, and maintained a chain of evidence.

Another limitation of this study is that it is not statistically generalisable. As with any case study research the focus is more on analytical generalisability rather than statistical generalisability. Thirdly, the data collected represents the views of the research participants at a particular period of time. These views may change over time as ASD methods become more embedded in organisations and team members gain experience. Fourthly, the major data collection was through interviews which have inherent limitations. Time was a factor for some interviews as some interviewees had a limited amount of time to partake in the study. It was also important to be aware of potential bias on the part of the researcher and the interviewee. To help overcome potential bias, care was taken to corroborate information through a triangulation process. Data was checked across participants and further corroborated with documentation and observations when necessary. Finally, cultural issues may have had a part to play as 10 of the 19 interviewees were non-native English speakers. While all interviewees spoke excellent English, there were times when the researcher had to re-phrase a question or provide further explanation. It is possible that interviewees may have misinterpreted a question or

been unable to articulate a concept as clearly as they could have in their native language.

7.6 Implications

This section summarises the contributions and implications of this study for theory, practice and education.

7.6.1 Implications for Theory

There is a large gap in the ASD literature surrounding the integration of ASD practices within a wider organisational context. Researchers tend to examine single practices and use single theories when examining ASD practices. Wider organisational structures, processes and mechanisms and the affect these have on ASD teams are rarely taken into account. This study explores how ASD teams operate through the lens of the Beyond Budgeting model. By using the Beyond Budgeting model, the study discovers that many different processes and mechanisms within organisations affect the ASD team. For example, customer focus practices are far more complex than previously realised (pages 150-156), reward mechanisms not designed to incorporate group rewards are problematic and can cause dysfunctional behaviour (pages 181-183) and yearly budgeting processes have a negative impact on the ASD team (see page 185). This knowledge is important for future researchers who wish to study ASD methodologies and practices. Research within ASD should be aware that ASD teams do not operate in isolation and the actions of the team members may be influenced by a number of external forces.

The literature in the area of management control systems also recognises the need for research to be based on more coherent theoretical foundations (Broadbent and Laughlin, 2009; Chenhall, 2003; Covaleski et al., 2003; Ferreira and Otley, 2009). The tendency to focus only on specific aspects of control systems, as opposed to a more comprehensive and integrated approach has led to spurious findings, ambiguity and a potential for conflicting results (Chenhall, 2003). There have been calls for a more integrated approach which includes the interdependency between different control mechanisms operating at the same time in the same organisation (Abernethy and Brownell, 1997). By using a holistic model, this research is small but

important initial step in discovering the interdependencies between different processes within organisations.

The Beyond Budgeting model is recognised by many practitioners to be well suited to an ASD environment, yet as far as the researcher is aware no previous research has operationalised or applied the model to an ASD environment. The large number of principles and theories underpinning the Beyond Budgeting model made this a daunting task. However, given the growing interest in Beyond Budgeting, its conceptual similarities to ASD environments, and the pressing need to understand ASD practices in a wider organisational context, it is becoming increasingly urgent for the ASD community to operationalise models such as Beyond Budgeting. This study is the first attempt to operationalise this model. Researchers can examine the operationalised dimensions (see Table 5-1, page 148) and build on the findings of this study to further refine and tailor the model.

7.6.2 Implications for Practice

This study highlights the issues ASD teams have when it comes to operating efficiently in an environment where supporting processes are not always complementary to an ASD way of working. By examining each principle separately and highlighting how it is currently being applied within two case sites, this study shows a way forward in the design of management systems which are particularly suited to an agile way of working. Organisations currently using ASD methods or hoping to implement ASD methods need to consider how surrounding processes are designed to support and complement ASD practices. They should be aware that ASD teams do not operate in isolation and legacy organisational structures, processes and mechanisms will impact on how ASD teams operate.

In particular, practitioners can examine the findings of this study and see at first-hand how seven ASD teams operated within a wider organisational context. The findings clearly describe the issues faced by ASD teams and the practices employed by the teams to compensate for these issues. For example, while ASD practices are designed to prioritise the customer, the findings from this study show that there are still major obstacles to be overcome. Communication channels, customer proxy issues, and knowledge storage and transfer problems were identified across all seven teams. Practitioners can examine how the teams within this study handled these

issues and apply the recommendations from the study to their own organisations. Practitioners can also see how issues surrounding traditional organisational processes affect the team. This study points out how organisational functions such as finance and human resources employ practices that will have a direct impact on the ASD team environment.

