UNIVERSITY OF KWAZULU-NATAL

Microsoft SharePoint Server 2010: a Case Study of the Corporate Governance guiding its Selection, Deployment and Commissioning at the University of KwaZulu-Natal, South Africa

By

Sonwabo Seedwell Jordan (882219688)

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School of Management, IT and Governance

Supervisor: Prof. Brian McArthur

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DECLARATION

I, Sonwabo Seedwell Jordan declare that:

(i)   The research reported in this dissertation, except where otherwise indicated, is my original research.

(ii)   This dissertation has not been submitted for any degree or examination at any other university.

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ABSTRACT

Organizations typically have a reason for deciding to implement a particular business application, for example an Enterprise Resources Planning or a Human Resources management system. The reasons run the entire gamut from wanting to be the first (thus gaining a competitive edge) to playing catch-up (herd mentality perhaps) if everyone is deploying the solution. In between these extremes, there are organizations which take a technology agnostic view and thus set out to garner a good understanding of business challenges, opportunities, threats and risks to mitigate before seeking to deploy a particular solution. The objective of this study was to understand the business drivers and thought processes that the University of KwaZulu-Natal followed in selecting Microsoft SharePoint Server 2010 technology. It was also the objective of the study to understand the deployment model chosen as well as understanding the attendant corporate governance put in place as well as the usage patterns once operational.

The study followed a qualitative research format primarily using case study as the research design. Qualitative research was chosen because it is amenable to the collection, analysis and interpretation of data that cannot be easily or meaningfully quantified and summarized in the form of numbers. The case study research design was chosen because it allows the researcher to focus on one instance of a 'thing' to be investigated which then becomes the subject of an in-depth study using interviews and observation as a primary tool for data generation.

A major finding of the study was that the University of KwaZulu-Natal followed an organic bottom-up approach which typically starts by providing collaborative sites and, as users find values in these sites, the implementation grows organically over a period of time. Another major finding was the absence of a formal documented corporate governance model that would include a SharePoint Delivery Plan for the organization. Consequently, of the four colleges within the university, only one college uses SharePoint technology. The adoption rate at the cluster or support services level is also markedly low.

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TERMS AND ABBREVIATIONS

API   Application Programming Interfaces

BCS   Business Connectivity Service

CLR   Common Language Runtime

CRM   Customer Relationship Management

DAM   Digital Asset Management

ECM   Enterprise Content Management

ERP   Enterprise Resources Planning

XSLT   eXtensible Stylesheet Language Transformation

GC   Governance Committee

HR   Human Resources Management

IaaS   Infrastructure as a Service

Java EE   Java Platform Enterprise edition

JVM   Java Virtual Machine

KPI   Key Performance Indicators

MOSS 2007   Microsoft Office SharePoint Server 2007

NIST   National Institute of Standards and Technology

PaaS   Platform as a Service

PPS   PerformancePoint Services

PMO   Project Management Office

REST   Representational State Transfer

RIA   Rich Internet Application

TERMS AND ABBREVIATIONS (continued)

RM	Records Management
SaaS	Software as a Service
SCM	Supply Chain Management
SPF 2010	SharePoint Foundation 2010
SPS 2010	SharePoint Server 2010
XML	eXtensible Markup Language
WFE	Web Front End

CHAPTER 1: INTRODUCTION AND PROBLEM STATEMENT

1.1   INTRODUCTION

The University of KwaZulu-Natal (UKZN) made a decision in 2007 to invest in a business application from Microsoft Inc., then called Microsoft Office SharePoint Server (MOSS 2007) which was later upgraded to Microsoft SharePoint Server 2010 (SPS 2010) in 2011. In an attempt to understand the reasons that would prompt UKZN to make this strategic decision, it is important to explore typical reasons that could inform such a decision.

Evelyn (2010) cites the following as typical reasons that prompt organizations to consider installing SPS 2010:

- the organisation has islands of information and applications
- there is a need to improve its responsiveness to business and users
- there is a need to improve information sharing inside and outside the organization
- the organization experiences challenges in locating the right content, data, and people
- lastly, the organization wants to mitigate exposure to information management risks.

According to Geier, Bertham, Clark, Dew & Mitchell (2011:29), SPS 2010 "…has the potential to deliver tremendous value to an organization if it is rigorously planned, successfully deployed, and widely adopted". Perran, Perran, Mason & Rogers (2011:683) contend that because of the breadth and depth of SPS 2010, it is a "tool that will cross many different aspects of the organization".

"Over the last decade, we've seen SharePoint evolve from a collaboration application to a business collaboration platform. With SharePoint's growing popularity, organisations have looked to extend SharePoint beyond traditional

collaboration to scenarios such as human workflow, document processing, line-of-business portals, Internet sites, and more" (Carter, Scholl & Jausovec, 2011:xxxii).

It is thus the primary objective of this study to understand not only the reasons informing the decision to deploy SharePoint technology but also to understand corporate governance processes relating to its selection, deployment and commissioning at UKZN.

1.2   BACKGROUND TO THE STUDY: EVOLUTION OF THE INFORMATION LANDSCAPE

In order to appreciate how organizations typically find themselves straddled with the challenges cited by Evelyn (2010), it helps to take a historical perspective and trace the evolution of computing in order to understand the complexities of today's Information Technology (IT) computing environment.

One of the profound effects marshaled in by the advent of the Internet was to reduce planet earth from a number of continents separated by distance, time and culture, into a small, single multiple-protocol community: the digital village. The residual effect of this phenomenon inevitably heralds in a new set of challenges which are best understood by appreciating the fact that the IT infrastructure or landscape we know today is the culmination of events that have played themselves out over a period of at least five decades. During this period, Laudon & Laudon (2012) identify five categories of varying configuration of computing power and infrastructure.

The *first stage* can be seen as starting in the 1950s with general purpose mainframe computers, an era which saw the beginning of the widespread use of mainframe technology but was soon followed by the introduction of minicomputers in the late 1960s. The *second stage* – personal computing - was marked by the rise of personal computers that brought in a proliferation of personal computers which, in turn, gave rise to a plethora of desktop

productivity tools (for example, word processors, spreadsheets, and small data management programs) that were primarily standalone systems. The *third stage* – client/server technology - saw personal computers being networked to a central server in a configuration called client/server technology. The *fourth stage* – enterprise computing - saw a major thrust towards standardization on networking standards and protocols that would later facilitate data transmissions across disparate networks. As a result, Transmission Control Protocol / Internet Protocol (TCP/IP) networking standards soon became the backbone for enterprise wide networks resulting in a "global system of computer networks" known as the Internet (Alonso, Casati, Kuno & Machiraju, 2010).

Before discussing the last stage, it is important to note that the enterprise computing stage brought about a proliferation of silos of applications that 'spoke the same language' but needed to be aggregated for the end user (Sezov, 2012). Typical examples of such applications are what Miller (2003) calls the alphabet soup namely Customer Relationship Management (CRM), Enterprise Resources Planning (ERP), Human Resources management (HR) and Supply Chain Management (SCM). In the absence of an aggregated view for end user consumption, navigating these applications has the potential for undermining efficiency as the user needs, amongst other things, to log individually to each application and continually juggle information between these applications in order to execute tasks.

Faced with the challenge of a distributed workforce in a digital village that is separated by time, distance and culture, aggregation is not the only issue. As organizations battle to engender economies of scale, they have to address other pressing problems relating to collaboration, enterprise content (documents, records and allied artifacts) stored in disparate repositories and business processes that span multiple time zones.

As the world marches on towards the end of the second decade of the 21st century, the evolution of IT has led us to the stage called *cloud computing*. Corrado & Moulaison (2011) see the history of computing as a gyration of

centralization versus decentralization of computing power. They cite early machines as being expensive, resulting in centralization of power in computer centers. The advent of the personal computer broke this centralization putting power in the hands of individuals. However, the advent of the internet saw another wave of centralization and cloud computing, which, according to them represents taking 'centralization to its logical conclusion' with the idea of 'clients' and 'server' dissipating into oblivion.

To surmise, having looked at the various stages of computing evolution, the focus of this study will be on the challenges posed by enterprise computing - the penultimate stage in the evolution of IT - as organizations look for business applications that address the challenges of aggregating and integrating disparate islands or silos of information. Organisations also seek solutions for managing the exponential explosion of both structured and unstructured data, implementing business process management to drive efficiencies and mitigate risk and litigation.

1.3   MAPPING SOLUTIONS TO BUSINESS PROBLEMS

The first consideration with any planned technology deployment is to clearly capture the overall objectives for the organization, typical examples being improving the bottom line, maximizing revenue, cost cutting and improving customer relationship management (Jamison, Hanley & Cardarelli, 2011). This process assumes a technology agnostic approach to first unravel underlying issues, challenges, opportunities, threats or pain points confronting the organization.

Having adopted a holistic view of where the organization is, where it wants to gravitate to, what thought processes shape or inform the decision to choose a particular form of technology? In other words, what is the business value add statement for wanting to deploy a form of technology? How do we map the business issues to a chosen solution and not of another competing product?

1.4 A MULTI BILLION MARKET

The architectural design for a solution that seeks to solve the kind of problems cited during the enterprise computing stage typically employs two types of technologies namely, application server and portal server technology.

In a study by Natis, Pezzini & Iijima (2009:1), the market for application server technology was $2.5 billion in 2008 [R24 billion] and forecasts were it would "…grow at a five-year compound annual growth rate of 5.6%, reaching nearly $3.3 billion in 2013." A subsequent study by Pezzini, Natis, Iijima, Sholler & Favata (2011:1), forecast "…the application server market to grow at a five-year compound annual growth rate of 9.2%, reaching approximately $5 billion in 2015."

Given the substantial combined sizes of these markets, it is inevitable that this would attract the attention of several vendors vying for a slice of the market. Whilst this is good for the market in terms of width and depth of choice, it does however pose quite a challenge in terms of selection.

1.5 PROBLEM STATEMENT

Organizations typically have a reason for deciding to implement a particular business application, for example an ERP, HR or CRM system. The reasons run the entire gamut from wanting to be the first (thus gaining a competitive edge) to playing catch-up (herd mentality perhaps) if everyone is deploying the solution. In between these extremes, there are organizations which take a technology agnostic view and thus set out to garner a good understanding of business challenges, opportunities, threats and risks to mitigate before seeking to deploy a particular solution.

Pursuant to gaining a competitive edge, O'Connor, Coventry, Lanphier, Lightfoot, Resing & Doyle (2011) contend that organizations are typically turning to technology in order to secure that edge. With particular reference to

SharePoint technology, this technology has "… given organizations throughout the world the means to implement information systems that increase productivity and enhance organizational collaboration while giving users the tools they need to accomplish their jobs more quickly and efficiently" (O'Connor et al., 2011:1).

Chennault & Strain (2009:6) charge that "SharePoint has grown into a software platform that is currently in production or planned for deployment in tens of thousands of organizations both large and small throughout the world". Miles (2011:4) concurs with this view as he states that SharePoint "growth has been rapid with an adoption rate of 60%-70% across all sizes of organizations and all industry sectors". These views are congruent with the assertion by Cameron (2013) that SharePoint technology has grown so fast and become so ubiquitous that it has become a common noun for content management as is Kleenex for tissue and Xerox for copying.

McLeod, Childs, Lappin & Siggers (2010) of Northumbria University conducted a study into the use of Microsoft SharePoint technology in higher education institutions (HEIs) in the UK with several key objectives, namely: establishing the level and nature of interest amongst the institutions; secondly, determining usage patterns within these institutions; thirdly, eliciting the views of stakeholders; fourthly, understanding lessons learnt from deploying SharePoint technology; lastly, determining whether the deployment followed accepted good practice.

Key findings of the study showed a rapid increase in the adoption of SharePoint technology amongst the HEIs with collaboration being the most common usage; usage ranged from providing team sites for collaboration to specific functions such as teaching and learning, research, student administration and social computing; further, usage included using SharePoint technology as an institutional portal for staff and students giving them central access to key information. (Lappin & McLeod, 2009).

The problem statement to be addressed by this research project is to build an understanding of the organizational issues or business challenges that underpinned the decision or prompted UKZN to invest in SharePoint technology. Having deployed the solution in 2009, this research project seeks to follow the thinking processes espoused by O'Conner et al. (2011) and McLeod et al. (2010) above: understand how SharePoint is being used at UKZN, what economies of scale it has brought to the organization, whether or not it has increased productivity and enhanced collaboration.

Faced with numerous differentiation and sometimes aggressive selling strategies from vendors, the primary aim of this study is thus to understand the drivers that persuaded UKZN to choose Microsoft SharePoint 2010 (SPS 2010) over competing products, to understand the corporate governance put in place for the implementation exercise, to understand the deployment model chosen and to understand the usage patterns, once operational. It is also the primary aim of this study to determine lessons learned if any.

The problem statement can be decomposed into a number of research questions. For each of the research questions, preliminary context will be provided in order to justify and clarify the research question.

1.6   RESEARCH QUESTIONS

From the problem statement above, the following research questions have been formulated:

Question 1:

Evelyn (2013:20) makes an interesting observation regarding having a business case for SharePoint technology namely:

"In producing SharePoint solutions, people want one or more of three things out of its implementation. They want the SharePoint solution to be better,

cheaper, or faster . . . If you can tick two of those requirements, the business
case sells itself."

<div align="right">

Duncan Hartwig, information architect, AFREN

</div>

Jamison, Cardarelli & Hanley (2007:24) contend that successful implementations of SharePoint Server technology typically involve both IT and line of business managers or business owners carefully crafting a solution "…with clearly defined business goals and objectives that are used to guide the decisions that need to be made during the solution design and on-going operations." Ward, Andrushkiw, Galvin, Harbridge, Hinckley & Nagle (2012) point out some very poignant research statistics in that more than half of SPS 2010 implementations are undertaken without a clear business case which would be a baseline of what the organization wants to achieve. In addition, they assert that, once implemented, a third of organizations simply do not know how to use SPS 2010.

This leads to the first question guiding this research.

What are the business considerations that led UKZN to consider deploying
SPS 2010?

It is important to pose this question in order to understand the business case for UKZN in choosing SharePoint technology and also to understand benefits realized (if any) and or benefits to be realized sometime in the future. Is it, for example, to "…increase productivity and enhance organizational collaboration while giving users the tools they need to accomplish their jobs more quickly and efficiently" (O'Connor et al., 2011:1)?

Question 2:

Technology by itself plays a small role towards the overall success of SharePoint solutions: processes and people have a more profound residual effect (Jamison et al., 2007). During the early days of SharePoint 2003 Server, the

main emphasis was on IT successfully installing the application with minimum business community involvement. Typical reasons for that included the assumption that users knew the basics of the solution and, once deployed, the solution would be self-explanatory (Evelyn, 2013).

However, an international study of large organizations (5000 plus employees), mid-sized organizations (500 to 5000 employees) and small to mid-sized organizations (10 to 500) conducted by Miles (2011) to look at, amongst other things, user experiences of SharePoint and also determine governance as it relates to SharePoint security and compliance, came up with some interesting findings (Appendices 1.1 to 1.4 show the breakdown of these organizations by size, geography, industry sector and job roles). One of the key findings, as shown in the diagram below, is that 46% of the organizations suffer from "lack of strategic plan on what to use it for" (Miles, 2011:15). A primary reason for this is a "...lack of firm governance and lack of a forward strategy" (Miles, 2011:17).
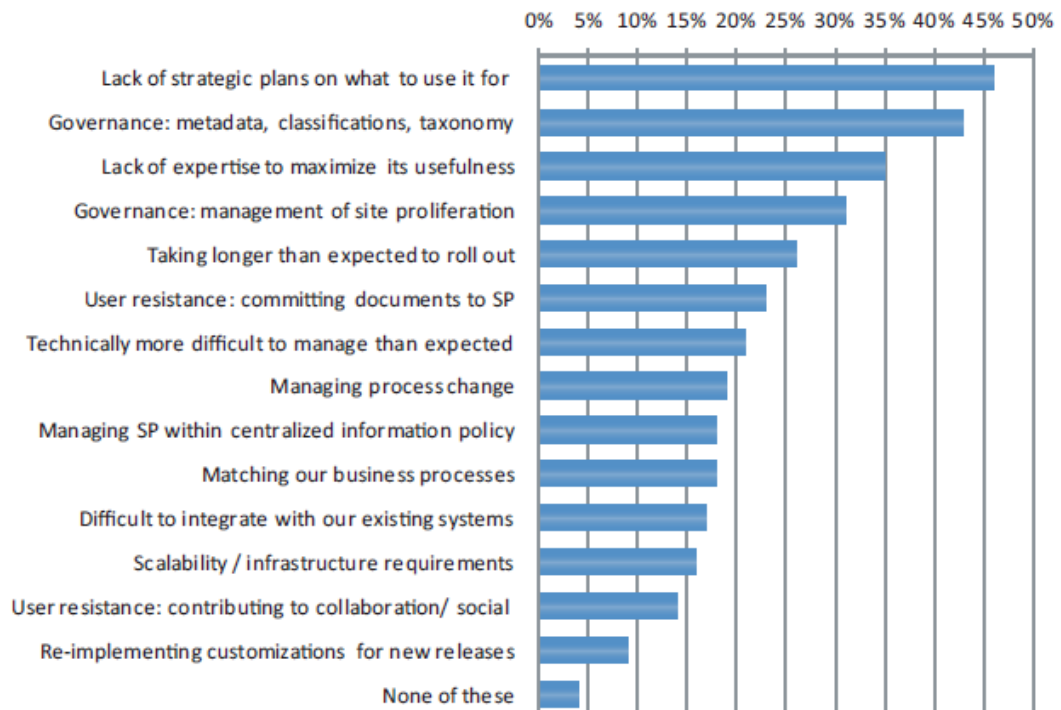
Figure 1.1: What would you say are your biggest on-going issues with your SharePoint system? (Miles, 2011)

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This leads to the second question guiding this research.

What is the SharePoint corporate strategy for UKZN and in particular corporate governance for the solution and how was it assembled in the first place?

Evelyn (2013) argues that the process of building a business case for SharePoint technology is not only a precursor to user adoption, but also leads to good governance. As a result any SharePoint solution should involve "…people such as the business sponsor, the business stakeholders, the support teams, and information workers. And continual review of the progress and communication between the business stakeholders and technical teams is vital." (Evelyn, 2013:20). One of the reasons cited by Porter-Roth (2012) for SharePoint failure is the minimal involvement of business stakeholders.

It is important to ask this question as it should highlight the involvement (if any) of the business community and the user community in particular in delivering the SharePoint solution to the organization. As pointed out by Jamison et al. (2007), technology is not the sole determinant of the overall success of SharePoint.

Question 3:

Wang & Hamerman (2008) propose that selecting an enterprise solution is a four-step process which is not only a systematic process of elimination but also often demands a trade-off between the level of due diligence and the length of the decision process. Pezzini et al (2011), on the other hand, assert that while the enterprise application market is dominated by a few individual players, it is rapidly evolving with the vendors using support for cloud architectures, in-memory computing, cloud style transaction processing, different forms of service-oriented architectures and web advancements as differentiation strategies. Other differentiation strategies used by the vendors sometimes

include nebulous and potentially subjective variables, for example ease of use, accelerated development and deployment time, and seamless integration points with legacy applications.

This leads to the next question guiding this research.

Having scoured the landscape for competing solutions and meandered through the sometimes nebulous and subjective functionality touted by vendors as alluded to by Pezzini et al (2011), what process was followed at UKZN and what criteria were used to arrive at SPS 2010 as the solution to deploy?

The total cost of a solution is not just the acquisition costs of hardware and software but includes on-going support over the lifecycle of the solution. Asking this question should shed light on how the incumbent vendor's offering is aligned with the business case as cited in research question one.

Question 4:

As a result of high costs, amongst other things, organizations are challenging the traditional approach of using proprietary licensed software and are increasingly looking forward to using well trusted open source alternatives (Fleming & Perry, 2010). The advantages of open source solutions (for example, relatively lower development costs) outweigh its disadvantages (for example, relatively poor documentation and support which is typically proportional to the size and interest of the community group) thus persuading organizations to pay close attention to open source as an alternative in production environments (Kapur, Saha, Costa, Carvalho, Chong, Kohlamnn, 2010).

This leads to the next question guiding this research.

What reasons guided UKZN in choosing between open-source based solutions versus a comparable commercial offering?

Using open source technology has the potential to lower both development and implementation: asking this question will yield insights to the trade-off between commercial and open source offerings as seen by UKZN.

Question 5:

A study conducted by Computer Economics (2012) shows that an increasing number of organizations are investing in cloud computing primarily driven, amongst other things, by the need to implement cost cutting measures. Fox, Follete, Raja & Stubbs (2012) suggest that some of the key advantages of cloud computing are that it allows organizations to shorten the time to market, reduces or eliminates infrastructural challenges of setting or managing hardware, deploying and managing software. Fox et al. (2012) further contend that software development and management are moving off premises to data centers through the world.

This leads to the next question guiding this research.

Given the number of deployment scenarios, ranging from the traditional on-premises hosting to cloud computing, what is the chosen deployment model at UKZN and what informed that decision?

Significant economies of scale can be realized through cloud computing - asking this question should shed light on the contribution of the chosen deployment model towards cost containment as seen by UKZN.

Question 6:

Joshi (2008) contends that with the evolution of the Internet, applications have not only progressively become more and more distributed but such distribution

transcends geographical boundaries. This poses a challenge whereby information workers need to navigate all these repositories in order to efficiently execute a task (Hillier & Stevenson, 2011). It is also a key challenge for organizations as they seek to integrate these silos of information with the aim of "…unlocking critical business data that resides in large, enterprise systems" (Fox, 2010:278). Breaking into these hodgepodges of information silos would have the effect of bringing about productivity gains as it would put such data in the hands of information workers in the course of executing day-to-day activities.

This leads to the last question guiding this research.

To what extent is SPS 2010 being used as an integration platform for aggregating data from the disparate application repositories or information silos that exist at UKZN?

It is important to ask this question as it will highlight how SharePoint, once deployed, interacts with the ecosystem in leveraging existing knowledge and not merely duplicating functionality.

1.7   WHO WILL BENEFIT FROM THE STUDY?

Creswell (2012) stresses that one of the reasons for conducting any form of research is to add to existing information and thus contribute to knowledge and practice. He then proposes five ways for assessing whether a research study or project is worth undertaking. These are:

- will the research fill a gap or void in existing literature?
- does the research replicate a past study but investigates different participants or different sites?
- does the research extend past work but examines such work more thoroughly?

- does the research give voice to people silenced, not heard or rejected in society?
- does the study inform practice?

As indicative from the title, the primary research design chosen for this research is the case study which seeks to interrogate a chosen instance within its real life context, focusing on all the factors, issues, politics, processes and relationships at play in a 'real' world or scenario. Case study research takes a holistic view of the instance and emphasizes depth rather than breadth (Oates, 2006).

The UKZN community (executive managers, line of business managers, information workers, and corporate IT) and institutions in academic and similar environments, could benefit from this study as they can use the 'instance' studied as a reference point when deploying a form of technology in their environments.

In answering the five questions posed by Creswell (2012) above, it is thus envisaged that this research will inform practice as it has the potential to benchmark UKZN practices against similar practices in other industries.

1.8   LIMITATIONS OF THE STUDY

The prevalent categories of application server architecture and the corresponding programming models are dominated by Microsoft.NET and the multivendor Java Platform Enterprise Edition (Java EE) (Pezzini et al., 2011). In terms of functionality, there are many similarities between the two (Alonso et al, 2010).

However, there is keen competition from emerging programming models and platforms for example, Spring Framework, PHP, Ruby on Rails and other proprietary frameworks. As this study will concentrate on the two dominant models, a future study could include the other cited models and frameworks.

Another limitation is that the study is being conducted right in the middle of a SPS 2010 implementation at UKZN and will be concluded before the end of the project. As a result therefore, it will not be able to draw experiences on the full implementation cycle which includes post implementation.

1.9 PREVIEW OF CHAPTERS

The rest of the study will be broken down into the following chapters:

Chapter 2 will cover the literature review with the view of demonstrating, amongst others things, that the researcher is aware of existing work in the chosen field of study and not merely duplicating the effort of others.

Chapter 3 looks at SharePoint technology 'under the hood' in order to understand its constituent parts or key functionality as this becomes helpful in analyzing the level of usage in an organization.

Chapter 4 looks at a typical ecosystem that SharePoint technology is normally deployed in with the aim of understanding the role that SharePoint technology plays in a typical software stack of an organization.

Chapter 5 discusses the theoretical framework that underpins the main thrust for this study.

Chapter 6 will cover research and design methodology chosen for this study

Chapter 7 will make an attempt to pull together the entire project in the form of findings and map these to the research objectives set out in the first chapter.

Chapter 8 which, is also the final chapter, will outline recommendations based on the findings mentioned in the chapter on research findings. The chapter will also set out answers for the research questions that were formulated during the problem statement discussion.

1.10   SUMMARY

The chapter started by briefly looking at the evolution of IT, particularly noting the challenges of the enterprise computing stage. A key challenge noted at this stage is the complexity brought about by a globally distributed workforce which inevitably needs to collaborate efficiently in the execution of duties.

This chapter introduced the problem statement and stated typical reasons (for example competitive edge or playing catch-up) that inform a decision to invest in a form of technology. The chapter then discussed the problem statement and compiled research questions in support of the problem statement.

The chapter concluded by discussing potential beneficiaries from the study and the limitations of the study.

CHAPTER 2: LITERATURE REVIEW

2.1   INTRODUCTION

It has already been mentioned that SPS 2010 has the potential to add value to an organization if rigorously planned, properly installed and enjoys wide adoption (Geier et al., 2011). This chapter will thus interrogate published literature on SharePoint technology with the specific view of understanding three broad key areas, namely

- planning for SharePoint Server 2010 strategy
- selecting, installing and commissioning SharePoint Server 2010
- planning for SharePoint Server 2010 user adoption

2.2   PLANNING FOR SHAREPOINT SERVER 2010

Evelyn (2010) contends that any SharePoint implementation, whatever the size, follows a process of engaging the client, the business, support teams and users. He further contends that successful SharePoint implementation is based on the connection between the business stakeholders and the technical team responsible for the rollout.

Jamison et al (2011) warn that whilst SPS 2010 boasts powerful features for developing solutions such as portals, intranets, and extranets, it remains an organizational challenge to ensure that it is optimally planned for and configured in order to deliver positive value. They further contend that SPS 2010 comes with a unique challenge: it cannot be mandated. In other words, an organization cannot simply issue a decree that SharePoint must be used as of a particular point in time and expect one hundred percent compliance. Users may choose to continue using other available solutions such as Google Docs to collaborate with colleagues and external stakeholders.

In discussing how SharePoint projects often fail and what can be done to mitigate this risk, Ward et al (2012) make the following suggestions:

- SharePoint deployment is not about technology but about business processes. The implication here is that the implementation teams need to understand the way the organization works and not what the training manual describes
- SharePoint adoption may require that the users alter the way they have previously done things
- The importance of choosing and training a cross organizational team with clearly set goals and priorities for the implementation exercise.

"Practical experience indicates that technology has only a small impact on the success of SharePoint solutions; organizational and political (process and people) strategies have a much greater impact, and as a result, a comprehensive SharePoint strategy is vital for success" (Jamison et al, 2011:6).

2.2.1   Developing a Corporate SharePoint Strategy

Jamison et al (2011) propose five main pillars that constitute a framework for a corporate SharePoint strategy namely, determination of key stakeholders; critical business objectives for the stakeholders; measuring business success; planning for governance; and roll-out strategy

2.2.1.1   Determination of key stakeholders

Jamison et al (2011:7) contend that in many organizations corporate IT is "separated both physically and 'emotionally' from the organizations they are designed to serve". They further contend that one way of maximizing the chances of SharePoint technology failure is for "IT to build the solution without engaging a broad spectrum of potential users".

2.2.1.2   Critical business objectives for the stakeholders

"In today's world, organizations are looking for an advantage over their competition. These organizations have increasingly turned to technology to gain the edge" (O'Connor et al., 2011:1).

"In many ways, technology has moved from being a back office function and enabler of cost reduction, to a driver of growth and value" (IBM White Paper, 2011:2).

Typical primary objectives for deploying SharePoint technology include improving business margins, cutting costs and optimizing business processes (Jamison et al, 2011). He further identifies several secondary or organization-specific examples that are common drivers for deploying SPS 2010 whilst stressing the importance to document these business objectives. Some of these examples include:

- Using the analogy of a 'one-stop shop', SPS 2010 acts as a single repository for information storage, search and subsequent retrieval so as to expedite decision making
- Providing a collaboration environment in a self-service format between business entities, customers and business partners
- SPS 2010 engenders organizational learning as it promotes the ability to share and exchange resources, leverage expertise and resources across organizational boundaries.

2.2.1.3 Measuring business success

Difficult or subjective as it may sometimes be, organizations do require a quantifiable business value proposition for any planned solution and SPS 2010 is no exception to this precept. Although a number of options exist for both how to measure and what to measure when calculating a return of investment (ROI) for a SPS 2010 project, Geier et al. (2011) charge that defining return on investment should be a straight forward process. However, challenges arise in

terms of measuring what the solution should deliver. The reason for this is that some of the benefits are intangible or the so-called 'soft benefits'.

To overcome the challenge, the next key step is to seek and establish qualitative and quantitative measures that can be used to serve as a form of barometer in terms of how a SPS 2010 solution addresses these objectives. Examples that could be used are qualitative anecdotes by users as they express how finding key information (this could be a skill within the organization or a document for attachment to a sales proposal) has added positively to their day-to-day task execution. On the quantitative side, metrics include the number of downloads a particular artifact enjoys from the portal, for example the latest product prices brochure (Jamison et al, 2011).

2.2.1.4 Planning for governance

Despite Geier et al. (2011) charging that the term governance has been used and abused over the years to the extent that it may have lost its value, governance remains crucial as it seeks to capture the planning and subsequent implementation efforts of an organization in pursuit of deploying a solution.

Governance or whatever term an organization chooses is thus an all-encompassing term that takes the form of a charter that seeks to "…describe the roles, responsibilities and rules applied to both the back end (hardware, farm, application, database configuration and maintenance) and the front end (information architecture, taxonomy, and user experience)" (Jamison et al, 2011:97).

Evelyn (2010:144) points out that "SharePoint governance is not a hardware, software, or people resource solution. It is an organizational strategy and methodology for documenting and implementing business rules and controls related to your client's data." Such governance brings cross-functional teams together consisting of business and technical teams to strategize around SharePoint implementation.

Why is corporate governance important?

"With the increasing dependence on IT in modern enterprises and the significant risks associated with omnipresent IT systems in business, IT governance is becoming imperative to all organisations" (Butler & Butler, 2010:33). Raghupathi (2007:96) suggest that "governance reflects the leadership and organizational structures and processes that ensure IT sustains and extends the organization's strategies and objectives". Marks (2010:37) suggests that "technology is too critical to organizational success" and that organizations no more view IT as a 'black box' best left to the technocrats but as both a catalyst for driving value as well as a source of risk. Hence governance processes should ensure that "IT operations, risks and opportunities are managed to optimize performance".

Corporate governance planning is important as it ensures that the envisaged solution strategy is congruent with set business objectives and there are clear guidelines for escalation in case of deviations from set objectives. Corporate governance also mitigates the risk of content 'sprawl', a term used to refer to unmanaged web content that is not subject to periodic review for accuracy and currency. Corporate governance is also important as it helps foster guidelines for content designers and also ensures that content is retained in accordance with predefined retention rules in compliance with legal or organizational requirements (Jamison et al, 2011).

Lin, Arshad, Haron, Wah, Yusoff & Mohamed (2010:44) argue that "the purpose of IT governance is to direct IT endeavors to ensure that IT's performance meets the objectives set out in its strategy". The view is supported by both Gheorghe (2010) and Iliescu (2010) when they suggest that governance not only helps support business goals but has the effect of not only optimizing business investment in IT but also managing IT related risks and opportunities.

Evelyn (2010:149) argues that governance in SharePoint is important because it adds legitimacy to a SharePoint implementation and also "provides the evidence for requesting the necessary people and money investments". He further states that defined rules, roles and responsibilities ensure that the organization is provided with the resources to make the implementation a success. He concludes that the key reason for such governance is not to impose on the user community but rather to be a conduit for communication and education.

Perran et al, (2011:683) contend that planning for SPS governance is also important because, given the breadth and depth of the solution, it has the potential to "cross many different aspects of the organization". They identify three key points to remember when putting together a governance framework, namely:

- Firstly, each organization is unique. This means that one needs to guard against simply taking the 'best practices' and simply overlaying or extrapolating them to the organization without due cognizance of the eccentricities or idiosyncrasies underlying the organization
- Secondly, one needs to set realistic expectations in that it is not always feasible to start with a perfect team or assemble a perfect set of governance standards
- Lastly, a firmly grounded understanding of the company vision is crucial in assembling a corporate governance framework.

Assembling a governance plan

Jamison et al (2011) recommend putting together a team to help draft the governance plan. Such a team should typically comprise people from the IT discipline and definitely people from line of business who have a keen understanding of organizational issues.

Evelyn (2010) recommends setting up a formal committee called the Governance Committee (GC) which should be set up right at the start of the

planning phase. Other than being a vehicle for communication and education, an important deliverable by the GC is the creation of a SharePoint "Statement of Operations" (SOO) document which then becomes a proxy or face of SharePoint within the organization. The SOO is not only a key output from the governance that should be continually updated; it is also a framework that describes the nature of SharePoint in an organization.

Contents of a corporate governance plan

Jamison et al (2011) further contend that a governance plan should be seen as a framework for designing standards, information architecture, service level agreements, infrastructure maintenance and the overall measurement plan. Further, such a governance plan should cover important topics such as the vision statement, roles and responsibilities, guiding principles, policies and standards. A typical example of a vision statement for SPS 2010 as follows:

"The portal enables the creation, management, and sharing of document assets in a business-driven environment for collaboration, classification, and access across all of the company. Through its workflow capabilities and application development foundation, it will support the organization's information management needs and provide a business process framework for all business units" Jamison et al (2011:102).

Corporate governance model: who governs?

Evelyn (2010) proposes a SharePoint governance model as shown in the diagram below.
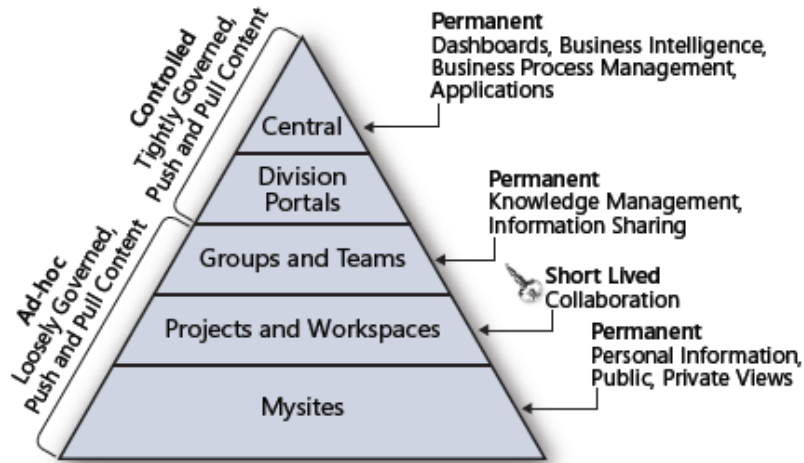
Figure 2.1: SharePoint Governance Model (Evelyn, 2010)

An important thing to note from this model is that the sites at the top of the pyramid consist of published content and usually call for relatively tight governance. As one moves down the pyramid, governance requirements tend to become looser as the focus is more on team collaboration than corporate communication.

To answer the question of who governs, Evelyn (2010) proposes selecting a lead steward who enjoys recognition or has clout within the organization. Some of the key roles of the lead steward are to establish the lines of businesses involved, identify the leader in each and then secure a meeting in order to show value for the program.

Corporate governance committee members

In order to strive towards an optimal balance, Evelyn (2010) suggests that the committee comprise business and technology individuals as shown below.
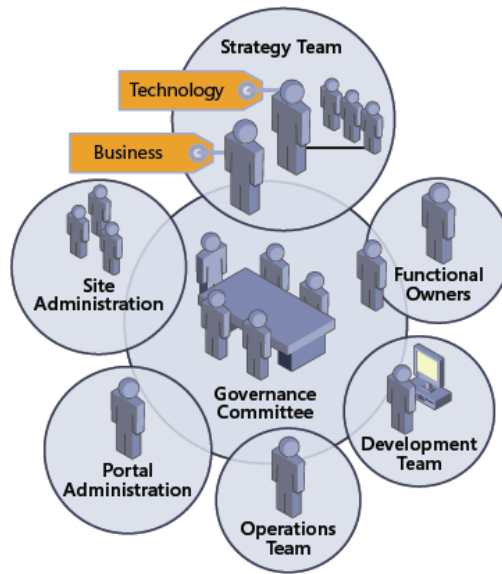
Figure 2.2: Strategy Team and Tactical Team for SharePoint governance (Evelyn, 2010)

As the figure above shows, the governance committee brings two teams together namely the strategy team (typically consists of the client, executive, financial stakeholders, security and compliance officers, development leaders and information workers. The emphasis is to strike a balance between business and corporate IT) and the tactical team (typically focuses on operations such as building the infrastructure, providing database and network connectivity, SharePoint global configuration, administration and maintenance).

2.2.1.5 *Planning for both design and maintenance*

The penultimate part of a SharePoint IT strategy is planning for design and maintenance in the form of *project management* and *change management*.

Perran et al (2011:690) contend that "project management is going to be the tool that helps you get somewhere, and change management is going to be the tool that allows users to make changes once you are there." Following sound project management fundamentals, the first requirement is thus to have a clear project charter which could be to set up a team collaboration charter, a document management solution or an intranet site. *Change management* is a typical

requirement whatever project methodology is in place. As such, corporate governance needs to be specific in terms of types of changes that will be allowed, the procedure for approving changes, and the resultant procedure for commissioning the changes to the organization.

Evelyn (2010) talks of a SharePoint implementation plan which, he argues, consists of a SharePoint Quality Plan (the 'who' and 'how' of the implementation) and a SharePoint Project Plan (the 'what' and 'when' of the implementation) as shown in the diagram below.
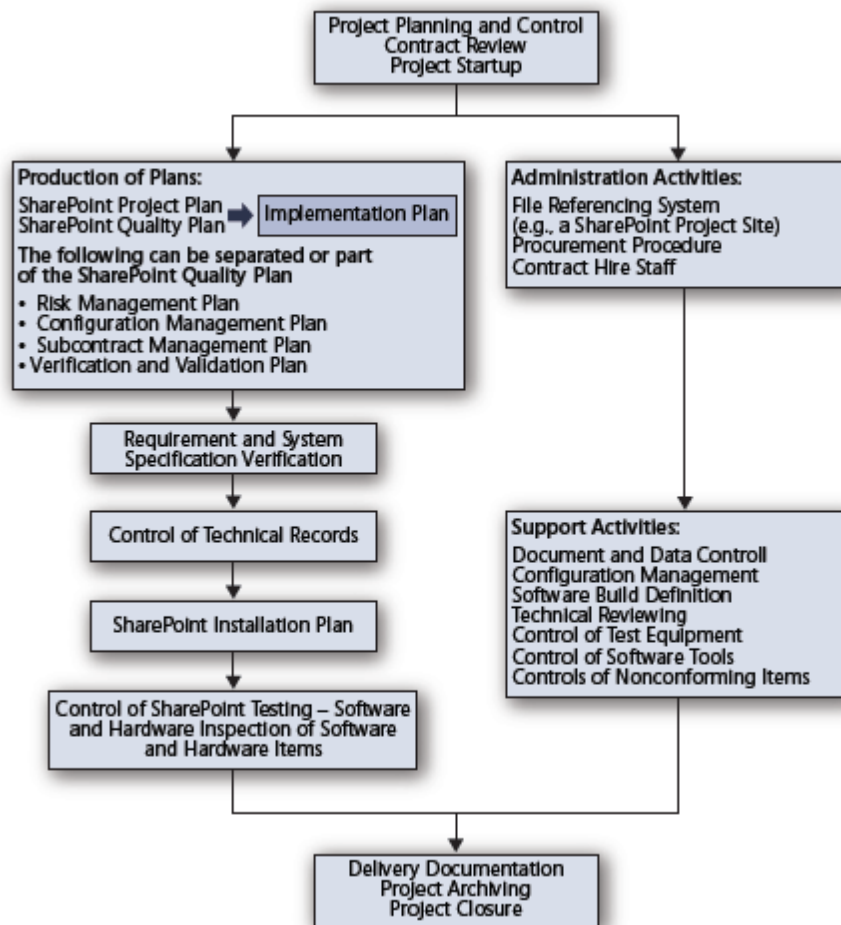
Figure 2.3: SharePoint 2010 Project planning and control life cycle (Evelyn, 2010)

Perran et al (2011) further argue that there is nothing special about SPS 2010 to warrant special project management attention. However, if SPS 2010 is not

project managed, problems or issues that subsequently emanate can easily be seen as related to project fundamentals in the form of time, scope, and budget.

2.2.1.6 *Roll-out strategy*

The last part of SharePoint IT strategy looks at two key components: communication and training. Jamison et al (2011) charge that planning for communication does not end at SPS 2010 launch but should persist throughout the duration of the solution. Doing so affords the organization an ongoing opportunity to enhance the value of the solution and also provides consistent reinforcement of best practices. As far as training goes, there is no one-size fits all and the need for training should reflect and be in line with the incumbent user within the enterprise.

Kammerer (2009:11) sounds a very poignant warning: "One caveat to using SharePoint is the common fate of content management systems, which is underutilization by undertrained employees who have little idea what applications are available to them".

2.3 SELECTING, INSTALLING AND COMMISSIONING SHAREPOINT SERVER 2010

The previous section looked at planning for SharePoint Server 2010 strategy. This section will look at key considerations for selecting, installing and commissioning SPS 2010.

It has already been mentioned in the introductory part of chapter one that organizations typically have a number of reasons prompting them to consider installing SPS 2010. Some of the reasons cited were grappling with islands of information and applications, the need to be more responsive to business and users and the challenges of locating the right content, data, and people (Evelyn, 2010). It was also mentioned that with rigorous planning, successful

deployment and wide user adoption, SPS 2010 "…has the potential to deliver tremendous value to an organization…" (Geier et al, 2011:29).

2.3.1 Application server: building blocks for deploying solutions

In discussing the limitations of the study, it was mentioned that the prevalent categories of application server architecture and programming models are the multi-vendor Java EE specification and the Microsoft.NET framework (Pezzini et al., 2011). In other words, organizations seeking to install and deploy a solution to counter the challenges cited by Evelyn (2010) above more often than not narrow their choices between these platforms. Alonso et al (2010) also contend that there are some similarities between the two platforms as shown in the diagrams below.

Whilst developed by two distinct entities (Microsoft.NET framework is developed by the Microsoft Corporation and integrated into the Windows operating system whilst Java EE is a vendor specific implementation of the Java EE specification), the two architectures share some commonalities as shown in the diagrams below (Microsoft Visual Studio White Paper, 2011).
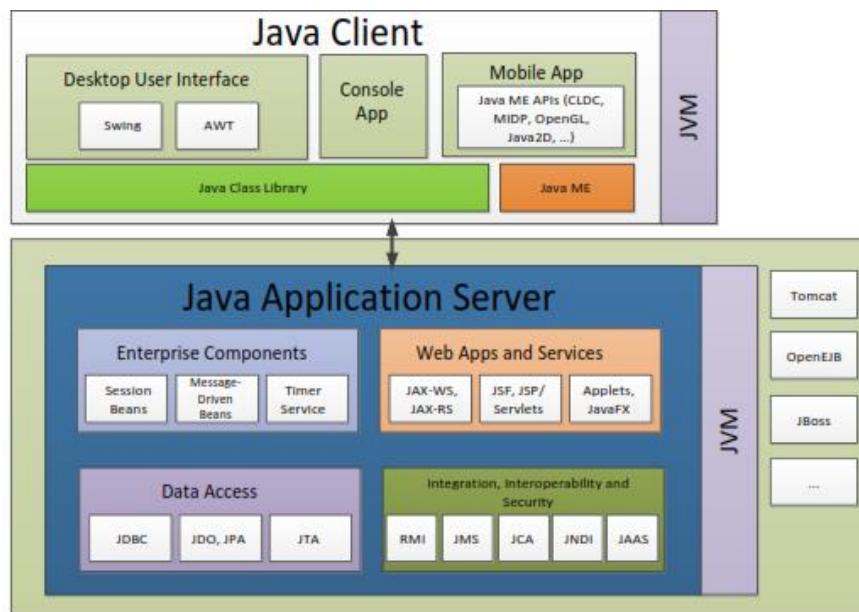
Figure 2.4: Common Java specifications and technologies (Microsoft Visual Studio White Paper, 2011)

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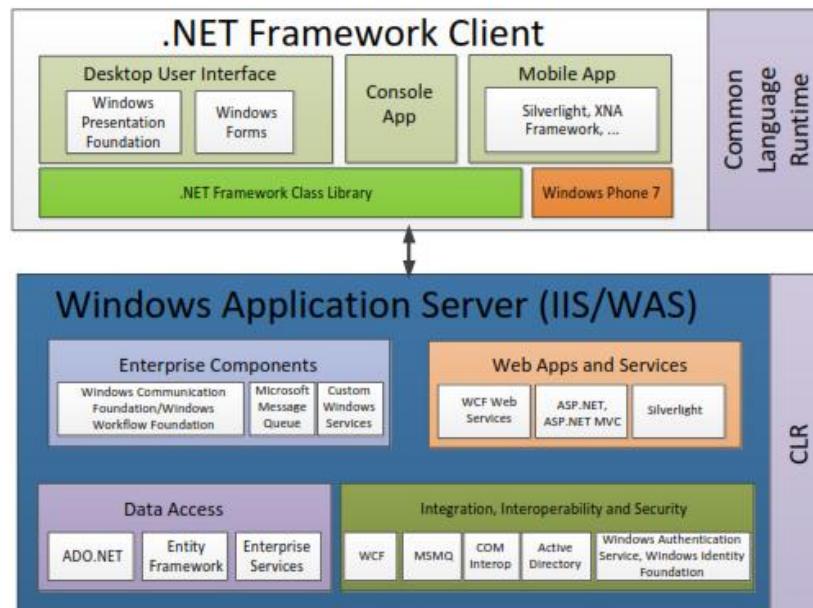
Figure 2.5 The .NET framework architecture (Microsoft Visual Studio White Paper, 2011)

What is clear from both diagrams though is that Java EE applications run inside a Java Virtual Machine (JVM) whilst .NET applications run inside the Common Language Runtime (CLR) with each framework offering a comparable rich library of functionality (Miller, 2003). What is also clear from the above diagrams is that an application, for example a portal application, would have to be deployed on top of the underlying application server. It is thus essential to explore application server technology first as it forms the basis for the subsequent deployment of a portal application.

2.3.1.1 *Application server technology: solving business problems and not technical problems*

"Today's developers recognize the need for distributed, transactional, and portable applications that leverage the speed, security, and reliability of server-side technology. Enterprise applications must be designed, built, and produced for less money while still providing greater speed and more resources" (Oracle White Paper, 2010:1).

What the two diagrams above have in common is a layer typically called the application server which hosts several services which are then made available to an application. What this means for the developer is that an abstraction layer is created which shields the programmer from having to deal with low level mundane tasks of, for example, how to interact with a naming directory service or any underlying service needed.

Each application server layer or component has a specific role, supports a set of APIs and offers services to components for example, security, database access, transaction handling, naming directory, and resource injection. This then frees the developer from having to solve 'technical' problems and concentrate on solving 'business' problems. The overarching aim of application server technology is thus to let developers focus on application logic notwithstanding the equally important objectives of availability, security and scalability (Johnson, 2005).

2.3.1.2   Defining the application server

Thompson (1997:92) defines middleware as a "layer of software that enables communications between software components regardless of the programming language in which the components are developed, the protocols used to communicate between components, or the platforms on which the components execute." Goedicke & Zdun's (2001:11) definition is "…extends the platform with a framework comprising components, services, and tools for the development of distributed applications. It aims at the integration, the effective development, and the flexible extensibility of the business applications."

Applegate, Austin & Soute (2009) define the application server as a "hodgepodge of enabling utilities, message handling and queuing systems, protocols, standards, software tool kits and other systems that help clients, servers, mainframes and their systems coordinate activities in time across the networks". The middleware thus becomes a critical denominator on top of

which other equally important technologies run, for example software as a service, service oriented architecture and grid computing.

Natis et al (2009) and Pezzini et al., (2011) both define an application server as system software that acts as a container for applications' business logic and further call it a form of middleware whose key function is to host software modules developed using the application server's prescribed programming model. A key runtime functionality that is afforded by application server technology is the optimization of system resources (memory and threads), network and database connectivity, and quality of service (QoS) support including availability, reliability, security, management, performance and scalability.

2.3.1.3   Choosing an application server

Given the role of application server technology, it is important for an organization to select the right fit for the envisaged deployment environment. Sutton (2001:2) warns that "…if selected or applied inappropriately, it can become a key disabling technology". This view is also supported by Huang, Wang, Liu & Mei (2011:1160) who claim that "on the one hand, middleware services ease the development, deployment and the management of distributed systems, but on the other hand, their failures inevitably affect the reliability of the whole system". Goedicke & Zdun (2001:12) charge that "choosing a key technology like middleware, has severe impact on the software architecture of the enterprise's information system". Sutton (2001:2) emphasizes the importance of middleware solution selection because "…it is a key enabling technology: it provides services, supports application functions and features and integrates components. In these roles, middleware interacts with and may impact many other technologies, such as database systems, workflow engines, web servers, and applications".

Although SharePoint technology only runs on the Windows platform as shown in Figure 2.5, it is nonetheless important to understand that a robust application

server typically exhibits characteristics such as interoperability (that is, platform agnostic and thus support for various programming languages); services provisioning (for example, the depth and breadth of component APIs for messaging, directory, and transaction services); scalability, performance, standardization (Goedicke & Zdun, 2001), (Young & Young, 2003), (Kotermanski, Armstrong, Holloway & Kharkvoski, 2009).

2.3.2   Selection criteria: vendor elimination process

Another important challenge with sourcing any technology must include a selection criterion for the vendor which by itself is also not an infallible science. Wang & Hamerman (2008) point out that consolidation in the vendor market and the myriad of deployment options are some of the problems besetting decisions around technology deployment issues. They then propose that selecting an enterprise solution is a four-step process which is not only a systematic process of elimination but also often demands a trade-off between the level of due diligence and the length of the decision process. A major driving construct of the decision process is proof of concept which allows for trying out the technology before any commitments are made. Rogers (2003) in the diffusion innovation theory refers to this as trialability.

The process consists of the four key aspects as the diagram below shows.
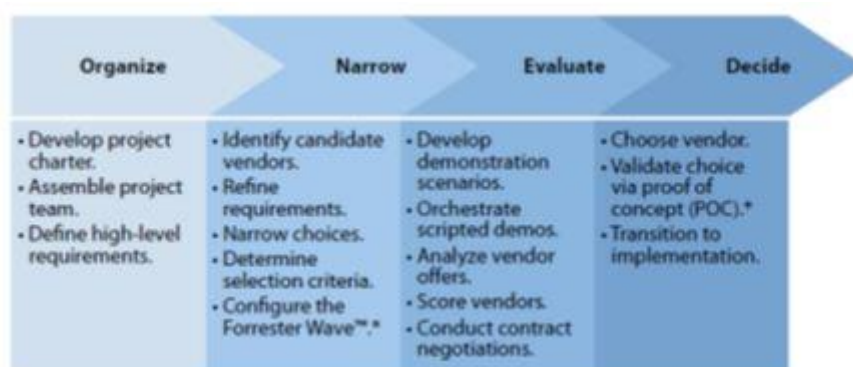
Figure 2.6: The Vendor Selection Process (Wang & Hamerman, 2008)

2.3.3   Planning SharePoint delivery solution

Evelyn (2013) contends that the delivery of a SharePoint solution is not a one-person effort but calls for a solution delivery team that will design and implement the solution. The composition of the team depends on the solution scope, the complexity of the solution and how the solution fits into an organization's existing ecosystem. Such a team is graphically illustrated as in the diagram below.
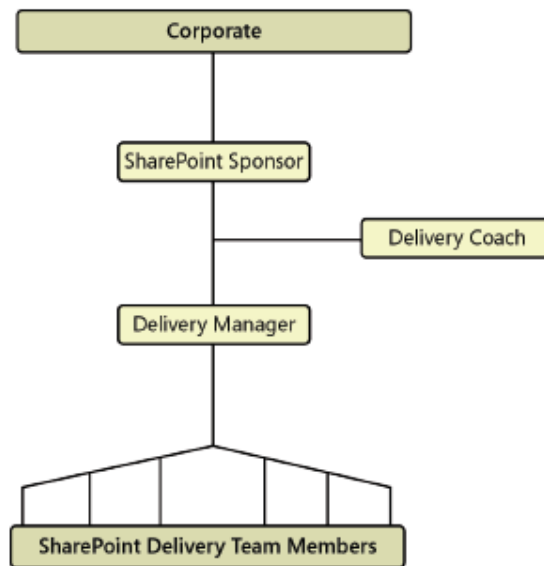
Figure 2.7: A typical SharePoint delivery team's roles and hierarchies

(Evelyn, 2013)

Key functions of the delivery team are to ensure that user requirements map correctly to SharePoint features and capabilities; set, agree on, and prioritize solution delivery; identify materials requirement and resources; and ensure that team members are in agreement with the SharePoint features to be implemented.

As can be seen in the next diagram, Evelyn (2013) decomposes the SharePoint delivery plan to four distinct phases, namely envisioning, planning, user adoption and the build phase.
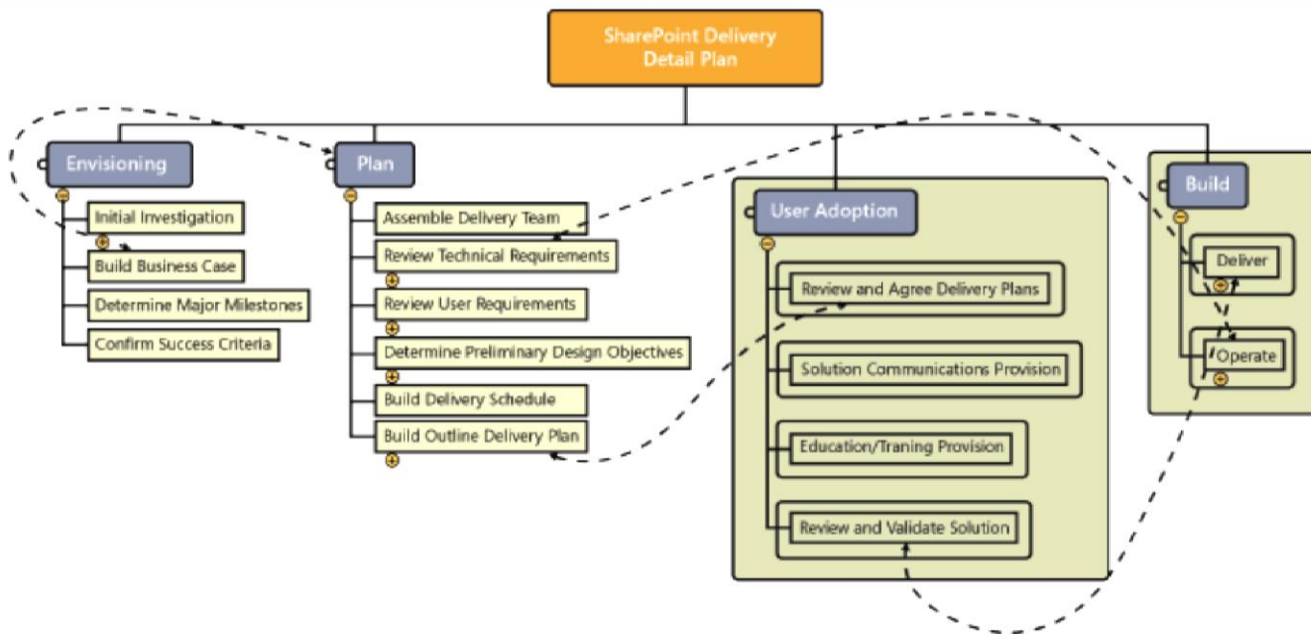
Figure 2.8: Format of a SharePoint Delivery Detail Plan (Evelyn, 2013)

2.3.4 Installing and commissioning SharePoint Server 2010

'SharePoint Server 2010 is a complex and powerful product, and there is no one-size-fits-all architecture solution. Each SharePoint Server deployment is unique, and is defined by its usage and data characteristics. Every organization needs to perform a thorough capacity management process and effectively take advantage of the flexibility that the SharePoint Server 2010 system offers to customize a correctly sized solution that best satisfies the organizational needs'. (Microsoft Inc. White Paper, 2012:46).

Evelyn (2013) contends that there are basically two modes for SPS 2010 installation namely, on-premises (organization provisions own infrastructure that is managed by internal staff) and off-premises (for example SharePoint OnLine which is part of the Office suite that includes SharePoint technology).

In order to explore options for deploying SPS 2010, Ward et al (2012) suggest that an organization needs to ask questions such does the organization have an existing infrastructure that it can leverage?; does the organization have in-house

staff to deploy and administer the environment?; what degree of control does the organization wish to maintain over the hardware and software?; are there security or regulatory constraints that the organization should be concerned with?

Having answered the above, there are basically four deployment scenarios to choose from namely, on-premises deployment, hosted deployment, cloud computing deployment, and hybrid deployment (Ward et al, 2012). However, Evelyn (2013) warns that decisions between on-premises and off-premises can become quite complex.

2.3.4.1 On premises deployment: defining SharePoint Farm topology

An organization would typically choose on-premises hosting because of the flexibility and control it affords such as patch management, application integration, and customization (Ward et al, 2012). Challenges for organizations choosing this route include initial capital outlay for hardware and software, capable IT support staff for ongoing performance, scalability, and reliability.

Mann (2010) contends that several factors affect the selection of an appropriate infrastructure model namely, the topology (configuration and deployment of servers and the services they offer), server roles (web front end, application servers) and database servers (SQL servers) for an organization. Other factors include the size of portal content (for example the number of documents), SharePoint user headcount, expectations of uptime and scope of SharePoint services.

Mann (2010) identifies four possible topologies as shown in the table below.

Topology	Description
A single server (one server farm) installation	All services including SQL Server and SharePoint residing on a single piece of hardware. Appendix 2.1 Single Server Deployment shows this graphically.
A small server farm	This topology separates the SQL Server(s)

	(could be one or two servers) from the web front end. Appendix 2.2 Small Server Farm shows this graphically.
A medium server farm	In this topology the web front end is separated from the application server(s) and the SQL Server. The role of the application server(s) would be to provide shared services such as the timer and indexing services. Appendix 2.3 Medium Server Farm shows this graphically.
A large server farm	This topology is characterized by the clustering of SQL Server backend and also uses several web front ends and several application servers. Appendix 2.4 Large Server Farm shows this graphically.

Table 2.1 Physical architecture (Mann, 2010)

Services and Features

Another important consideration when planning SharePoint deployment is the provision of shared service applications (for example Excel services for hosting worksheets) which provide various services to the SharePoint farm and are thus available to all web applications and site collections (Mann, 2010). Appendix 2.5 gives a full list of such services.

Capacity planning and management

In carrying out capacity planning and management, organizations face the complexity of multiple fully functional and integrated SharePoint farms which can be quite a daunting exercise. However, not only is this exercise essential, but an organization also needs to consider multiple SharePoint farms because industry best practices and proper governance dictate separate development environments: for example, one for quality assurance or user acceptance testing and another for the production environment (Ward et al, 2012). It is also important to note that capacity planning is not a once-off exercise to be undertaken only when planning the initial deployment of SPS 2010 but should be ongoing because no implementation remains static with regard to content and usage (Microsoft White Paper, 2012).

Capacity management has a primary focus on four major aspects when sizing a SharePoint solution, namely latency (defined as the duration between the time a user initiates an action and the time a response is delivered), throughput (defined as number of concurrent requests a server or farm can process), data scale (defined as the content size and data corpus that the system can host) and reliability (defined as a measure of the ability of the system to meet targets set for latency and throughput over time).

Data scale is the greatest concern for an organization as it represents the volume of data the server farms can store while still meeting latency and throughput goals. The greater the amount of data, the greater the impact on the overall throughput and end user experience. The methods used to transfer data across disks and database servers can also affect latency and throughput (Ward et al, 2012).

To mitigate the risks of under capacity and optimize a farm for data and storage performance Ward et al (2012) suggest several interventions such as ensure sufficient database server resources; proper database distribution across database servers; proper database volume distribution (Appendix 2.6 shows a typical SharePoint 2010 capacity management model).

Estimating content database storage

Ward et al (2012) contend that since SharePoint is database-driven, it is essential for an organization to understand the basics of capacity planning, especially in terms of storage, which means that database sizing, data architecture, and database server hardware all become very important considerations towards creating an optimal solution (Appendix 2.6 shows a typical SharePoint 2010 capacity management model).

2.3.4.2   Hosted deployment

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The next deployment option is to employ a SharePoint hosting service thus using the hosting provider's infrastructure to deliver on scalability, reliability or security that may be cost-prohibitive for an organization with meager resources. This model does however come with a challenge in terms of flexibility, portability, and change management control. A typical portability issue is switching from hosting to another form of deployment (in-house or cloud deployment) as hosting providers are normally time and contract bound (Ward et al, 2012).

2.3.4.3   Cloud computing

Another option for deploying SharePoint technology is cloud computing. It was mentioned in chapter one that IT evolution is now in the cloud computing era stage and the question "what exactly is cloud computing?" was posed. The question can now be qualified and specifically changed to "what is cloud computing and what has it got to do with SPS 2010?"

Before attempting to define cloud computing, it is important to first understand the organizational challenges faced, the opportunities to exploit as well as risks to mitigate from cloud computing.

Firstly, Mahmood & Hill (2011:4) note that "whereas large organizations are being drawn to the cloud technologies and infrastructures, SMEs (small- and medium-sized enterprises) have been using cloud computing for some time. Consumers such as general public have also readily embraced cloud computing in the form of services like *Facebook* (since about 2006), *YouTube* (since about 2005) and *Gmail* (since about 2007)".

Secondly, Knorr & Gruman (2012:1) further argue that cloud computing is at an early stage, with a "motley crew of providers large and small delivering a slew of cloud-based services, from full-blown applications to storage services to spam filtering". He further argues that cloud computing has become the phrase 'du jour' and, as with other technologies (notably Web 2.0), everyone has a

version of a definition. He also argues that cloud computing is often used as a metaphor for the web thus begging the question of where the cloud or cloud computing starts and ends.

Fox et al., (2012) charge that institutions such as Gartner and Forrester characterize cloud computing as a 'disruptive shift' or a major inflection point for the next generation of information technology as it is a major shift from traditional software development and deployment and moves towards a service-driven approach that has its 'domicilium citandi et executandi' on the cloud.

What is cloud computing?

According to Krishnaswamy (2010:10), economic and business considerations are a major driver towards moving to what he calls the "…next level of productivity with economically valuable features such as extensibility, agility, elasticity, and security". The availability of such resources removes the constraints of maintaining an in-house infrastructure (hardware, software, personnel) and enables even organizations with meager resources to expend their efforts on developing their business without the distracting concerns of worrying about infrastructural issues. He concludes by saying that the arrival of cloud services is a defining moment for enterprises small and big, including the public sector.

According to the National Institute of Standards and Technology (NIST), cloud computing is a "model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction." (Mell & Grance, 2011:6).

According to Marks & Lozano (2010), the vision for cloud computing is a relatively free computing environment that not only scales up or down as needed but also scales as much as needed, operates itself, and always works. When asked whether this is ever possible, they are philosophical in answering

by borrowing from what engineers and mathematicians call 'within epsilon of zero' which is a term that comes from calculus. This term refers to "the process of approaching a particular limit from wherever you started to the limit itself. In the case of the cost of computing infrastructure, that limit is zero" (Marks & Lozano, 2010:5).

Fox et al (2012) contend that software development and management are moving off premises to data centers through the world. If that is the case, how are these cloud-based offerings different from the tradition on-premises management of applications?

The diagram below helps visualize some of the evolutionary steps and the stages towards gravitating to the cloud (Fox, 2011).

On Premises	IaaS	PaaS	SaaS
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking

Managed by you
Managed by vendor

Figure 2.9: The range of cloud service options (Fox, 2011)

The *on-premises* mode means exactly that: development, deployment and all attendant issues are handled using privately owned organizational resources managed by internal staffing.

Krishnaswamy (2010) contends that there are several types of cloud services with the most popular ones being Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

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Infrastructure as a service (IaaS) introduces virtualization capabilities with access to virtual machines instances on the cloud and marks the beginning of consolidation as the organization gradually begins to use fewer and fewer resources on premises. Mahmood & Hill (2011) contend that IaaS is essentially about hardware devices, for example visualized servers, storage and network devices. It offers computing power, storage and networking infrastructure through public and private clouds (Ward et al, 2012).

Platform as a service (PaaS) builds on top of IaaS by guaranteeing the underlying infrastructure thus allowing an organization to focus on developing and consuming services on the cloud. In other words, this model offers a runtime environment for application code (Ward et al, 2012).

The last model, *software as a service* (SaaS), is a very compelling one option for organizations as it minimizes access costs to or lifts the barriers to business solutions an organization may need. This model gives an organization freedom from all administration and management meaning the organization simply signs on and consumes the service subscribed for. SaaS refers to prebuilt, functionally independent, vertically integrated and universally available applications delivered to users as services (Mahmood & Hill, 2011). These services provide on-demand usage employing a pay-as-you-go delivery approach based on a paradigm called utility computing. Typical examples of such services are line of business applications such as customer relationship management, finance, and supply chain management.

A study by Computer Economics (2012) yields some key insights into the adoption of this phenomenon: an increasing number of organizations are adopting the SaaS model. The study found that in just one year, 2009, the number of organizations investing in this technology grew by more than 35% and that the number of organizations who already had SaaS in place went up by 24% in 2009. The study also found that of the figure for the number of organizations investing in a SaaS model includes first time adopters as well as organizations that are expanding their implementations.
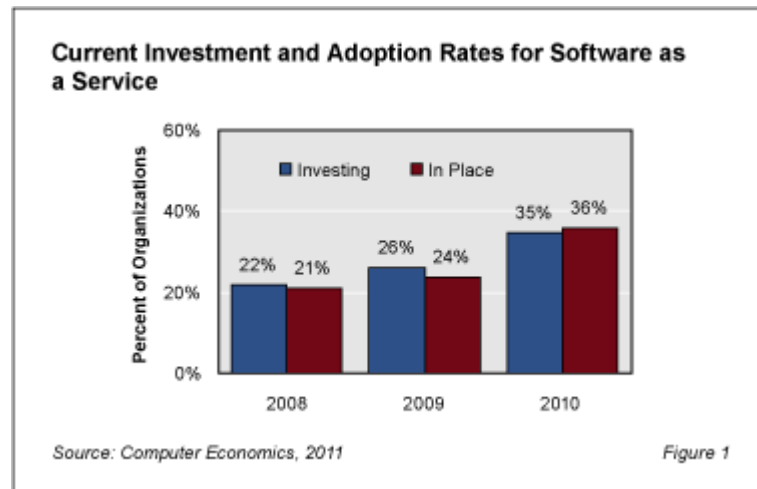
Figure 2.10: Software as a service comes of age (Computer Economics, 2012)

Some of the reasons fueling this growth are the growing familiarity with the technology and the omnipresent need to implement cost cutting measures. The study concludes by noting that some applications show a tendency of lagging in SaaS adoption and examples of these are core banking applications as well as industry specific ERP systems (Computer Economics, 2012).

Office 365

A typical example of a SaaS from Microsoft is the Office 365 offering that bundles an online version of SharePoint Online 2010, Exchange 2010, Lync 2010 and Microsoft Office Professional Plus as the diagram below shows (Rizzo, Rais, Otegem, Bishop, Durzi, Tejada & Mann, 2012). Office 365 is hosted and maintained by Microsoft at their data centers.
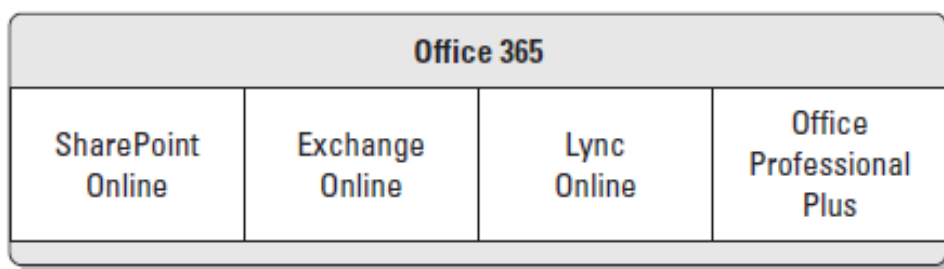
Figure 2.11: Office 365 as a SaaS offering (Rizzo et al., 2012)

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SharePoint Online allows small, medium and large organizations to use SharePoint without needing to make an upfront investment in infrastructure that is typically hosted on premises. *Exchange Online* is a service based on Microsoft Exchange server and includes features such as e-mail, archiving, the calendar, contacts and distribution groups. *Lync Online* facilitates unified communication bringing capabilities such as instant messaging, audio/video calling and a rich online meeting experience including PC-audio, video and web conferencing. *Office Professional Plus* is the typical Office suite with extended functionality.

In conclusion, Rizzo et al (2010) suggests that there are two different versions of SharePoint Online namely Standard and Dedicated. Key differentiating features are that the standard offering is a multi - tenant environment whilst the dedicated is a dedicated hardware environment both hosted by Microsoft. The level of customization between the two is also a key differentiating factor.

Challenges facing cloud computing

Whilst there are compelling reasons to employ some form of cloud computing, there are however pertinent challenges to be addressed. Shaikh & Haider (2011) single out security whilst Skendzic & Kovacic (2012) point out availability and safety as being one of the greatest disadvantages of cloud computing as users continued business depends on the availability of a third party's infrastructure. Fox et al (2012), on the other hand, identify identity management, security management, regulation and policy management as some of the key challenges organizations face.

An organization may also have a challenge of securing their data so issues of identity management need to be addressed within the wider realm of *security management*. Whilst security and identity management may be part of the equation, *regulation and policy* may prevent an organization from uploading data to the cloud.

Krishnan (2010) lends his arguments to cloud computing by first stating that traditional on-premises hosting will not be going away anytime soon and cites his reasons for instances when an organization may choose *not* to use cloud computing. One set of reasons is legal constraint, security, confidentiality and audits. Another reason draws from the fact that cloud computing thrives on homogeneous data centers that run mostly commodity hardware which is a major driver for keeping costs low. This means that organizations with custom infrastructure requirements (for example, high-end CPUs for heavy duty graphics processing or organizations with high speed interconnects for ultra-high performance computing that are not satisfied with gigabit Ethernet) would probably have to look at alternative deployment models. Another reason is sustainable service availability as power outages do occur.

Notwithstanding the above challenges, research work by the International Data Corporation (IDC), a global researcher in IT, telecommunications and consumer technology markets, shows suggest that "The cloud software market reached $22.9 billion in revenue in 2011, a 30.9% year-on-year growth rate. IDC expects cloud software will grow to $67.3 billion by 2016 at a compound annual growth rate (CAGR) of 24%. SaaS delivery will significantly outpace traditional software product delivery, growing nearly five times faster than the software market as a whole and becoming the significant growth driver to all functional software markets. By 2016, the cloud software model will account for $1 of every $5 spent on software." (Mahowald & Sullivan, 2012:1).

2.3.4.4 Hybrid deployment

As suggestive of the name, this type of deployment is a permutation of the above that could possibly combine on-premises hosting with a virtual private cloud offering. Such a model could be typically tried out by an organization that is at an exploratory stage of cloud computing (Ward et al, 2012).

2.4   PLANNING FOR SHAREPOINT SERVER 2010 ADOPTION

Having looked at planning for SPS 2010 strategy, followed by a discussion on selecting, installing and commissioning the solution, the last determinant of a successful SPS 2010 deployment is planning for user adoption (Geier et al, 2011).

Weeks (2011) conducted a study in order to better understand how organizations are deriving or driving value from their SPS deployments and also understand what organizations believe to be the most challenging issue with their SharePoint implementation. Whilst many organizations reported lack of a clear business plan or strategy for the deployment as a substantial concern, it is clear from the diagram below that adoption and training was quite widely reported as a key challenge.
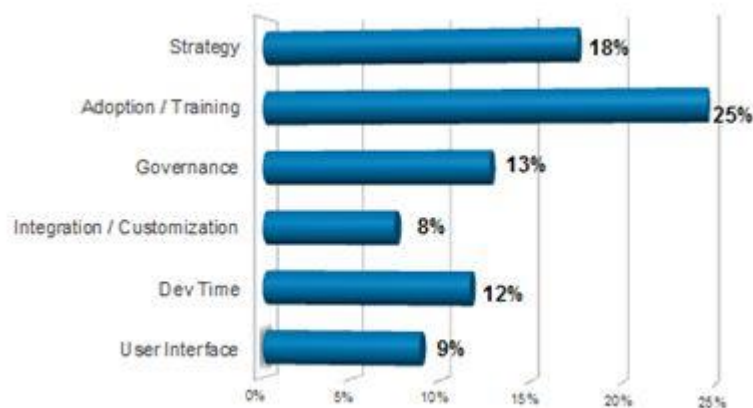
Figure 2.12: SharePoint challenges (Weeks, 2011)

The results of this study are congruent with the assertion by Evelyn (2013: 44) that "…even the best technologies and logical business processes will fail if the user community does not readily adopt them".

Having a well assembled and carefully thought-out governance plan complete with a fully tested solution does not mean that the organization can simply 'turn on the new portal, collaboration or social computing environment' and expect user adoption to happen (Microsoft White Paper, 2010a). The paper further

underscores the importance of user involvement in the design of a solution as clearly captured in the diagram below.

Figure 2.13: Organizational change: people, process, tools (Microsoft White Paper, 2010a)

The paper further suggests the following sections to be included in any user adoption plan namely, make sure that you have successfully incorporated the technology components that help drive adoption; start small and grow with the culture; implement a training plan; implement a communications plan; decide on a content migration strategy; have a user support plan; provide incentives and rewards; and enable end-user feedback.

2.4.1   Microsoft SharePoint Server 2010 Entry Points

Geier et al (2011) contend that, given the complexity of SPS 2010, it is prudent to carefully select 'entry points' in order to facilitate adoption as these entry points are 'solid and proven entry points for implementing SharePoint in an organization'. They then identify the entry points as collaboration, intranet, document management, extranet, internet, and product integration. This view is supported by AvePoint (2012: 4) which refers to the entry points as "…common stages in the evolution of SharePoint usage in an organization: content repository, collaboration tool, content enabled vertical applications, and structured data systems."

 "Think big and act small" is the tag line that Geier et al. (2011:61) propose.

2.5 SHAREPOINT TECHNOLOGY: INSIGHTS FROM THE UK HIGHER EDUCATION INSTITUTIONS

In discussing the problem statement, research work conducted by Northumbria University in 2009 to determine, inter alia, SharePoint technology usage by higher education institutions (HEIs) in the UK, was alluded to. As mentioned in discussing the problem statement, the primary aim of the study was "…to discover how SharePoint was used, the views of stakeholders and any lessons learnt" (McLeod et al., 2010:335). It was also the aim of the study to gain an "…understanding about the level and nature of interest in SharePoint and whether it is justified in terms of accepted good practice" (McLeod et al., 2010:335). At the time of the study, the latest release of SharePoint technology was Microsoft Office SharePoint Server 2007 (MOSS 2007).

This study specifically consisted of a population of 159 HEIs out of which a sample of 40 HEIs was drawn. These 40 HEIs then became the subject of a telephone and online survey targeting IT Directors and SharePoint Project Managers. This sample was deemed to be representative of the UK institutions based on the type of institution (for example 19th century and earlier) and geographical location (such as Wales, Northern Ireland, Scotland and England (McLeod et al., 2010).

A key finding of the study was "…that most UK HEIs were using SharePoint to some extent" and that "interest in Microsoft SharePoint solutions is growing within UK higher education and the wider public sector" (McLeod et al., 2010:335). The study ascribed this growth to three reasons namely: *firstly*, configuration capabilities of SharePoint technology to fit working environment; *secondly*, Microsoft Inc. enjoys a good relationship with many IT divisions; and *lastly* the integration capabilities with Microsoft Office and Outlook (McLeod et al., 2010).

Specifically, the study found that usage of SharePoint by the HEIs runs the entire gamut from administrative to academic functions and further showed that the "…most common usage of SharePoint in the UK HEIs is for team collaboration" (Lappin & McLeod, 2009:i). In particular, "implementations range from the provision of team sites supporting team collaboration, through the use of SharePoint to support specific functions, to its use as an institutional portal, providing staff and/or students with a single site from which to access key information sources and tools" (Lappin & McLeod, 2009:i). Examples of the specific functions included teaching and learning, research, student administration and social computing.

Strengths, weakness, opportunities and threats of SharePoint technology

McLeod et al. (2010) contend that the three reasons that account for the rapid growth enjoyed by SharePoint (configuration capabilities, selling power of Microsoft Inc. and the tight integration with the Office suite) can also be seen as constituting the ***strengths*** of SharePoint technology.

McLeod et al. (2010) also found two main ***weaknesses*** of SharePoint technology: *firstly*, it is seen as a 'jack of all trades and master of none' because Microsoft launched it as a multifaceted product that can be used for hosting websites, collaboration, document management, social computing, business process improvement through workflows and also as a development platform. The *second* weakness is the phenomenon of SharePoint sprawl (which typically manifests in the form of unfettered expansion of sites) which, in turn, typically thrives in environments with little governance in place.

A major ***opportunity*** for SharePoint is the potential of a large customer base as a result of the influence that Microsoft Inc., enjoys in the market. Lastly, McLeod et al. (2010) point out the potential of vendor lock-in as a ***threat*** as SharePoint technology only runs on the Windows software stack.

Procuring SharePoint

Another finding was that all of the surveyed HEIs had procured SharePoint through a Microsoft Campus Agreement (MCA) which is a licensing agreement that bundles a number of solutions that allows an HEI to choose which Microsoft software (client and server) it wishes to use. This MCA includes SharePoint and the HEIs thus have "… SharePoint by default" (Childs, McLeod, Siggers & Lappin, 2009: 1). As a result none, of the HEIs "…had undertaken a formal procurement process" (Childs et al., 2009: iii).

Implementation approaches

When it comes to implementing SharePoint, the study found two dominant approaches which they called the 'organic bottom-up' approach and the 'corporate top-down approach.

The *organic bottom-up approach* typically starts by providing collaborative team sites for local group users. This part of the organization then starts using SharePoint and the implementation grows organically over a period of time as other local users find value in these collaborative sites. A key strength of organic bottom-up approach is generally high user acceptance "…because it is focused on providing sites where teams need and want them" (McLeod et al., 2010: 39). Another key feature of this organic growth is that it typically evolves without a pre-existing corporate strategy and inevitably results is SharePoint sprawl which, in turn, heralds in issues of scalability (McLeod et al., 2010).

Chennault & Strain (2009) prefer a different name for SharePoint sprawl namely, the 'SharePoint Effect'. Key features of the SharePoint Effect include users "…hijacking control, adding content and setting policies and permissions independently of enterprise planning or strategy; users camping outside the SharePoint administrator's door, demanding a never-ending stream of enhancement, site creation and integration requests; content monitoring and control growth beyond the reach of IT resources; uncontrolled access inviting

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unauthorized exposure of sensitive data; and business goals that are not properly aligned with content creation" (Chennault & Strain, 2009:7).

The *corporate top-down approach* on other hand typically sees SharePoint implemented as an intranet and/or portal that provides collaborative team sites for local work groups. A key distinguishing feature of this implementation methodology is that the institution makes an explicit decision to use SharePoint for a specific reason with dedicated resources. The institution thus starts with "…bigger ambitions and more resources than the organic approaches" and is thus "…able to begin with the infrastructure and support arrangements that they need in order to sustain the implementation on an institution wide scale" (McLeod et al., 2010:339). Appendix 2.7 shows examples of HEIs pursuing the corporate approach.

However, this approach has its own unique challenges as institutions that have no prior experience with SharePoint technology "…are launching with demanding projects" as the technology is not easy "…to install and configure, and the learning curve is very steep" (McLeod et al., 2010:339).

Drivers behind SharePoint implementation

Lappin & McLeod (2009) report that the reasons driving SharePoint implementations in the UK run the entire gamut from providing administrative efficiencies to providing academic economies of scale. At a high level, two drivers stand out namely, improved services and collaboration (Childs et al., 2009). Some of the specific drivers identified included the following: improving particular processes; providing improved document management and collaborative facilities; collaborating with external partners (particularly in research programs); and enabling staff and students to find colleagues with similar interests (Lappin & McLeod, 2010). However, as already mentioned, "by far the most common usage of SharePoint in the UK is for team collaboration" (Lappin & McLeod, 2009:i).

In addition, some HEIs have identified specific areas where they envisage or plan to exploit SharePoint functionality (Lappin & McLeod, 2009). These include:

- Teaching and learning – the plan is to extend SharePoint into a virtual learning environment by using a free set of open source code released by Microsoft Inc., to extend core SharePoint functionality
- Research – These HEIs envisage using SharePoint when collaborating with researchers at other universities or even from the commercial sector.
- Student administration – Some HEIs plan to use SharePoint as a portal to their existing student administration database
- Social computing - Some HEIs plan to use SharePoint social computing functionality in the form of wikis and blogs
- Workflow and process improvement - Some HEIs plan to use SharePoint in order to re-engineer particular processes within their environments
- Business intelligence - Some HEIs plan to use SharePoint as an integration platform with different line of business applications and create dashboards in order to monitor key performance indicators.

Critical success factors for SharePoint implementations

McLeod et al. (2010) assert that critical success factors apply to institutions that choose the corporate top down approach or institutions that need a sustainable and scalable solution. These factors include identifying a clear focus of SharePoint deliverables; a clear relationship between SharePoint and other systems; corporate governance; managing customization; training and advice.

Specifically, the HEIs emphasized four points. *Firstly*, SharePoint can be deployed for such varying reasons (for example, enterprise content management, development platform, collaboration) that the organization needs to have a firm grasp of the intended functionality or functionalities they want to employ. *Secondly*, where SharePoint offers duplicate functionality, the organization needs to recognize and have a plan for that. *Thirdly*, the

organization needs to have a strategy for managing SharePoint sprawl typically through corporate governance as it relates to planning technical and information architectures. *Fourthly*, SharePoint is complex system thus necessitating training in order to leverage its functionality. However, for organizations following the organic bottom-up approach, this poses a key challenge as it is difficult to "…know in advance who is going to become a SharePoint user" (McLeod et al., 2010:340).

Barriers to adopting SharePoint

Barriers to accepting SharePoint technology were classified into technical, people and organizational issues. *Technical issues* relate to the HEIs seeing SharePoint as "…a complex product with a complex architecture…and requires complex development/configuration to reduce the product scope" (McLeod et al., 2010:341). The HEIs also pointed out that SharePoint "…only works under the Microsoft environment causing incompatibility problems with other systems and products used by HEIs" (McLeod et al., 2010:341). Examples of *people issues* relate to the skill set required (for example, Windows Server operating system, SQL Server, actual SharePoint product and application development skills) which the HEIs felt are in frugal supply thus necessitating the employment of consultants. Lastly, *organizational skills* relate to balancing the risk of SharePoint sprawl that typically follows organic implementations against the demands on governance structure and resources needed for the SharePoint implementation when adopting the corporate top-down implementation approach.

Lessons learned

Childs et al. (2009) classified the key lessons learned into people, technical / functionality, implementation and organizational factors as shown in the diagram below.
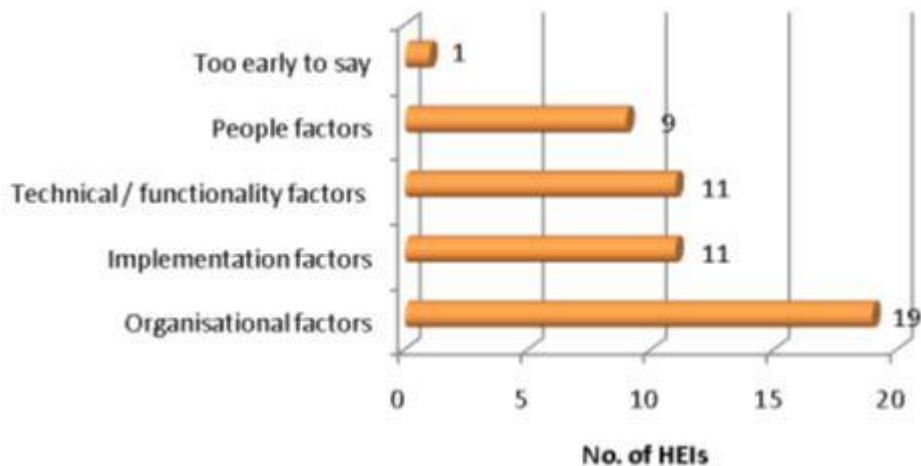
Figure 2.14: Key Lessons learned (Childs et al., 2009)

When asked what they would do differently, some HEIs mentioned under *people factors* the importance of configuring SharePoint properly. Some HEIs also reported that users do not always appreciate the functionalities embedded in SharePoint as there may be more than one way of doing things. As far as *technical / functionality factors* go, some HEIs mentioned the importance of designing an optimal infrastructure and leveraging SharePoint functionality by integration with existing systems. Some HEIs noted that using SharePoint calls for an overall review of other systems. Under *implementation factors*, some HEIs emphasized the importance of corporate governance, starting small and growing incrementally as well as training. Lastly, under *organizational factors* some HEIs noted that SharePoint is not a solution that an organization can simply jump into - strategic direction is of key importance; the involvement of management as well as being specific about expected deliverables from SharePoint in order to avoid SharePoint sprawl or the SharePoint effect.