The study also highlights what ASD practices are working well for the teams studied. Practitioners can use the findings from this study to employ practices that worked well across both case sites. There was a general agreement among those interviewed that ASD practices are an improvement on traditional development practices. Practitioners can gain confidence from this and continue to endorse ASD practices while being aware of the possible pitfalls associated with traditional organisational structures, processes and mechanisms.

7.6.3 Implications for Education

There are two major implications of this research for educators. The first implication involves the teaching of ASD practices. It is obvious that ASD practices are becoming mainstream and probable that more and more IT/IS graduate programmes will incorporate modules on ASD practices. Indeed there is a growing number of academic papers describing how ASD courses are currently being taught in graduate and masters degree programmes (Hazzan and Dubinsky, 2010; Lu and DeClue, 2011; Mahnic, 2011; Rico and Sayani, 2009). As noted by Fitzgerald (1998), organisations rarely utilise any particular method as it is prescribed in textbooks. Educators should take heed of this as there may be a tendency to put emphasis on the formal method as described in standard textbooks. ASD methods are far from the silver bullet of systems development methodologies. The findings from this study highlight the many difficulties faced by ASD teams in practice. When designing modules that introduce ASD methods and practices, it would be wise to emphasise the importance of having a supportive environment for ASD teams. Educators should note the importance of having traditional organisational structures, processes and mechanisms designed in way that suits an ASD team environment.

The second educational implication of this research concerns the way in which contemporary management accounting is taught. When addressing contemporary

issues in management accounting Otley (2006) says that: *"It is possible to view planning and control techniques as a spectrum. At one end is a focus on robust planning techniques where implementation is primarily a matter of ensuring that the preset plans are actually realised. At the other end is a focus on agility where planning becomes so unreliable that it is dispensed with, and the control focus is moved towards rapid responses once actual operating conditions are observed. Organisations need to place themselves appropriately on this continuum"*. The Beyond Budgeting model is firmly placed on the agility end of the spectrum.

As the name suggests, Beyond Budgeting argues that organisations move beyond the budgeting process to enable organisations perform in a volatile marketplace. This is achieved through processes designed for empowerment, teamwork and accountability. That is not to say budgets are no longer used in the organisations, indeed research shows, that despite the problems associated with budgeting, the majority of organisations will continue to use budgeting processes. The argument made by Hope and Fraser (2003a) is that organisations should not use the budgeting process to drive performance or reward and sanction personnel depending on how they perform against a budget target set the previous year. Budgeting will still be used for reporting to shareholders and stock markets, etc. However the emphasis will shift to more flexible accounting techniques. Forecasting and rolling forecasts will be used to give a clearer picture of actual performance and accounting mechanisms will need to be flexible to incorporate these changing figures. This is in contrast to traditional annual and relatively rigid accounting processes. Educators should incorporate these techniques into their modules.

7.7 Future Research/Directions

This research agrees with others who found that in order to increase our understanding of agility beyond the ASD environment, researchers need to consider the ways in which organisations set up their supporting organisational structures and processes (Agerfalk et al., 2009; Lyytinen and Rose, 2006; White Baker, 2011). The findings suggest that while the Beyond Budgeting model is complementary to an agile systems development (ASD) environment, many legacy organisational processes and mechanisms are not suited to an agile way of operating. The analysis provides explanations as to why organisations need to consider functions such as the

planning, reward and resource allocation processes if they wish to optimise the use of ASD. The Beyond Budgeting model also offers ways in which ASD techniques such as customer focus, coordinating and self managing teams may be improved by understanding their use within the wider organisational management control system. In particular:

- Agile practices such as customer – developer collaboration need to be better understood when customer proxies are in place. Perhaps, as suggested by Albert (2004) we can draw on other disciplines to improve our understanding of what having a customer focus involves with respect to ASD.
- Insights from accountability theory, decentralisation theory or team empowerment can offer a better understanding of how self-managed teams make decisions. What are the incentives and repercussions of those decisions? What level of responsibility is optimum for the team? The ASD literature does not have a good grasp of this and further research will help clarify this area.
- There is a paucity of research examining reward structures for ASD teams. Through the application of the Beyond Budgeting model this study shows that the literature on ASD needs to have more clarity on this. There is little empirical evidence showing what works best for and ASD environment. Further research needs to examine how teams and individuals within teams are incentivised. Researchers could also look at how benchmarking works within an agile environment and establish optimal performance measures and review processes for ASD teams.
- In both the case sites, the traditional budget set out the project milestones and drove many aspects of the project's long-term planning and control processes. Rather than trying to be flexible within the boundaries of a rigid budgeting process can ASD teams deliver additional customer and economic value when a project budget is not the main driver? The application of the Beyond Budgeting model in the case sites emphasises the role the traditional budget has to play in inducing myopic thinking and impeding the formation of long lasting teams. For those organisations who value long-lasting teamwork and long-term thinking then the Beyond