Nature of use of SharePoint

Lastly, the work by Childs et al. (2009) show the areas where SharePoint is being used as portrayed in the diagram below.
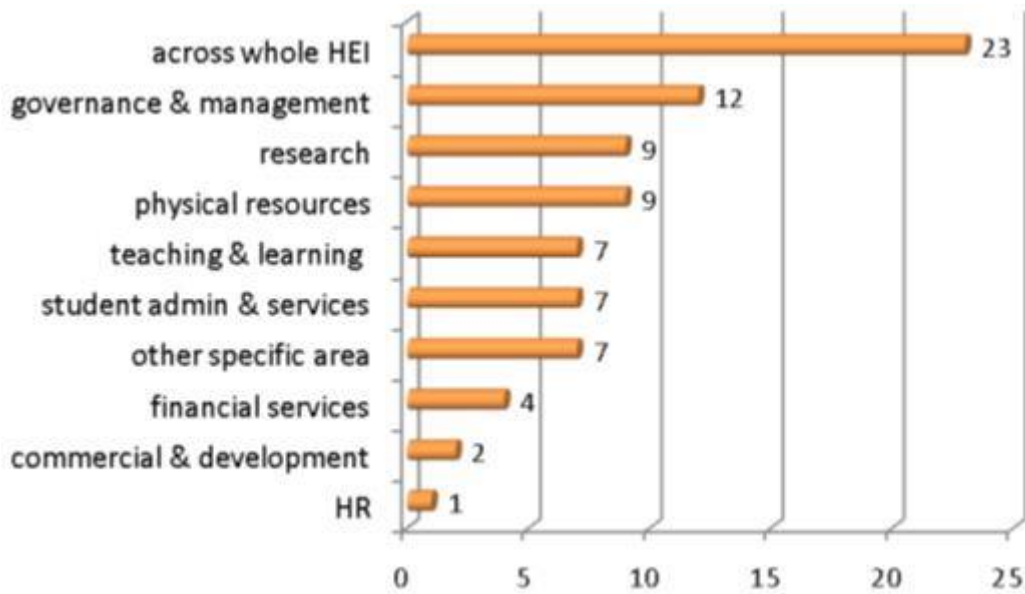
Figure 2.15: Use in areas of HEI (Childs et al., 2009)

As can be seen from the diagram, a high number of HEIs have SharePoint deployed across the organization and only one HEI using it in HR. The next diagram shows the actual usage pattern or purpose of use amongst the HEIs.
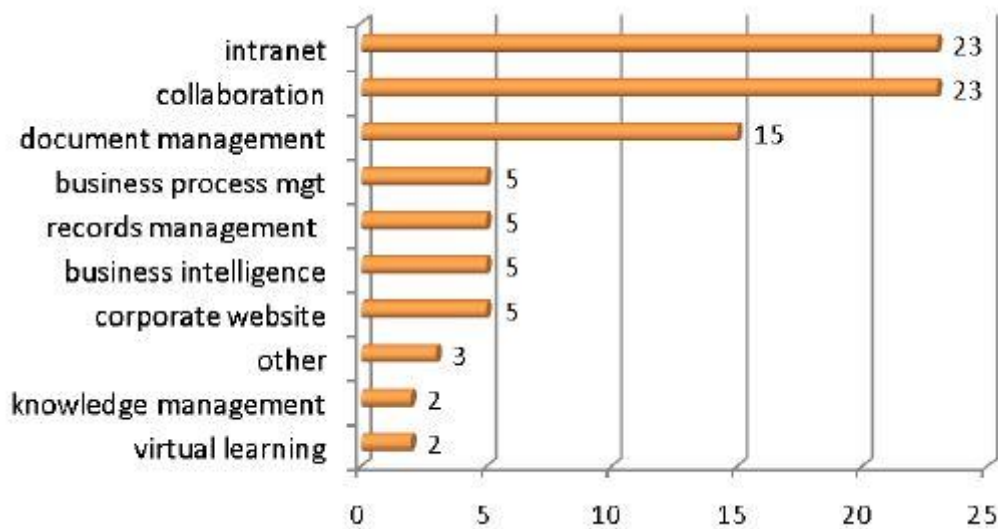
Figure 2.16: Purpose of use (Childs et al., 2009)

The diagram clearly shows a high percentage usage of SharePoint hosting an intranet sites as well as collaboration followed by document management.

2.6   SUMMARY

This chapter explored SharePoint technology under three headings: firstly, planning for SPS 2010 strategy; secondly, key issues in selecting, installing and finally commissioning SPS 2010; finally, planning for user adoption. As far as planning for SPS 2010 is concerned, the chapter underscored the importance of having a comprehensive SharePoint IT strategy of which planning for corporate governance constitutes an important part.

In selecting a solution of the magnitude of SharePoint technology, commanding a good understanding of the underlying application server technology is important as the application server becomes the building block for deploying applications. The chapter discussed the challenges of making an optimal choice between the various application server frameworks and cited a number of reasons why organizations have difficulties in choosing the correct application server technology for their environment. As far as installing and commissioning SPS 2010, the chapter discussed four deployment scenarios namely on-premises, hosted, cloud computing and hybrid deployment. The penultimate discussion focused on planning for user adoption and pointed out typical entry points such as collaboration and document management in expediting the process.

The chapter concluded by looking at SharePoint usage by HEIs in the UK.

The next chapter will look at SPS 2010 'under the hood' in order to understand its constituent parts or key functionality. It is important to have a good grasp of the underlying functionality of SPS 2010 as it forms a basis for appreciating the level or extent of the deployment and commissioning of the solution at UKZN.

CHAPTER 3: SHAREPOINT SERVER 2010: A 21st CENTURY
CHAMELEON?

3.1   INTRODUCTION

SharePoint technology is a modular solution that an organization can choose to implement incrementally in a staggered format over time as opposed to a 'big bang' approach by installing and activating all features within the solution. This chapter will thus explore and unpack the core functionality that form the backbone of SharePoint technology and also look at extended functionality which has the effect of accelerating economies of scale in an organization that implements such technology.

The major reason for this approach is that the functionality (both core and extended) can be used as a foundation or benchmark to determine the extent of SPS 2010 usage at UKZN. In other words, without a clear understanding of SharePoint technology functionality components, it becomes difficult or almost impossible to benchmark solution usage in any environment.

3.2   DEFINING SHAREPOINT SERVER 2010

The previous chapter discussed SharePoint technology without an attempt at first defining it. What is Microsoft SharePoint Server 2010? Is it a web application? Is it a portal solution? Is it a document management solution? Is it a collaboration tool? How does the author of the solution define it?

"There is no catch-all definition for SPS 2010" (AvePoint, 2012:4).

Microsoft Inc., the author of the solution, chooses to *describe* (and not to define) SPS 2010 as a solution that "…provides an information-sharing platform, document management platform, workflow platform, business process management framework, and development foundation on which information worker solutions can be created. Comprehensive business solutions can be

easily assembled to support a company's information management and business needs." (Microsoft White Paper, 2010a:3).

Microsoft Inc. then breaks down SPS 2010 into six key feature areas namely, sites (infrastructure for web content); communities (collaboration tools); content (enterprise content management); search (tracking and finding people and other resources); insights (business intelligence tools); finally, composites (create mash-ups or composite applications). Graphically the six key-feature areas can be shown as per the diagram below.
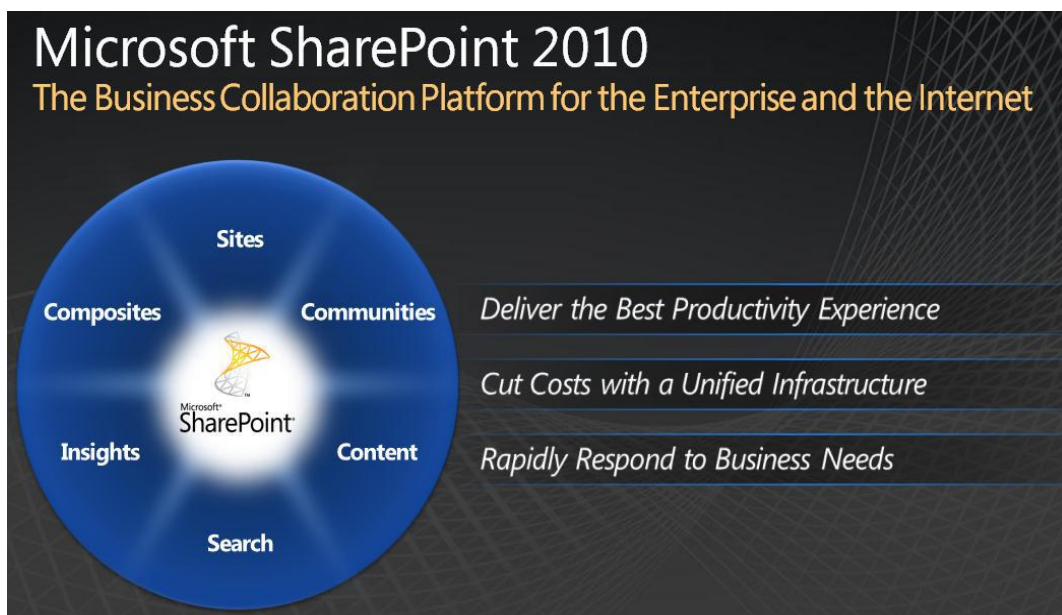
Figure 3.1 SharePoint 2010 Capabilities (Microsoft White Paper, 2010b)

Having just described it, Microsoft Inc., is however quick to concede that this is a difficult task because SharePoint technology "…encompasses so many applications, uses, and functions" (Microsoft White Paper, 2010b:3).

Another version of describing SharePoint technology is a "… business productivity platform for the enterprise and the Internet" as shown in the diagram below (Fox, 2010:4).
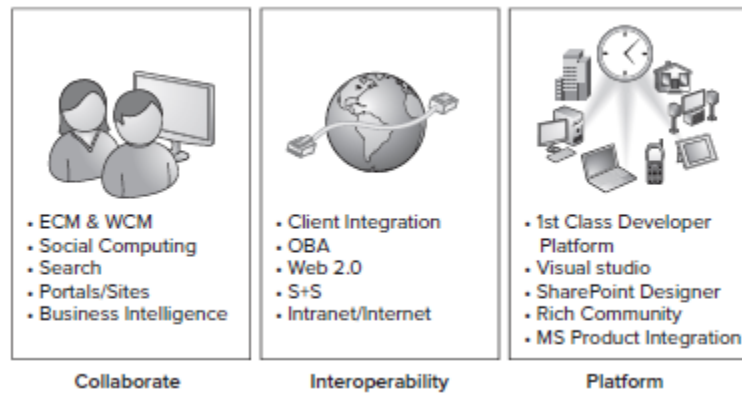
Figure 3.2 SharePoint as a platform (Fox, 2010)

The *collaborative feature* or theme emphasizes bringing people together using technologies like enterprise content management, social computing and web content management. The *interoperability feature* addresses extension points that SharePoint technology exposes to facilitate integration with external clients like the Microsoft Office, line of business (LOB) applications and active directory service for enterprise authentication. Lastly, the *platform feature* refers to the rich object model that aids the development community (Fox et al, 2012).

At its core, stripped of all technical jargon, SPS 2010 is a web application (Geier et al, 2011). Fox (2011) concurs with this but puts it differently when he states that, in essence, SharePoint technology is a web-based application that provisions a set of native capabilities to support productivity and collaboration; an extensible set of APIs and services and a configuration engine that provides rich administrative capabilities.

Krause, Langhirt, Sterff, Pehlke & Doring (2010) suggest that SPS 2010 is multifaceted – it is an application, a platform, a server, a framework, and a database. Mann (2010:25) describes SPS 2010 as a set of "…server applications that facilitate collaboration, provide comprehensive content management, implement business processes, providing access to information that is essential to organizational goals and processes". SPS 2010 thus provides an integrated platform to plan, deploy, and manage intranet, extranet, and internet applications.

Husman & Stahl (2010) describe SPS 2010 as an application that can be used to build internet portals for an organization or department, a public internet site, an extranet portal for customers and partners, a team site, a project site, a document management system, a personal site for each user, a digital dashboard for storing business intelligence data, a place to search and locate any type of information regardless of where it is stored, and a record management system. Jamison et al (2011) simply define SPS 2010 as a platform for developing solutions such as portals, intranets, and extranets that solve business problems. Poole (2008:20) is of the view that "SharePoint is a web-based collaboration, document management, and process management product that allows us to build an enterprise portal".

Murphy, Phifer, Valdes, Knip & Tay (2011:14) defines SPS 2010 as "…a comprehensive portal framework with a consistent and unified architecture built atop the proven .NET platform. SharePoint provides portal capability, a range of content management capability, search, collaboration, social capability and workflow capability in a single product."

One of the key features of SPS 2010 is that it allows users not only to collaborate on content but also to rank the content, for example through tagging and taxonomies which has the effect of adding to an organization's shared knowledge base (Jamison et al, 2011).

Wright et al. (2011) state that they are more inclined to see SPS 2010 as a platform thus implying that developers and development organizations have a substantial opportunity and responsibility to provide complete solutions that enhance the features the platform offers. For example, the rich features across multiple areas of collaboration, eForms, workflows and business intelligence make for a compelling reason around which to build both horizontal solutions and vertical solutions.
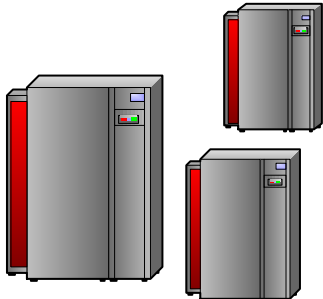
From the above definitions, platform and infrastructure seem to be key denominators thus strongly suggesting that SPS 2010 is not an end to itself but a

means to an end: a platform or infrastructure to host line of business (LOB) applications.

3.3   SHAREPOINT TECHNOLOGY: FUNCTIONALITY OVERVIEW

Having looked at the various attempts at defining or describing SharePoint technology, this section will now look at key functionality of the solution: in other words, what key components does SPS 2010 have or contain that prompts or persuades Microsoft to describe it as "the business productivity platform for the enterprise and the Internet?".

The diagram below attempts to capture all the functionality of SharePoint technology by breaking them into two categories, namely *core functionality* and *extended functionality*. It is important to note that the distinction between core and extended functionality is not an official one but is used in this research project to group similar functionality.

Core Functionality	
• Lists	
• Libraries	
• Pages	
• Subsite or workspaces	
• Web parts	
Extended features	
• Portal Server	
• Enterprise Content Management	
o Digital Asset Management	
o Document Imaging	SharePoint Server 2010
o Records Management	
o Web Content Management	
o Workflow management	
• Presentation layer	
• Integration platform	
• Project management	

• Search Provider • Social networking and Personalization	

Figure 3.3: SharePoint 2010 functionality

3.3.1   CORE FUNCTIONALITY

Starting with the first category, Carter et al (2011) state that there are four basic types of artifacts that one can create in SPS 2010 namely lists, libraries, pages, and new subsites / workspaces.

3.3.1.1   Lists

Fox (2010:159) contends that lists are the "most commonly used artifacts by end users" and are thus a "primary and core artifact in SharePoint". The view is supported by Coventry (2010) who describes them in a similar fashion: lists form the very core of SharePoint technology.

Fox (2010) then describes a list as a collection of items or objects of similar type whilst Carter et al (2011) describe a list as a listing of custom data whose constituent members conform to a specific schema. An example of a list could be a simple contacts lists with a definition for fields and their content type, for example a field called firstName which may be defined as a string and also compulsory. SharePoint defines a number of lists such as an announcement list, a calendar list and an issue tracking list. Appendix 3.1 shows a full breakdown and description of such lists.

3.3.1.2   Libraries

Londer & Coventry (2011) contend that libraries are one of the most useful features in SharePoint technology. Carter et al (2011) define a library as a special form of SharePoint list that has a primary focus of managing documents and files. Examples of libraries include a document library (storage, check-in /

check-out and versioning) and form library (XML business forms). Appendix 3.2 shows a full listing of libraries available libraries within SPS 2010.

3.3.1.3 Pages

The penultimate artifact available in SharePoint technology is a page of which two main types are available, namely a wiki page (allows a user to add objects such as text, images, tables, links to compose a web page) and a web part page (allows each web part to be customizable) (Carter et al, 2011).

3.3.1.4 Subsites / workspaces

The fourth and last type of artifact that can be created in SharePoint is a subsite which is sometimes also called a workspace. A subsite is simply a SharePoint website that is prepopulated with some initial pages that have some lists and libraries. Examples of workspaces include a basic meeting workspace (planning, organizing and capturing the outcomes of a meeting) and a decision meeting workspace (captures and manages tasks and decisions made in a meeting). Appendix 3.3 shows a full listing of workspaces available in SPS 2010.

3.3.1.5 Web Parts

Fox (2010:217) describes web parts as "core building blocks in SharePoint" technology whilst Wilen (2011:4) charges that web parts are "a fundamental component of SharePoint" technology. Wilen (2011) then describes a web part as a small or standalone application that extends SharePoint functionality by executing a particular activity. SPS 2010 comes with a number of out-of-the-box web parts (see appendix 3.4 for a web parts listing) whilst more can be downloaded from Microsoft's website. A frequently used web part is the SharePoint list view for displaying a task list, a calendar and a document library.

SPS 2010 has functionality (using SharePoint Designer 2010/2013 or Visual Studio 2012/2012) for building custom web parts as requirements prescribe. For

example, a web part could show overdue library books and levies charged within a university environment.

3.3.2   EXTENDED FUNCTIONALITY

In fact, such extended functionality closely approximates functionality normally found in the commercial version of SPS 2010.

3.3.2.1   *Portal Server: aggregator of knowledge*

The vision for portal technology is to aggregate applications and to present them in a unified view to the user.

The Gartner Group defines a portal as "a web software infrastructure that provides interaction with relevant information assets (for example, information content/architect, applications and business processes), knowledge assets and human assets by selected targeted audiences, delivered in a highly personalized manner" (Valdes, Murphy, Phifer, Tay & MacComascaigh, 2012:1). Sarin (2012) defines a portal as a collection of mini web applications that provide support for features like personalization, content aggregation, authentication and customization. Finally, Sezov (2012) defines a portal as a web-based gateway or web-based environment from which all of a user's applications can run in an integrated, consistent and systematic way.

3.3.2.2   *Enterprise content management (ECM)*

The Association for Information and Image Management (AIIM) define ECM as "… the strategies, methods, and tools used to capture, manage, store, preserve, and deliver content and documents related to organizational processes. ECM tools and strategies allow the management of an organization's unstructured information, wherever that information exists" (AIIM, 2012:1). Gilbert, Shegda, Chin & Tay (2011) define ECM as a strategy than can help enterprises take control of their content and, in so doing, boost effectiveness,

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encourage collaboration and make information easier to share. Forquer, Jelinski & Jenkins (2006) put emphasis on the fact that ECM is not about numbers but more about words as it was written from the ground up to manage the spiraling and proliferation of non-numeric content such as documents, web pages, spreadsheets, diagrams and images. Weintraub, Powrrs & Yakkundi (2011) support this view when he states that organizations do not only grapple with the exponential growth of unstructured content but also the increasingly diverse types of content (typical examples being wikis, documents, corporate records, blogs, rich media, scanned images, web content, email, e-forms, audio and video) to manage.

Document Management

Kitta, Caplinger, Grego & Houberg (2011) contend that document management is a key pillar of ECM as it encompasses the storage, organization, classification and control of electronic documents into a computing platform typically referred to as a document management system. Through document taxonomy which describes the organization and classification of documents within the system, users are able to use metadata to associate pieces of data which facilitates quick access and retrieval of stored documents.

Whilst SPS 2010 provides all the features of an enterprise level document management system within a portal based infrastructure which can be easily expanded on the fly, Kitta et al (2011) argue that the real power of SPS 2010 as a document management system is the SharePoint object model. This model exposes a number of access points through defined application programming interfaces that allows a developer to programmatically interact with SPS 2010.

Digital Asset Management

Kitta et al (2011) define a digital asset as a graphic, audio or video file or other fragment of rich content that is used by an organization and defines digital asset management (DAM) as the life cycle management of this special content.

SPS 2010 provides several built-in site columns that enable the content types used by asset libraries, allowing an organization to capture fields such as name (name of the file being uploaded or created), the title (friendly name of the document being uploaded or created), author (name of the digital asset author), comments (additional comment text regarding the digital asset) and preview image URL (a hyperlink to the thumbnail image for the digital asset).

Document Imaging

Kitta et al (2011) define document imaging as the component of enterprise content management that consists of the capture of paper documents into electronic format, the indexing and importation of these documents into a document repository, and the capability to later search and view these documents within the repository.

Kitta et al (2011) further argue that since SPS 2010 excels at storing large numbers of documents, provides extensive document management capabilities, a robust search infrastructure, integrated security and remote access capability, several 3rd party vendors (for example Kofax) have leveraged SharePoint technology in creating solid, scalable and high performing document imaging systems as can be seen in the diagram below.
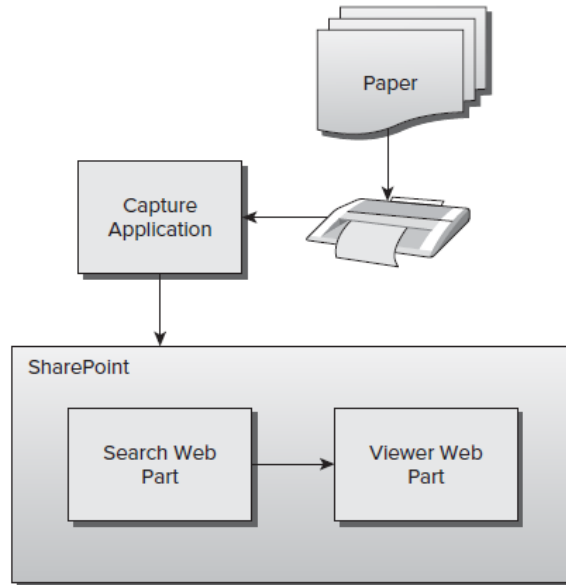
Figure 3.4 Document imaging (Kitta et al, 2011)

Web content Management

A traditional challenge with organizations is the inordinate reliance of business users on corporate IT to publish content on a website (Perran et al, 2011). Fortunately, SPS 2010 boasts a functionality called web content management (WCM) which is a process for creating content on both an intranet site and a public facing website.

Perran et al (2011) cite the following key features in SPS 2010 for managing and publishing content ability to create web pages from a web browser with minimal knowledge of HTML code; enforcing consistency across the organization through use of page layouts and master pages when new pages are created; workflows for managing content approval in tandem with governance policy; content versioning; lastly, co-authoring a document, check-in and check-out ensures currency of the document being worked on.

To support creating different types of web sites, SPS 2010 provides several site templates as shown in appendix 3.5.

Records Management

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Given the exponential growth and proliferation of paper and digital information in organizations, the challenge of establishing good governance for the effective retention, organization, and disposal of such data becomes increasingly critical. As a result thereof, records management has become a key area of focus for many organizations today (Perran et al, 2011).

Jenkins (2006) states that email has become the number one means of communication in the world with over 2.8 billion emails sent out every day. Legislation in many countries, for example the Interpretation Act, the Document Disposal Act, and the Freedom of Information and Protection of Privacy Act in the US, defines a record to cover all recorded information, including information stored electronically. According to Jenkins (2006) email meets this requirement.

Kitta et al (2011) contend that the importance of records management (RM) in organizations has been demonstrated by the highly publicized corporate scandals based on gross mismanagement of corporate records in the form of the Enron Corporation (shredding of key documents to hide wrongdoings), WorldCom (falsification of financial statements), Arthur Anderson (destruction of audit records) and Walt Disney (destruction of royalty records). As a result of these, they further contend that records management represents the central pillar of enterprise content management. He further describes RM as being responsible for the methodical and consistent management of an organization's records.

Records retention and destruction are together known as *records management*. Records management is thus a form of technology that allows organizations to ensure that all information is retained for as long as needed, that audits can be performed in an efficient and cost effective manner and that information is destroyed on a consistent basis (Jenkins, 2006).

Kitta et al (2011) point out that RM is a core function of SPS 2010 as it provides numerous features for managing an organization's records. However, he warns that in order to leverage these features, an organization must not only understand the features available, but also needs to invest time in putting together an RM plan. Further, he contends that SPS 2010 RM features take advantage of and build on existing document features for document taxonomy, storage, and security.

A key consideration for RM is records retention and expiration as well as holds. Records retention and expiration policy determines how long records should be retained before being expunged from the system. Whilst SPS 2010 supports the definition of multistage retention schedules, a trigger needs to be defined (for example using a date-based property of a document or using a programmatic function) that will initiate actions to follow. Such an action could, for example, move a document to the recycle bin (Perran et al, 2011).

3.3.2.3   Workflow Management

Kitta et al (2011) argue that any ECM system worth its salt must have some form of workflow capability which typically relates to content approval, content development, content disposition and custom business processes. Wicklund (2010) adds that business processes do not only surround and affect employees daily in their execution of duties, but organizations depend heavily on these processes to perform work.

SPS 2010 as a platform boasts several approaches when it comes to leveraging workflow related solutions. For example, SPS 2010 provides out-of-the box workflow functionality for canonical yet straightforward business processes to using an external tool like Visual Studio for advanced custom development (Kitta et al, 2011). Appendix 3.6 shows typical approaches depending on the capabilities sought and internal organizational skillset.

A compelling feature of SPS 2010 is the ability to configure workflow through the browser window thus allowing non-technical users to drive some of the workflow process definitions as some of these definitions provide out of the box usable features with no need for custom implementation (Stalljohann, Herding & Schroeder, 2011).

SPS 2010 comes with out-of-the-box workflow functionality including a three-state workflow, an approval workflow, a collect feedback workflow, a collect signatures workflow, a disposition workflow and a translation workflow.

The *three-state workflow* is typically used in tracking lists in SPS 2010, for example tracking an issue from the states such as active, ready or review. The *approval workflow*, as indicative of the name, is typically used in routing content to designated approvers either in a serial or parallel fashion. The *collect feedback workflow* allows the initiator to acquire feedback on the status of submitted documents. This workflow routes the document to the designated approvers who can each attach their viewpoints on the document as it circulates amongst the team members. The *collect signatures workflow* has additional functionality in that it requires each approver to place a digital signature on the document. The *disposition approval workflow* manages document expiration and retention enabling the author to determine what happens when the document expires whilst the *translation management workflow* facilitates the manual process of translating office documents from one language to another.

3.3.2.4 A presentation layer

One of the powerful features of SPS 2010 is that it allows the creation of a shareable data source thus creating a single source of data which further has the potential to facilitate data synchronization when multiple copies of the data must be maintained (Geier et al, 2011). Whilst such data could be external to SPS 2010, the latter has a number of integration points which, through a technology called Business Data Catalogue, allows a developer to define connections to these sources for both reading and writing.

Another feature of SPS 2010 is the use of business intelligence which has the effect of pulling and aggregating reports from multiple sources and presenting them, amongst other things, using key performance indicators (KPIs) for decision making. SPS 2010 does not only display different types of reports in a secure fashion, but it also brings them into dashboards that organize them to support the individuals accessing them. In other words, information can be organized in a way that maps to the associated business process needs, access to material can be controlled, relevant people can be notified of new or changes to information (Bates & Smith, 2010).

3.3.2.5 *A development platform*

Kitta et al (2011) argue that SPS 2010's rich functionality, extensibility and programming interfaces enable it to be used as a platform from which to leverage its out-of-the-box functionality to craft whatever solution. German & Stubbs (2012) concur when they state that SharePoint's popularity derives primarily from the extension points it exposes thus prompting a marketplace of independent software vendors to provide add-ons to the base product. For example, why would a developer architect a security model, engineer a workflow model or design a presentation rendering framework when these artifacts come native in SharePoint technology?

SPS 2010 can thus also be seen as a development platform as it allows applications to be run on top of the SharePoint infrastructure. For this to be feasible, a runtime environment, typically referred to as an application server, must exist as shown in the high level architectural design in the diagram below. (Krause et al, 2010).
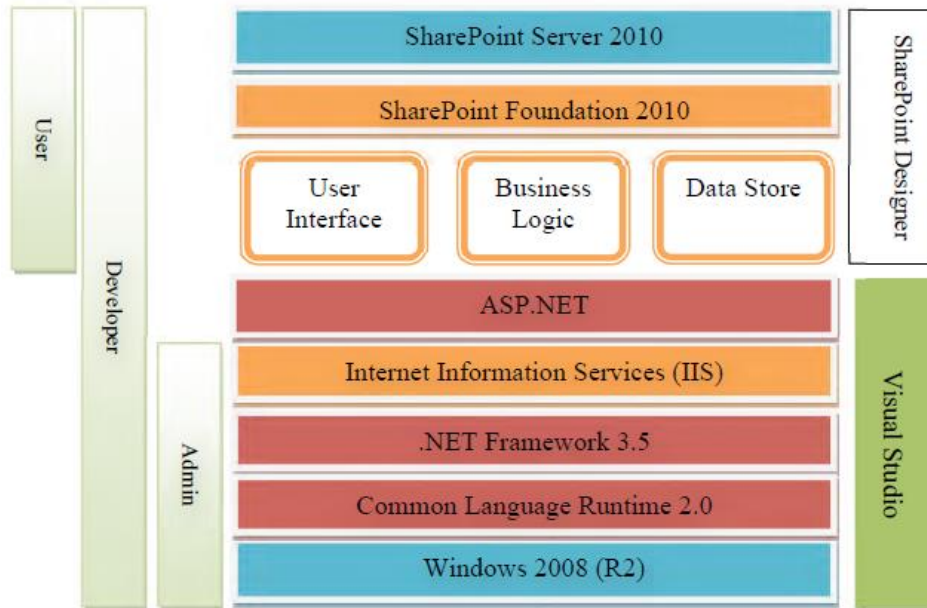
Figure 3.5 A typical SharePoint application within the Windows Server stack

(Krause et al, 2010)

What the diagram above also shows are the essential components or layers for a successful SharePoint deployment, that is, from operating systems level, through the .NET application server framework, the free to use Foundation of SPS 2010, and SPSP 2010 server itself.

A useful feature of SPS 2010 is that it allows users to create web applications with minimal understanding of classic web site development. This is feasible through web parts which are small or standalone applications that extend the functionality of SPS 2010 or create new applications altogether.

The diagram also shows development tools available to developers to extend SPS 2010 beyond web parts. An important benefit of developing and deploying applications this way is that it allows the developers to focus on business logic and worry less about, for example, implementing security or authentication, issues of large scale deployment to a server farm, as all such issues are natively handled by SPS 2010 (Wilen, 2011).

3.3.2.6   An Integration Platform

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Joshi (2008) contends that with the evolution of the Internet, applications are not only progressively become more and more distributed but such distribution breaks geographical locations. This is a key challenge faced by organizations as they seek to integrate these silos of information with the aim of "…unlocking critical business data that resides in large, enterprise systems" Fox (2010:278).

Miller (2003) cites a number of the problems relating to integrating applications, some of which are complexity of dealing with legacy and poorly documented applications; proprietary applications with no natural hooks into their data; the number of applications involved in an integration exercise – the alphabet soup of ERP, HR, CRM and SCM – adds geometric complexity as integration points increase; lastly, while the above complexities normally relate to applications running within an organization firewall, such problems are accentuated when a need arises to incorporate players within the ecosystem such as business partners and independent software vendors (ISVs).

SPS 2010 addresses the challenges of integrating structured and unstructured data through Business Connectivity Services (BCS) which is a service that facilitates integration of external data into SPS 2010. BCS achieves this through using standardized interfaces that map to external systems without the need for understanding the intricacies or nuances of the underlying line of business application (Hillier & Stevenson, 2011). Evans (2010:1) suggests that BCS in SharePoint 2010 "…is all about connecting to external data. BCS enhances the SharePoint platform's capabilities with out-of-box features, services and tools that streamline development of solutions with deep integration of external data and services".

Kitta et al (2011) go on to suggest that BCS is key to organizations as they inevitably do need to integrate SPS 2010 with other LOBs in order to "unlock critical business that resides in large enterprise systems". Evans (2010) shows BCS functionality clearly in the diagram below.
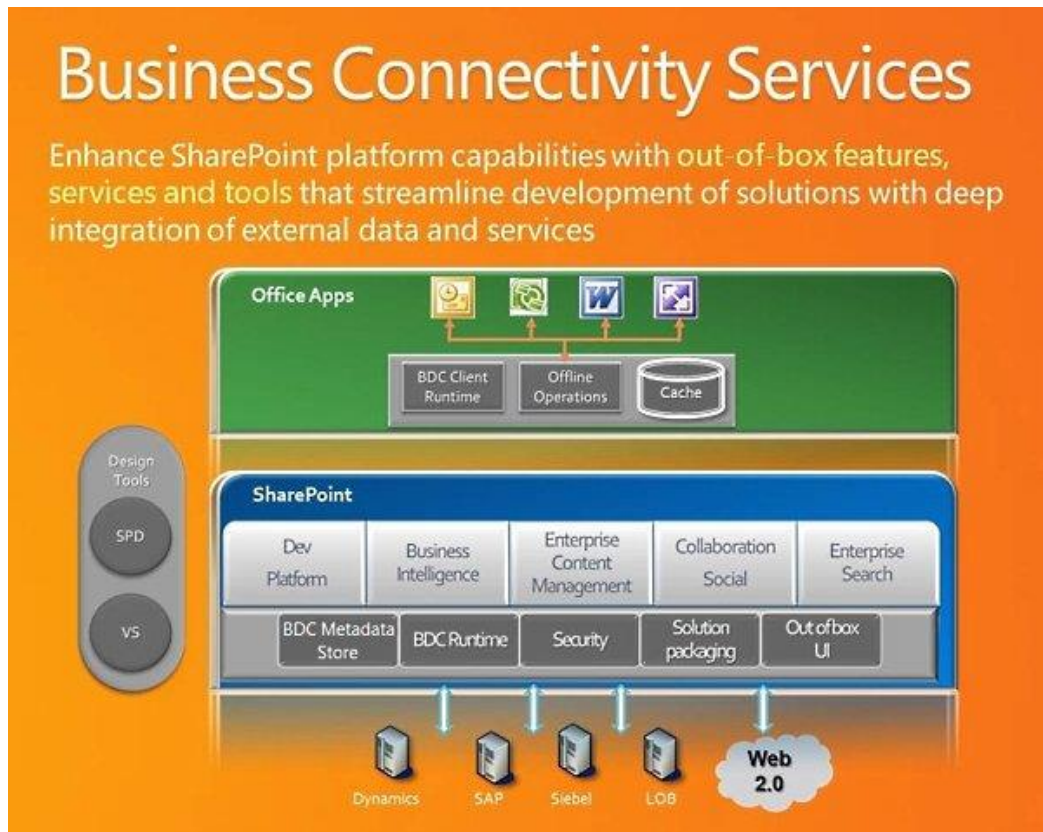
Figure 3.6 Business Connectivity Services Architecture (Evans, 2010)

3.3.2.7   A Collaboration Platform

Geier et al (2011) charge that the history of SPS 2010 is deeply rooted in collaboration, a feature that enables workers to work together and share documents, files, and other content. It is thus not surprising that SPS 2010 comes with out-of-the-box functionality that includes team collaboration, document workspaces, meeting collaboration.

Team collaboration typically takes the form of a team website where a group of people, for example a department, or even an ad hoc collection of users, creates a workspace that makes use of artifacts like group announcements or a team calendar to foster collaboration. A *document workspace* is a specific type of site where typically a single document is the center of attention (Geier et al, 2011). Such a document could be a large complex document that requires inputs from several stakeholders for example assembling a bid book to host the next Olympics games in Zimbabwe in the year 3000. A *meeting collaboration site*,

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which is somewhat similar to document workspaces, has a primary focus of coordination information around meetings and uses artifacts like a SharePoint based calendar or Microsoft Exchange/Outlook for a group calendar.

3.3.2.8 Project Management

SPS 2010 has good support for project management throughout the stages of project planning, project execution, and project closure. Bates & Smith (2010) suggest that SPS 2010 helps manage challenges such as project related information which may otherwise be scattered throughout the organization and typically stored in shared locations such as network drives and emailed as a means of communication; improving communication amongst stakeholders; coordination of geographically disbursed teams who need to communicate across disparate time zones, cultural backgrounds and physical distance.

A key challenge for organizations may be that information is typically stored in several places. For example, documents and files may be stored in a file share; the list of members stored in an email distribution list; calendars, events, contacts and tasks stored in Outlook; emails stored in each member's personal inbox. According to Husman & Stahl (2010), one way of describing this is organized chaos.

Evelyn (2010) suggests that through using SharePoint features and tools such as reporting tools, data relevance, security, auditing, traceability and centralization of data, the organization is able to increase team collaboration. For example, SPS 2010 allows a project manager and their teams to create sites that serve as a Project Management Office (PMO). Such sites would then be a one-stop-shop for the PMO office thus standardizing and streamlining communication.

3.3.2.9 A Search Provider

A challenge for many organizations is not only the efficient storage of information but an equally efficient way of locating, on demand, such

information. McCabe & Ward et al (2011) say this is especially true in a knowledge economy where information, ideas, and execution are key differentiators.

In the execution of duties, information workers need to find content to help them make the right decision, amongst other things. Content in this context, could mean finding a document (maybe a contract), or finding a person (particular skill or attribute). What is also of key importance when searching is that users typically want to search using keywords or tags that make sense to them.

SPS 2010 not only provides keyword searching and relevance ranking, but it also provides additional properties including metadata, tagging, and information rating (Geier et al, 2011). SPS 2010 actually boasts the capabilities of indexing and querying data sources within and outside of SPS 2010 itself including file shares, web sites, Microsoft Exchange public folders, databases and LOBs (McCabe & Ward, 2011).

The diagram below shows a typical result page following a people search.
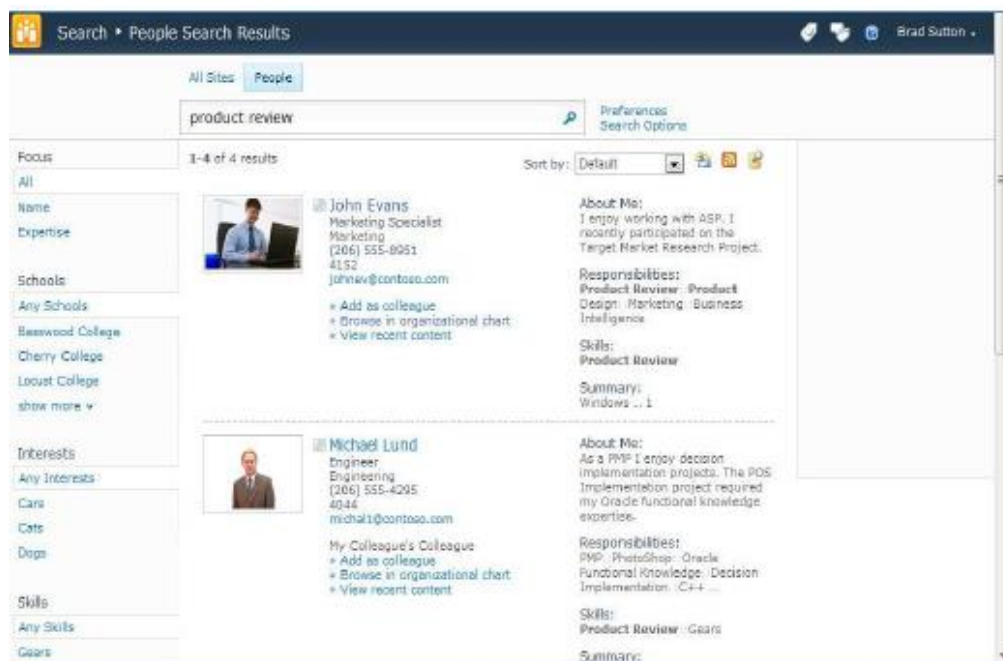
Figure 3.7 People search (McCabe & Ward et al, 2011)

3.3.2.10 Social Networking and Personalization

Turban, King, Lee, Liang & Turban (2010) contend that traditional computing systems have over the years concentrated on organizational issues with a strong emphasis on cost cutting. However, with the advent of social computing, there is now a paradigm shift that concentrates on improving collaboration and interaction amongst users based on generated content. This paradigm shift has brought about what O'Reilly Media in 2004 coined Web 2.0: a second generation of internet-based services that allow people to generate and collaborate on content using tools like networking sites, wikis, blogs and folksonomies (Turban et al., 2010).

Whilst social networking is a somewhat broad and undefined topic, subject to various forms of interpretation, if properly planned, it can actually foster economies of scale to an organization by enhancing productivity. Microsoft Inc. has thus invested a lot of time and effort into transforming SPS 2010 into an enterprise level social computing platform (Geier et al, 2011).

Wilson, Alirezaei & Baer (2012) refer to social networking as a new digital workforce dubbed the 'Generation Z' which grew up with PCs, cellphones, and MP3 players and is one of the largest populations in Facebook. This is a generation that is certainly not afraid of technology, blogs a lot, tweets a lot: for them the term 'security setting' is a somewhat foreign concept and privacy most likely an afterthought. This generation exerts pressure on organizations to strike a balance between their needs and expectations on the one hand and the need for compliance, IP protection, governance and security.

SPS 2010 boasts a number of key social computing features (also called social feedback) in the form of tagging, rating, note board, and personal sites. Tagging is the process of assigning descriptive words or categories to content, essentially adding metadata to data thus improving content 'findability'. *Tagging* thus has the effect of extending the organizational taxonomy and information

architecture and also supplements setting document properties such as document title, date created and authorship with user defined tags. *Rating* allows users to rate document content which could serve as a key indicator to other users searching for high quality content. In addition to tagging and rating, SPS 2010 allows users to attach their thoughts to a document or any artifact, for example through use of what SPS 2010 calls *note boards*. Lastly, SPS 2010 engenders social computing through user *personal sites* where a user typically stores private documentation and individually administers access to the site.

The social web thus encourages users to actively participate rather than be static consumers of information (Geier et al, 2011).

3.4   SHAREPOINT 2010 VERSIONS AND EDITIONS

The discussion up to now has explored SharePoint technology without making a distinction between the various versions and editions available.

At a high level, SharePoint technology is available as *SharePoint Foundation 2010* (SPF 2010) and *SharePoint Server 2010* (SPS 2010). The diagram below shows a functional overview of SharePoint technology as a stack of technologies rooted in the Windows server operating system.
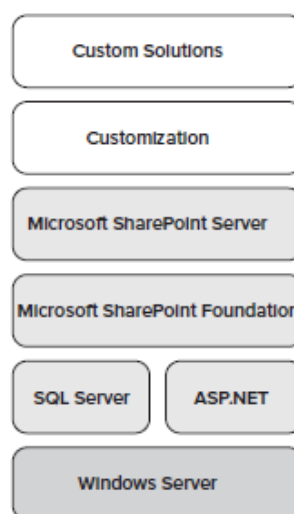
Figure 3.8: Baseline SharePoint architecture (Fox, 2010)

Whilst SPF 2010 is available for free, it nonetheless forms an indispensable building block for installing SPS 2010, the commercial version as can be seen in the diagram above. SPF 2010 is not only an entry level offering but an offering best suited for individual departments or organizations eager to venture into SharePoint technology in a more exploratory fashion before it commits substantial resources into the product Ward et al (2012). SPF 2010 focuses specifically on functionality primarily related to content storage, team collaboration and document control (Perran et al, 2011). Lastly, SPF 2010 offers core document and collaboration features that allow non-technical users to create web based applications and is freely available with the Windows Server operating system from version 2008 and upward.

On the other hand SPS 2010, which is built on top of SPF 2010, is the nexus for collaborative technologies as it has the potential and capacity to accelerate adoption of business process management, content management, business intelligence across the internet, extranet, and the internet. SPS 2010 thus extends SPF 2010 with key enterprise tools and functionality that fosters even closer collaboration between people, processes and information (Perran et al, 2011).

SPS 2010 is available in the form of two commercial versions namely, *SharePoint Server 2010 Standard* and *SharePoint Server 2010 Enterprise* as shown in the diagram below.
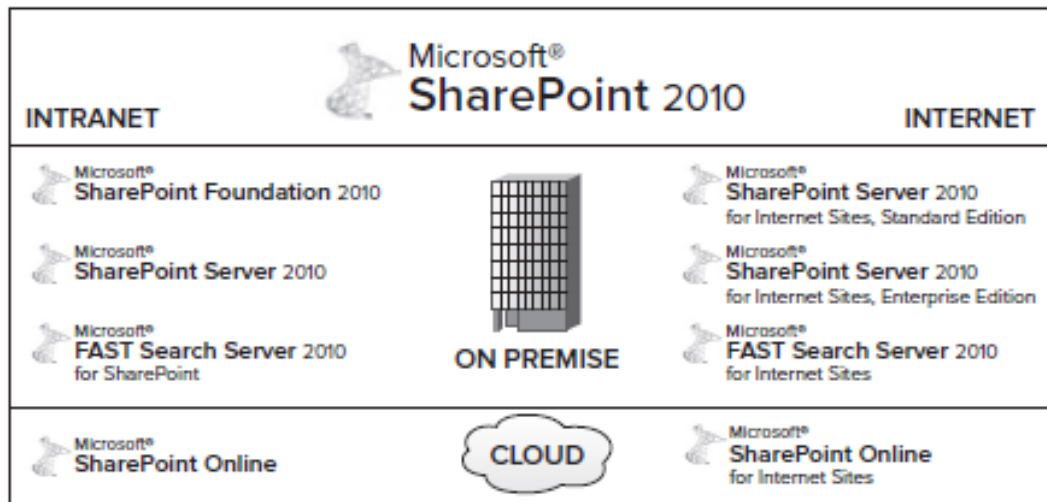
Figure 3.9: SharePoint 2010 Editions (Fox, 2010)

SPS 2010 Standard extends the core features of SPF 2010 to include social networking, compliance and governance, enterprise scale search and advanced web and enterprise content management. SPS 2010 Enterprise, the premium product, extends the Standard version with business intelligence, integration and reporting and adds Office client services such as Access, Excel, InfoPath, PerformancePoint and Visio services (Ward et al, 2012).

Bates & Smith (2010) summarize the difference between SPF 2010 and SPS 2010 clearly: the foundation version provisions fundamental collaboration services (such as a web-centric information management and presentation platform, lists and libraries for managing structured information and creating workflow solutions) whilst the commercial version adds enterprise solution (such as full-featured document, record, and web content management; extended data integration, reporting, and analysis; form and process integration automation and management; application integration; enterprise wide search; people integration and social networking; and personalized content and alerts.

Selecting, installing and commissioning a solution as comprehensive as SPS 2010 thus requires not only a keen understanding of the available editions and versions, but also a keen understanding of the core functionality of the product, how such functionality can be extended to meet organizational goals, and how to create scalable solutions with or without custom code (Perran et al, 2011).

They further argue that many organizations struggle with understanding which of the SharePoint products is appropriate for their needs.

Callahan (2011) almost ominously warns that failure to understand the difference between the versions often leads to an organization selecting the paid-for version of SPS 2010 but unknowingly using only the free functionality embedded in the SPF 2010. It is actually recommend to start out with SPF 2010 as it comes with core collaboration capabilities generally needed by first time SharePoint users. This allows an organization "…to avoid additional licensing costs until features associated with those licensed versions are actually required by users (Young, Caravajal & Klindt, 2013:19).

3.5   SUMMARY

This chapter explored the underlying core functionality of SharePoint technology in the form of lists, libraries, pages and subsites or workspaces. It also looked at extended functionality in the form of portal server, enterprise content management, workflow management, presentation layer, development platform, integration platform, collaboration platform, project management, search provider and, finally, social networking and personalization.

The chapter also emphasized the importance of understanding the difference between the editions of SPS 2010 available so as to guard against investing in the commercial version only to use functionality available in the community version.

The next chapter will look at a typical ecosystem that SharePoint technology is normally installed in. It is important to include this discussion because understanding this ecosystem has the potential of enabling SharePoint to leverage existing functionality in these systems and thus foster economies of scale. Disregard for this could result in SPS 2010 being relegated to being 'another system' in the UKZN software stack. Novak, Balassy, Arvai & Fulop (2012:391) agree with this school of thought when they say "Applications aren't

islands. They live in an ecosystem that connects them to other applications and services – sometimes through the operating system, and sometimes through the internet." This view is strongly supported by McClure, Blevins, Croft IV, Dick & Hardy (2012:113) when they state that "Applications no longer live as little islands of data. Everything is interconnected, or will be."

CHAPTER 4: SHAREPOINT TECHNOLOGY ECOSYSTEM

4.1 INTRODUCTION: EXTENDING SHAREPOINT FUNCTIONALITY

Whilst SharePoint technology can be installed by itself (incrementally or big-bang approach as discussed in the previous chapter), integrating it with other systems makes for an even better solution. In fact, a key slogan adopted by Microsoft Inc. is "better working together". This means that SPS 2010 can be seen as being part of an ecosystem that can be extended through integration with solutions such as Forms Services, Reporting Services, Business Intelligence and leverage existing corporate authentication and communication mechanisms.

The primary objective of this chapter is thus two-fold: firstly, to explore the functionality of this ecosystem and see how it enhances the value-add of SharePoint technology. The second objective is to explore how SPS 2010 can be extended through custom development in order to enhance, even further, the value-add of SharePoint technology.

Recognizing the potential for adapting SPS 2010 into an ecosystem and also the tools available to further enhance the solution, will be used as one of the key measures in order to understand the deployment model followed by UKZN.

4.2 SHAREPOINT 2010 ECOSYSTEM AND DEVELOPMENT

The diagram below shows the ecosystem that SPS 2010 could be seen to be part of whilst also showing the capabilities for extending the solution through custom development. It is also important to mention that all the solutions listed under integration as well as the tools listed under development, are either freely available for UKZN to download and use (for example SharePoint Designer 2010 and 2013) or the university has already paid for them (for example, Reporting Services and Analysis Services).
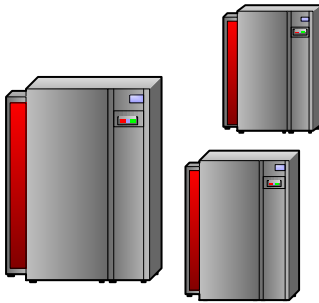
Core Functionality		Development
• Websites • Libraries • Lists • Blogs and wikis		
Extended features	**SharePoint Server 2010**	• SharePoint Web browser • SharePoint Designer 2010 /2013 • Visual Studio 2010/2012 • Expression Blend • Silverlight

• Portal Server
• Enterprise Content Management
   o Digital Asset Management
   o Document Imaging
   o Records Management
   o Web Content Management
   o Workflow management
 	
• Presentation layer
• Integration platform
• Project management
• Search Provider
• Social networking and Personalization		

Integration			
Reporting Services	Business Intelligence	Forms Services	Other

• Authoring
• Management
• Delivery
• SharePoint integration
	• Personal BI / Team BI /Organizational BI
	  • Visio Services
	  • Excel Services
	  • PerformancePoint Services
	  • SharePoint integration
		• REST Web Services for LOB systems
		• WCGA 2.0
		• VSTA for managed code
		• InfoPath forms SharePoint integration
			• Authentication
			• Exchange Server

Figure 4.1 SharePoint ecosystem

The diagram above shows that SharePoint technology is not just a monolithic hodgepodge technology product that exists as an island of information but, with

careful planning, thrives in an ecosystem that leverages rather than duplicates functionality.

4.3   THE SHAREPOINT ECOSYSTEM

Potential integration with SPS 2010 as shown in the above diagram includes forms services, reporting services, business intelligence, authentication and communication services. The next section briefly looks at each.

4.3.1   *Forms Management*

Kitta et al (2011) argue that forms have been an integral part of business processes since well before the ENIAC ushered in the era of general computing in 1946. Since forms are pivotal in business processes, Microsoft Inc.'s response was the introduction of Microsoft InfoPath, which is an electronic form application that supports rich form authoring, including a capability to implement simple to complex business rules, handle moderately complex layouts, offer an intuitive method for data capture, and, very importantly, manage user submissions after proper validation (Kitta et al, 2011). InfoPath 2010, which comes bundled with Microsoft Office Professional Plus 2010, is a forms design tool that features advanced functionality in order to connect with line of business (LOB) systems and also to create collaborative solutions in SharePoint.

Some of the key features that underpin InfoPath 2010 include the ability to create sophisticated forms with minimal coding experience whilst enforcing rules management and data validation; filling in forms offline and automatically synchronize to the SharePoint library once the participant is back online; and using forms with LOBs through REST Web Services thus allowing InfoPath 2010 to integrate with Business Connectivity Services (BCS) of SPS 2010.

The ability to publish InfoPath forms to SharePoint is one of the key features as it enables exploiting native functionality in SharePoint such as workflow, for

example approvals and routing (Shadravan & Rogers, 2011). Roberts, Green & Meats (2011), contend that publishing InfoPath to SharePoint offers a very rich integration experience.

4.3.2   Reporting Services

Turley, Bruckner, Silva, Withee & Paisley (2012) describe SQL Server 2012 Reporting Services (SSRS) as a report design infrastructure that underpins enterprise-class information delivery technology. They further describe it as a comprehensive reporting tool that also forms part of the data analysis platform which in turn lays a foundation to construct complete reports, scorecards and dashboard business solutions for decision making.

SSRS is geared for use by four key members of the business community in the form of information users and powers users, application developers, systems engineers or database administrators and business leaders (Turley et al., 2012).

Information workers have the ability to use data-wizard driven out-of-the-box reporting functionality that intuitively guides them to produce standard reports that users could access from a central reporting server via a corporate intranet. *Application developers* can write applications using the .NET programming tools as an example to build desktop, web, mobile device and applications that can be deployed on SPS 2010. *System engineers or DBAs* are typically less concerned with aesthetics and features of reporting but are more concerned that report managers, designers, developers and final users all have predictable and controlled access to the reports server.

4.3.3   Business Intelligence

Davis (2012) contends that organizations the world over are exploring novel and smarter ways to improve performance, grow revenue, develop stronger customer relationships and improve workforce agility. He also contends that there is a growing expectation for individuals in every role to contribute to these

outcomes. He then surmises that business intelligence (BI) is a key factor in realizing these objectives because the vision of BI is to support informed decision making at every level thus enabling managers, executives and knowledge workers to take the most effective action in a given situation. According to Ren (2010), BI helps to improve products and services as it capacitates informed decision making in an organization.

In discussing BI in the context of SharePoint technology, Jorgensen, Stacey, Knight & LeBlanc (2011) charge that the right question to ask is *not* "what can SharePoint do for my BI efforts?" The right question to ask rather is "how does the new feature set in SharePoint 2010 mesh with the ways my users want to analyze data and improve their understanding of their business operations?"

In the context of BI, Jamison et al (2011:399) are quick to emphasize and "state upfront what SharePoint 2010 is not: It is not a data warehouse for storing large amounts of corporate data. It is not a data-cleansing tool that will automatically correct bad or incomplete data. Think of SharePoint as a potential presentation tier for business intelligence data."

Before defining business intelligence (BI) in SPS 2010, Warren, Neto, Campbell & Misner (2011) contend that BI is "less about a specific technology or product tailored to meet the needs of a small percentage of users, and more of a 'buffet' of offerings that can aid customers who are trying to solve a specific problem". They then go on to define BI as "…a series of organizational processes and applications designed to optimize the execution of business strategy (Warren et al., 2011:6).

Jorgensen, Segarra, LeBlanc, Chinchilla & Nelson (2012) define business intelligence as "the name given to the discipline and tools that enable the management of data for the purpose of analysis, exploration, reporting, mining, and visualization". In other words, business intelligence is an enabler for building applications that help organizations learn about and understand their businesses (Hagerty, Sallam & Raichardson, 2012).

When Microsoft Inc. ventured into the business intelligence space, their tag line was "business intelligence for the masses" which they have since modified to read "business intelligence for the masses by the masses". This vision, clearly shown in the diagram below, is made possible through modern computing power which makes BI increasingly available to individuals so they can make better informed decisions even faster (Warren et al, 2011).

Figure 4.2 Democratizing Business Intelligence (Warren et al, 2011)

The above diagram also shows the levels at which BI is made available namely strategic, tactical and operational. To realize 'democratizing' BI as suggested in the diagram above, Microsoft Inc. assembled a BI stack that comprises Microsoft SQL Server and Microsoft Office suite and runs in a SharePoint infrastructure that is deployed across three tiers as shown in the diagram below. The BI stack specifically consists of four application services namely, Visio Services, Excel Services, PerformancePoint Service and PowerPivot for Excel.
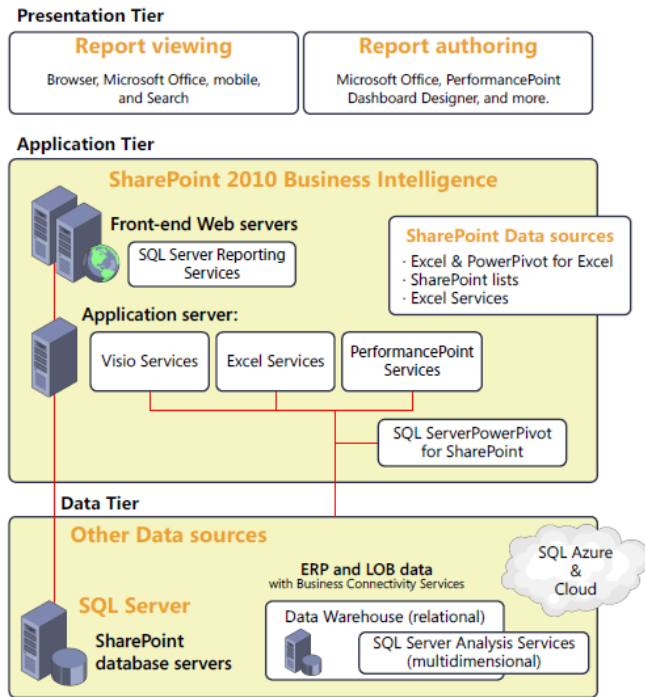
Figure 4.3: SharePoint 2010 Business Intelligence (Warren et al, 2011)

4.3.3.1   Classification of Business Intelligence

Warren et al (2011) propose classifying BI functionality as organizational BI, Team BI, and self-service BI as shown in the diagram below.
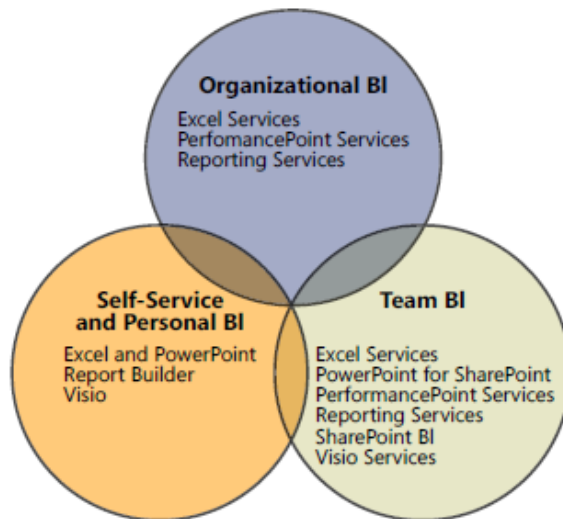
Figure 4.4: Business Intelligence communities (Warren et al, 2011)

Jorgensen et al (2011) on the other hand, speak of a BI continuum which he also breaks down into three tiers namely organizational BI, Team BI and Personal BI as shown in the diagram below.

Figure 4.5: The Business Intelligence Continuum (Jorgensen et al, 2011)

Self-Service and Personal BI

Designing, building and maintaining effective analysis using traditional BI solutions has the downside of taking weeks and even months to define and develop and potentially requires expensive resources to maintain (Tableau Software White Paper, 2011). As a result of these challenges, a new BI approach has emerged: operational business intelligence also called self-service BI.

According to Evelson (2012:2), traditional BI approaches and technologies invariably suffer from a constant backlog of requests because of reasons such as the requirements for BI change "…happening faster than IT centric support model can keep up with" and a bad fit between conventional waterfall software development lifecycles approaches when architecting BI solutions.

Tennick (2011) articulates the challenges emanating from traditional BI quite succinctly when he states that corporate IT is typically focused on building ERPs, SharePoint farms, enterprise data warehouses whilst users, on the other hand, are typically busy trying to learn and use whatever reporting and

analytical applications are availed to them. He then makes an important observation in the form of a question: what is the most often used tool by users to answer any sort of data or BI related question? The answer is Excel, followed by Excel with the third spot also taken by Excel. In other words, whether known or unbeknown to organizations, parts of the business (often critical parts as well) in organizations are managed by Excel based applications built by an analyst or power user and running on someone's desktop.

Put differently, how can an organization setup an environment that enables business users to build their own BI applications without much assistance from corporate IT? How can corporate IT focus on building the right data store for the enterprise, secure it and ensure its quality but avoid being involved in writing canned analysis reports for the users (Tennick, 2011)? In other words, how can an organization create a data store that is subject driven so that users with minimal SQL skills can build queries and perform hypotheses testing? (Ralston, 2011).

Microsoft Inc., entry into this market, aptly dubbed the "managed self-service business intelligence", is through a solution called PowerPivot. PowerPivot is built on top of Microsoft Office as it extends Microsoft Excel allowing for the creation of applications within Excel and using SharePoint technology to collaborate on these across the organization (Harinath, Pihlgren & Lee, 2010).

The emphasis on Personal BI is to empower business users to perform BI in a flexible self-service fashion with little intervention from corporate IT. Team BI focusses on team collaboration and, as can well be expected, uses SPS 2010 as a collaboration framework. Should demand and constraints exceed expectations (for example mounds and mounds of data and a legion of users), organizational BI in the form of Analysis Services fits the bill as shown in the diagram below (Turley et al., 2012).
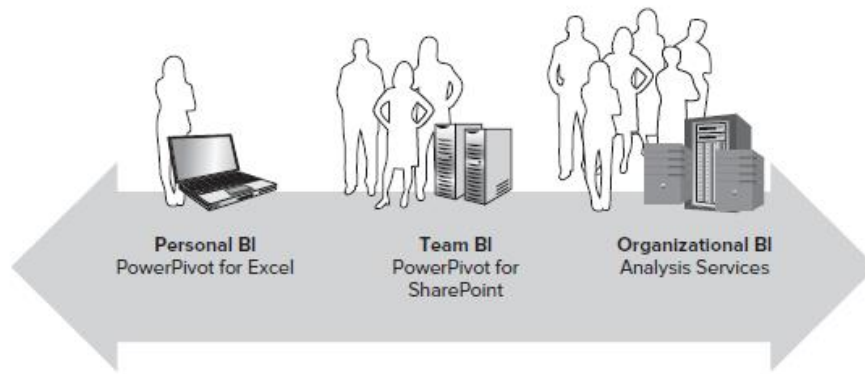
Figure 4.6: The Business Intelligence Semantic Model (Turley et al., 2012)

Excel Services

Jamison et al (2011) point out two main trends in business intelligence adoption within major organizations. Firstly, a growing number of organizations have or are in the process of implementing a BI strategy. Secondly, Microsoft Excel continues to be the most popular tool for delivering BI data as business analysts and information workers choose or prefer to work with tools that they are familiar with.

Excel Services is thus a service that allows users to manage, view, interact and consume Microsoft Excel client workbooks running on SPS 2010.

One of the compelling features for Excel Services is that it not only allows users to publish Excel workbooks (these could contain an entire workbook, a worksheet or even a single chart) but also affords the workbook owner the prerogative to determine what sections of the workbook are published. This feature empowers the business community to publish results and build custom web pages and dashboards without being wholly dependent on corporate IT (Jamison et al, 2011).

Performance Point Services

Jamison et al (2011) define Performance Point Services (PPS) as a performance management service that an organization can use to monitor and analyze its

business using SharePoint technology for the definition, construction and management of dashboards and scorecards. PPS is thus a performance management service that provides flexible and easy to use tools for building dashboards and scorecards. Scorecards are a collection of key performance indicators (KPIs) and objectives used to measure multiple performance factors in an organization. A dashboard on the other hand is a group of related objects that help organizations quickly comprehend their performance. Such a dashboard could include scorecards, reports, spreadsheets and diagrams.

Visio Services

Jamison et al (2011) contend that one of the key collaboration challenges that organizations face is how to share corporate data that is in the form of diagrams which are typically created in solutions like Microsoft Visio. This is so because not all content consumers have a copy of Visio installed on their machines.

Microsoft Inc.'s answer to this challenge was the introduction of Visio Services that is deployable as a service within a SharePoint instance. Visio Services thus allows real-time sharing and viewing of Visio diagrams from within SPS 2010 which treats Visio files as first-class document types like Word, Excel or PowerPoint.

One benefit from deploying Visio artifacts within a SharePoint context includes the ability to use and share corporate data in the form of diagrams created in Visio. Another benefit is the ability to maintain information currency through periodic refreshes on the browser to ensure that the latest data is presented (Jamison et al, 2011).

Team BI

Team BI consists of a subset of the organization (for example an entire department) and could use the same set of tools as organizational BI. Turley et al (2012) contend that Team BI focuses on collaboration among a workgroup

typically using SharePoint technology to provide a common place for business users and corporate IT to publish, share and collaborate.

Organizational BI

Organizational BI allows for decision support systems that span across an organization and typically interrogate information that comes from approved sources that has been staged, transformed and restructured into a data warehouse.

A major strength of Microsoft Inc. as far as BI strategy and vision is concerned, is that the organization has consistently invested in building and enhancing BI capabilities in three of its core offerings namely Microsoft Office (especially Microsoft Excel), Microsoft SQL Server and Microsoft SharePoint Server. The primary driving vision for this is that "…by incorporating BI capabilities into its most ubiquitous products, Microsoft virtually guaranteed its BI offering's continued adoption particularly in organizations with a Microsoft-centric information infrastructure" (Hagerty et al, 2012:15).

SQL Server Analysis Services is the main thrust that provides business intelligence that allows organizations to gain insight from historical data and thus create a springboard for future strategic initiatives (Harinath, Carroll, Meenakshisundaram, Zare & Lee, 2009). Such data is typically stored in an electronic repository called a data warehouse with the actual data being drawn from operational databases and then transformed into a structure that facilitates business analysis. The data warehouse is then availed to the organization for querying, reporting and analysis. Business decision makers can then conduct reactive mode business analysis – which is also known as business analytics – by exploring the warehouse for patterns and trends. Business decision makers can also conduct predictive mode analysis – also known as data mining – using mathematical models to predict future trends (Harinath et al, 2009).

4.3.4   Integration

Mann (2010) argues that as is typical of Microsoft products, integrating SharePoint technology with other network server components has the potential to extend the functionality of the solution. He then cites several network interface points in the form of authentication mechanisms and communication (Exchange Server) as key considerations for extending SPS 2010 functionality.

4.3.4.1 Authentication

Whilst there are number of authenticating mechanism available for SPS 2010, one of the primary drivers for choosing a particular authenticating mechanism is to leverage single sign-on. Active Directory (AD) is the primary authentication mechanism for organizations that are Microsoft technology centric and SPS 2010 has native out-of-the-box integration points. Some of the compelling reasons for this integration thus include active directory federation for single sign-on, AD directory management web services, user profile replication, and user and group management. Besides using AD, SPS 2010 also supports pluggable authentication (support for non-Windows based identity management systems), claims-based authentication and SQL Server authentication (Mann, 2010).

4.3.4.2 Exchange Server

Mann (2010) contends that integrating with Exchange Server as a corporate email server platform is widely used. Other integration scenarios include using public folders for team site email integration, using web parts to access inbox, calendar and to-do-lists features of Exchange, and also integrating discussion boards, announcements and libraries by accepting Exchange incoming email Mann (2010).

4.4 SHAREPOINT DEVELOPMENT

Rymer & Koplowitz (2008:1) argue that whilst many organizations see SPS 2010 "as a collaboration application, many shops are discovering that SharePoint is also a development platform that people both inside and outside of IT use to create intranets, outward-facing portals, electronic forms, workflows, and even dashboards."

Fox (2010) argues that SPS 2010 actually has three layers in the form of *application level* (end users integrate with the out-of-the-box collaboration and productivity applications), *a customization layer* (power users or developers can begin to customize the SharePoint experience for the end user) and the *application development layer*. These layers are shown in the diagram below.
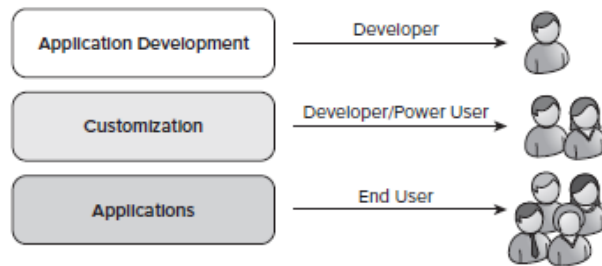
Figure 4.7: The three levels of SharePoint (Fox, 2010)

Another way of looking at the development features of SPS 2010 is by looking at the development toolset and the intended audience for usage as shown in the diagram below.
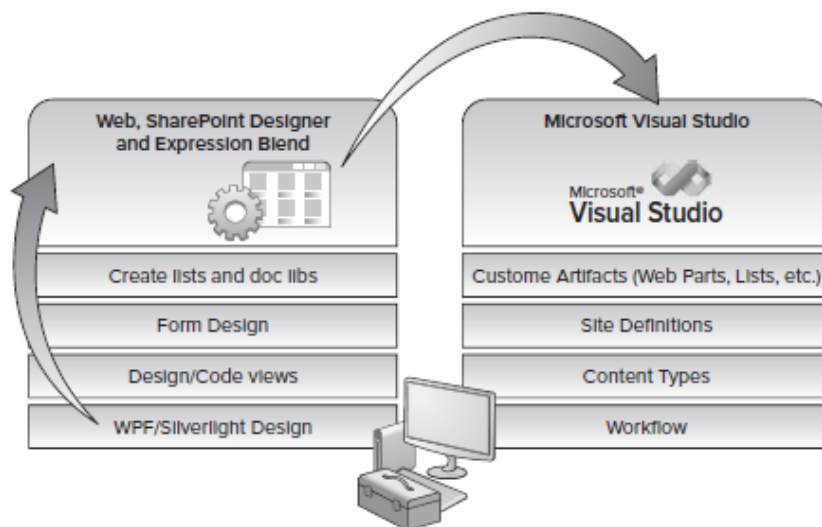
Figure 4.8: SharePoint development across developer segments (Fox, 2010)

4.6 SUMMARY

This chapter started by looking at a typical ecosystem that SharePoint technology is deployed in. It then identified some of these systems as being reporting services, forms services, business intelligence and showed the synergies of the solution working together with SharePoint technology being used as the presentation layer or collaboration platform. Lastly, the chapter then looked at how SPS 2010 could be extended through custom development in order to enhance, even further, the value-add of SharePoint technology.

This chapter, together with the previous one, attempted to portray and present SharePoint technology (core and extended functionality) as a multifaceted solution that thrives and also has the potential to add substantial value if deployed as part of an ecosystem.

CHAPTER 5: THEORETICAL FRAMEWORK

5.1 INTRODUCTION

A number of theories or frameworks have been espoused or formulated to try and understand the model typically followed by organizations in selecting a form of technology. Wixom & Todd (2005:85) assert that "…researchers have developed rich streams of research that investigate the factors and processes that intervene between IT investments and the realization of their economic value". Examples of these frameworks include the work system theory, task closure theory, organizational culture theory, theory of reasoned behavior, theory of planned behavior as well as theories such as the technology acceptance model and the diffusion innovations theory.

This study proposes a framework that draws most of its constructs from two technology acceptance models namely, the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) theory. TAM was chosen because it is the "most widely applied theoretical model in the IS field" (Lee, Kozar & Larsen, 2003:752). DOI, which "…draws upon rational theories of organizational life adopted from economics, sociology and communication theory", was chosen because it enjoys wide popularity in the IT field (Lyytinen & Damsgaard, 2001:174).

5.2 TECHNOLOGY ACCEPTANCE MODEL

Lee et al. (2003) further contend that TAM is "the most influential and commonly employed theory for describing an individual's acceptance of information systems". TAM posits that an individual's acceptance of technology is primarily influenced by two major variables, namely, perceived usefulness and perceived ease of use as shown in the diagram below.
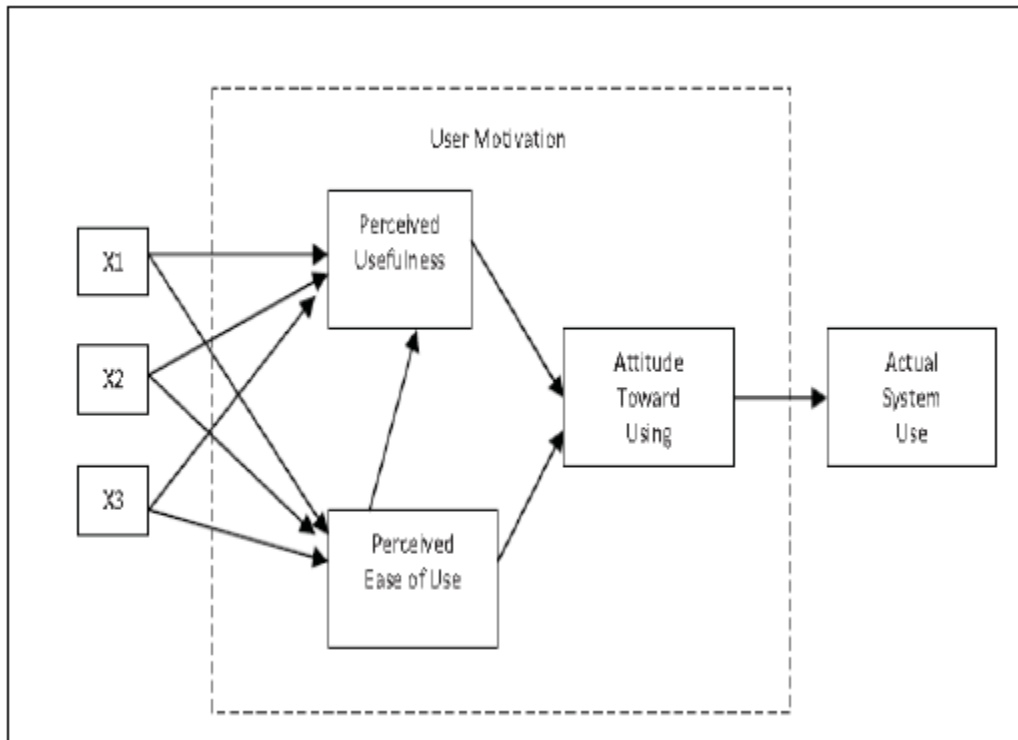
Figure 5.1: Technology Acceptance Model (Lule, Omwansa & Waema, 2012)

TAM has enjoyed industry-wide acceptance as evidenced, amongst other things, by the number of journal citations it has commanded: 424 citations since inception and a further 698 by the end of 2003. It has been described as a parsimonious and powerful theory (Lee, Kozar & Larsen cited in Lucas and Spitler: 1999, Venkatesh and Davis: 2000) and has been applied to different technologies (e.g., word processors, email, Hospital Information Systems), under different situations (e.g., different time and culture), with different control factors (e.g., gender, organizational type and size), and different subjects (e.g., undergraduate students, MBA students and knowledge workers) (Lee, Kozar & Larsen, 2003).

However, despite the enviable and undisputed success track record, it is not without critics. According to Malhotra & Galletta (1999), TAM is incomplete in that it does not account for social influences in the adoption and utilization of information systems. Gefen & Straub (2000) charge that whilst research has shown that perceived usefulness does indeed affect intended adoption of technology, the same cannot be said regarding perceived ease of use. Benbasat & Barki (2007:211) contend that "independent attempts by several researchers

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to expand TAM in order to adapt it to the constantly changing IT environments has led to a state of theoretical chaos and confusion in which it is not clear which version of the many iterations of TAM is the commonly accepted one". Lastly, "TAM provides only limited guidance about how to influence usage through design and implementation" (Wixom & Todd (2005:86) cited Taylor and Todd 1995, Venkatesh et al., 2003). An example that Wixom & Todd offer is that "designers receive feedback regarding ease of use and usefulness in a general sense, but they do not receive actionable feedback about important aspects of the IT artifact itself (e.g., flexibility, integration, completeness of information, and information currency)."

Goodhue (2007:220) adds a somewhat sense of humor to the TAM discussion when he suggests that "…it is time for the IS field to look in other directions; perhaps we have overworked TAM".

5.3   DIFFUSION OF INNOVATION MODEL

Rogers (2003) defines diffusion as the process in which an innovation is communicated through certain channels over time among the members of a social system, further emphasizing that the type of communication at play here is a special one as it is primarily concerned with new ideas. In particular, he suggests that "the innovation-decision process is essentially an information-seeking and information-processing activity in which the individual is motivated to reduce uncertainty about the advantages and disadvantages of the innovation" (Rogers, 2003: 13).

The diagram below shows the Diffusion of Innovation theory model and shows the sequential stages in the process of innovation decision making.
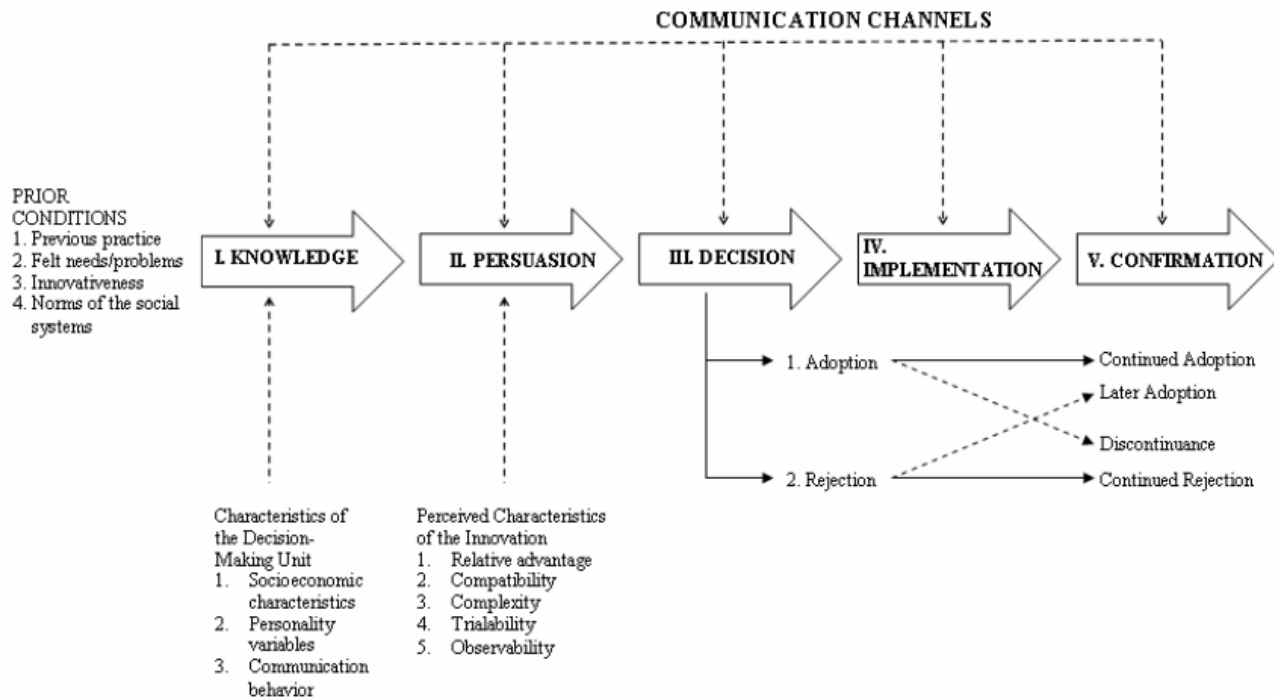
Figure 5.2 A Model of Five Stages in the Innovation-Decision Process (Rogers, 2003)

The stages are:

- An individual or organization becomes knowledgeable when exposed to the existence of an innovation
- Persuasion occurs when an individual or organization forms a favorable or unfavorable attitude towards the innovation
- Decision takes place when an individual or organization chooses to adopt or reject the innovation
- If the decision is acceptance of innovation, the next step is implementation
- Confirmation takes place when the individual or organization shows reinforcement through continued usage or continued rejection of the innovation.

According to Rogers (2003:213), there are five qualities that influence the adoption process. *Firstly*, the relative advantage which he describes as "…the degree to which an innovation is perceived as being better than the idea it supersedes by a particular group of users, measured in terms that matter to those users, like economic advantage, social prestige, convenience, or satisfaction". *Secondly*, compatibility with existing values and practices which he describes as

"…the degree to which an innovation is perceived as being consistent with the values, past experiences, and needs of potential adopters. An idea that is incompatible with their values, norms or practices will not be adopted as rapidly as an innovation that is compatible." *Thirdly*, simplicity and ease of use which he describes as "…the degree to which an innovation is perceived as difficult to understand and use". Fourthly, trialability which is "…the degree to which an innovation can be experimented with on a limited basis. An innovation that is trialable represents less uncertainty to the individual who is considering it. Lastly, observable results which suggest that "…the easier it is for individuals to see the results of an innovation, the more likely they are to adopt it."

However, as was the case in the discussing TAM, DOI also has its share of critics. Lyytinen & Damsgaard (2001:173) conducted a study to examine "…the usefulness of the diffusion of innovation research in developing theoretical accounts of the adoption of complex and networked IT". Whilst the DOI theory is divided into stages, they concluded in their study "…that complex technologies will not diffuse in sequential stages" and also found that "…many a times it was not clear what these stages would mean in relation to the observed behavior. In some situations, adoptions took place in dyadic relationship where it was difficult to see what the notion of an early adoption would mean" (Lyytinen & Damsgaard, 2001:183).

Now that we have briefly discussed the two technology acceptance models, the next section will look at the proposed framework that underpins this study.

5.4   THE ORGANIZATIONAL BUSINESS TECHNOLOGY AND GOVERNMENT FRAMEWORK

In order to understand the low adoption rate of technology amongst SMEs as opposed to big organizations, Kim (2010) proposes what he calls a holistic organizational, business, technological, and governmental (OBGT) framework. The OBGT framework is underpinned by two groups of factors which he calls "…organizational related internal factors and business environment related

external factors" (Kim, 2010:167). He further breaks these into four major constructs or dimensions namely, the *internal organizational* (for example, the size and type of organization, technology awareness and management support); the *external business environment* (for example competitive landscape and capital availability); *technology related* (for example technology availability and level of complexity (real and perceived); lastly, *government related* (for example tax incentives). The OBGT framework is shown in the diagram below.

Organizational Dimensions

- Organizational characteristics (e.g., size, types, experience)
- Market focus
- Technological awareness and motivation
- Technological capability (knowledge, human, financial and technology awareness)
- Management support
- Organizational culture

Business Dimensions

- Electronic and telecommunications environment
- Pressure (buyers, suppliers and competitors)
- Outsourcing elements
- Competitive advantage
- Improving relationship with stakeholders
- Availability of capital

Technological Dimensions

- Technological availability
- Complexity
- Benefits (e.g., usefulness)
- Technology-business fit (training and maintenance)
- Adoption risk / cost
- Fear factors (security, privacy, upgrade, etc.)

SME ICT ADOPTION

Government Dimensions

- Government role (e.g., tax breaks, technology adoption tax credits)
- Information channel and trade policies
- Level of support
- Control industry regulation
- Government-industry consortiums

Figure 5.3: Holistic Organizational, Business, Technological, and Governmental framework (Kim, 2010)

In a nutshell, the OBGT framework posits that the interaction of the internal and external variables, the technology itself (how complex and how available) and the intervention strategies of the government of the day, have an effect on the adoption and successful implementation of technology.

This research is based on this model because it is a sound framework to employ as a basis for understanding technology acceptance, as it starts by breaking the underlying factors into external (less controllable) and internal factors (more controllable). Furthermore, breaking the model into organizational, business, technological and government dimensions is also a sound decision as it helps concretize and visualize the constituent components of the internal and external environments. However, this research proposes some modifications to the original OBTG for reasons discussed below.

The modified holistic organizational, business, technological and government framework

Starting with the technological dimensions, the OBGT model above clearly points out the main constructs that underpin or influence the level of adoption: for example, the availability and complexity of the technology. However, the researcher thinks these dimensions are better captured when seen in the context of *both* the diffusion innovation model and the technological acceptance model discussed earlier on. The diffusion innovation model, for example, clearly shows the progression from becoming knowledgeable about the technology, through persuasion, the actual decision, the implementation and confirmation as shown in Figure 5.2. The same can be said of the technology acceptance model, which suggests perceived usefulness and perceived ease of use as having a direct bearing on the resultant attitude towards adoption and actual use of system as shown in Figure 5.1. The fusion of these two models better captures and illuminates the dynamics at play in describing the technology dimensions.

The modified version thus specifically proposes the fusion of the major constructs of the TAM model (namely, perceived usefulness and perceived ease

of use being major determinants of behavioral intention to use) and the DOI. The major constructs of DOI, as can be seen in Figure 5.2, are knowledge (communication behavior), persuasion (complexity, triability, and observability), decision, implementation and confirmation.