Budgeting model may be the optimum management model. Further research is needed to fully explore and understand the pros and cons of operating without budgetary constraints.

- Further qualitative research could examine the Beyond Budgeting model in other contexts including distributed teams, off-shoring, outsourcing or ASD teams that develop packaged products rather than custom products. The practices employed by these teams may shed further light on the operating practices of ASD teams and therefore further help in our understanding of ASD practices in a wider context.
- Others might take a quantitative approach and examine the links between the operationalised dimensions of the Beyond Budgeting model and measurable success factors such as on-time completion or customer satisfaction. Future research can build on the findings from this study to develop a survey research instrument. A large scale quantitative study may add more insight into which practices work best and in which context.

While a central argument of this study is that there is a need for a change in the management and structure of organisations necessitated by a paradigm shift from the age of Taylorism to the information-age (Drucker, 1988), it is worth noting that others believe this may not actually be a paradigm shift and may be part of a cyclical change of managerial discourse brought about by the expansion and contraction of economies. Barley and Kunda (1992) produce a strong argument in this regard, stating that *"Rather than having progressed steadily from coercive to rational and then to normative conceptions of control, managerial discourse may have elaborated in surges of rhetoric that alternately celebrated normative and rational forms of control"*. They show how management rhetoric has followed the path of economic expansion and contractions from the 1870s until the 1990s, highlighting how economic contraction led to periods of normative influence (industrial betterment of the 1870s, human relations of the 1930s and organisation culture of the 1980s) and economic expansion led to periods of rational influence (Taylorism/scientific management of the 1900s and systems rationalism of the 1950s). While the arguments of Barley and Kunda (1992) are well presented, they state that their thesis is based on ideology rather than practice and recognise that they are in the minority with regard to their stance on the evolution of management discourse and the move

towards normative forms of control. Nevertheless, for future research this may have implications for the Beyond Budgeting model as a normative management model. Should, as predicted by Barley and Kunda (1992), organisations wish to revert back to rational control models in line with an economic expansion then the Beyond Budgeting model may not gain further traction. However, advocates of the model suggest that the model is suited for organisations wishing to utilise employee knowledge, that there are inbuilt transparency and accountability mechanisms which allow employee autonomy within boundary operating conditions (Bogsnes, 2009). The studies by Hope and Fraser (2003a) show that the benefits of using Beyond Budgeting will be evident regardless of economic expansion or contraction. The model is designed for the information age and as pointed out by Barley and Kunda (1992), it will only be with the benefit of hindsight that that we can see whether management discourse during this age reverts back towards a rational form of control as their hypothesis suggests.

There are, however, some considerations to be made regarding the implementation of Beyond Budgeting regardless of the economic environment. The model is designed to support front-line employees and shift the power for decision making further down the organisation. This may not always happen in practice. For example, Ostergren and Stensaker (2011) found that in an organisation that had implemented Beyond Budgeting the controllers are perceived to be more powerful and that power has shifted upwards in the organisation. There is an increased centralisation of target setting while simultaneously there has been increased decentralisation regarding how these targets are reached by sub-divisions. They also note that while none of those they interviewed expressed any concern over an ideological clash; this may become an issue later in the implementation process, when the implications of the new system become more evident.

In the meantime we know that the Drucker (1988) is correct insofar as the information age has caused a major evolutionary shift in the management and structure of organisations. While it remains to be seen whether organisations revert back towards rationalism, thereby reducing the use of normative management models such as Beyond Budgeting, we know for sure that ASD methods are now an embedded part of the ISD discipline. As the purpose of this study is to extend ASD to better integrate them within the wider organisation, the recommendations from

this study remain valid whether management discourse is normative or rational. The management model chosen as a lens is first and foremost a management control model and secondly a normative model. The findings and recommended extensions are relevant for both rational and normative management control systems.