The second major modification to the OBGT model relates to the government dimensions. It is important to mention that the model was proposed by Kim (2010) as a "… theoretical framework of e-business adoption for SMEs" and, as a result thereof, "…governments of some countries have made an effort to initiate a wider diffusion of ICT for the SME sector" through a "… number of IT-based innovations such as venture businesses" (Kim, 2010:165).

The researcher thinks the political government of the country has no direct influence on how a university employs a form of technology. The government dimension of the OBGT model is thus replaced by corporate governance because the presence of corporate governance becomes the 'government' of the day in delivering the solution. In discussing the importance of corporate governance in the chapter on literature review, one of the key factors mentioned is that it ensures that the envisaged solution is congruent with set business objectives. Butler & Butler (2010:33) also suggested that "with the increasing dependence on IT in modern enterprises and the significant risks associated with omnipresent IT systems in business, IT governance is becoming imperative to all organizations". Marks (2010:37) concluded that "technology is too critical to organizational success" and that organizations no more view IT as a 'black box' best left to the technocrats but as both a catalyst for driving value as well as a source of risk. Hence governance processes should ensure that "IT operations, risks and opportunities are managed to optimize performance".

The proposed modified model, which also has four dimensions, is shown in the diagram below.

Technological Dimensions

Behavioral intention to use

- Perceived usefulness
- Perceived ease of use

Communication channels

- Knowledge
- Persuasion
- Decision (continued adoption – continued rejection)
- Implementation
- Confirmation

Organizational Dimensions

- Organizational characteristics (e.g., size, types, experience)
- Market focus
- Technological awareness and motivation
- Technological capability (knowledge, human, financial and technology awareness)
- Management support
- Organizational culture

Technology Adoption

Business Dimensions

- Electronic and telecommunications environment
- Pressure (buyers, suppliers and competitors)
- Outsourcing elements
- Competitive advantage
- Improving relationship with stakeholders
- Availability of capital

Corporate Governance

Corporate SharePoint IT Strategy

- Stakeholder determination
- Critical business objectives
- Measures of business success
- Planning for governance
- Roll-out strategy

Figure 5.4: Modified Organizational, Business, Technological, and Governmental

framework

The major constructs of the modified OBGT model are:

- The *technological dimensions*, as already mentioned, draws mainly from TAM (discussed in section 5.2) as well as the DOI (discussed in section 5.3).

- The *organizational dimensions* put emphasis on organizational issues (for example, key characteristics of the organization), stakeholder engagement, and technology literacy of the organization

- The *business dimensions* put emphasis on organizational excellence as seen by the drive to be a market leader.

- *Corporate governance* makes up the fourth dimension and a key emphasis is mitigating risks.

5.5   SUMMARY

The chapter discussed the major constructs of the OBGT model and suggested that it is a good foundation for understanding the dynamics of technology acceptance. The chapter then cited reasons for modifying the model with specific reference to the technological and government dimensions.

The chapter concluded by adopting the modified OBGT framework as the principal framework to be used in an attempt to understanding technology selection and adoption, in this instance, SharePoint technology at UKZN.

CHAPTER 6: RESEARCH DESIGN AND METHODOLOGY

6.1   INTRODUCTION

This chapter will start by revisiting the research questions formulated from the problem statement in chapter one. The main thrust of the chapter will then be to discuss the research design and methodology followed in this research project. The methodology will first be discussed at a theoretical level citing relevant sources and conclude with a discussion of how the researcher conducted the planned research design.

6.2   RESEARCH QUESTIONS

Question 1

What are the business considerations that led UKZN to consider deploying SPS 2010?

Question 2

What is the SharePoint corporate strategy for UKZN and in particular corporate governance for the solution and how was it assembled in the first place?

Question 3

Having scoured the landscape for competing solutions and meandered through the sometimes nebulous and subjective functionality touted by vendors as alluded to above by Pezzini et al (2011), what process was followed at UKZN and what criteria were used to arrive at SPS 2010 as the solution to deploy?

Question 4

What reasons guided UKZN in choosing between open-source based solutions versus a comparable commercial offering?

Question 5

Given the number of deployment scenarios, ranging from the traditional on-premises hosting to cloud computing, what is the chosen deployment model at UKZN and what informed that decision?

Question 6

To what extent is SPS 2010 being used as an integration platform for aggregating data from the disparate application repositories or information silos that exist at UKZN?

6.3 RESEARCH DESIGN

Zikmund (2003:65) defines research design as "…a master plan specifying the methods and procedures for collecting and analyzing the needed information. It is a framework or a blueprint that plans the action for the research project". Kumar (2011) defines research design as conceptualizing an operational plan to be executed in order to achieve the objectives of the study, taking into account the procedures needed to obtain valid, objective, and accurate answers to the research questions. Finally, Creswell (2012:3) defines research design as "… a process of steps used to collect and analyze information to increase our understanding of a topic or issue". Suter (2012:342) simply defines research design "as a blueprint for collecting data to answer questions".

6.4 QUANTITATIVE AND QUALITATIVE RESEARCH

Creswell (2012) suggests that after defining the research problem(s), the next important step to consider is whether the study lends itself to a quantitative or a qualitative approach. Wiid & Diggines (2009:85) then define qualitative

research as "the collection, analysis, and interpretation of data that cannot be meaningfully quantified, that is, summarized in the form of numbers".

Yin (2011) contends that because of the diversity of what is called qualitative research, rather than proposing a definition for this kind of research, he rather considers features that underline qualitative research. These he describes as

- Studying the meaning of people's lives under real-world conditions
- Representing the views and perspectives of the people
- Covering the contextual conditions within which people live
- Contributing insights into existing or emerging concepts that may help to explain human social behavior
- Striving to use multiple sources of evidence rather than relying on a single source alone.

Creswell (2012) posits that whilst a defining feature of quantitative research is to explain or predict relations among variables, the defining feature of qualitative research is an attempt at exploring and understanding a problem. He further suggests the following criteria for selecting between quantitative and qualitative research.

Quantitative Research	Qualitative Research
Measure variables	Learn about the views of individuals
Assess the impact of these variables on an outcome	Assess a process over time
Test theories or broad explanations	Generate theories based on participant perspectives
Apply results to a large number of people	Obtain detailed information about a few people or research sites

Table 6.1: Quantitative researcher versus Qualitative research (Creswell, 2012)

Elliot (2005:2) charges that one of the advantages of qualitative research is that it allows for focus on a process whilst "…providing more comprehensive or fine-grained information than quantitative research". Kumar (2011: 104) asserts that "the main focus in qualitative research is to understand, explain, explore,

discover and clarify situations, feelings, perceptions, attitudes, beliefs and experiences of a group of people".

Stake (2010:133), who equates qualitative research to interpretive research, states that "much qualitative research is based on the collection and interpretation of episodes. Episodes are held as personal knowledge more than as aggregated knowledge. An episode has activities, sequence, place, people, and context".

However, there is a school of thought that sees quantitative and qualitative research as two complementary approaches thus leading to a hybrid or 'mixed' methodology (Knoblauch, 2004).

Yin (2011) charges that qualitative research is now part of the mainstream form of research in several academic and professional fields. Examples of these in social sciences are sociology, anthropology, political science whilst examples of the professions are education, management, nursing and urban planning. However, Yin (2011) is quick to suggest that executing qualitative research is not easy as one of the key challenges relates to data presentation as such data typically includes narratives from participants. Another problem of qualitative research is that the results "tend to be 'impressionistic' and that inter-subjective verification is rather cumbersome" (Yin 2011:356). Suter (2012:343), on the other hand, is very forthright when he states that "the field of qualitative is indeed fragmented with confusing language in regard to its orientation and methodological principles of data collection and analysis". As a result, "some qualitative researchers prefer to use the term *understanding of data* instead of *analysis of data*" (Suter, 2012:352).

Eriksson & Kordaine (2008) list nine different types of qualitative research namely, case study research, ethnography research, grounded theory research, focus groups research, action research, narrative research, discursive research, critical research and feminist research.

In investigating the usage of SharePoint in the UK higher education institutions, McLeod et al. (2010, 336) assert that "the study's methodology was qualitative" although they do not offer reasons for such a choice. Their primary data generation tool consisted of a telephone survey of directors and managers of the sampled HEIs which was further supplemented with a detailed case study of three HEIs in the form of face to face interviews.

Guided by the thought processes espoused by Creswell (2012) above, the research design chosen for this study is a qualitative research for several reasons. Firstly, the researcher plans to learn about the views of the individuals involved in the processes leading up to the selection, deployment and commissioning of SharePoint at UKZN. In other words, the researcher wants to "… understand, explain, explore, discover and clarify situations…and experiences of a group of people" (Kumar, 2011:104). Secondly, the researcher plans to assess the process over time as SharePoint was first installed in 2009. Thirdly, the researcher plans to link the study to an existing theory (modified OBGT); lastly, the researcher plans to obtain detailed information from people involved in the processes leading up to the selection, deployment and commissioning of SharePoint at UKZN.

In summary, this will be a qualitative study that employs a combination of case study and narrative research which are briefly discussed in the following sections.

6.5   CASE STUDY RESEARCH DESIGN

Oates (2006) describes the case study research design as a study that focuses on one instance of the 'thing' to be investigated which could be an organization, a department, an information system, or a unique event like the staging of a World Soccer Cup like the one hosted by South Africa in 2010. Kumar (2011:126) lends support when he states that "a case study could be an individual, a group, a community, an instance, an episode, an event, a subgroup of a population, a town or city".

The chosen instance then becomes a subject of an in-depth study that uses a variety of data generation methods for example, interviewing, observation, document analysis, and/or questionnaires. The chosen instance is further studied extensively within its real life context focusing on all factors, issues, politics, processes and relationships with the aim of understanding how they link together and also explaining the *how* and *why* of outcomes observed. In other words, the chosen case "becomes the basis of a thorough, holistic and in-depth exploration of the aspects that you want to find out about" (Kumar, 2011:126).

Hesse-Biber (2011:256) suggests that "the unique contribution of a case study approach is that it provides the researcher with a holistic understanding of a problem, issue, or phenomenon within its social context". Eriksson & Kordaine (2008:115) are of the opinion that "the main purpose is to investigate the case in relation to its historical, economic, technological, social and cultural context".

To qualify as a case study, Kumar (2011) asserts that it is paramount to treat the total study population as one entity. He also contends that whilst one could arguably use a single method for data collection, it is quite normal to use multiple methods such as in-depth interviewing, obtaining information from secondary records and data gathered from observations.

A case study thus exhibits the following chief characteristics (Oates, 2006):

- it focuses on depth rather than breadth, meaning that the researcher obtains as much detail as possible about one instance
- the instance is extensively explored within its natural setting and not in a laboratory or some artificial setting
- it takes a holistic view in that the researcher focusses on the complexity of relationships and processes and how they inter-relate or are interconnected rather than trying to isolate individual factors

- it makes use of multiple resources and methods for data collection with the researcher consulting as many individuals as possible when for example, making a departmental study.

Oates (2006) further suggests that there are three basic types of case studies namely exploratory, descriptive and explanatory. This view is supported by Babbie (2004) who contends that whilst research serves many purposes, the most common and useful purposes of research are description, exploration, and explanation.

An *exploratory study* is used as a springboard for defining questions or hypotheses that could potentially be used in a subsequent study. A *descriptive study* has the potential to lead to a rich detailed analysis of a particular phenomenon and its contexts, attempting to tell a story of what occurred and how different people perceived what occurred. A distinguishing feature of descriptive research, as can well be expected, is that it describes the characteristics of a population or phenomenon. It does this by seeking answers to questions like who, what, why, when, where, and how. Lastly, "an *explanatory study* goes further than a descriptive study in trying to explain why events happened as they did or particular outcomes occurred." (Oates, 2006:143). In particular, this type of research seeks to identify multiple, often inter-linked factors, that have a link to existing theories/ frameworks or may even help construct new theories/frameworks to the body of knowledge (Oates, 2006).

The focus of this research paper is the explanatory study as it will seek to understand how events unfolded or particular outcomes arrived at and also attempt to strike a linkage with existing theory.

6.6   CHALLENGES WITH CASE STUDY RESEARCH DESIGN

Oates (2006) acknowledges the school of thought that suggests that case studies produce knowledge that only relates to the case under study. However, she

contends that it is possible to form generalizations from such studies provided the chosen case is typical of other cases. She gives an example of a study that looks at the usage of IT in a small manufacturing company: such findings could be used as generalization using companies of a similar profile.

6.7 SELECTING A CASE

Oates (2006) suggests that selecting a case may be justified based on one of the following:

- it is a typical instance in that the case is typical of many others and therefore can be seen as being representative of the whole class
- it is an extreme occurrence and therefore not typical of others thus providing a contrast from the norm
- it is a test bed theory in that it exudes elements that are suitable for testing an existing theory
- it is a unique opportunity such as the staging of a World Soccer Cup competition.

6.8 RELATIONSHIP OF CASE STUDY TO THEORY

From the above it is clear that a case study can be linked to a theoretical framework in one of several ways as suggested by Oates (2006), namely:

- one can use a case study in order to build a new theory, concept, framework or model
- one can also use a case study in order to test an existing theory, concept or framework
- one can also use a case study in order to evaluate alternative theories

The focus of this study from a theoretical framework point of view can thus be seen

- as a typical instance as the selection, deployment, and commissioning of SPS 2010 could closely mirror the selection of another system within the university (or external organization such as another university), for example selecting, deploying and commissioning of an enterprise resources planning system

- as a test-bed theory context as it will seek to test the findings against existing frameworks or models in technology acceptance practices

- in the context of a unique opportunity as software solutions of the magnitude and complexity of SPS 2010 normally have a long life cycle.

In summary, it is the intention of this study, amongst other things, to link the case study with the modified OBGT model discussed in the previous chapter. The next section will now consider interviewing as one of the data generation methods.

6.9   INTERVIEWING

Packer (2011) contends that it is a standard practice in qualitative research to conduct interviews as a primary data generation tool. Suter (2012) adds observations and documents to the list whilst Wiid & Diggines (2009) suggest that the three most common qualitative research methods are focus groups, projective techniques, and in-depth interviews.

Stake (2010) suggests there are three primary reasons why a qualitative researcher would use interviews, namely: as an attempt to gather unique information or interpretation from the interviewee, generating information from several persons and as an attempt to finding out about "a thing" that the researchers would typically not be able to gather otherwise using methods such as observation. When using interviews, Kumar (2011) contends that the researcher has the freedom to decide both the format and the content of questions to be asked. The researcher also has the freedom of selecting the wording of the questions and the order in which they are asked.

Oates (2006) further suggests that interviews are most suitable for data generation under the following conditions:

- the researcher wants to obtain detailed information
- the researcher wants to ask complex or open-ended questions whose order and logic might need to be different for different people
- the researcher wants to explore emotions, experiences, or feelings that cannot be easily observed or described via predefined questionnaire responses
- the researcher wants to investigate sensitive issues or privileged information that respondents might not be willing to write about on paper for a researcher they have not met.

Wiid & Diggines (2009:93) lend support to using interviews as a key data generation strategy as they contend that one of the reasons for using interviews is "where a novel or complex situation exists and the main objective is to gain insight rather than to measure".

Planning and conducting interview

Oates (2006) suggests that successful research interviews exert specific demands on a researcher's repertoire: researcher's role and identity, type of interview, interview preparation, recording, interviewing, transcribing and checking.

As far as the researcher's role and identity are concerned, "…people respond differently depending on how they perceive the person asking the questions" (Oates 2006: 188). As an example, the answer may vary depending on whether the interviewer is perceived as a police detective, a student or journalist. Other determining factors include sex, age, ethnic origin or accent (Oates 2006: 188).

Interviews can be broken down into three types namely: structured interviews, semi-structured interviews and unstructured interviews. *Structured interviews*

use pre-determined, standardized and identical questions. The interviewer reads the questions after which the response is noted using pre-coded answers. *Semi-structured* interviews allow the interviewer to determine a number of themes to cover and related questions to ask. This form of interview is flexible as it allows for changing the order of questions depending on the flow of the conversation. Lastly, with *unstructured interviews,* the researcher starts the interview with contextual information and broad questions and allows the interviewee to develop own ideas and freely discuss events, beliefs with minimal intrusion by the researcher (Oates, 2006). It is thus important for the interviewer to decide on the format of interview to employ.

As far as the actual interview goes, Oates (2006) suggests starting with relatively easy questions that is, questions that the interviewee is likely to have well-formed views on or asking open-ended questions (such questions typically start with 'what', 'how, or 'why') as opposed to closed questions ('yes' or 'no' answer type of questions). Lastly, the interviewer needs to be non-judgmental during the interview.

As far as interview preparation goes, Oates (2006) suggests that it may be useful to send the prospective interviewees a list of themes or topics to be covered before the actual interview as this gives the interviewee time to mull over the themes to be covered during the interview.

The interviewer needs to determine the form of recording mode to be used during the interview. Oates (2006) identifies three modes namely, field notes, audio tape recording and video tape recording.

The penultimate point to ponder when planning and conducting interviews is transcribing interviews from tapes into a written form. Oates (2006: 193) asserts that "transcribing is laborious, but it is also rewarding because it brings the interview back to life again".

The last point to ponder is checking which involves, where possible, taking the transcribed notes back to the interview for checking to confirm the correct capture of key discussion points.

Advantages and disadvantages of interviews

Interviews, whatever the format (that is, structured or not), have both advantages and disadvantages. On the positive side, Oates (2006) suggests that interviews lend themselves well towards discussing issues at great depth and in detail; conducting interviews typically requires relatively little equipment; some respondents have a preference for interviews as opposed to completing questionnaires; and lastly, interviews afford a level of flexibility as they allow the researcher to adjust the line of enquiry given the ebb and flow of the discourse. Some of the disadvantages of interviews include the demands on time as the researcher also needs to transcribe the data as part of the analysis; interviewing also requires good social skills and tact otherwise it could be stressful for both the interviewer and interviewee (Oates, 2006).

Reasons for choosing interviews

In summary, the researcher will conduct interviews as a primary tool for data generation. In line with the suggestions by Oates (2006) above, this study will make use of interviews because the researcher plans to obtain detailed information by asking complex or open-ended questions whose order and logic might need to be different for different people. The researcher also plans to explore emotions, experiences, or feelings that cannot be easily observed or described via predefined questionnaire responses. Lastly, the researcher plans to investigate sensitive issues or privileged information that respondents might not be willing to write about on paper for a researcher they have not met.

The interviews will specifically be semi-structured primarily for two reasons: *firstly*, the interviewer can change the order of questions given the flow of the conversation; *secondly*, semi-structured interviews have the potential to allow

interviewees to "…speak with more detail on the issues" and also "…introduce issues of their own that they think relevant" (Oates, 2006:118). Semi-structured interviews are the most popular form (Franklin, 2012).

Lastly, for the purpose of recording the interview, the researcher will make use of field notes that is, noting what the interviewee says during the interview. Pursuant to the suggestion by Oates (2006), this will be followed by writing further notes immediately after the interview whilst the discussion is fresh in mind.

In summary, as a cost-containment measure, the researcher chose to conduct face-to-face interviews with interviewees within a ten kilometer radius; otherwise, telephonic interviews were held. The researcher also took a cue from Oates (2006) by sending prospective interviewees a list of themes or topics to be covered before the actual interview as this gave them time to mull over the themes to be covered during the interview. The interviews were conducted on a school and cluster basis; as such, the list detailing the interviewees will be mentioned when discussing the school or cluster the incumbents belong to.

6.10   OBSERVATION

Taking a cue from Kumar (2011:127) that "the use of multiple methods to collect data is an important aspect of a case study, namely in-depth interviewing, obtaining information from secondary records and gathering data through observation", the researcher plans to use observation as an additional data gathering tool. Zikmund (2003) suggests that for observation to be deemed as a tool of scientific enquiry, it must, amongst other things, serve a formulated research purpose and be planned and recorded systematically.

The researcher plans to use observation as an additional data gathering tool in the form of logging into the deployed SharePoint instance at UKZN. Once logged in, this will offer the researcher a 'live' observation of how SharePoint is being used in a particular cluster or school. Subject to security constraints and

permissions granted, the researcher may or may not be able to glean and observe all the activities; however, artifacts deployed (for example lists, web parts and workflow), will form a solid ground for further interrogating the interviewee (possibly pursuing a specific line of thought) should the requirement exist. Such observation will not be done as a once-off exercise but will be staggered over a period of time such as fortnightly or monthly depending on the SharePoint level of activity of a school or cluster.

Using observation as a data gathering tool will offer the researcher two distinct advantages. Firstly, the researcher will enjoy unobtrusive, unhindered and hidden observation where the subject is unaware that observation is taking place. Secondly, the researcher will use the data gleaned from the observation as a form of triangulation to verify interviewee data against actual implementation. For example, the researcher can verify a claim of using a web part that connects to a library system and then aggregate information that shows outstanding books and fines payable.

6.11   QUALITATIVE DATA ANALYSIS

Sekaran & Bougie (2009) define qualitative data as data in the form of words. Bernard & Ryan (2010) expand on this when saying qualitative data takes the form of five constructs namely, physical objects, still images, sound, moving images and written words. Oates (2006) defines qualitative data as data that includes non-numeric data such as words, images, sounds and this type of data is typically generated by cases studies, action research and ethnography.

A major challenge of qualitative data compared to quantitative data is that whilst the latter is amenable to analysis through well-established mathematical and statistical procedures, analysis of qualitative data is not always a simple or straight forward process (Oates, 2006). There are also relatively few well established and commonly accepted guidelines for analyzing qualitative data (Sekaran & Bougie, 2009). Another challenge with qualitative data is that the researcher could easily be overwhelmed by voluminous data (Sekaran &

Bougie, 2009) as words take up more space than numbers; words also have the potential of meaning different things for different people. Yet another disadvantage of qualitative data analysis is that the interpretation of the data is more closely tied to the researcher (for example, their identity, beliefs and background) and this may lead to conclusions that are more tentative (Oates, 2006).

As a starting point towards data analysis, Oates (2006) then suggests reading through data with an initial aim of getting a general impression in order to identify themes in the data. Typical examples of such themes are:

- segments of themes that bear no relation to the overall research and are thus not needed
- segments of themes that provide general descriptive information that one needs in order to describe the research context
- segments that appear to be relevant to the research work.

Sekaran & Bougie (2009) support this view when they state that there are generally three steps in qualitative data analysis namely data reduction, data display, and drawing conclusions. *Data reduction* is a systematic process of selecting, coding and categorizing the data. *Data display* is concerned with the presentation of the data and this can take the form of a matrix, a graph or a chart that illustrates patterns in the data. The last step is to *draw conclusions* from the data. Bold (2012) calls these three steps *thematic analysis*: that is, seeking to find and identify themes within narratives. Suter (2012) shows this graphically in what he calls a kaleidoscope metaphor describing an approach to analyzing qualitative data.
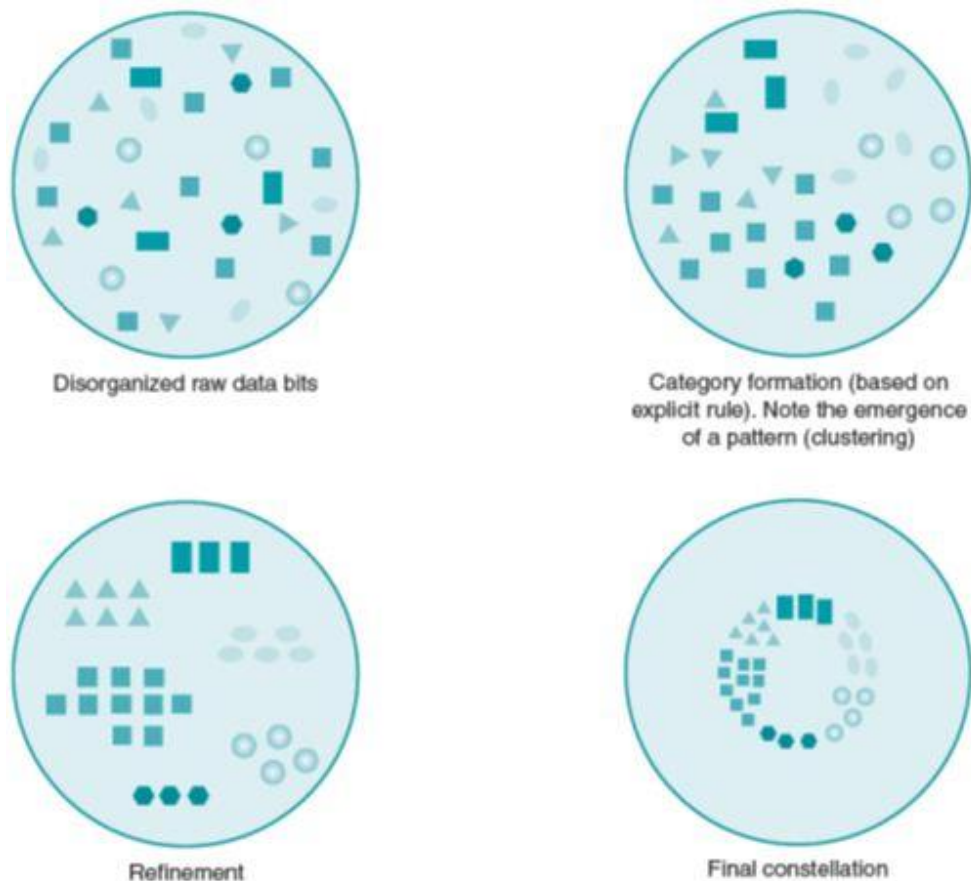
Figure 6.1: A kaleidoscope metaphor describing one approach to analyzing data (Suter, 2012)

Creswell (2012) goes a step further by espousing a more detailed approach for qualitative data analysis in the form of preparing and organizing the data, exploring and coding the data, describing findings and forming themes, representing and reporting findings, interpreting the meaning of findings, and validating the accuracy of the finding, and interpreting findings.

i)   *Preparing and organizing data*

The first step in analyzing and interpreting qualitative data is to organize the data by transferring it from the spoken or written word to a typed file and then deciding whether to analyze it by hand or by computer.

ii)   *Explore and code the data*

The objective of exploring the data is to obtain a general sense of the data by segmenting and coding it. The aim behind coding is "…to make sense out of text data, divide it into text or image segments, label the segments with codes, examine codes for overlap and redundancy, and collapse these codes into broad themes (Creswell, 2012).

iii)   Describe the findings and form themes

The principal aim of this step is an attempt at answering the major research questions and then forming a detailed and comprehensive appreciation and understanding of the central phenomenon through description and thematic description.

iv)   Representing and reporting findings

This step involves displaying the findings in tables and or figures with a narration that explains how the conclusions were made.

Creswell (2012) suggests that qualitative researchers often display their findings visually using pictures or figures such as a comparison table, hierarchical tree diagrams, drawing a map or developing a demographic table.

v)   Interpreting findings

When interpreting findings, Creswell (2012) suggests the researcher should not shy away from conveying personal thoughts because there is a belief amongst qualitative researchers that personal views can never be kept separate from interpretations. He also suggests that in interpreting findings, the researcher should make comparisons to literature and also offer limitations and suggestions for future research.

vi)   Validating the accuracy of the findings

Validating findings is essentially an attempt to determine the accuracy or credibility of the findings using strategies such as member checking or triangulation. Member checking can be effected by having the researcher asking one or more of the participants in the study to check and corroborate the veracity of an account. Triangulation, on the other hand, is an attempt to corroborate evidence from different individuals (Creswell, 2012).

6.12   PRACTICAL APPLICATION OF RESEARCH METHODOLOGY

The researcher started conducting interviews late in 2012, primarily targeting the office of the CIO as typical custodians or major players in IT sourcing, installation, deployment and support within UKZN. The researcher prepared a set of questions to ask in order to guide the interview as shown in appendix 6.1.

During these interviews, it became clear very early on that the entire SharePoint project was not only almost exclusively or singularly run by the CIO office; it was, within the office itself, also run by a handful of people. It also became clear that given the trickle rollout to the Colleges (and the attendant schools within) and clusters that make up the Executive Committee (for example Corporate Relations, Human Resources and Equity, Student Services) that the researcher, in pursuit of conducting the interviews, was not going to draw a lot of data worthy of detailed analysis as suggested by Creswell (2012) in the previous section. In other words, the researcher was never at risk of being inundated, overwhelmed with a deluge of data or "…swamped by voluminous data as words take up more space than numbers" as ominously forewarned against by Oates (2006:267).

In the absence of such data, the researcher was thus unable, as originally planned, to use thematic analysis as espoused by Sekaran & Bougie (2009), Creswell (2012) and Bold (2012). The researcher then chose to conduct narrative analysis as another form of qualitative data analysis which is discussed in the next section.

6.13   NARRATIVE RESEARCH AND ANALYSIS

Suter (2012) claims that narrative research is closely related to phenomenology and case study research in the family of qualitative research design. He then suggests that a distinguishing feature of this research is that it uses the 'life story' method in which, through storytelling, people describe their life experiences. It then becomes a task for the researcher to assemble a written account (hence narrative) in order to understand the 'how' and 'what' of the complexities of the life story. In other words, the challenge for the researcher is to "define the elements of the person's story (the raw data), identify themes, uncover important sequences, and tell the story in ways that provide insight" (Suter, 2012:369).

Stake (2010) agrees when he states that much of qualitative research draws from a collection of interpretations and episodes with each episode characterized by having activities, sequence, place, people, and context. Elliot (2005:3) adds that these narratives can then "… be best understood to organize a sequence of events into a whole so that the significance of each event can be understood through its relation to that whole". Elliot (2005:3) then defines narratives as "… discourses with a clear sequential order that connects events in a meaningful way to define audience and thus offer insights about the world and/or people's experiences".

Sekaran & Bougie (2009:386) expand on the definition of narratives by suggesting that "narrative analysis is an approach that aims to elicit and scrutinize the stories we tell about ourselves and their implications for our lives. Narrative data are often collected via interviews. These interviews are designed to encourage the participant to describe a certain incident in the context of his or her life history. In this way, narrative analysis differs from other qualitative research methods; it is focused on a process or temporal order, for instance by eliciting information about the antecedents and consequences of a certain incident in order to relate this incident to other incidents".

Narrative analysis focuses on stories told by participants and a "key defining feature appears that these stories are narrative of events which unfold sequentially over time" (Grbich, 2013:217). Whilst typically used in social sciences, Eriksson & Kordaine (2008:211) suggests that "an imperative justification for doing narrative research is the belief that people are storytellers because telling and sharing stories help us to understand ourselves and connect to each other."

As another form of qualitative data analysis, Bold (2012) suggests what he calls structural analysis for analyzing narrative data. This he does by identifying five categories of questions which are then used as a guide that seeks to analyze such data. These categories are:

Category	Description
Abstract	What is the story about?
Orientation	Who, when and where?
Complicating action	Then what happened
Evaluation	So what
Result	What finally happened?

Table 6.2: Qualitative Data Analysis: structural analysis (Bold, 2012)

Whilst not related to technology, research work conducted by McNulty (2003:364) shows a practical application of the theory espoused by Bold (2012) above and the usage of categories for analyzing narrative data. The objective of his study was to compare and analyze what he calls 'the life stories' of twelve participants who had been diagnosed with dyslexia when they were children. The focus of his study was "What are the life stories of adults who were diagnosed with dyslexia as children?" (McNulty, 2003: 366). He chose qualitative research as a form of research design, used interviews as a primary source for data generation and, for data analysis, he chose narrative analysis. In particular, these stories were analyzed using a structural framework similar to

the categories used by Bold above but with different headings as shown in the table below.

Category	Description
Prologue	Possible differences and difficulties in early childhood.
Exposition	Failures, Misunderstandings, and Trauma at Early to Middle School Age.
Plot and subplot	Contending with the Learning Difficulties and the Sense that "Something's Wrong with Me."
Resolution	"The part of the story which goes from the beginning of the change in fortune to the end".
Epilogue	Integrating the Emotional Experience in Adult Life.

Table 6.3: Qualitative Data Analysis: structural analysis (McNulty, 2003)

In summary, despite its origins in social sciences, the researcher intends to use narrative analysis and then summarize the findings as per the categories defined by Bold (2012). The researcher thinks this is appropriate because it will allow the researcher to tell a story about the SharePoint instance at UKZN, identify the stakeholders (the who, when and where), look at complicating action (if any). Finally, the researcher will be able to evaluate the dynamics around the project and present them in the form of a result.

6.14 RELIABILITY AND VALIDITY IN QUALITATIVE RESEARCH

Sekaran & Bougie (2009:384) underscores the importance of reliability and validity in qualitative research by suggesting that conclusions drawn from such analysis should be "plausible, reliable and valid". He goes on to define validity as the "extent to which an instrument measures what it purports to measure".

A technique that is often used with qualitative data analysis to ensure reliability and validity is triangulation (Sekaran & Bougie, 2009). Triangulation is built on the premise that one can have a relatively high level of confidence in results if

different methods or sources of information lead to the same results. Several kinds of triangulation are feasible namely:

- Method triangulation which uses multiple methods of data collection and analysis
- Data triangulation which involves data collection from several sources and at different time periods
- Researcher triangulation where multiple researchers collect and analyze data
- Theory triangulation where multiple theories and perspectives are used to interpret and explain data

The researcher used data triangulation for this exercise by collecting data at different time periods and checking for consistency to answers given in previous questions.

6.15   SUMMARY

This chapter emphasized the importance of deciding early on in the research design as to whether the study lends itself to quantitative or qualitative research. The chapter also cited the burgeoning importance of qualitative research as seen in a number of sciences and disciplines.

It was also noted that a standard practice of qualitative research is to conduct interviews which have the potential of eliciting detailed feature-rich insights into the research problem. This is so because the researcher, amongst other things, typically uses open-ended questions.

In conclusion, the chapter provided justification for the choice of applying narrative analysis instead of thematic analysis.

CHAPTER 7: FINDINGS AND DISCUSSION

7.1   INTRODUCTION

The initial plan was to conduct interviews (face to face or telephonic) with heads of colleges and clusters as the expectation then was their participation or involvement in the SharePoint project through a governance committee system as discussed in the literature review. However, as will be discussed in this chapter, this was not the case.

In choosing who to interview, the researcher was guided by the principle of purposive sampling. Kumar (2011:207) states that "the primary consideration in purposive sampling is your judgment as to who can provide the best information to achieve the objectives of your study." The researcher then chose to interview individuals who "…are likely to have the required information and be willing to share it" (Kumar, 2011:207). Purposive sampling is not only more common in qualitative research, Kumar (2011:207) also suggests that "this type of sampling is extremely useful when you want to construct a historical reality, describe a phenomenon or develop something about which only a little is known".

Interviews were thus conducted with SharePoint knowledgeable individuals within the colleges and clusters. Such individuals, who are not necessarily heads or managers in their respective portfolios, can be seen as champions for their school or cluster because of their involvement or level of activity with SharePoint initiatives. The full listing of interviewees is shown in Appendix 7.1.

The primary form of data generation used was face-to-face and telephonic and sometimes augmented with an email conversation.

7.2   COMMISSIONING SHAREPOINT SERVER 2010 AT UKZN

In chapter three, it was stated that SharePoint technology is a modular solution that can either be commissioned or deployed using a 'big bang' approach (that

is, installing and activating all the solution features) or using an incremental approach staggered over a period of time. The chapter also underscored the importance of commanding a good understanding of SharePoint technology functionality as it becomes a key benchmark in an attempt to appreciate the level and extent of its usage in an organization. Such functionality was broken down into *core* and *extended* functionality; core functionality relates to basic artifacts such as lists, libraries, pages and workspaces whilst extended functionality relates to portal server technology, enterprise content management, presentation layer, integration platform, project management, search provider, social networking and personalization.

In chapter four, the study focused on the SharePoint ecosystem and identified several solutions in this space such as reporting services, business intelligence, and forms services. The reason for looking at the ecosystem, as mentioned in previous chapters, is to understand how SPS 2010 interacts with other solutions within the UKZN software stack. Does it become a new black spot on a whiteboard or does it merge with other solution colours to form a rainbow or kaleidoscope of colours?

The *first section* of analysis will thus be guided by the deployment level of both core and extended functionality within UKZN whilst the *second section* of analysis will look at the ecosystem within which SPS 2010 is actually deployed and the level of integration, if any.

The analysis will start with the cluster of Executive Director: Planning and Operations because one of the sub-clusters therein is the Information Communication and Technology (ICT) which is headed by the office of the Chief Information Officer (CIO). Key performance indicators (KPIs) for this sub-cluster include (see appendix 7.2):

- Providing strategic leadership, governance and management of UKZN's computing, information and communication services and infrastructure in relation to people, process, research, teaching and learning, technology,

finance, data and information in order to leverage IT as a strategic enabler of the University's core business

- Keeping abreast of new and emerging technologies to assess their potential to enable and support UKZN's vision of being the Premier University of African Scholarship

- Being accountable for all information and communications technology governance, regulatory compliance, audit compliance, risk management and security.

From the above KPIs, there is thus an expectation that the ICT sub-cluster should be seen to be taking quite a proactive leadership role in SharePoint technology at UKZN. This expectation is supported by the research findings of Miles (2011:6) who state that "… the IT department is by far the most advanced adopter and user of SharePoint" and further states that "this finding is reflected in the 'ownership' of SharePoint" by corporate IT.

It is with this reason in mind that the findings of this research project will start in this sub cluster.

7.3   GENERAL FINDINGS ACROSS UKZN

Before discussing specific findings across the clusters and colleges, beginning with ICT for reasons just stated, this section will start by discussing and analyzing general findings that surfaced very early on during interviews with ICT. These findings have the potential or effect of setting the trajectory for the subsequent deployment and commissioning of SharePoint across the university, both at college and cluster level.

The *first finding* is that the entire SharePoint project at UKZN is managed by three individuals namely, the SharePoint Infrastructure Administrator (SIA), the Network Manager and the Improvement and Development Manager (ID Manager). As can well be expected, all three incumbents are deployed in the corporate IT sub cluster.

In reply to the request for "list of people involved with the SharePoint project especially now that UKZN is moving on to SharePoint 2013" posed by the researcher in an email conversation (full extract of email in appendix 7.3 edited for the anonymity of the interviewee), extract from the reply was:

"I am the SharePoint Infrastructure Administrator. There is no help desk per se, I deal with the SP issues as well, once we grow big enough, ICS User Support will take over the end user support function.

I project manage all of this, as people ask for the product I meet, demo & implement the system. Then I train them." SharePoint Infrastructure Administrator, UKZN ICT

Evelyn (2013) graphically showed a typical SharePoint delivery team in Figure 2.7 as well as a SharePoint delivery detail plan in Figure 2.8.

The SIA officially reports to the Network Manager and, from a project management point of view, also reports (dotted lines) to the ID Manager who plays a project management role for all projects (including SharePoint) currently underway at UKZN. Since the SIA singularly performs ***more than*** 95% of the work on SharePoint, most of the interviews (personal, telephonic and sometimes augmented with email conversations as shown above), were conducted with him.

However, having such a miniscule support structure is not without serious service delivery repercussions to the user community as will be seen when discussing SPS 2010 at the schools level.

Secondly, of the two implementation approaches identified by McLeod et al. (2010) namely, the organic bottom-up approach and the corporate top-down approach, UKZN exhibits strong characteristics of the organic approach. As discussed in the literature review, organic implementations are characterized by

starting out small, evolving over time without a strategy or plan (Lappin & McLeod, 2010). A key characteristic of this approach is that a section of the institution (the College of Agriculture, Engineering and Science in the case of UZKN) would start using SharePoint (primarily using it for providing team site) and this would be followed by organic growth over a period of time as other sections of the institution also start using the product.

As mentioned in the literature review, key challenges posed by the organic approach are planning user support, responding to increased workload as word of mouth increases the user base and governance issues around lines of responsibility (Lappin & McLeod, 2010).

Interviews with the SIA reveal that the entire SharePoint project was delivered without any SharePoint formal strategy or project plan in place. However, UKZN is not alone as both the Imperial College London and University of the West of England (UWE) started with the organic approach implementations. UWE further admits that "most of our SharePoint work has been done without a formal strategy" (Lappin & McLeod, 2010:7). In addition, both institutions now "report that their implementations grew organically to a point where the institutions have now recognized that SharePoint has become a critical system, and needs to be treated as a corporate system" (Lappin & McLeod, 2010:7).

In an email conversation with the SIA asking for comments on lessons learnt, if any, during the SharePoint project at UKZN, the response was:

"*Had I known how long this project was, I would have followed a proper project plan & methodology*" *SharePoint Infrastructure Administrator, UKZN ICT*

In other words, since the initial installment of SharePoint was commissioned in 2009, later upgraded to SharePoint 2010 in 2011 and now being upgraded to SharePoint 2013 starting in the latter half of 2013, a common denominator has always been the absence of a project plan.

Flowing from the second finding, the *third finding* from interviews with the SIA is the absence of corporate governance around the SharePoint project. As discussed in the literature review, SharePoint corporate governance is important because it is an "…organizational strategy and methodology for documenting and implementing business rules and controls" in relation to the data SharePoint houses (Evelyn, 2010:144). Corporate governance also ensures that the envisaged solution remains aligned with set business objectives whilst also mitigating SharePoint sprawl (Jamison et al., 2011). Miles (2011:5) contends that governance has "…implications for security, compliance and long-term archive".

However, the absence of corporate governance is prevalent in SharePoint implementations as evidenced by the study by Miles (2011) who reports that of the worldwide organizations under study, only 17% had a representative governance committee. He further found that 70% of the organizations do not have an acceptable-use policy and that only 28% have a guiding policy relating to "…corporate classification and use of content types and columns" (Miles, 2011:5).

As can be seen in the diagram below, governance issues relate to classification and metadata as well as managing site proliferation.
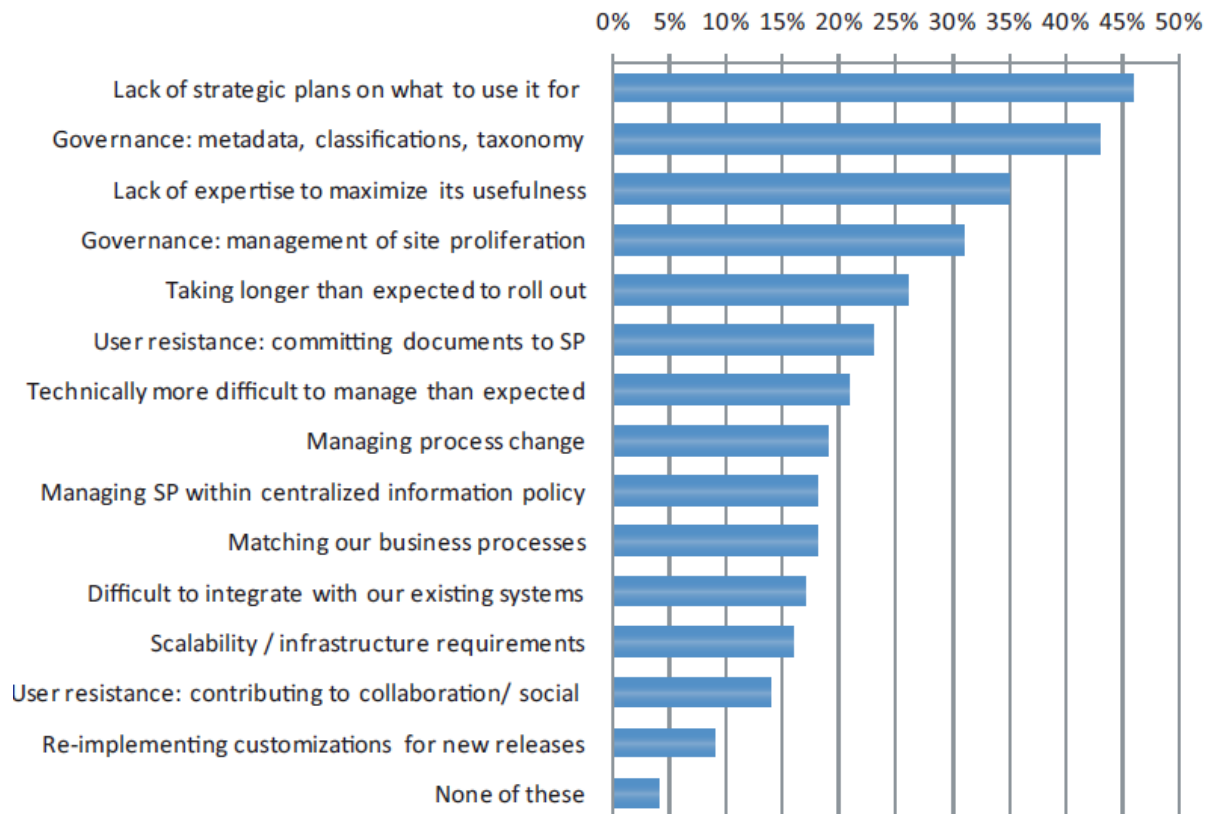
Figure 7.1: What would you say are your biggest ongoing issues with your SharePoint system? (Miles, 2011)

The above discussion answers the following research question:

Question 2:

What is the SharePoint corporate strategy for UKZN and in particular corporate governance for the solution and how was it assembled in the first place?

The *fourth finding* is that whilst McLeod et al. (2010:339) see SharePoint as "…a system with a wide variety of functionality that can be put to a wide variety of different uses", interviews with UKZN users suggest that a majority of them use SharePoint as a document management system that replaces networked or shared drives or public folders. This finding is in line with what McLeod et al. (2010) refer to as 'drivers behind SharePoint implementations'

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within the UK HEI community which they listed as including improvements of services/systems/ management, automating cross institution processes, replacing networked/shared drives or public folders, collaboration and document management. Indeed, Childs et al. (2009), show in the diagram below that a number of UK HEIs use SharePoint technology for document management.
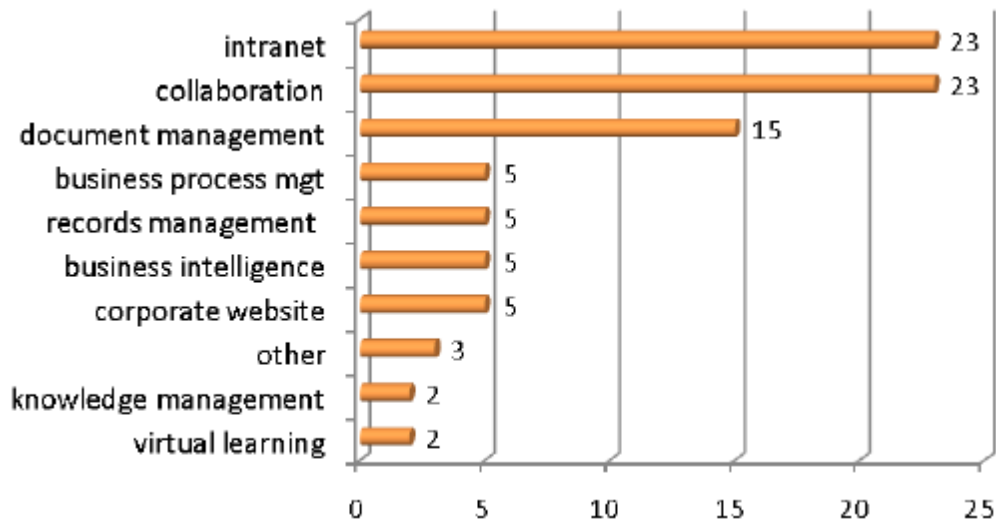
Figure 7.2: Purpose of use (Childs et al., 2009)

It is however key to note that the most popular usage of SharePoint technology is as an intranet site and collaboration as clearly shown in the diagram.

This view is supported by Miles (2011:4) when he states that "collaboration and intranet are the most widely used application areas, then document management and search". This is also supported by a study by IBM commissioned in 2011 to determine key business and IT priorities and resultant investment decisions for midsized companies across the globe. The study specifically surveyed more than 2000 businesses in more than 20 countries scattered across several industries such as industrial products, insurance, banking, retail, consumer products and transportation. The diagram below shows that of the top initiatives, 70% targets collaboration (SharePoint technology is a major driver of collaboration) as it has the capability to be a key driver of innovation, improving employee productivity through improved focus on the customer" (IBM White Paper, 2011).

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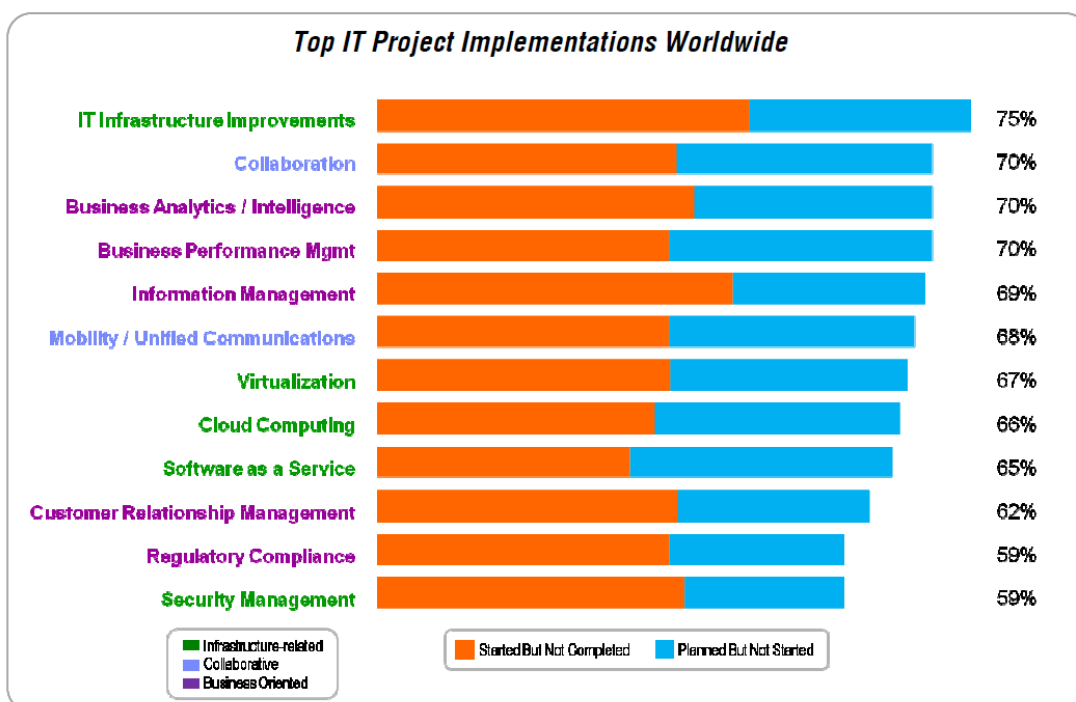
Figure 7.3: Top IT Project Implementations Worldwide (IBM Whitepaper, 2011)

The *fifth finding* is that since the first instalment of SharePoint technology in 2009, formal user training (arranged exclusively by and also for the College of Agriculture, Engineering and Science) ***only*** took place in July/August 2013.

McLeod et al. (2010:340) ominously warn against this practice because "SharePoint is a complex system; end users need training and advice to enable them to make the best use of the system". Hitherto, training had taken the form of PowerPoint presentations (the researcher was privileged to attend one of these) showcasing a high level overview of the capabilities in SharePoint technology which were then followed by a select demonstration of such capabilities on a server. The study by Weeks (2011), summarized in Figure 2.12 in chapter two, clearly shows that a number of organizations report training as important.

Training was offered by a certified Microsoft Inc. business partner and consisted of End User Level 1 and End User Level 2 (Learnfast, 2013).

Level 1 training covered a high level introduction to SPS 2010 (SharePoint versions and basic site navigation), SharePoint List Basics (predefined list templates), library basics (library templates, creating libraries and managing documents and versioning), Working with Lists and Library Views (default views and custom views), Working with Sites (site templates, creating sites and site navigation), Page Content (add content to the pages in a site, Wiki style pages and Web Parts and Web Part pages), Forms Library (creating a Forms Library, creating InfoPath Forms, publishing InfoPath Forms to SharePoint), Site Columns and Content Types (Site Column Gallery, Creating Site Columns and Site Content Type Gallery), Office Integration (Excel, Outlook, Access integration and SharePoint Workspaces) and Managing SharePoint Site (permissions levels and permissions inheritance).

Level 2 training covered Server Site Definitions (Publishing Portal, Records Center, Search Center and Business Intelligence Center), Workflows (built-in workflows, reusable workflows, build workflows with SharePoint Designer 2010 , export workflow to Visio, import a workflow from Visio and implement logging in your workflows), My Site (social computing, profiling, blogs and colleagues - tracking changes), Site Administration (name, description, appearance, tree view, site theme, workflow settings, RSS settings, navigation and web analytics and reports), Site customization (foundation web parts, filter web parts, master page and CSS customization and page layouts), Site Collection Administration (search settings, recycle bin, record declaration settings, site hierarchy, site collection policies and portal site connection). As can be seen, Level 2 is advanced training typically geared towards creating power users and was attended by two individuals who both came from the College of Agriculture, Engineering and Science.

This two-pronged approach is in line with the Imperial College which also defined two classes of users when it comes to training namely end users and powers users. End users typically use SharePoint for team sites for collaboration and uploading documents they are working on. Power users, on the other hand, perform a wide range of functions such as setting up sites and permissions on

these sites as well as setting up web parts when needed. As a result, this relieves pressure on corporate IT as schools are able provide much of the functionality they require (Lappin & McLeod, 2010).

Armed with this kind of training, an expectation is created that the latter part of 2013 should show a keen sense of using SPS 2010 within College of Agriculture, Engineering and Science in line with the findings of Lappin & McLeod (2010) as cited above.

The *sixth finding* is that UKZN paid for and acquired the commercial version of SPS 2010 but uses the functionality that comes with the freely available foundation version; this has the effect of making the investment in SharePoint technology very expensive and difficult (if not outright impossible) to justify in terms of return on investment.

A key differentiator between SharePoint Foundation 2010 and SharePoint Server 2010, as discussed in the literature review, is that the latter includes functionality such as full-featured document, record, and web content management; extended data integration, reporting, and analysis; form and process integration automation and management; application integration; enterprise-wide search; people integration and social networking; and personalized content and alerts (Bates & Smith, 2010).

The literature discussion did underscore the importance of understanding the different editions and versions of SPS 2010 and the underlying functionality. This knowledge then empowers organisations in making the right financial decision of perhaps starting out with the free version and scaling up to the enterprise version as and when functionality requirements dictate.

The combination of the above findings seems to explain the slow and trickle effect of SPS 2010 adoption at UKZN. Of the four colleges, only the College of Agriculture, Engineering and Science uses SPS 2010 as of beginning of May

2013 (see appendix 7.4). Out of a total of 8 clusters, 5 clusters use SPS 2010 as of the same period (see appendix 7.5).

Having registered these general observations, this narrative analysis will now shift focus and look at the SharePoint instance starting with the ICT sub-cluster.

7.4   SUB-CLUSTER: INFORMATION COMMUNICATION AND TECHNOLOGY

Acquisition considerations

Before discussing SPS 2010 within ICT, this section will first explore the processes that led, in the first instance, towards the acquisition of SharePoint technology within UKZN.

The major business driver for selecting SPS was a business need raised by the Finance cluster in 2007 and defined as a need to have a document management system in order to arrest the spiraling or proliferation of paper trail across UKZN. A task team of 5 people drawn primarily from corporate IT was then assembled to look at potential solutions. In particular they looked at the following possible solutions:

Name	Functionality
ImageNow	On their website, ImageNow describe their boutique of solutions as targeting process and content management. The company thus has modular solutions for business process management, process mining, process modeling, in the *process management space*. The organization also has enterprise content management, document management, rich media management, electronic signatures, records and information management, and document management in *the content management space*. The organization also has a contract management solution to manage the composition, renewal and signing of contracts for an organization without printing and

	routing contracts in paper form.
Novell Team and Conferencing	This is a collaborative solution from Novell that allows team members within organizations to communicate and collaborate around projects. A key feature is that it facilitates the creation of workspaces into which members can be invited. The solution also boasts, inter alia, real-time collaboration for these virtual workspaces with team members able to access and share documents, calendars and discussion forums. The solution also has document management functionality with workflow capabilities.
Joomla	This is an open source solution content management system (CMS) for building web sites and online applications and requires almost no technical skill.
SharePoint (then called Microsoft Office SharePoint Server	This has been sufficiently described in chapters 3.
No one remembers the 5th solution	

Table 7.1 Solutions shortlist

The task team members attended seminars followed by a brief proof of concept which was performed by an external organization in 2009 using Microsoft Office SharePoint Server 2007 (MOSS 2007) as the then available platform.

This is a commendable exercise by UKZN as Childs et al. (2009:19) point out in the UK study that "very few HEIs undertook any formal process before using SharePoint". In fact, only one HEI is reported to have followed a task team formation strategy as many simply started using SharePoint upon realizing that it "…is available in the HEIs existing MS bundle / campus agreement" (Childs et al., 2009:19).

At the recommendation of the task team, the decision to go Microsoft SharePoint technology was made by the ICT Director in 2008 and the

overarching reason for choosing SharePoint technology was based on the licensing model offered by Microsoft.

The SIA, who is the sole surviving member of the task team, stresses that other equally important key features such as ease of use, functionality and extensibility, were all subservient to the licensing model. In other words, this was despite the fact that the Novell Team and Conferencing solution not only boasted similar functionality with SharePoint (for example, virtual workspaces for sharing documents, accessing calendars and discussion forums) but UKZN had more Novell engineers and exactly no skills in Microsoft technologies. At the end of the day, the cost of acquiring the solution was the primary determinant.

The above discussion addresses the first research question namely:

Question 1:

What are the business considerations that led UKZN to consider deploying SPS 2010?

The inclusion of Joomla (an open source solution) in the short lists of potential solutions is both good and bad news.

It is good news as it indicates UKZN's attitude or openness towards open source based solutions, something that is in keeping with Fleming & Perry's (2010) view (as stated in the literature review) that organizations are challenging the traditional approach of using proprietary licensed software and are increasingly considering using well trusted open source alternatives. This view is supported by Lawton (2009:14) when he contends that for many years open source technology was seen as a technological social movement. This perception has changed quite a lot as it is now seen as one of the "…means to developing good software, not an end in itself".

On the other hand, the inclusion of Joomla is however unfortunate as Joomla was written from the ground up to be a web content management system and *not* a document management system which is what the university was looking for. A more fitting open source solution could have been KnowledgeTree (http://www.knowledgetree.com/) which the authors thereof describe on their website as a business-centric document management system to create, organize, and discover content the way their business works.

The act of choosing between open-source based solutions and their commercial counterparts is not unique to UKZN. Nanyang Technological University (NTU) identified a need for developing a portal that would be a repository for software code components which would allow students to fast track software development projects as they could embody such code as reusable components in their projects (Goh, Ang & Sikand, 2003). Such code primarily consisted of algorithms and data structures which had been compiled into reusable components and categorized properly to reflect the underlying functionality such as stemming, compression, indexing and lexical analysis.

NTU unfortunately were constrained by a tight schedule and were thus looking for a solution that would provide a reasonable number of out-of-the-box functionality. It was also important that the solution should also run on NTU existing infrastructure which was primarily Intel based machines running on Windows. Lastly, in the likelihood of customizations being essential, it was also important for the solution to be congruent with NTU existing technical skills which were also primarily Microsoft based for example Active Server Pages. This then ruled out open source solutions such as PHP-Nuke (a PHP language based portal solution) and Zope written in Python language as NTU felt that the associated learning curve with developing in a new language would more than offset the financial savings and flexibility of using open source solutions (Goh et al., 2003).

The above discussion thus addresses the research question on sourcing commercial vis-à-vis open source solutions.

Question 4:

What reasons guided UKZN in choosing between open-source based solutions versus a comparable commercial offering?

As far as the selection process is concerned, the university did, to a large extent, follow a vendor selection process similar to the one espoused by Wang & Hamerman (2008) shown again in the diagram below.
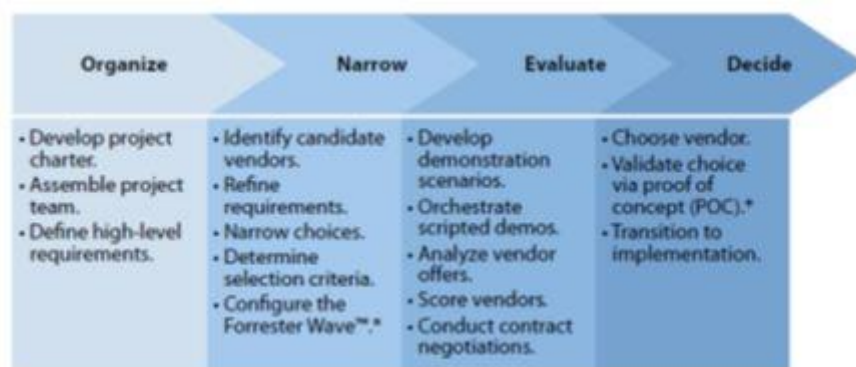
Figure 7.4: The Vendor Selection Process (Wang & Hamerman, 2008)

With the exception of developing a project charter (which would typically form part of a project methodology), UKZN, as discussed in the section titled 'acquisition consideration', did follow the other three steps. As far as the narrowing phase is concerned, UKZN *did not* compile a comprehensive solution of candidate vendors but zoomed in on a narrowed list of vendors. This has the effect of screening out potential candidates such as KnowledgeTree which Mooney & Baenziger (2007) describe as an extensible easy to use open source document management system that boasts useful features such as workflow enablement. It is primarily used by the Computational Biology and Bioinformatics at Indiana University to manage curriculum material (Mooney & Baenziger, 2007). As far as evaluation is concerned, UKZN did have scripted demos that were followed by a proof of concept which is the decision step in the selection process.

Although no documentation was kept or at least can be found, UKZN chose Microsoft Inc.'s solution based on price; thus it can be surmised that it scored the vendor highest on this attribute.

This then addresses the next research question namely:

Question 3:

Having scoured the landscape for competing solutions and meandered through the sometimes nebulous and subjective functionality touted by vendors as alluded to above by Pezzini et al (2011), what process was followed at UKZN and what criteria were used to arrive at SPS 2010 as the solution to deploy?

With the decision to deploy SharePoint technology formalized, the next logical exercise would be the installation. Four deployment scenarios were discussed in the literature review, namely on-premises deployment, hosted deployment, cloud deployment and hybrid deployment.

From interview data with the Network Manager, the only role he played was in the installation of SPS 2010 following the on-premises model.

The SIA pointed out that the decision leading to the on-premises model was based on the strategy of exploiting existing infrastructure at UKZN. This decision is in line with the observation by Ward et al., (2012) that one of the reasons for choosing the on-premises model is to exploit existing infrastructure.

The SIA also pointed out that UKZN did not consider cloud computing anyway for SharePoint deployment because the university had not yet explored cloud computing as a phenomenon for any of its existing hardware and software stack. When asked about SharePoint Online, the SIA showed lack of understanding of this option.

In this regard, it is important to note the experience of the university of Maryland University College which has a relatively long history in distance education as it provides off-campus, evening, and week-end courses for adults and part-time students. This university decided to explore SharePoint technology and concluded that it offered capabilities to be used as a combination of intranet and cloud computing technologies especially when it comes to remote access. The university specifically chose SharePoint technology because it allowed it to have a one-stop shop for information sharing that is accessible in a secure and efficient fashion (Diffin, Chirombo & Nangle 2010).

The on-premises model, as discussed in the literature review, affords an organization more flexibility in terms of patch management, integration and customization, amongst other things. In particular, the SIA reported that UKZN chose the small server farm or topology which offers limited redundancy and failover (see appendix 2.2) as it separates SQL servers from the web frontend. The installation is thus made up of two web frontend (WFE) servers supported by a standalone SQL server.

As to whether this is an optimal configuration for a university the size of UKZN, maybe suggests that one revisits capacity planning and management as discussed in chapter two. The number of services and features (such as business data connectivity service and timer service as some of the examples given in the literature review) to be activated is an important consideration. Another important consideration is estimating the size for content database a suggested formula was also mentioned in the literature review.

The SIA also reported that UKZN did not do any database sizing but instead chose to follow the recommended topology as drawn up by Microsoft Inc. on their website. Notwithstanding redundancy and failover requirements, this topology, given the trickle effect of user adoption, does seem to lean towards overcapacity for now especially given the fact that most of the services and features are not enabled.

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The above discussion answers the following research question:

Question 5:

Given the number of deployment scenarios, ranging from the traditional on-premises hosting to cloud computing, what is the chosen deployment model at UKZN and what informed that decision?

Having looked at acquisition considerations, the next section is a narrative analysis of the current usage of SPS 2010 specifically in the ICT sub-cluster.

SharePoint usage within ICT

The installation process for SharePoint creates a farm of servers (it could start as small as one server) which runs as a web application in the Internet Information Server web server. A root instance is deployed on the web server from which child sites can subsequently be created. Each child site could represent various departments within an organization with distinct policies for security and access rights, branding and content. This is clearly captured in the diagram below.
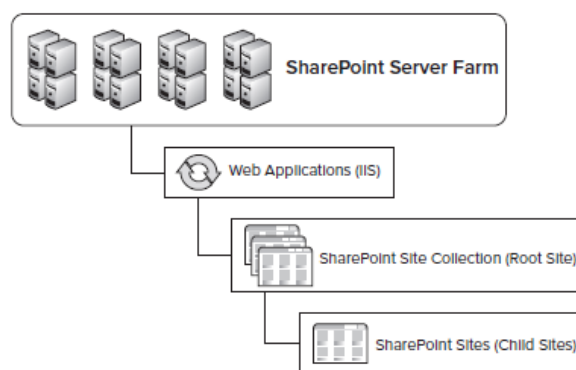

Figure 7.5: SharePoint Server Farm (Fox, 2010)

This is the architecture followed by UKZN as well where the child sites take the form of schools within colleges and clusters. In order to understand usage patterns within a school or cluster, the researcher used access privileges to the

various sites, using the root site (see diagram below) as a starting point. By scrutinizing artifacts deployed, one is able to have a fair assessment of what SharePoint is being used for.
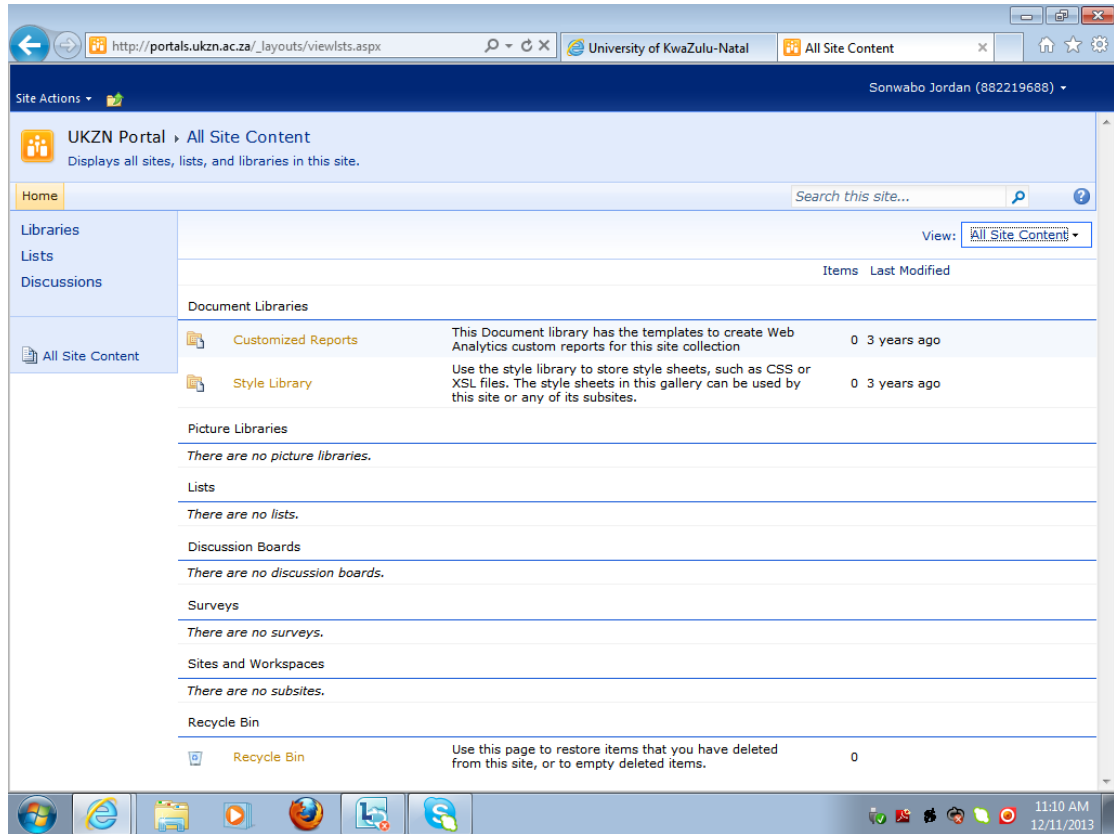
Figure 7.6: SharePoint Root Site

As discussed in chapter six, observation is another form data generation. Consequently, the above diagram shows (top right hand corner) a user with the name of 'Sonwabo Jordan (student number)' having logged into the SharePoint instance at UKZN on the production server. This is the home base or landing page and is the equivalent of the root site in Figure 7.5: SharePoint Server Farm.

On closer scrutiny, it is apparent that no artifacts have been defined for the root site: the picture library, lists, discussion boards, surveys and workspaces are all empty. When asked why this is so, the SIA reported that development of the landing page (the root site) was put on hold following the decision to upgrade to SharePoint Server 2013. This effectively means the root site has been empty since installation. This is somewhat disappointing as the landing page could, for

example, be used to run organization wide surveys, organization wide discussion threads, running a calendar with events that appeal to the UKZN community.

Laced with some creativity, out-of-the-box thinking and vision, the landing page could be used a as a teaser: a foretaste of things to come.

The next stop is the ICT sub-cluster site shown in the two diagrams below. Figure 7.7 (a): ICT SharePoint site shows the top part whilst Figure 7.7 (b): ICT SharePoint site shows the bottom part of the same site.
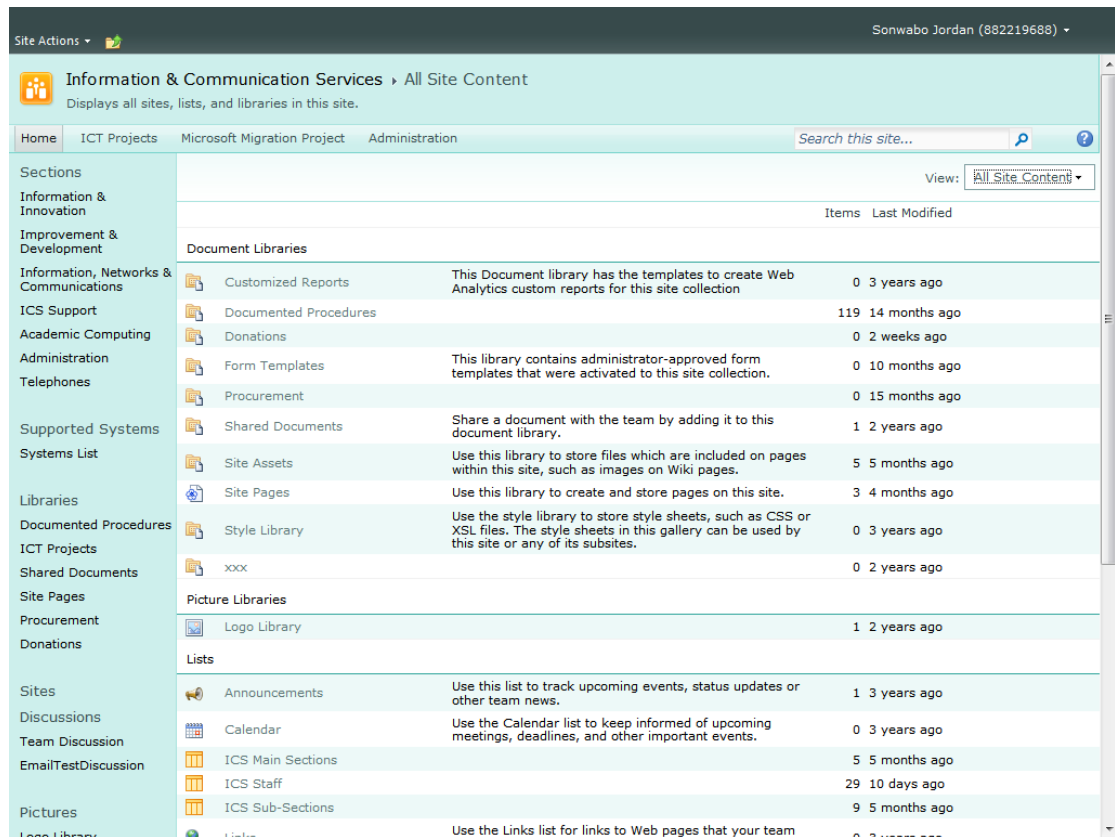
Figure 7.7 (a): ICT SharePoint site
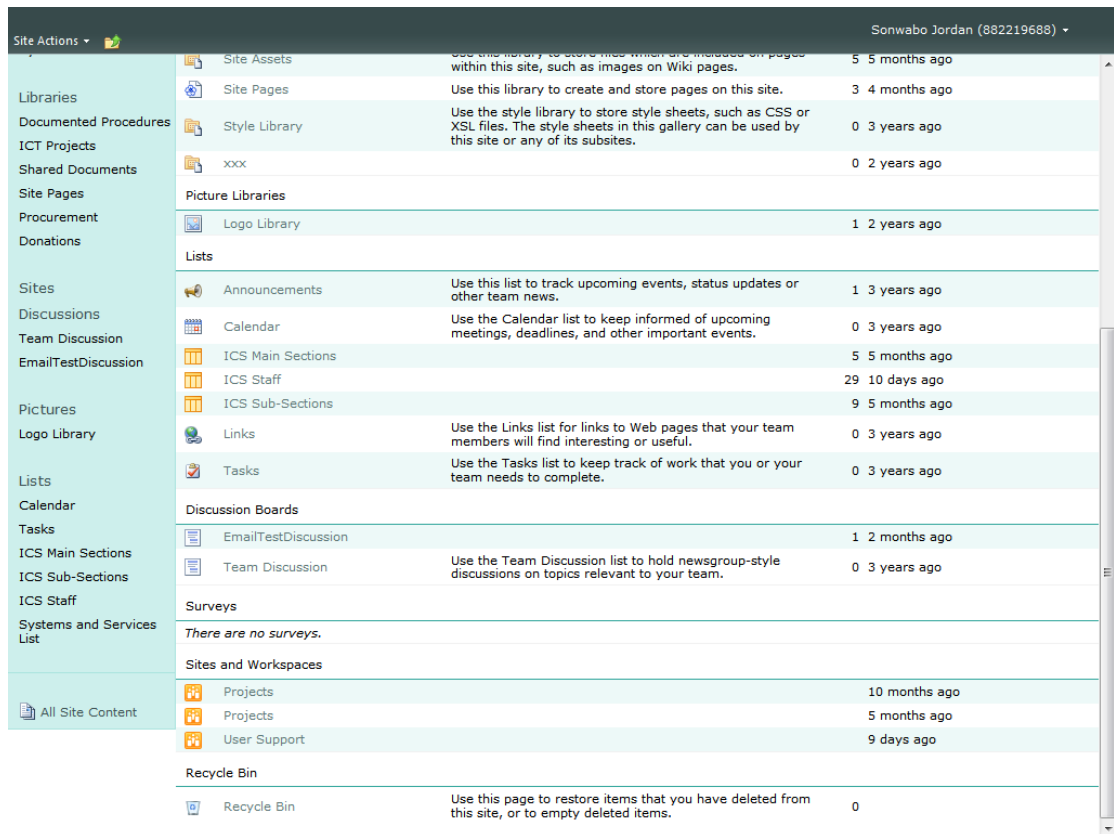
Figure 7.7 (b): ICT SharePoint site

The literature review pointed out that lists, libraries, workspaces and web parts are key components of SharePoint technology. These four artifacts, with specific reference to the two figures above, will now be used as a key constructs or organizing devices in determining usage within the ICT sub cluster.

Lists

Lists were described in the literature review as being a primary and core artifact in SharePoint technology as they are one of the most commonly used functionality points (Coventry, 2010).

From the screenshot in Figure 7.7(a), it is clear that ICT have the following out-of-the-box lists deployed: announcements, calendar, links and task. However, they are not necessarily using all of them as can be seen by the zero instances shown in the screenshot. The announcements list shows an instance of one;

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however, when the researcher clicked on the list, it turned out to be an empty shell with no announcements ever loaded.

From either of the two screenshots, it is also clear that ICT has defined three additional custom lists namely, ICS Main Sections, ICT Staff and ICS Sub-Sections. The first list captures section names and sub- sections therein (one example is a section called innovation with subsections of academic computing, institutional intelligence and shared services), the second list is a staff contact list with phone numbers whilst the last list captures information similar to the first list. The issue here is *not* so much what the meaning of these sections and subsection are, but the fact that functionality within SPS 2010 for creating custom lists exists and is, at least, being utilized.

From Figure 7.7 (b), it is also clear that ICT have created two discussion boards called 'EMailTestDiscussion' and 'Team Discussion'. Discussion boards are a specialized form of a list for managing discussion threads. However, on accessing both discussion boards, they were found to be empty.

As can be seen in appendix 3.1, SPS 2010 ships with a total of thirteen lists which, with minor tweaking, are ready for deployment. Whilst no list can be seen as being more important than the other, the list such as the Issue Tracking list (capability to track issues raised or problems associated with a product or project thus allowing a user to assign, track and prioritize issues in the list) should typically find usage within an organization. When deployed by UKZN, it would allow members of the university (students included) to capture an issue (for example, a burst pipe in the toilet) and track it until resolution.

Of the thirteen out-of-the-box lists, the ICT sub-cluster thus uses two forms of lists: the custom list and the discussion board.

Libraries

Libraries, which are actually a specialized form of a list as discussed in chapter 3, are one of the most useful features in SharePoint technology (Londer & Coventry, 2011). Typical libraries that can be created in SPF 2010 include a document, form, picture and wiki page library whilst SPS 2010 includes libraries such as report and slide libraries.

As can be seen in Figure 7.7(a) above, the ICT cluster currently uses the document library and a picture library.

Workspaces

Workspaces were described as websites prepopulated with initial pages, lists and libraries. A number of workspaces were discussed in chapter three namely a basic meeting workspace, a blank meeting workspace, a decision meeting workspace, a blank site, a blog, a decision meeting workspace, a document workspace, a group workspace, a group workspace, a multipage meeting workspace, a social meeting workspace and a team site.

From looking at the two screenshots above, ICT only uses the team site workspace which is the default workspace when installing SPF 2010.

Web Parts

As just mentioned, web part artifacts in SharePoint technology were described in the literature review chapter as a core and fundamental building block as they have the potential to extend SharePoint functionality (Wilen, 2011). Appendix 3.4 lists the different web parts available for SPF 2010 and SPS 2010.

Again, by exploring the ICT site and from data gleaned from the interviews, ICT does not use any of these web parts.

Workflow

Another key feature in SharePoint technology is workflow, which has the potential to automate processes across UKZN. The SPS 2010 Foundation comes bundled with a single workflow called a three-state workflow. SPS 2010 on the other hand comes with several workflow templates as discussed in chapter three: examples include an approval workflow, a collect feedback workflow, a collect signatures workflow, a disposition workflow and a translation workflow.

Typical usage could be a leave application that is first captured and put in a queue for processing (this would be state one as the application awaits approval from the immediate manager), then run against an HR system to verify available days for leave consumption (this would be state two), and finally a courtesy email sent to concerned business partners informing them of the pending absence and who to contact during the period of unavailability (this is state three).

The Imperial College, for example, facilitates collaboration between researchers within the college and their counterparts wherever they are in the world. Researchers planning to publish use workflow capabilities of SharePoint to create tasks and notifications for comment on papers as milestones are reached or deadlines approach (Lappin & McLeod, 2010).

Again, by exploring the ICT site and from data gleaned from the interviews, ICT does not use such capability within their sub-cluster.

The reason proffered by the SIA for these empty artifacts is the same as previously stated for the unpopulated root site: further development has been shelved pending the migration to SharePoint 2013. However, this again points out that these have been empty since installation.

In summary, it is disappointing to note that major constructs or key functionality in SharePoint technology (list, libraries, workspaces, web parts and workflow) are not being exploited by the ICT sub cluster. This flies in the face of the

findings by Miles (2011: 4) that "IT is by far the most advanced department for adoption and use" because it reflects ownership of SharePoint. He further reports that "project management and Internal IT support are the two most popular business processes to be automated with SharePoint" Miles (2011: 4).

It is not difficult to see the core problem(s) that beset ICT thus portraying them as low key users of the solution. Perran et al (2011) identified several key roles for SharePoint technology as shown in appendix 7.9. All these roles are currently handled by the SIA.

How does one person juggle roles between ensuring that the implementation remains congruent with organizational goals and initiatives (SharePoint owner), maintenance of the SharePoint farm (SharePoint Infrastructure Administrator), maintain a communication link between the corporate IT support and the end user community (SharePoint Solution Architect), branding and solution layouts (SharePoint Branding Specialist), design of the SharePoint site based on the direction from the Site Owner (SharePoint Site Designer) and day to day end user support (SharePoint Help Desk)?

However, it is commendable that UKZN is currently upgrading to SharePoint Server 2013 (SPS 2013) because one of the key features of this release is the new design that has a wider target reach that spans traditional laptops and desktops to include touch-based slates and smartphones. For example, SPS 2013 boasts new mobility features that "…provide improvements in rendering content and location-aware lists that can aid in mobile application development. It also supports applications on mobile devices that should receive notifications from a SharePoint site" (Coventry, 2013:24). It is also commendable that UKZN is deploying SPS 2013 on the Windows Server 2012 as it provides robust data security and compliance solutions built on strong identity and authorization solutions in keeping with the mobile 'work-everywhere culture' demands of today (Tulloch, 2012).

Takeaways and lessons learnt

In keeping with the study by Childs et al. (2009), the researcher concluded the interviews with the SIA by enquiring what his closing thoughts (takeaways and lessons learned) are on the SharePoint project since his involvement in 2007. This was done in an email conversation (see appendix 7.3).

In terms of takeaways, that is positive milestones for him:

"The introduction of a document management system to UKZN. Moving from a manual system to an electronic one, is something that was positive. It was a huge mind-set change for people to work with documents differently, thereby training was key. That is something that I would do the same. Training users to understand the system is something that I would do again. It is also key to give users what they want and not for IT to introduce something they think the user needs" SharePoint Infrastructure Administrator, UKZN ICT.

In terms of lesson learned:

"From a lessons learnt perspective, I would have got more support from management, and every time a team member on the project left, I would replace them with another member. Also, to diversify skills sets, depending on the product and the streams, the correct skills set should be allocated to the correct people.

Had I known how long this project was, I would have followed a proper project plan & methodology" SharePoint Infrastructure Administrator, UKZN ICT.

7.5   SCHOOL OF CHEMISTRY AND PHYSICS

This school provides concrete evidence of an organization that follows the organic approach with regards to the implementation of SharePoint. It was mentioned in the literature review that a key positive feature of this approach is that "… because it is focused on providing sites where teams need and want

them, there is generally high user acceptance and adoption" (McLeod, 2010: 339). However, a key caveat for this approach is that it lends itself to SharePoint sprawl manifesting itself as "…users camping outside the SharePoint administrator's door, demanding a never-ending stream of enhancement, site creation and integration requests" (Chennault & Strain, 2009:7). McLeod (2010: 339) also cautioned that "the main challenge for the organic approach is the issue of scalability".

Flowing from interview data with an associate professor (AP) within the school of Chemistry and Physics, it became clear that he exhibits not only a keen understanding of SharePoint functionality but is also quite focussed on what he wants to achieve with SharePoint technology.

It all started when the school was introduced to SharePoint technology by corporate IT in the form of presentations and demonstrations. The AP then took it upon himself to fast track his education around the product by looking at websites of other universities using SharePoint and also looking at YouTube videos. He was impressed with the University of Queensland's usage of SharePoint in facilitating research within the university (Queensland University of Technology, 2013). He was also impressed by the usage of SharePoint at the School of Chemistry at the Durham University which uses SharePoint as a central repository for their health and safety policies such as chemistry safety policy, chemistry safety audit, moving items by hand, good laboratory practice, protection of hands and disposal of waste (Durham University, 2013).

In late 2012 the AP made a strategic decision to use the collaborative features of SharePoint to drive research initiatives within the school. He further mentioned that the primary driver for the school for wanting to use SharePoint technology emanated from the merging of university campuses and the resultant need to share data.

The AP further appreciates and shows a good command of the value of integrating with existing solutions within UKZN. He then sought help from

corporate IT in integrating the school's SharePoint site with the Integrated Tertiary System (ITS) within the university as this would help avoid duplicating data and functionality. ITS is an administrative system and is also "…the main ERP system at the University of KwaZulu-Natal. This system manages all Student, Human Resources, Payroll, Finance and Asset information." (University of KwaZulu-Natal, 2013d:1). A typical integration scenario would be pulling information about a student from the student database alleviating the need for capturing the information all over again.

Landing page

All of the clusters (with the exception of ICT) and schools using SharePoint do not have a landing page; that is, there is no topmost site that has public viewing rights. When the researcher asked the AP for reasons for locking up the entire school site, the answer given was that this was a security directive from corporate IT. When the researcher asked the SIA, the answer given was that it was actually the schools that had chosen to lockup the entire site.