7.8 Conclusion

This study sought to illuminate ways in which ASD may be better integrated with the wider organisation by using the Beyond Budgeting model as a lens to examine the extension of ASD concepts. To do this, the study operationalised and applied the Beyond Budgeting model to an ASD environment. The findings suggest that contemporary thinking in budgeting resonates strongly with contemporary thinking in ISD. The Beyond Budgeting model shares many similarities with ASD and both have a distinctly agile and flexible quality. By using the Beyond Budgeting model as a lens to examine 7 ASD teams, this research explored how legacy processes and mechanisms have a direct impact on the daily operations of the ASD teams. The findings show that ASD teams operate within environments that are affected by traditional organisational functions such as human resources and finance. ASD teams and the organisations within which they operate can both make changes to their practices to better align ASD team functioning with management strategy. Through the application of the Beyond Budgeting model to an ASD environment, this research provides nine recommendations which the agile community can utilise in an effort to begin better aligning ASD practices within the wider organisational context.

Appendices

Appendix A ISD Failures

Author	Comment
Au et al. 2008	Project failure due to end user dissatisfaction.
Dibbern et al. 2008	Outsourcing: 50% of the cases of offshore projects fail to achieve cost savings or that costs actually increase (Hatch 2004; Schaaf 2004).
Bartis & Mitev 2008	(Fitzgerald & Russo 2005) Only 16% of IS projects are completed on time and within budget (Standish Group)
Park et al. 2008	Project failure is a serious problem in the information field
Iivari & Huisman 2007	Problems regarding the cost, timeliness, and quality of S/W products still exist
Huigang et al. 2007	..many ERP projects have failed and led companies to financial difficulties (Miller 2000; Xue et al.2005)
Espinosa et al. 2007	Many SW projects are behind schedule and over budget (Mann 2002).
Xu & Ramesh 2007	A significant proportion of SW projects run over budget (Standish 2004)
Keil et al. 2007	More than half S/W projects experience severe difficulty and/or failure (Standish 2004)
Napier et al. 2007	53% of ISD projects are late and/or over budget and 18% fail outright. (Standish 2004)
Mitchell 2006	2001 Standish Group: 49% exceeded time and cost estimates.
Slaughter & Kirsch 2006	Firms often fail in their attempts to build and deploy software (Gaudin 2003)
Pan et al. 2006	43% of projects were over budget (Standish 2003)
Porra et al. 2005	Texaco IT failed because top management consistently misinterpreted its performance as poor
Weidong & Lee 2005	Standish 1994: 16.2% Successful projects. Standish 2001: 28% Successful projects. ISD project failures occur regularly (Ewusi-Mensah 1997; Field 1997; Johnson 1995; Standish 2001)
Lee & Xia 2005	Success rate is historically low, (Standish Group 1994, 2001)
Chiang & Mookerjee 2004	Standish Group 2001: close to 50% suffered cost and schedule escalation and another 23% were outright failures. Van Genuchten (1991) notes that more than 70% surveyed suffered cost overruns
Kautz & Nielson 2004	Devlopment of software frequently results in project overruns
Baskerville & Pries-Heje 2004	A quarter-century has elapsed since the field first realised budget overruns are typical
Goulielmos 2004	There continues to be a significant failure rate in ISD
Smith & Keil 2003	26% of projects delivered on time (Standish 1999)
Keil at al. 2002	$75B cost of failed projects in US in 1998 (Johnson 2000).
Schmidt et al. 2001	Too many projects end in failure: 25% cancelled outright (Gibbs 1994). 80% run over budget (Walkerden & Jeffrey 1997). The average project exceeds its budget by 50% Gibbs 1994; Johnson 1995).
Barki et al. 2001	Project failures are still common (Gibbs 1994; Hoffman 1998)