However, the AP kindly supplied a screen shot of the school's landing site which is shown in the diagram below.
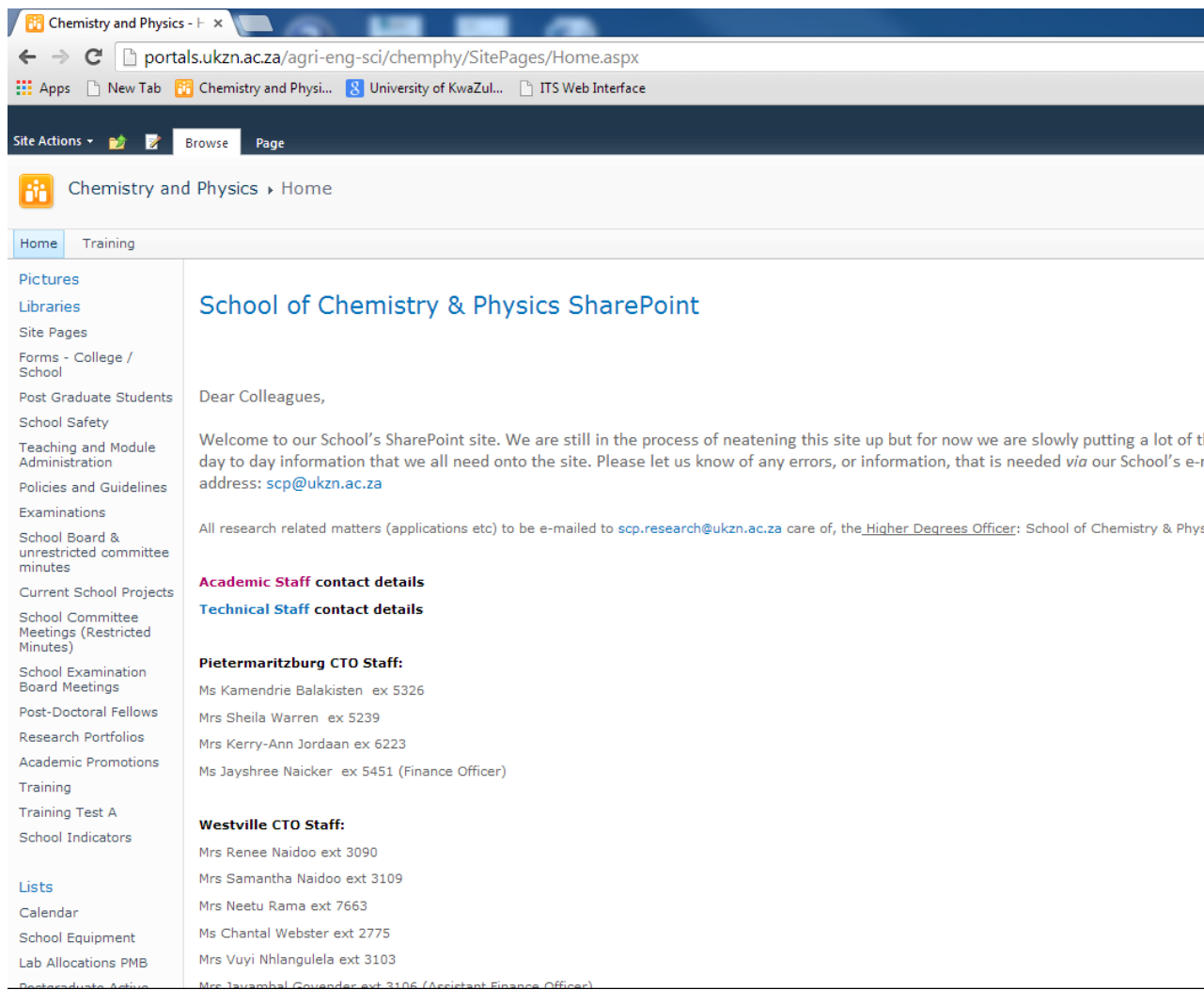
Figure 7.8: School of Chemistry and Physics Landing page

As can be seen in the screen shot above, there is no classified and confidential information but a warm welcome to visitors with some useful contact details. In other words, as discussed earlier, the landing page can be used as a general entry point to a school's site capturing key data of an advertising or general information nature.

Usage patterns

In analyzing usage patterns with the school (as was in fact done for other schools as well), a similar approach was followed namely logging into their site (or asking for screen shots) and following up with interviews as was done with ICT. However, in anticipation of a lower technical understanding of SharePoint

technology, the researcher prepared a separate set of questions to guide the interview as shown in appendix 7.6.

As shown in the diagram below, the school uses SPS 2010 primarily as a document management system, uploading various documents used by the school and assigning various access rights to members of the school.

Figure 7.9: School of Chemistry and Physics
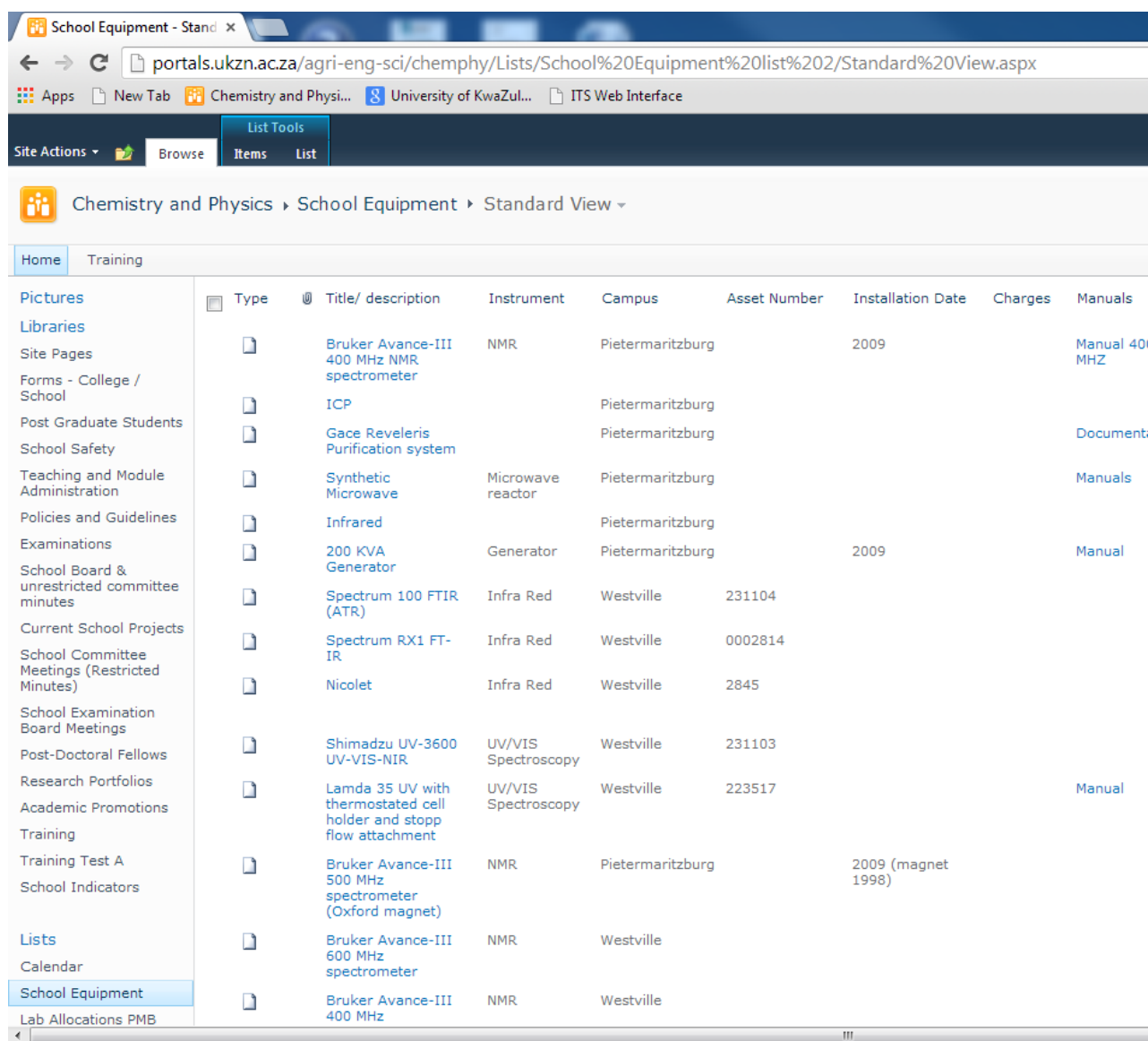
What can be gleaned from the screen shot above is that a number of libraries have been defined for uploading documentation. A very self-explanatory library

is the School Board library (unrestricted access) as well as the School Committee Meetings (restricted access).

What can also be gleaned from the screen shot above is that a number of lists have been defined, for example the School Equipment custom list. On clicking on this list, the user is navigated to a detailed breakdown of this list as shown in the screen shot below.

ri-eng-sci/chemphy/Lists/School%20Equipment%20list%202/Standard%20View.aspx

ysi... University of KwaZul... ITS Web Interface

ool Equipment ▸ Standard View ▾

Search th

Title/ description	Instrument	Campus	Asset Number	Installation Date	Charges	Manuals	Quick Start Guide	Location	Model	Equipment Use	Ph
Bruker Avance-III 400 MHz NMR spectrometer	NMR	Pietermaritzburg		2009		Manual 400 MHZ		Room 9	Avance-III	Teaching Postgraduate	
ICP		Pietermaritzburg									
Gace Reveleris Purification system		Pietermaritzburg				Documentation					
Synthetic Microwave	Microwave reactor	Pietermaritzburg				Manuals		Warren Lab		Teaching Postgraduate	
Infrared		Pietermaritzburg									
200 KVA Generator	Generator	Pietermaritzburg		2009		Manual					
Spectrum 100 FTIR (ATR)	Infra Red	Westville	231104				QSG Spectrum 100	Instrumnet Lab	Spectrum 100		
Spectrum RX1 FT-IR	Infra Red	Westville	0002814				QSG	Instrumnet Lab	Spectrum RX1	Teaching Undergraduate	
Nicolet	Infra Red	Westville	2845					Research Instrument Lab LHS	Impact 400	Please select or enter new	
Shimadzu UV-3600 UV-VIS-NIR	UV/VIS Spectroscopy	Westville	231103				QSG	Instrumnet Lab	UV-3600	Teaching Undergraduate	
Lamda 35 UV with thermostated cell holder and stopp flow attachment	UV/VIS Spectroscopy	Westville	223517			Manual	QSG	Pysical Chemistry Lab	Lamda 35	Teaching Undergraduate	
Bruker Avance-III 500 MHz spectrometer (Oxford magnet)	NMR	Pietermaritzburg		2009 (magnet 1998)				Room 2	Avance-III	Teaching Postgraduate	
Bruker Avance-III 600 MHz spectrometer	NMR	Westville						NMR laboratory	Avance-III	Please select or enter new	
Bruker Avance-III 400 MHz	NMR	Westville						NMR laboratory	Avance-III	Please select or enter new	

Figure 7.10: School of Chemistry and Physics

The above custom list captures key equipment used by the school some of which costs more than a million rand. Key features of the list are the campus location (for example Pietermaritzburg or Westville) of the equipment as well as downloadable manuals for the equipment. Other key fields captured in the diagram above include the laboratory location field for the equipment (for

example, NMR laboratory) as well as what the equipment is used for (for example, teaching postgraduate).

The school has also created a custom list called an active directory of postgraduate students. As can be seen in the diagram below, the school is able to capture, for each student, details such as the supervisor, the degree registered and the planned completion date.

Figure 7.11: School of Chemistry and Physics

It is important to note that most of the field data in the above list already exists within the UKZN business application repositories. For example, given a student ID as a key, column details such as name, surname, degree and campus, can potentially be extracted from the underlying student database housed within ITS. However, in the absence of integration, the school had to capture all this information by hand.

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The school has also developed a few other custom lists and one example of these is a list that captures the actual progress for higher degree students and any interaction with the supervisor with the objective of reporting on progress. The school calls it a 'Progress report on higher degrees candidates' and an example is shown as appendix 7.8. The form is filled in manually and then captured into the defined list in SharePoint.

This is in line with research findings by Rockinson-Szapkiw, Dunn & Holder (2010) where SharePoint technology is used to streamline and managing dissertations for online students.

Business process automation

The AP also appreciates and exhibits a good command of business process management and has a vision of workflow enabling the school's SharePoint site. The strategy is to automate a number of processes and, key to this, making use of electronic signatures.

For example, the 'Progress report on higher degrees candidates' cited above, is a potential candidate for automation. The AP agreed with the researcher's view that the school could benefit from automating this process by using InfoPath to design and deploy a form which would allow a student to update the report online. As discussed in chapter four, InfoPath has a number of capabilities such as validation to ensure data integrity, a forms management service that allows offline capture and subsequent synchronization with SharePoint. On submission, a custom workflow could trigger a process that then updates the defined list in SharePoint. Lappin & McLeod (2010) report that Cranfield University plans to use InfoPath forms to capture travelling claim details and then take advantage of the workflow functionality in SharePoint to automate the entire process.

Armed with this repertoire or bouquet of desired functionality (integration with ITS, workflow, electronic signatures amongst other things) planned for the school's SharePoint site, the AP approached corporate IT for assistance. Unfortunately, as pointed out by Chennault & Strain (2009:7), another key feature of organic bottom-up implementations is what they call the SharePoint Effect namely "...growth beyond the reach of IT resources". In fact, the Imperial College has some very sound advice to institutions implementing SharePoint in the form of key questions namely, "how will the support for users be provided?; can your help desk cope with supporting SharePoint users when the implementation scales up?; if colleagues want to use Visual Studio to do complex workflows can ICT support them, or are they on their own?" (Lappin & McLeod, 2010:21).

Firstly, the AP expressed exasperation at the SharePoint project being run by one person (whom he actually called by name) thus corroborating a standing observation noted by the researcher from the start of the research period. *Secondly*, he also noted that workflow is disabled on their school's site. *Thirdly*, the AP mentioned that he has been asking for electronic signatures since 2012 with corporate IT (specifically the SIA) continually offering one reason or the other and effectively moving the delivery date. The researcher had the privilege of being allowed by the AP to read a strongly worded email from him to corporate IT with a promise to escalate the matter to the Office of the Registrar. *Fourthly*, the HOD is of the opinion that corporate IT does not fully understand the depth and width of the product. *Lastly*, the AP strongly believes corporate IT should invite people or organizations from the private sector to come and address UKZN on the scope of SharePoint technology and share their experiences with the university.

Training

In discussing general findings at UKZN, it was mentioned that training on Microsoft SharePoint 2010 End User Level 1 took place mid-2013. The training was attended by the College of Agriculture, Engineering and Science (School of

Engineering, School of Agriculture, Earth and Environmental Sciences, School of Chemistry and Physics, School of Life Sciences and School of Mathematics, Statistics and Computer Science) with each school represented by at least one person. Additionally, two users from the School of Chemistry and Physics attended Microsoft SharePoint 2010 End User Level 2 training in August/September 2013, an advanced course in SPS 2010.

One of the key roles defined by Perran (2011) is that of SharePoint Power User described as an experienced user who manages other user access to the site, uploads content, designs the site, and manages first-level user support. Indeed, the training content offered in the End User Level 2 is pitched at the power user level; for example server site definitions, site administration and workflow.

In discussing general findings at UKZN, it was also mentioned that armed with this kind of training – especially the inclusion of Level 2 training - an expectation is created that the latter part of 2013 should show a keen sense of using SPS 2010 with the College of Agriculture, Engineering and Science.

However, on attempting to interview the users who attended the Level 1 training, a number of them (at college level and at a school level) pointed the researcher to the two power users for any discussion around SPS 2010. The reason given for this is that SharePoint has not been deployed in their respective sections and that it is the two power users who drive SPS 2010 within the college.

On interviewing the two power users late November early December 2013, they reported little or no activity at all in SPS 2010 since attending training. They contend that time has not allowed them to do so and matters are now accentuated by the year-end processes, notably the examination process. However, they conceded that they obtained good grounding in SharePoint technology since attending the two courses.

This behavior shows some unexpected anomalies as far as the organic approach is concerned. It will be remembered that one of the key positive characteristics of this implementation methodology is that "…there is generally high user acceptance and adoption" (McLeod et al., 2010:339). In other words, almost six months after the not inexpensive training availed, SPS 2010 continues to lie underutilized in the data center of UKZN.

Technological dimensions

In discussing the modified OBGT model in chapter five (see Figure 5.4: Modified Organizational, Business, Technological, and Governmental framework), it was stated that one of the major constructs is the technological dimensions. It was mentioned that the technological dimension is a major determinant for the behavioral intention to use depending on the perceived usefulness and perceived ease of use. It was also mentioned that the communication channels (knowledge, persuasion, decision, implementation and confirmation) also play a key role in technology acceptance.

All interviewees attest to the apparent usefulness of SharePoint technology and also attest to its relative ease of use. In the OBGT model, what seems to be missing is the continued adoption as seen by lackluster usage within the college.

7.6 OTHER SCHOOLS WITHIN THE COLLEGE OF ENGINEERING AND SCIENCE

Usage of SPS 2010 in other schools within the college show similar patterns with the School of Chemistry and Physics. Where SPS 2010 is being used, whatever the level of usage, it is used as a document management system uploading various artifacts such as Word documents and minutes.

7.7 SHAREPOINT USAGE IN CLUSTERS

Following the executive committee structure, UKZN has the following clusters: Chief Financial Officer, Student Services, Human Resources and Equity, Teaching and Learning, Research, Registrar, Corporate Relations and Physical Planning and Operations (see appendix 7.5).

The narrative analysis will now focus on the clusters that have an instance of SharePoint in their environments.

7.7.1   OFFICE OF THE REGISTRAR

According to the UKZN website, "the main functions of the Registrar's division include, but are not limited to providing administrative, legal and secretarial services to the University Senate, Council and the Executive. The division is also responsible for the dissemination, implementation and maintenance of University-wide policies, procedures and systems" (University of KwaZulu-Natal, 2013a).

Telephonic interviews were held with the legal services as well as the administrative services sub cluster within the Office of the Registrar.

Legal Services

The legal services support services provides professional legal services to UKZN and these include litigation management, contracts management, provision of general legal advice, copyright management, student discipline management and protection of University from Legal Risk (University of KwaZulu-Natal, 2013b).

From the telephonic interview session with the Administrative Support Office: Employment Litigation, the legal services sub cluster is at the 'crawling stage' as they have just started using SPS 2010. The major driver for using SharePoint technology is that they handle extensive paper trails emanating from sources such as the various legal courts of the country as well as the Commission for

Conciliation, Mediation and Arbitration (CCMA), a dispute resolution body established in terms of the Labour Relations Act, 66 of 1995 (LRA). The legal services sub cluster is thus subject to strict auditing as it handles confidential material on behalf of UKZN.

During the interview session, the interviewee mentioned that the sub cluster has decided to adopt a very cautious approach to SharePoint as they see this as a potential threat to accessing the sensitive information in their repositories. As a result, they have insisted on signing a non-disclosure agreement with corporate IT to ensure confidentiality. Secondly, processes such as contracts and copyright management are housed in a separate business application called ImageNow which is not accessible outside the legal services sub cluster. ImageNow is a commercial solution from an organization called Perceptive Software which defines its product as a solution that offers organizations "…enterprise document management, imaging and workflow solutions that seamlessly integrate with business systems to provide users with single-click access to supporting documents" (Perceptive Software, 2009:1).

From the definition, it is important to note that there is potential overlap in functionality between ImageNow and SPS 2010. This is also acknowledged by Perceptive Software as well when they state that with the release of SPS 2010, Microsoft Inc. has been noted as entering the enterprise content management space and has thus "…moved closer to the turf of established enterprise content management (ECM) providers, such as Perceptive Software" (Perceptive Software, 2010:2).

In discussing critical success factors in the literature review, McLeod et al (2010) did warn that where SharePoint offers duplicate functionality, the organization needs to recognize and have a plan for that. When asked what the strategy is for handling this duplicate functionality, the answer given is that there are no plans at this stage to either move to SPS 2010 or to perform any integration between the two products. The primary reason for that is the sensitive nature of their work and the fact that SPS 2010 is new to them.

However, Perceptive Software contends that the two solutions "…can work together, and companies that use them both would be better served using the solutions' respective strengths to improve business processes" (Perceptive Software, 2010:2). Indeed it is important to note that the University of the Free State (UFS) reported a 35% improvement in staff productivity following the integration of Perceptive Software process and content management technology with Microsoft SharePoint. UFS reports that "…Perceptive Software provides complementary enterprise content management (ECM) and business process management (BPM) functionality to SharePoint. This tight integration brings the strengths of both applications together, providing SharePoint users a vastly extended set of document management capabilities to support and refine key business processes" (Perceptive Software, 2013:1). As a result, "…faculty and staff at a university of nearly 30,000 students can access personnel, academic, expense and other documents right inside SharePoint without having to jump into other applications" (Perceptive Software, 2013:1).

Perceptive Software, author of ImageNow, identifies five potential integration points between the two solutions. *Firstly*, organizations that have recurring workflow rules and large volumes of documents, can leverage this functionality as ImageNow was designed to manage high volumes of transactional content. Scalability and integration issues are also relatively easy to manage as ImageNow can integrate"… with components running on a mix of OS platforms, including Windows, Linux, AIX and Solaris — without enlisting a consultant or third-party solution provider" (Perceptive Software, 2010:3). *Secondly*, organizations can use SPS 2010 to manage low volume but collaboration centric documents with dynamic content. *Thirdly*, an organization can use ImageNow as a backend solution to manage documents and processes, with SPS 2010 deployed as a frontend portal or intranet with access only for authorized users. *Fourthly*, an organization can leverage the native search capabilities of SPS 2010 to locate and view ImageNow artifacts. *Lastly*, an organization can exploit ImageNow imaging capturing capabilities for

subsequent deployment into SharePoint as shown in Figure 3.4: Document Imaging.

It thus remains to be seen what integration, if any, will result between SharePoint technology and ImageNow. It is also important to note that this sub cluster has not yet attended the kind of training attended by the College of Agriculture, Engineering and Science.

Administrative and secretarial services

From the interview sessions with the Committee Officer and the Head of Committees, the sub cluster reports that it has been upgraded to SharePoint Server 2013 (SPS 2013) and that they use it quite often. Despite having received no formal training in SPS 2013, the Committee Officer interviewed reports that they find the product very intuitive and not difficult to use. They use SPS 2013 primarily to upload various forms of documentation such as minutes and agendas.

Technology dimensions

Despite describing themselves as 'crawling stage' users of SharePoint technology with no formal training credentials, the Legal Services sub cluster attests that they can clearly identify with the usefulness and ease of use of SPS 2010. The Administrative and secretarial services shares similar sentiments.

7.7.2   RESEARCH OFFICE

From the telephonic interview conducted with the Research Office Manager, she reports that she is currently the only user of SPS 2010 within the research office. Although she did not attend formal training on the product, she finds it quite intuitive and not complex and is thus self-taught using it as a document management solution. As far as technology dimensions are concerned, she can also identify with the usefulness and ease of use of SPS 2010.

7.7.3   CORPORATE RELATIONS

Usage of SPS 2010 in this cluster shows similar patterns with the clusters discussed above with the solution being used as a document management system uploading various artifacts such as Word documents and minutes.

7.7.4   QUALITY PROMOTION & ASSURANCE

The mission of the Quality Promotion & Assurance (QPA) support service, which falls under the University Teaching and Learning Office, "…is to ensure the promotion and development of a culture of quality in the University of KwaZulu-Natal through a comprehensive quality assurance system" (University of KwaZulu-Natal, 2013c).

From telephonic interviews with the Improvement and Development Manager from the Information & Communication Services Division, the QPA support service will be rolling out - in 2014 - workflow enabled solutions that integrate online forms with SharePoint technology. The online forms will be generated using Microsoft InfoPath (discussed under the SharePoint ecosystem section in chapter four) and native SharePoint workflow (discussed under the workflow management section in chapter three) to automate some of the processes within the support service for example, corporate governance and quality assurance around new teaching modules for the university.

If this functionality is indeed rolled out as envisaged, it will be a major milestone in the history of SharePoint technology at UKZN, as it will mark the beginning of using the exclusive functionality embedded in SPS 2010 (commercial offering) as opposed to SPF 2010 (free to use version). The differences between the two offerings were discussed under the SharePoint 2010 versions and editions in chapter three.

7.8   INTEGRATION PATTERNS

UKZN experienced quite a revolutionary growth in the wake of its amalgamation with three formerly autonomous institutions in 1994. These institutions are the former University of Durban-Westville, the University of Natal (Durban), and the University of Natal (Pietermaritzburg) to form what is now known as the University of KwaZulu-Natal.

The implication of this revolutionary growth is that the resultant organization inherits a number of systems that need to be managed one way or the other. For example, each institution would, in all probability, have had its own payroll system, its own financial management package and its own student registration system. Such an amalgamation thus heralds in a key challenge for the university namely to determine the most efficient way of managing these systems either by way of consolidation into one system or managing these systems as distinct entities with or without some form of integration.

Another implication for the amalgamation is that when a new system is introduced, for example SPS 2010, it becomes part of an existing ecosystem that can be treated in primarily a similar fashion. One way is to treat the new system as an additional member of the ecosystem that occupies some point in a hierarchy of some form and does its work in an almost oblivious attitude to other members of the ecosystem. The other alternative would be to see the ecosystem as comprising members who complement or supplement individual efforts striving for synergy amongst the constituent members with the view of bringing greater value to an organization. Fox (2010:278) aptly calls this an attempt at "unlocking critical business data that resides in large enterprise systems".

The study by Lappin & McLeod (2010) also recognized this phenomenon amongst the HEIs in the UK as students and staff needed to interact with existing solutions such as a virtual learning environment (VLE), library system, student record systems, human resource system, finance system and content management systems. The Glasgow University, in particular, deployed SharePoint as a student portal with the specific aim of "…enabling them to

collect their own information (i.e. email, files) together; It will also provide web parts linking to university systems allowing students to access the student records system, library services, printing services, and learning materials on the VLE" (Lappin & McLeod, 2010:15).

One of the research questions posed by this study is determining the potential of using SharePoint technology as an integration platform. The question was

Question 6:

To what extent is SPS 2010 being used as an integration platform for aggregating data from the disparate application repositories or information silos that exist at UKZN?

A number of systems exist within UKZN and, whilst not exhaustive, the following table maps and briefly describes some of the key systems.

System	Name	Description
	Moodle	Moodle is a web application for creating online learning sites. It is a Learning Management System sometimes called a Virtual Learning Environment. (http://moodle.org).
	HEAT	HEAT is a modular customer service and support solution for IT help desks, support centers and call centers. It has a module for customer service and a lifecycle dashboard monitoring for call resolution (http://www.smasystems.com/products/heat.htm).
	Oracle Financials	An enterprise resource planning (ERP) solution from Oracle Corporation (http://www.oracle.com).

| | | ImageNow (now actually called Perceptive Content) | ImageNow is a solution from a company called Perceptive Software and is described on their website as having document management, electronic signatures, records and information management, and document composition functionality (http://www.perceptivesoftware.com/products/perceptive-content).

Such functionality overlaps with SPS 2010. |
|---|---|---|---|
| | | SharePoint | An enterprise-wide modular solution that brings people together different forms of collaboration such as enterprise content management, web content management and social computing using tools such as wikis and blogs. |
| | | Performance Management System | A system for capturing performance which the UKZN website describes as "a holistic process of people management in which the primary objective is the establishment of a culture in which individuals and groups take responsibility for the achievement of high levels of organisational performance through enhancement and full utilisation of their own skills, behaviour and contributions" (http://hr.ukzn.ac.za/Integrated-Talent-Management/PM/About-Perfomance-Management.aspx). |
| | | Student Management System | Key features of this custom-built solution are the capturing of student marks and calculating duly performed (DP) statistics for examination qualification. |
| | | Library System | This is a custom-built library system with modules for acquisitions, cataloging, circulation and the public interface for users (OPAC). The system has, amongst other things, extended functionality in the form of search engines such as Primo which allows searching of local and remote resources such as e-journals e-books. |

	SiteFinity	This is primarily an ASP.NET based web content management (WCM) that empowers content creators or subject matter experts to exert full lifecycle management of the content they create. Such content is primarily driven for consumption on the web. It boasts additional features such as out-of-the-box mobile content creation for any device using mobile applications and mobile websites. It also has features of building Ecommerce sites, incorporate personalization and social media (http://www.sitefinity.com/). The WCM features overlap with the WCM features of SharePoint.

Table 7.2: Select systems deployed at UKZN

It is important to note that the above table simply plots the business applications as existing or isolated systems. In the absence of any integration, we have what is typically referred to as silos or islands of information as each system occupies its own niche thus forming a hodgepodge of solutions. A somewhat lighthearted way of describing this phenomenon is *organizational manners* or *corporate etiquette*: mind your own business.

It is also important to note that some of the systems are unique in the functionality they contain (for example, the ERP system) whilst some offer duplicate functionality (for example SiteFinity). It is important to remember the wise counselling by McLeod et al (2010) that where SharePoint offers duplicate functionality, the organization needs to recognize and have a plan for that.

Business Connectivity Services and Reporting Services

The need for business integration has been described as an attempt at unlocking intelligence that resides across disparate systems within an organization. It has also been described as an attempt at integrating structured and unstructured data.

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As discussed in the literature, Microsoft had the foresight of developing, building and deploying SharePoint technology as an integration platform – hence the question posed earlier on "… is it a 21st century chameleon?" SharePoint technology provisions integration capabilities through *Business Connectivity Services* (BCS), an out of-the-box feature for surfacing external data in SharePoint.

The HEIs in the UK also recognized the importance of business connectivity services (then called business data catalogue) in integrating SharePoint with the ecosystem. For example, they recognized that SharePoint technology offers "…the opportunity to bring data from other information systems into the SharePoint environment (without coding) but using XML where it can be manipulated and used" (Lappin & McLeod, 2010:15).

Consequently, Coventry University integrates their SharePoint solution with data not only from their Active Directory Services (for example authentication) but also from their HR system and use SharePoint as a presentation layer whilst Cranfield University plans to integrate SharePoint with data from their student database and financial database (Lappin & McLeod, 2010). Another HEI reports that it is "…working on a business intelligence dashboard. We are setting up SQL Server integration services to extract data from many different systems and pull it into a data warehouse. We will use SQL Server reporting services to allow us to define reports that can be viewed through SharePoint" (Lappin & McLeod, 2010:16).

Although not necessarily using BCS technology, the primary reason for choosing SharePoint at the University Of Southern Queensland Faculty Of Business SharePoint is its integration with Microsoft Office suite which is widely deployed as a desktop productivity tool for most employees within the university (Millett, Te'O, Rhodes, Clarke & Carswell, 2005).

Reporting services were described as a platform that provides comprehensive reporting functionality for a variety of data sources. Lappin & McLeod (2010)

further report that one HEI has a bespoke system that manages energy consumption on campus running on Microsoft SQL without a good front end. This HEI uses SharePoint as the front end as it integrates data from the SQL server with Reporting Services.

With the two technologies in mind - business connection and reporting services - one of the integration patterns within the UKZN stack could be as shown in the diagram below.
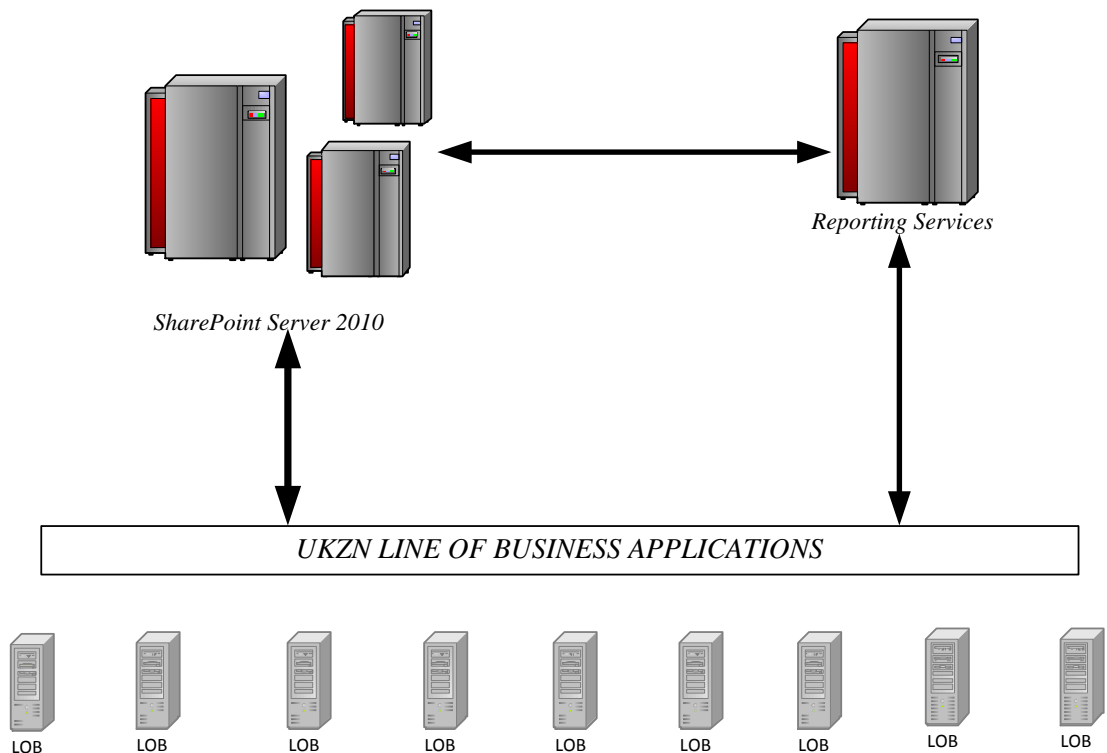
Figure 7.12: Integration patterns

The diagram above shows three integration possibilities as per the different connecting arrows.

The arrow linking SharePoint Server 2010 with the business application stack shows SPS 2010 using data sources typically defined within BCS in order to access external data. A practical example could be student data entered into Moodle which exposes a number of web services as a potential point for integration. Web services architecture has the potential to improve enterprise

application integration processes as developers do not laboriously spend value time trying to hack together complex system integration (Gilmore, 2010). Such student data could then be displayed in SPS 2010 using lists (for example, the External Lists), web parts (for example the Data Form web part which is a useful tool for connecting to external data sources and web services) or be part of a workflow process defined within SharePoint.

The arrow linking the Reporting Services server uses similar functionality as the reporting server has the capability to define data sources of its own. Once accessed, such data could then be deployed on the Report Server running as a separate entity.

The arrow linking SharePoint Server with the Report Server shows a typical scenario where SharePoint technology exploits the data visualization and reporting capabilities of the report server but uses SPS 2010 as a presentation layer.

7.9   STRUCTURAL ANALYSIS AND CASE STUDY

The discussion in chapter six, research design and methodology, referred to two forms of qualitative data analysis namely, thematic analysis and structural analysis. *Thematic analysis* was described as seeking to find and identify themes within narratives whilst *structural analysis* was described as identifying categories of questions which are then used as a guide that seeks to analyze narrative data. The chapter concluded by providing justification for using structural analysis.

It was also mentioned in that chapter that the researcher chose to use case study as a form of research design because it provides "…the researcher with a holistic understanding of a problem, issue or phenomenon" (Hesse-Biber, 2011:256) and further allows the researcher "…to investigate the case in relation to its historical, economic, technological, social and cultural context"

Eriksson & Kordaine (2008:115). This is done with "…the aim is to obtain a rich detailed insight into the 'life' of that case" (Oates, 2006:141).

Using the case study approach and, in particular, the combination of interviews and observation for data generation, the researcher is now in a position to use structural analysis as per the following categories.

Category	Description
Abstract	What is the story about?
Orientation	Who, when and where?
Complicating action	Then what happened
Evaluation	So what?
Result	What finally happened?

Table 7.3 Qualitative Data Analysis: structural analysis (Bold, 2012)

The next section will now summarize the findings at UKZN under the headings as per above table.

Abstract

The story is about UKZN identifying a business problem described as a spiraling paper trail and thus the need to manage the proliferation of both structured and unstructured content. UKZN then set out to install a document management solution.

Orientation

Tasked with the mandate of finding a solution to the spiraling paper trail, a 5-person task team was assembled in 2007 to scour the landscape for potentials solutions and subsequently drew a shortlist of five solutions. The shortlist consisted of ImageNow, Novell Team and Conferencing, Joomla and SharePoint. Unfortunately, nobody remembers the fifth solution name.

At the recommendation of the task team, the then ICT Director made a decision in 2008 to acquire SharePoint technology primarily motivated by the cost of acquisition. In the same year, the task team attended seminars which were followed by a proof of concept conducted by a Microsoft certified partner. This in turn was followed by formal training on the solution in 2009.

The first installment of SharePoint technology (Microsoft Office SharePoint Server 2007) was installed and commissioned in 2009 and upgraded to SharePoint Server 2010 in 2011. Starting mid-2013, ICT are busy upgrading the solution to SharePoint Server 2013 and also migrating existing SPS 2010 sites to the new platform.

Complicating action

A major complicating factor is that UKZN followed the organic bottom up approach implementation methodology. Whilst this seems advantageous in terms of relatively faster adoption, the attendant disadvantages such as SharePoint sprawl and scalability as cited by McLeod et al (2010) seem to suggest that these are but short term gains.

However, despite seemingly adopting the organic approach, UKZN further shows some idiosyncrasies in that there is almost lackluster adoption as seen when discussing the College of Engineering, Agriculture and Science.

Another complicating factor, as mentioned in earlier chapters, is that SharePoint technology is a comprehensive modular solution of which enterprise content management is but a component. Whilst very much in line with the identified problem, the first complicating action is that almost five years after the first instance of SharePoint technology, UKZN continues to use only the enterprise content management functionality which is a miniscule percentage of total functionality within the solution.

However, UKZN is not alone in using SharePoint technology primarily as a document management solution as seen in the diagram below. In a six monthly survey by Weeks (2011) which is conducted from organizations across multiple industries, just over 60% respondents use SharePoint technology as a driver of content management.
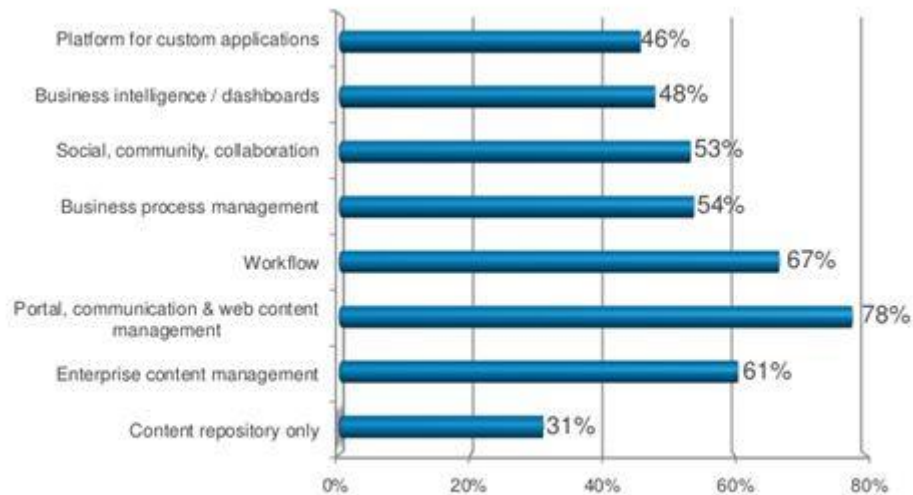
Figure 7.13 SharePoint usage patterns (Weeks, 2011)

It is important though to note that a high number of organizations (78%) realize the 'dexterity' of SharePoint – this paper suggested an alias of 21st century chameleon – as they drive SPS 2010 to solve communication problems in the form of using the solution as an aggregator of knowledge (portal) with rich content through web content management.

Yet another complicating factor is that the task team did not allow itself sufficient time to fully understand the comprehensiveness of the solution of the size of SharePoint. The task team thus failed to appreciate the base functionality spread between the freely available version (that is, SharePoint Foundation 2010) and the commercial version (that is, SharePoint Server 2010). As a result, UKZN paid for functionality they are currently not using. Given the usage patterns since the first installment of SharePoint, UKZN could have started off by investing resources in the free-to-use version of SharePoint namely SharePoint Foundation and only upgrading to the Enterprise version when business drivers, in terms of need, dictate.

The last complicating factor is that the task team also failed to properly plan beyond just installing the product which is, by all accounts, a non-event. SharePoint can be installed within an hour depending of course on the type of topology followed. However, life begins after the installation. It was mentioned in an earlier chapter that SharePoint cannot be mandated: making a kind announcement that SharePoint is available or even issuing a decree summoning all and sundry to start using the product, is not likely to succeed.

Evaluation

UKZN is in the process of appointing an external consultant to drive SharePoint within the university. The terms of reference have not been finalised so it remains to be seen what direction the university takes. These two processes need to be expedited because SharePoint, which is currently lying almost idle in data centers of UKZN, has the potential to drive efficiencies within the university.

Result

It is currently difficult to perform a return on investment and thus justify the current investment in SharePoint technology within UKZN. The fact that after more than 3 years since the first installment of SharePoint technology, only one college and a few clusters use it (both barely scratching the surface of SPS 2010 in terms of functionality) suggest that UKZN should revise their go-to-market strategy.

One of the observations made by the AP in the School of Chemistry and Physics was that corporate IT does not fully understand the depth and width of SPS 2010. There is merit in this statement. However, the researcher believes the core problem is the non-existence of a governance committee as shown in Figure 2.2: Strategy Team and Tactical Team for SharePoint governance. Flowing out of

the deliberations of this committee would be, amongst other things, the go-to-market strategy.

7.10 SUMMARY OF FINDINGS

Chapter six pointed out that the case study research design was to be employed for this research project. Specifically, it was mentioned that the case study approach was adopted because it allows for a chosen instance to be studied extensively within its real life context focusing on all factors, issues, politics, processes and relationships with the aim of understanding how they link together in order to explain the *how* and *why* of the outcomes observed. This was achieved by following an explanatory form of case study which seeks to answer questions such as who, what, when and how. Lastly, the aim of the study was then to link the case study research design to an existing theory and such a theory was identified as the OBGT model in chapter five.

The researcher was fortunately able to get an understanding of the factors, issues, processes and politics around the SharePoint instance at UKZN and was able to get answers to the questions such as who, what, when as per categories defined in Table 6.2: Qualitative Data Analysis: structural analysis.

However, the researcher had minimal success in determining a linkage to the four major constructs of the modified OBGT model (see Figure 5.4: Modified Organizational, Business, Technological, and Governmental framework). As far as the technological dimensions are concerned, the researcher was able to interrogate users in terms of behavioral intention to use as determined by perceived usefulness and perceived ease of use. As far as the other constructs are concerned namely organizational dimensions, business dimensions and corporate governance responsibilities, almost no documentation exists in support of this. In other words, in arriving at the decision to adopt SharePoint technology, UKZN does not seem to have followed the modified OBGT model as the decision was primarily informed by the licensing model: the cost of acquiring the solution.