Author	Comment
Smith et al. 2001	Marriot, Hilton and Budget Rent-a car CONFIRM project failure 1992 $125M. Standish 1999 CHAOS reports 26% completed on time and within budget.
Doherty & King 2001	Quotes other authors figures, failure rates of 50%, 89%, 70%, 90%
Jiang et al. 2001	Alarming lack of success of IS projects in industry
Irani & Love 2000	A case study highlighting a vendor supplied MRPII system that failed after implementation due to lack of human and organisational factors being considered during cost/benefit analysis. The intangible benefits were taken on faith therefore rendering the evaluation process ad hoc.
Lyytinen 2000	Large IS projects continue to fail at an alarming rate
Montealegre & Keil 2000	Project failure is a costly problem and troubled projects are not uncommon
Lyytinen 2000	A truism that large projects escalate. These have a higher probability of achieving poorer performance in terms of budgets and schedules
Ravichandran & Rai 2000	Recurrent problems such as high costs. Denver Airport $1.1M per day operating costs increase (Gibbs 1994).
Yetton et al. 2000	Projects continue to fail at an alarming rate
Ravichandran & Rai 1999	In most organisations systems development is characterised by recurrent problems, such as high costs
Zmud 1999	Failure to deliver S/W systems on budget
Keil & Robey 1999	Project failure is a costly problem and troubled projects are not uncommon. Quotes the Standish report from (Johnson 1995). 1995: American companies spent $59B on cost overruns, and $81B on cancelled projects. Tauras project abandoned £80M over 3 years (Drummond 1996). Payroll for NZ Education Dept. abandoned (Myers1994)
Kanellis et al. 1999	The cost of project disappointment in monetary terms for public sector projects is over £5B over past 12 years
Lyytinen & Robey 1999	$59B spent on cost overruns in the US 1995. (Johnson 1995)
Marakas & Elam 1998	One study (Jenkins et al. 1984) found that over 50% of the systems reviewed had problems necessitating a return to the requirements analysis phase.
Guinan et al. 1998	Denver Airport baggage handling system $1M per day delayed for over 1 year. Confirm travel reservation cancelled with sunk costs exceeding $125M. Federal Aviation Administration $1B over budget for traffic control system (Gibbs 1994)
Lyytinen et al. 1998	Sales support system CONFIG cancelled with costs of $1m (Keil 1995) IS field is plagued by various system failures (Lyytinen & Hirschheim 1987) and budget overruns
Ocker et al. 1998	Software is still developed behind schedule and over budget
Qing et al. 1998	Significant problems plague software projects. Worst of these problems is cost overruns and schedule slippages. Peat Marwick Mitchell and Co. (Rothfeder 1988) showed more than 35% of its 600 largest customers had major cost overruns. Authors own experience indicates a 200% to 300% cost overrun is not unusual.
Lind & Sulek 1998	Most development projects have completion time overruns.

Appendix B

Interview Protocol

Beyond Budgeting and Agile Methods

(Note: Parts I, II & III cover background information valuable to contextualise this research. Part IV forms the bulk of the research and was developed from a review of existing literature. In preparation for each interview, relevant questions will be drawn from this guide according to the profile of the interviewee.)

Interview Guide

Name of Company/Department:

Date and time

Location

I. INTERVIEWEE INFORMATION

(To be asked of all interviewees)

A. Name and Title

B. Responsibilities

C. Background: work and technical

(Years and positions in this firm)

(In the industry in general)

(With agile methods)

(With Beyond Budgeting)

II. COMPANY INFORMATION

(To be obtained from executives, local managers or the company's webpage)

A. Background/Description

- When started, what it is, etc.

B. Marketplace

- What is the market in which the organisation competes?
- How is the organisation positioned competitively?
- Who are the key competitors?
- More about the industry?

C. Mission

- What is the mission of the organisation?
- What are the key corporate strategies

D. Organisational Structure

- Obtain copies of and discuss the organisation charts (clarify formal versus informal flows of authority and responsibility)
- Any major changes in the recent past? What triggered them? Have they been effective?

III. IS ORGANISATION INFORMATION

(To be asked of IS executives and IS managers or collected from company documentation)

A. Mission

- What is the (perceived and stated) mission of the IS organisation?
- What are the key strategies of the IS organisation?
- What is the basic production work of the IS organisation, e.g., build standalone systems for clients, vs. building systems to fit within and architecture, etc.

B. IS organisation – Characteristics

- Culture: how would one describe the culture? (Probe if necessary on consensus orientated, compliance, commitment, team orientated, competitive, collaborative, etc.). Ask for examples of norms in action (also get a sense of the culture through documents and on-site observations).
- Is the IS culture different to that in the rest of the organisation?
- What are the formal and informal relationships that IS has with the user groups?

Agile methods

- Why were agile methods introduced? And why this particular method?
- Who was involved in the decision? And how was the decision made? What criteria were used? (Get documents of feasibility studies/ cost-benefit analyses, etc.).
- Are agile methods part of a long-term strategy for the IS organisation? For the company?
- Are they being standardised across the whole IS organisation?
- What methodology was used before the adoption of agile methods? How and where were they used? How effective were they?
- Is the use of agile methods being tracked, measured, and evaluated? What criteria and what time-frame for evaluation? (E.g. improvements in productivity? Quality, ease of maintenance, etc.)

Beyond Budgeting (if applicable)

- Why was the Beyond Budgeting model introduced?
- Who was involved in the decision? And how was the decision made? What criteria were used? (Get documents of feasibility studies/ cost-benefit analyses, etc.).
- Is Beyond Budgeting part of a long-term strategy for the IS organisation? for the company?
- Are they being standardised across the whole IS organisation?
- What methodology was used before the adoption of Beyond Budgeting? How and where were they used? How effective were they?
- Is the use of Beyond Budgeting being tracked, measured, and evaluated? What criteria and what time-frame for evaluation? E.g. improvements in productivity? Quality, ease of maintenance, etc.)

IV. BEYOND BUDGETING EXPERIENCES

(To be asked of developers -- at all levels, from programmer through managers)

A. Beyond Budgeting and Agile Methods

- What development methodology (if any) did the individual use before this one?
- Are you familiar with the Beyond Budgeting framework? What does it mean to you?

LEADERSHIP PRINCIPLES

(During the course of the interview ask more why and how questions to gain a better insight and to avoid an overly descriptive interview)

B. Customers *(Focus everyone on improving customer outcomes, not on hierarchical relationships)*

- How would you describe your working relationship with your customer (or proxy customer)? (What works well? what doesn't? Do you know/understand your customer? What are the levels of interaction?)
- How do you receive customer requirements? (What do you like/dislike about this process? Get examples.)
- Do you get forward looking information on customer needs? (How is this gathered? Analysed? Disseminated? Why is it not?)
- What type of customer feedback do you receive? (Satisfaction surveys, email, meetings, pat on the back?)
- Is there a process whereby you can share information on customers or your experiences with customers with others? (Other teams or individuals, e.g. knowledge repositories.) Elaborate on this if necessary, what is the process? Get examples

C. Organisation *(Organise as a network of lean, accountable teams, not around centralised functions)*

D. Responsibility *(Enable everyone to act and think like a leader, not merely follow the plan)*

E. Autonomy *(Give teams the freedom and capability to act, do not micro-manage them)*

Implementation

- How were agile methods introduced? What was the stated purpose for using an agile method? Was it suggested or mandated? Was there a timetable? Was there a pilot? How is it evaluated?

- How has the Beyond Budget framework been introduced? (if relevant)

Decentralisation

- What level of authorisation do you have? Regarding spending on new equipment? Developing operational metrics such as quality metrics, implementing process improvements.
- What type of training do you receive? (Tools only? methodology? development philosophy? Communication/interpersonal skills? Who gets this training? Who gives it? Why is it given? Is it mandated? Can you decide on what training you want? Get a description of the process and its perceived value.
- What level of autonomy do you have? Freedom to carry out daily tasks in a way you see fit. Are there standards for systems development in place? Are these enforced? Get a description here and an opinion on how it affects daily tasks – restrictive or positive?
- Are your daily tasks meaningful? Get examples

Empowerment

- Are you given an opportunity to make suggestions regarding decisions that affect you or your team? Why? Why not? Get examples
- Are you aware of the department's goals, vision and policies? Do you have an input into developing these? How are communicated to you?
- Is there an explicit strategy for each project? Do you contribute to the formation of this? What are the benefits to this?
- Does your team have a short term strategy? A long term strategy? How is this developed?
- Is your team's strategy streamlined with that of the Organisation as a whole?

Management Support

- What is the perceived support from managers at various levels (mid-level and senior; and IS and business)? Is it perceived to be directive or supportive?
- What evidence is there for commitment to Beyond Budgeting from managers? (Either verbal or action. Get examples of each, and where possible documentary support. E.g., memos announcements, allocation of resources, etc.)

F. Values *(Govern through a few clear values, goals, and boundaries, not detailed rules and budgets)*

G. Transparency *(Promote open information for self-management, do not restrict it hierarchically)*

- Description of the project management tool. What tool is used? What metrics or information does this tool capture?
- How often is this updated? How often are reports generated? Who looks at these? What is on them?
- What level of access do you have to your project data? E.g. progress vs. plans/targets
- What data do you have access to on other agile teams?

PROCESS PRINCIPLES

H. Goals *(Set relative goals for continuous improvement, do not negotiate fixed performance contracts)*

I. Rewards *(Reward shared success based on relative performance, not on meeting fixed targets)*

Relativity

- Who sets the goals for the agile team? For the individual? Are the teams involved in setting their own goals? Are individuals involved in setting their own goals? Why?
- Are there both short term and long term goals set?
- Are these goals set to be challenging? Realistically achievable?
- Do they include behaviour metrics? (such as knowledge sharing) Get examples of both short and long term goals
- Can these goals be compared to relative peer groups? Are benchmarks used? Considered? An option? Why? Why not?
- What do you like/ not like about the goal setting process?

Subjective and group evaluation

- Who carries out the performance review?
- At what level are performance reviews carried out? (individual/group) Why at this level?
- Are the goals set used in the performance review?
- Is hindsight evaluation used which takes into account external operating conditions during the review period?
- How is the performance review linked to the reward system?

- Describe the reward system? What works well with this and what doesn't?

J. Planning *(Make planning a continuous and inclusive process, not a top down annual event)*

K. Control *(Base controls on relative indicators and trends, not variances against a plan)*

- Do you have a fixed yearly plan? How is this broken down? Into what level of planning? Weekly/monthly/quarterly?
- Who is involved in making these plans?
- How often are these plans monitored? Updated?
- Do you see a difference between targets and forecasts?
- Give an example of how a corrective action plan was implemented when a future performance gap was identified. How do you feel about corrective action plans?
- Do you use KPIs? If yes, what are these? How do you feel about them? Do you know the KPI parameters? Do you have access to all relevant KPI information? If no, why not? Do you know about KPIs? Do you think they would be a good idea?
- What would it take for a higher level management intervention in the planning and control of the project? Try to get an example here and a reason

L. Resources *(Make resources available as needed, not through annual budget allocations)*

- Do you operate with an annual budget?
- Can you describe the budget process?
- Can you describe the process of acquiring additional resources needed for your work? (Something that was not budgeted) What do you think of this process? Do you find it difficult to justify acquiring resources?
- Who is authorised to request additional resources?
- Are you aware of the costs of resources? And the impact of these costs on projected margins, etc.?
- Do you use decision gates during a project? Who is involved in the decisions?

M. Coordination *(Coordinate interactions dynamically, not through annual planning cycles)*

- Do members of the agile team interact with other agile team members formally during the working week?

- How often? In what capacity? What are the stated and perceived objectives for the communication?
- Do you use knowledge repositories? Blogs? Wikis? Bulletin boards? Etc. for sharing information?
- Do you participate in company organised events or outings?
- What is your opinion on the level of interaction between agile teams? Generally across the whole organisation? Good/bad? Get examples

VII. STATUS/FOLLOW-UP (if any)

Where needed or available, get clarification, elaboration, and updates (from relevant interviewees) on the above issues and any that emerged.

Appendix C Agile Practices

Agile Practices from 2007 Ambler Survey	
Active stakeholder participation	Customer/acceptance tests
Architectural spikes	Customer/acceptance tests
Architecture specification (detailed)	Daily stand up meeting
Architecture specification (high-level)	Data naming conventions
Burn-down chart	Database refactoring
CASE-tool modelling	Database testing
Code inspections	Defect reports
Code refactoring	Defect trend metrics
Coding standards	Developer tests
Collective ownership	Evolutionary design
Co-located team	Flexible architectures
Configuration management	Gantt chart (detailed)
Continuous code integration	Gantt chart (high-level)
Continuous database integration	Incremental delivery of working software
Independent confirmatory/exploratory testing	Simple design
Initial agile architectural modelling	Small releases
Initial agile requirements modelling	Source code
Iteration task list	Static code analysis
Iterative development	Sustainable pace
Model/document reviews	Test driven development (TDD)
Pair programming	Test plan
Paper models	UI testing
Paper-based modelling (index cards, post its)	Use cases (detailed)
Planning game	Use cases (light)
Proved the architecture early in the lifecycle	User interface (UI) refactoring
Regular status reports	Velocity
Requirements specification (detailed)	Whiteboard sketches
Requirements specification (high level)	Whiteboard sketching/modelling
Self-organizing teams	Working, demoable software

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