As part of the data generation and analysis, the researcher asked for supporting documentation (for example to understand, amongst other things, processes followed during the vendor selection criteria) and minimal documentation was made available. The primary reason proffered was that such documentation could not be found. This raises three possible conjectures: *firstly*, such documentation is genuinely not traceable despite reasonable efforts expended. *Secondly*, the researcher may have failed to register the importance of having access to such documentation. *Thirdly*, there are reasons for not wanting to make such documentation available: classified information. Whether or not there is any kernel of truth in any of the above raises the question of corporate governance. Were university rules properly followed in terms of sourcing, acquisition, retention and retirement of university assets? In the unforeseen but certainly possible eventuality of litigation, what recourse does the university have if supporting documentation cannot be found? Lastly, the above scenario lends strong credence to the fact that a solution of the type of SharePoint technology is a requirement for UKZN. With SharePoint in place and supported by good governance for records lifecycle management, key organizational documents do not easily dissipate into oblivion.

It was mentioned in chapter one that the first consideration with any planned technology deployment is to capture the overall objectives for the organization. The literature review argued for the mutual involvement of corporate IT, executive and line of business managers (in the form of a corporate governance committee) carefully crafting a solution with a clearly defined and communicated set of business goals and objectives. Such a committee does not exist at UKZN.

An earlier chapter also pointed out some very poignant research statistics in that more than half of SPS 2010 implementations are undertaken without a clear business case which would then be a baseline of what the organization wants to achieve. The statistics cited also showed that, once implemented, a third of organizations simply do not know how to use SPS 2010.

Whilst UKZN certainly did have a business case, the fact that there is not only a low adoption rate but also very lukewarm usage of the solution, certainly suggests that something is fundamentally wrong with the SharePoint project.

In the final analysis, three points stand out.

Firstly, there is no communally documented SharePoint IT strategy of which corporate governance in SharePoint is typically a major constituent.

Secondly, there are no project management endeavors to govern the deployment and commissioning of SPS 2010 within UKZN. Without project management, how does one measure the success or failure of a project? Indeed one may ask: from the initial installation of MOSS 2007 way back in 2009, and the subsequent upgrade to SPS 2011 during 2011, followed by the current migration to SPS 2013, has the project been an astounding success or a dismal failure? If a ship sets sail and simply follows the direction of the wind, and does not land on the Treasure Island within five years of setting sail, can the venture be judged as an exercise in futility?

Thirdly, given the comprehensive nature of the functionality inherent in SharePoint technology, UKZN only uses a miniscule portion thereof in the form of document management. Chapter three drew an analogy of a chameleon, in an attempt to emphasize and highlight different usage scenarios of SharePoint technology. In fact, UKZN should be using SharePoint Foundation 2010 (see Figure 3.9: SharePoint 2010 Editions) until such time that a clear business need is identified that is only available with SPS 2010.

7.11 CHALLENGES DURING DATA COLLECTION

The researcher experienced three major challenges whilst conducting interviews which was the chosen primary data generation method.

As mentioned earlier, given the deployment model followed by UKZN, the entire SPS 2010 project was primarily driven from the office of the CIO with minimal involvement from the line of business managers. This had the effect of narrowing the interview base as only a handful of people were knowledgeable enough to be interviewed using the set of guiding questions as set out in appendix 6.1: Guiding questions for corporate IT.

When interviewing line of business managers, the researcher had a different set of guiding questions as set out in appendix 7.6: Guiding questions for line of business executives. Given their level of SharePoint literacy as well, the researcher was not able to use many of the guiding questions during the interviews. As a result, the researcher felt precluded, as Oates (2006) puts it, from obtaining as much detail on the instance under study and consulting as many individuals as possible.

The second major challenge is that of the original 5-member task team constituted to explore potential solutions to address the identified problem of managing document proliferation, only one member remains within the employment of the university. Ideally, the researcher would have interviewed the entire task team in order to get an in-depth understanding of the politics, processes and other dynamics leading to the selection of SPS 2010 as the product solution to the identified problem. During the interviews, it became clear that this person, whilst officially known as a SharePoint Infrastructure Administrator, actually 'wears' many hats within the SharePoint project. Appendix 7.9 shows a typical composition of resources normally used within a SharePoint project. However, on the *positive side*, the said person displayed a vivid and good recollection of the events since 2007 which were verified by using a form of data triangulation: asking similar questions at different periods in time and comparing answers given (Sekaran & Bougie, 2009). In other words, the researcher *was* still able to "…investigate the case in relation to its historical, economic, technological…" aspects (Eriksson & Kordaine, 2008:15).

Thirdly, very minimal documentation (see appendix 7.7) seems to have been kept over the lifespan of SPS 2010. The researcher was unable to access documentation beyond this.

CHAPTER 8: RECOMMENDATIONS AND CONLUSION

8.1   INTRODUCTION

The major thrust of this chapter is to build upon the discussion and summary of findings that were presented at the end of the previous chapter. It does so by proposing a number of recommendations and closes by discussing pertinent trends as they relate to SharePoint technology in general.

8.2   RECOMMENDATIONS

Recommendation 1: Change from organic to corporate approach for the SharePoint deployment

Despite the unique challenges cited by McLeod et al. (2010) such as launching with demanding projects, UKZN needs to shed the organic bottom-up approach in favour of the corporate approach. This exercise would be in line with the decision by both the Imperial College London and the University of the West of England which "…grew organically to a point where the institutions have now recognised that SharePoint has become a critical system, and needs to be treated as a corporate system." (Lappin & McLeod, 2010:7).

One of the implications for such a decision is that corporate IT needs to build capacity as shown in the different SharePoint roles in appendix 7.9. This would, amongst other things, mitigate the SharePoint Effect that is, "...growth beyond the reach of IT resources" as noted by (Chennault & Strain, 2009:7).

Recommendation 2: Institute corporate governance for the SharePoint deployment

Despite the late hour as corporate IT is now upgrading SPS 2010 to the 2013 version, UKZN needs to revisit the basic tenets of having an IT strategy for any planned technology deployment including SharePoint. However, as a preamble

to doing that, UKZN needs to constitute a governance committee as shown in the diagram in Figure 2.2: Strategy Team and Tactical Team for SharePoint governance in chapter two. Despite conceding that "…knowing how to get started is often the biggest impediment to successful governance" Chennault & Strain (2009:8) have nonetheless comforting news in that "…it is never too late to start proper governance for a SharePoint deployment".

Constituent members of the governance committee should not only be 'ad idem' as of the overarching reasons for wanting to use SharePoint technology, but also have a clear understanding of the role each member plays in pursuit of the deployment and commissioning of such technology within UKZN. It was mentioned in the literature review that technology by itself plays a small role towards the overall success of SharePoint solutions: processes and people have a more profound residual effect.

Recommendation 3: Identify clear focus for the implementation

Given the breadth and width of the entrenched functionality, SPS 2010 holds the potency of being put to a myriad of uses. UKZN thus needs a sharp and clear focus on what needs to be implemented.

The fourth finding in the previous chapter did note that a majority of SPS 2010 users see and use SharePoint as a document management system that replaces networked or shared drives or public folders. Whilst there is nothing inherently wrong with that, several studies were cited showing that the most popular usage of SharePoint technology is as an intranet site and for collaboration (Childs et al., 2009) (Miles, 2011) (IBM White Paper, 2011).

UKZN thus needs to exploit the collaborative features of SharePoint technology typically in an intranet environment.

Recommendation 4: Provide campus wide training

UKZN also needs to extend training to other schools and clusters because SPS 2010 "…is a complex system" (McLeod et al., 201:340) and is "…a critical challenge for both corporate approaches and organic approaches to rolling out SharePoint" (Lappin & McLeod, 2010:19). Having said that, it is important to reiterate that training poses a specific challenge for organic implementations as the organization typically "…does not know in advance who is going to be invited to collaborate to one or more team sites, or who will want to be a site owner of a team site (Lappin & McLeod, 2010:ii).

In addition, UKZN as an organization should take a cue from the initiatives of the School of Physics and Chemistry which, maybe unbeknownst to them, actually created two key roles (this is in addition to the normal end user role) namely SharePoint Site Owner and SharePoint Power User as shown in appendix 7.9. The primary function of the SharePoint Site Owner is to gather and define requirements for a proposed solution usually within a department or for a specific solution. This role is currently being played out by an Associate Professor within the school of chemistry as discussed in the previous chapter. The role of Power user typically consists of an experienced person who manages other user access to the site, uploads content, designs the site, and manages first-level user support. This role is currently being played out by the two users who attended the Level 2 training.

Recommendation 5: Think big but start small

As cited in the literature, having a well-assembled and carefully-thought-out governance plan complete with a fully tested solution does not mean that the organization can simply 'turn on the new portal, collaboration or social computing environment' and expect user adoption (Microsoft White Paper, 2010a). In order to foster organization wide adoption, UKZN needs to adopt a 'think big but start small' approach, draft and implement a communication plan which includes a training schedule, a user support plan and provide incentives and rewards for a college or cluster for active participation in the roll out of SPS 2010.

Lappin & McLeod (2010) report that Kingston University decided to use the 'big bang' approach, setting up a collaborative team site for each school within the university. The rationale for this was that, come go-live date for SharePoint within the university, every school would have its own SharePoint site in place. However, with the benefit of hindsight, the university is quick to acknowledge that it would do things differently in future should a similar opportunity exist.

Recommendation 6: Build capacity to deliver the functionality in the commercial offering of SharePoint technology

A warning was sounded in chapter three that many organizations struggle with understanding which of the SharePoint products is appropriate for their needs. Further, a warning was also sounded that failure to understand the difference between the versions often leads to an organization selecting the paid-for version of SharePoint Server 2010 but unknowingly using only the free functionality embedded in the SharePoint Foundation 2010. In fact, Young et al., (2013:19) explicitly advise against investing in the commercial version of SharePoint technology until the "… licensed versions are actually required by users".

UKZN should have been using the free SharePoint Foundation 2010 (also available as SharePoint Foundation 2013) all these years up until 2012 when the School of Physics and Chemistry started requesting functionality embedded in the commercial offering.

It is thus a strong recommendation that corporate IT needs to build capacity in order to deliver such functionality to the user community. UKZN needs to exploit and leverage the offerings embedded in the commercial version of SPS 2010 and go beyond using the free Foundation version of SPS 2010. As things are, it is difficult to justify expenditure by quantifying return on investment.

Recommendation 7: Explore integration with the ecosystem

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UKZN needs to take a cue again from the initiatives of the School of Physics and Chemistry as they seek to integrate the school's SharePoint site with the Integrated Tertiary System (and other systems within the university) as this would help avoid duplicating data and functionality thus "…unlocking critical business data that resides in large, enterprise systems" Fox (2010:278).

In the literature review, Novak, Balassy, Arvai & Fulop (2012:391) were very forthright in asserting that "Applications aren't islands. They live in an ecosystem that connects them to other applications and services – sometimes through the operating system, and sometimes through the internet." In case misconstrued by the world, McClure et al. (2012:113) decided to err on the side of brevity by simply stating that "Applications no longer live as little islands of data. Everything is interconnected, or will be".

Recommendation 8: Exploit SharePoint functionality in pursuit of excellence in research

Flowing from the mission statement of being a university "that is academically excellent and innovative in research", UKZN has set out seven strategic goals, one of which one is pre-eminence in research (College of Law and Management Studies, 2013).

Whilst important to use SharePoint technology across the entire university, given the unique profile of research within the academia, UKZN needs to exploit the functionality embodied in SharePoint in order to drive and improve the throughput and quality of research. This would be in line with the efforts at Kingston University which supports collaborative research with colleagues and other institutions (Lappin & McLeod, 2009).

Recommendation 9: Invest in application development skills within Corporate IT

On deployment, SPS 2010 is nothing more than a generic ASP.NET web application hosted on a web server. To leverage its fully functionality, tools are available to tweak, customize, integrate and extend the base solution as per unique organizational requirements. These tools do assume the existence of a base set of skills in the form of understanding how pages are structured and rendered using hypertext markup language, and also understanding technologies such as CSS, XML, XSLT and JavaScript. Therefore, training in this regard is recommended.

With these skills under the belt, UKZN will then be able to customize SharePoint technology using a number of tools. One such tool is browser based development which facilitates, amongst other things, SharePoint theme configuration and the creation and deployment of multimedia artifacts. Another tool is the freely available tool called SharePoint Designer 2010; depending on permission level, one can for example create workflows, external content, lists, and libraries. Lastly, in order to enjoy fine-grained programmatic control when creating custom artifacts for both sandboxed and farm-level solutions, a tool like Visual Studio 2010 and 2012 can be used.

Recommendation 10: Explore cloud computing

Lastly, this study recommends that UKZN aggressively explore cloud computing (and in particular SharePoint Online) as an alternative form of deployment as this will, amongst other things, release pressure and attendant costs of keeping a scarce and expensive corps of skilled personnel.

Cloud computing, as discussed in the literature review, affords organizations, big and small, an opportunity to drastically cut down on costs, not only relating to initial infrastructure setup, but also ongoing costs of keeping skilled personnel to maintain production and staging web servers, database clusters, routers and balancers, and security issues such as firewalls (Brunetti, 2011). Rizzo et al (2012:92) put it poignantly when they state that maintaining a SharePoint environment is not a mean feat as it involves a number of moving

parts – Windows server, Internet Information Services, Active Directory to mention a few – whilst maintaining SharePoint on the cloud "… is almost a nonevent".

A study commissioned by Price Waterhouse Coopers suggests that the debate no longer concerns whether cloud computing is emerging but rather what form it will take, the changes in the value chain that will result, the pace at which it will expand and whether it will coexist with other models (Price Waterhouse Coopers White Paper, 2010). This view is supported by Fox (2011:2) when he argues that whilst SPS 2010 has historically been pervasive in enterprise computing, this trend is likely to change because "…in essence, software deployment and management are moving off premises to data centers throughout the world" representing a model for ubiquitous application development and deployment.

8.3   SUMMARY OF THE STUDY, FINDINGS AND TRENDS

During the period of research, the researcher got a sense that the software stack at UKZN is much bigger than initially imagined. In other words, a number of business applications exist that have been deployed and commissioned throughout the organization to solve varying business problems.

Firstly, there is the Integrated Tertiary System which UKZN describes as the main enterprise resource planning system for managing students, human resources, payroll, finance and asset information. Then there is the library system which in turn has a number of sub-systems such as a workflow solution. Then there is the legal system for managing litigation, contracts, provision of general legal advice, copyright, student discipline and general protection of UKZN from legal risk. Corporate IT boasts a number of solutions of their own such as a web content management system. And of course, there is SharePoint technology.

In relation to SPS 2010, these systems exist as hodgepodges or application silos as there is very little integration (exception being integration with the Active Directory for authentication) with SharePoint technology - a phenomenon that the researcher lightheartedly dubs organizational manners or corporate etiquette: mind your own business. If one removes SPS 2010 from the equation, it remains an unanswered research question whether any integration exists amongst them.

As can be gleaned from the problem statement, it was never the intention of this study to enumerate all systems that exist within the UKZN solution stack. However, the study of the deployment and commissioning of SPS 2010 would be incomplete if done in complete oblivion of the ecosystem within the university. Hence a select list of such systems was identified as shown in Table 7.2: Select systems deployed at UKZN.

In summarizing the study and the findings, there is minimal attempt at unlocking the intellectual property that exists in other technologies (the ecosystem) already deployed within the organization. Fox (2010:278) referred to this as "…unlocking critical business data". Further, SharePoint technology is not used to its full potential despite, amongst other things, the expensive investment in training.

In terms of trends, three key developments stand out: cloud computing, the explosion and growing popularity of mobile devices and consumerization of technology. The latter refers to the technically savvy information workers who demand synergy between the technology they use at work and in their private lives has the effect of blurring the traditional lines between the enterprise and consumer software markets. Together, these three developments are transforming not only the software industry, but also the way the world at large accesses and leverages technology.

These findings are based on the research work commissioned by Price Waterhouse Coopers in 2010 into the analysis and opinions of the CEO and senior executives of the top 100 global software leaders about key trends in the

information technology and how these would impact their businesses in the next five years (Price Waterhouse Coopers White Paper, 2010).

In the final summary of the study and the findings, the manner in which UKZN handled SharePoint deployment was quite unexpected and somewhat disappointing.

It was unexpected in the sense that a solution of the magnitude of SPS 2010 cannot be optimally handled by one resource:

"I project manage all of this, as people ask for the product I meet, demo & implement the system. Then I train them." SharePoint Infrastructure Administrator, UKZN ICT

It was disappointing because out of four colleges only one college uses the solution. Usage within the college, as is within the clusters, is very minimal as it barely scratches the surface of the solution.

RECOMMENDATIONS FOR FUTURE RESEARCH

This study recommends further research in order to understand the model followed by other South African universities in deploying SharePoint technology in their environments. Such research should specifically seek to understand not only the benefits that accrue to the organization but also interrogate the deployment at these institutions with the view to understanding "… whether it is justified in terms of accepted good practice" as alluded to by McLeod et al. (2010:335).

Finally, such research should benchmark SharePoint deployment against a number of financial indicators as suggested by Evelyn (2013). For any SharePoint deployment to be deemed a success, it must honor at least one of the following objectives: "maintain or increase profitable revenue to the business, now or in the future; maintain or reduce the operating costs of the business, now

or in the future; maintain or reduce the amount of money tied up within the business, now or in the future; support or provide a solution to a necessary or externally imposed constraint" (Evelyn, 2013:7).

In other words, an investment in whatever form of technology (Customer Relationship Management, Supply Chain Management, Enterprise Resources Planning including SharePoint technology), should only be deemed to be justified in terms of accepted good practice if, and only if it honors at least one of the indicators above.

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APPENDICES

APPENDIX 2.1: Single server deployment

This is the smallest unit for deployment as it consists of one server with a supported version of Microsoft SQL Server. This configuration is typically ideal for evaluation purposes or development in an isolated non-mission critical environment and is thus not recommended for production (Jamison et al, 2011).
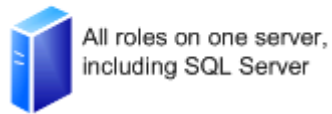
Small farm deployment (Microsoft White Paper., 2012 Capacity planning for Microsoft SharePoint Server 2010)

APPENDIX 2.2: Small server farm

This configuration consists of a single database server or cluster and one or two web front end servers that provide limited redundancy and failover. A small farm is useful in limited deployments as it typically has a minimal set of service applications enabled. It can also be deployed as a corporate intranet as shown in the diagram below.
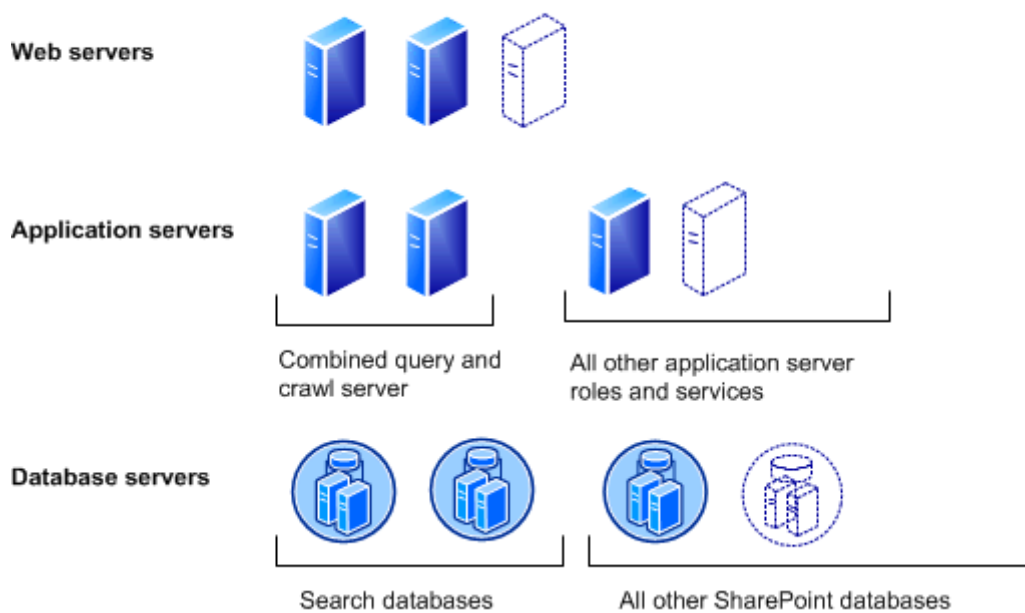
Two-tier small farm

Web server
Query server

Web server
Query server
All other app roles

All SharePoint
databases

Two-tier small farm deployment (Microsoft White Paper., 2012 Capacity planning for Microsoft SharePoint Server 2010)

APPENDIX 2.3: Medium server farm

This architecture separates the front end servers thus breaking down the topology into three tiers namely dedicated web servers, dedicated applications and one or more databases or clusters. This is the most common topology which is able to support a user base of tens of thousands of users with a load of 10 to 50 requests per second.

Medium farm

|		
Web servers		
Application servers	Combined query and crawl server	All other application server roles and services
Database servers	Search databases	All other SharePoint databases

Medium farm deployment (Microsoft White Paper., 2012 Capacity planning for Microsoft SharePoint Server 2010)

APPENDIX 2.4: Large server farm

This topology breaks down services and solutions across multiple farms and provisions services that can be deployed on a dedicated farm that can thus serve requests from multiple consuming farms. This topology typically services a user base in the range of hundreds of thousands of users with a usage load in the range of hundreds of requests per second. The large server farm could also be used for both a corporate intranet and an internet facing site as depicted as the diagram below shows (Jamison et al, 2011).
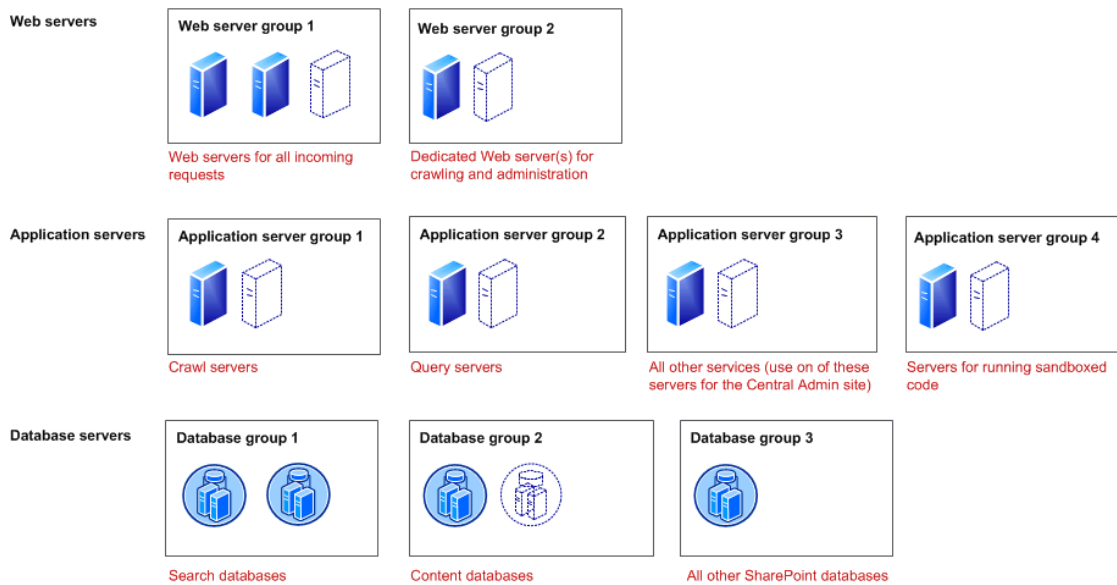

Large farm deployment (Microsoft White Paper., 2012 Capacity planning for Microsoft SharePoint Server 2010)

APPENDIX 2.5: Shared Services

Shared Service	Description
Business Data Connectivity Service	This service orchestrates the integration of LOBs defined for the organization
Excel Services	This service gives the capability to host and display Excel worksheets in a browser whilst the calculations are performed by SharePoint
PerformancePoint Service Application	This service drives analytical and visualization capabilities
Timer Service	The execution of scheduled tasks running on different farm servers are directed by this service
Visio Graphics Service	Enables the rendering of Visio diagrams within SharePoint
Word Conversion Service Application	This service drives automated conversion of Microsoft Word files from formats such as .doc to another format such as .pdf

Shared service applications provided in SharePoint Server 2010 (Mann, 2010)

APPENDIX 2.6: Capacity planning model
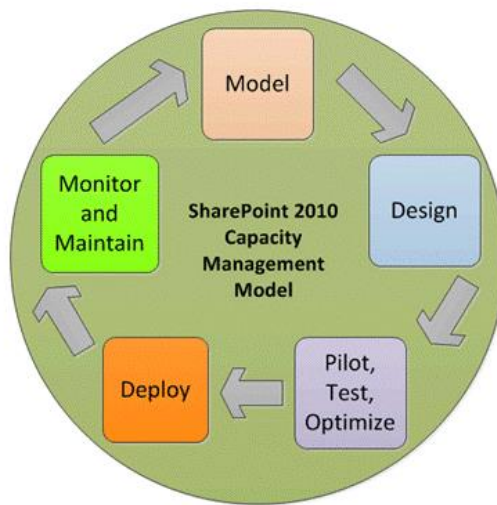
SharePoint Server 2010 capacity management model (Microsoft White Paper., 2012 Capacity planning for Microsoft SharePoint Server 2010)

Microsoft Inc., suggests the content database size (CDS) formula for estimating the size of the content database. The actual formula is CDS = $((D \times V) \times S) + (10 \text{ KB} \times (L + (V \times D)))$ where:

- D stands for an estimation of the expected number of documents
- S stands for an estimation average size of documents to be stored
- L stands for an estimation of list items
- V approximates the number of versions.

The constant value of 10 KB in the formula roughly estimates the amount of metadata required by SharePoint Server.

APPENDIX 2.7: Corporate approaches to the implementation of SharePoint

Institution	Specific purpose for implementation
Coventry University	Staff and student portal
Kingston University	Intranet, an extranet with partner institutions, and its provision of a collaborative team site to every department and faculty
Cranfield University	Replace its intranet
Napier University	Manage intranet, externally facing website, and to provide team collaboration sites
Glasgow University	Personalized portal for staff and students
Oxford University	Collaboration sites for research groups, committees and societies.

Corporate approaches to the implementation of SharePoint (Lappin & McLeod, 2010)

APPENDIX 3.1

SHAREPOINT LISTS

List Type	Description
Announcements	This list types captures announcements such as news, status updates or any information of importance
Calendar	Upcoming meetings and events can be captured and can also be synchronized with Microsoft Outlook
Contacts	Important customer details can be captured using this list which also has a capability to be synchronized with Microsoft Outlook
Custom List	This list typically starts off as a blank list which can then be used to create a list to store custom data
Custom List in Datasheet View	This list starts out as a blank list allowing the users to determine the types of columns as per requirements
Discussion Board	This list manages discussion threads with functionality for moderation of content before approved for public posting
External List	This is a special list that consumes external data in the form of 3rd party RDBMS as well as LOBs
Import Spreadsheet	This list is populated with data imported from an existing spreadsheet
Issue Tracking	This list has the capability to track issues raised or problems associated with a product or project thus allowing a user to assign, track and prioritize issues in the list
Links	This link stores links to other web pages
Project Tasks	This list stores data that can be displayed in a Gantt Chart view and has the capability to synchronize with Microsoft Office Project
Survey	This list provides capabilities to create and manage surveys
Tasks	This list aggregates and manages tasks which can also be included in a workflow model

APPENDIX 3.2: LIBRARIES

Library	Description
Document Library	This library facilitates document storage and sharing with built-in features for check-in and checkout, versioning and have documents organized by folders
Form Library	This library facilitates the storage of XML business driven forms which are typically authored and managed through Microsoft InfoPath 2010
Picture Library	A library that hosts pictures and other similar features
Wiki Page Library	A library that allows users to create and collaboratively work on content with the ability to link content

Libraries That Can Be Created in a Blank SharePoint Site (Carter et al., 2011)

APPENDIX 3.3: WORKSPACES

Workspace	Description
Basic Meeting Workspace	This workspace is geared towards planning, organizing and capturing the outcomes of a meeting as it comes preconfigured with lists to manage documentation for the meeting and a list of attendees
Blank Meeting Workspace	This subsite is similar to the basic meeting workspace but is not prepopulated with any lists
Blank Site	A blank workspace
Blog	This workspace facilitates blogging
Decision Meeting Workspace	This workspace captures and manages tasks and decisions made in a meeting
Document Workspace	This site is for collaboration on documents
Group Workspace	This is a team website as it has lists such as a group calendars and a shared document library
Multipage Meeting Workspace	This is similar to a basic meeting workspace with the special inclusion of additional web pages that can be customized
Social Meeting Workspace	A site for organizing social meetings
Team Site	This site organizes and shares information such as document libraries and calendar lists

Subsites That Can Be Created in a Blank SharePoint Site (Carteret al., 2011)

APPENDIX 3.4: SHAREPOINT WEB PARTS

The following web parts ship with SPF 2010:

Web part name	Description
HTML Form Web Part	Connects simple form controls to other Web Parts
Picture Library Slideshow Web Part	Creates a slideshow of pictures from a picture gallery
XML Viewer	Imports an XML source and transforms it using an XSLT document. For example, it can be used to import an RSS feed, which is then transformed using a custom XSLT into displayable content
Relevant Documents	Displays relevant documents for the current user
Content Editor	Used to add formatted text, tables, and images to a page. Can be used to add JavaScript functions to the page
Image Viewer	Shows an image
Page Viewer	This Web Part can be used to add framed custom external applications to a site
Silverlight Web Part	Adds a custom Silverlight application to the page
Site Users	Shows the current users and groups of a site
User Tasks	Displays the current tasks for the user from the site where the Web Part is placed.

For a full listing, see http://office.microsoft.com/en-za/sharepoint-foundation-help/overview-of-web-parts-available-in-sharepoint-foundation-2010-HA101806662.aspx

The following web parts spread between SPS 2010 Standard and SPS 2010 Enterprise and are normally grouped as follows:

Group Name	Description
Content Rollup web parts	These are used to collect and merger information from lists and sites and create views
Filter web parts	These are used in conjunction with other web parts in order filter content using web part connections
Search web parts	These allow a developer to take advantage of the highly customizable

	search engine in SPS 2010 to locate and retrieve information
Media web parts	These web parts take advantage of the publishing feature of SPS 2010 to display, amongst other things, an audio and Silverlight player
Navigation web parts	These web parts provide navigation functionality to enhance websites through improved features such as sitemaps
My information web parts	These web parts allow integration with Outlook Web Access to display a mail folder, a calendar or tasks
Business Data web parts	These are designed to leverage functionality from Business Connectivity Services (BCS) when connecting to external LOBs
PerformancePoint web parts	This is a new feature in SPS 2010 to drive scorecards and dashboards
Office Client web parts	These web parts allow integration with Microsoft Office files

APPENDIX 3.5 Site templates for WCM

Site Template	Description
Publishing Portal	This template is designed to provide a starting point for a public-facing Internet site or a larger or more formal corporate intranet. It includes a sample structure, including press releases and search. It also enforces content publishing with workflow out of the box. In addition, this template supports anonymous users, who are restricted from viewing SharePoint application pages.
Publishing Site	This template includes some core functionality for publishing web content (pages and images). It does not use workflow out of the box in order to approve content for publication. Rather, it utilizes drafts and major versions to show content to contributors and viewers, respectively.
Publishing Site with Workflow	This is similar to the Publishing Site template except that the Approval workflow is used to control content publication.
Enterprise Wiki	This template is appropriate for creating new sites that are used to capture organizational knowledge.

Site Templates for WCM (Kitta et al, 2011)

APPENDIX 3.6 Workflow approaches

Workflow approach	Skill Level	Details
Out-of-the-box	Low; only configuration is necessary	Several out-of-the-box workflows are included, which represent canonical yet fairly straightforward business processes. A recommended starting point.
Visio	Moderate; need to be comfortable designing business processes in Visio and familiar with SharePoint workflow capabilities	Allows a visual way to orchestrate business processes and allows further refinement in SharePoint Designer or Visual Studio
SharePoint Designer	Moderate; slightly more powerful than Visio.	Uses a text-oriented approach to orchestrating a business process. Includes a good number of workflow actions out-of-the-box as well.
Visual Studio	Advanced; this is for .NET developers	Visual Studio allows the ultimate flexibility as custom code is possible, which is not the case for the other solutions described.

Workflow Options in SharePoint 2010 (Kitta et al, 2011)

APPENDIX 6.1

GUIDING QUESTIONS FOR CORPORATE IT

Cluster		
Head of cluster		
Date of interview		

Question 1

When did the organization start flirting with the thought of installing SPS 2010?

Question 2

What were the drivers for this?

Question 3

When was the decision made to go SPS 2010 and where are we in the lifecycle of SPS 2010?

Question 4

Which of the following was the most influential person or body in making the decision towards SPS 2010?

Typical answer(s) expected
1. Project architect 2. Business manager 3. Project developer 4. Consultant 5. External IT planning

Question 5

What was your involvement with the SharePoint 2010 project?

Typical answer(s) expected
1. Requirements gathering 2. Technical planning 3. Feasibility analysis 4. Deployment 5. Proof of concept

6. Architecture
7. Budget decisions

Question 6

Does UKZN have a documented SharePoint strategy?
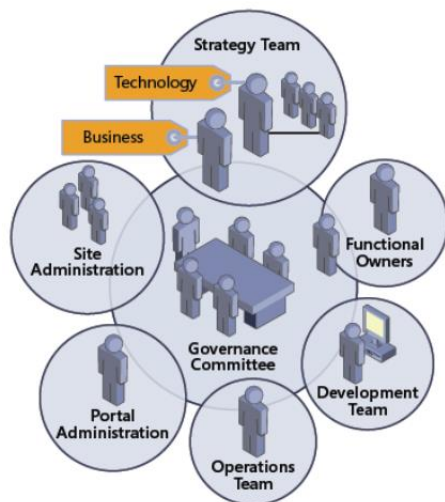
Typical answer(s) expected

Strategy Component

- Key stakeholder determination

- Business objectives

- Measuring success

- Planning for governance

- Roll-out strategy

Question 7

Has the University setup a Governance Committee or task team (whatever or was called) for SPS 2010 and how is it constituted?

Typical answer(s) expected

Question 8

As part of the implementation exercise, what key roles were defined for the project?

Typical answer(s) expected

SharePoint Owner

SharePoint Infrastructure

Administrator

SharePoint Solution

Architect

SharePoint Branding

Specialist

SharePoint Help Desk

SharePoint Developer

SharePoint Site Owner

SharePoint Site Designer

SharePoint Power Users

SharePoint Contributors

SharePoint Readers

Question 9

What was the vendor selection process followed?

Typical answer(s) expected

- *Organiz*e (develop project charter, assemble project team, and define high level requirements)
- *Narrow (identify candidate vendors, refine requirements, determine selection criteria and narrow choices*
- *Evaluate (develop demonstration scenarios, scripted demos, analyze vendors, score vendors and contract negotiations)*
- *Decide (choose vendor, proof of concepts and transition to implementation)*

Question 10

Did the organization use any presales technical help for selecting SPS 2010?

Typical answer(s) expected

1. In-depth technical or architectural discussion
2. Vendor presentations

3. Proof of concept
4. Advanced pilot

Question 11

What were the most important in choosing SPS 2010?

Typical answer(s) expected

1. Reliability
2. Performance
3. Security
4. Software cost
5. Maintenance costs
6. Scalability
7. Hardware costs

Question 12

Which of the following were important in selection of SPS 2010?

Typical answer(s) expected

1. Vendor commitment to support
2. Existing skill set in the organization
3. Productivity and speed of development
4. Interoperability
5. Broad availability of 3rd part tools and components

Question 13

How mission critical is SPS 2010 *currently* to UKZN?

1. Organization operations would shut down with the application not running
2. Fairly important to ongoing operations of the organization
3. Important at departmental level
4. Not very critical

Question 14

Who will be the primary users of SPS 2010?

Typical answer(s) expected

1. The entire organization
2. Certain colleges or schools within colleges
3. Customers and business partners
4. Students
5. General public

Question 15

What is the planned or envisaged overall usage of SPS 2010?

Typical answer(s) expected

1. SPS as a web platform – intranet, extranet, internet
2. SPS as collaboration platform
   a. Team collaboration – a team site used by group of people from within and without traditional hierarchical structure, such group permanent or ad-hoc
   b. Document workspace – single document centre of attention for example large complex document spans over time (e.g., world cup bid book, technical manual, employee handbook)
   c. Meeting collaboration – somewhat similar to document workspace emphasis is on coordinating and communicating meeting details
   d. Document collaboration – common repository to manage documents
3. SPS as an integration platform – exploiting native capabilities such as BCS
4. SPS as search provider – searching for content, people (skills, profiles)
5. SPS as a presentation layer – one stop shop as in portal technology
6. SPS as a development platform – SharePoint Designer, Visual Studio
7. SPS for social networking – internal blogs, wikis to share experience which is indexed and thus searchable

Question 16

What are the envisaged entry points for SPS 2010?

Typical answer(s) expected

- Collaboration – a compelling case as users typically navigate to team sites after Outlook

- Intranet – content management capabilities used for intranet or portal solution

- Document Management – though not pitched as best of breed needing 3rd party add-ons

- Extranet – collaborative environment between employees, partners, clients, vendors

- Internet – whilst not technically difficult, requires additional time to plan and design

- Product integration and or development environment

Question 17

Lists form the very core of SharePoint technology. What lists have been deployed within your cluster?

Typical answer(s) expected

Announcements

Calendar

Contacts

Custom List

Custom List in Datasheet View

Discussion Board

External List

Import Spreadsheet

Issue Tracking

Links

Project Tasks

Survey

Tasks

Question 18

Libraries, which are described as one of the most useful features of SharePoint technology, focus primarily on managing documents and files. What libraries have been deployed in your cluster?

Typical answer(s) expected

Document Library

Form Library

Picture Library

Wiki Page Library

Question 19

Workspaces are similar to sites but with a relatively short lifespan. Sites (based on site templates) are used as a blue print to jumpstart a new site typically prepopulated with lists, document libraries and web parts. Which site templates have been used in defining sites in your cluster?

Basic Meeting Workspace

Blank Meeting Workspace

Blank Site

Blog

Decision Meeting Workspace

Document Workspace

Group Workspace

Multipage Meeting Workspace

Social Meeting Workspace

Team Site

Question 20

Are integrators, consultants or external agents employed in the SPS 2010 project?
If so, what percentage of this project is outsourced to external agents?

Question 21

What is the current skill set of UKZN corporate IT with specific reference to the following programming languages and frameworks?

1. Microsoft languages (.NET and pre.NET)
2. Java (servlets, Spring, EJBs)
3. C/C++
4. Mainframe (CICS, COBOL)
5. PHP (Zend Framework)
6. Python
7. Ruby
8. Other

Question 22

Has the University explored using a form of cloud computing?

Typical answer(s) expected

On-premises, IaaS, PaaS, SaaS

Question 23

Has the University explored the use of SharePoint Online?

Typical answer(s) expected

Online-Standard - Multi - tenant hosted by Microsoft, Shared Hardware with no physical access, no Central Administration access but tenant administration access, no support for farm code but support for sandbox, supports certificate or form based authentication, Between 5 and 5000 users

Online-Dedicated - Dedicated hardware and hosting by Microsoft, Dedicated hardware with no physical access, Central Administration access supported, Customizable, but some solutions require Microsoft Approval, 5000 or more users.

Question 24

Will SPS 2010 coexist along other solutions in the organizational ecosystem or will it be used to integrate external line of business applications for example, HR system, ERP system? If so, what will be the primary driver (Business Connectivity Services?) for such integration?

Question 25

Capacity planning is not a once off exercise typically undertaken when planning initial deployment. How often is capacity planning performed by UKZN?

APPENDIX 7.1

INTERVIEWEE LIST

Interviewee	Designation
Mr xxx XXXXXXXX	SharePoint Infrastructure Administrator
Mr xxx XXXXXXXX	Network Manager
Mr xxx XXXXXXXX	Improvement and Development Manager
Ms xxx XXXXXXXX	School of Chemistry and Physics
Prof xxx XXXXXXX	School of Chemistry and Physics
Ms xxx XXXXXXXX	Research Office
Ms xxx XXXXXXXX	Office of the Registrar: Legal Services
Ms xxx XXXXXXXX	Office of the Registrar: Administrative and Secretarial Services

APPENDIX 7.2

KEY PERFORMAMANCE INDICATORS AS PER JOB DESCRIPTION
PLACED AS AN ADVERTISEMENT IN A NATIONAL NEWSPAPER
ADVERTISING THE POST

The University of KwaZulu-Natal is committed to Employment Equity
REGISTRAR'S DIVISION
CHIEF INFORMATION OFFICER
(5 YEAR FIXED TERM CONTRACT)
INFORMATION AND COMMUNICATION SERVICES
REF NO: ICS05/2012

The Chief Information Officer (CIO) heads up the University's Information and Communication Services (ICS) Division which consolidates all computing, audio-visual, telephony, access control, CCTV and print & copy services as well as information management into a single, integrated division across UKZN's 4 Colleges, 5 campuses, and the 50 affiliated units and sites of operation including hospitals and research institutes.

Areas of responsibility:

• Provide strategic leadership, governance and management of UKZN's computing, information and communication services and infrastructure in relation to people, process, research, teaching & learning, technology, finance, data and information in order to leverage IT as a strategic enabler of the University's core business;

• Define, develop and maintain an architectural solution for UKZN aligned to UKZN strategy in terms of business support systems; user support; and information, application, technology and data architectures;

• Establish and embed a comprehensive Information management and innovation solution for UKZN and provide strategic leadership to leverage information as a strategic enabler of the University's vision as well as ensuring the information assets of the University are effectively managed in terms of timeliness, integrity, quality, security, and adherence to data privacy stipulations in both structured and unstructured domains;

• Provide strategic leadership to develop an academic computing plan ensuring that teaching & learning, research and community engagement needs are incorporated in current and future UICT strategy and associated ICS operations and thus ensure academic computing supports and advances UKZNs research, teaching and learning strategies;

• Keep abreast of new and emerging technologies to assess their potential to enable and support UKZN's vision of being the Premier University of African Scholarship;

• Be accountable for all information and communications technology governance, regulatory compliance, audit compliance, risk management and security;

• Motivate for funding and manage budgets to ensure delivery against strategy.

Minimum requirements:

• A Bachelors degree in knowledge or information management or a related field, together with a relevant post graduate qualification in IT or business

• A minimum of 10 years relevant experience in a cross functional IT related Environment

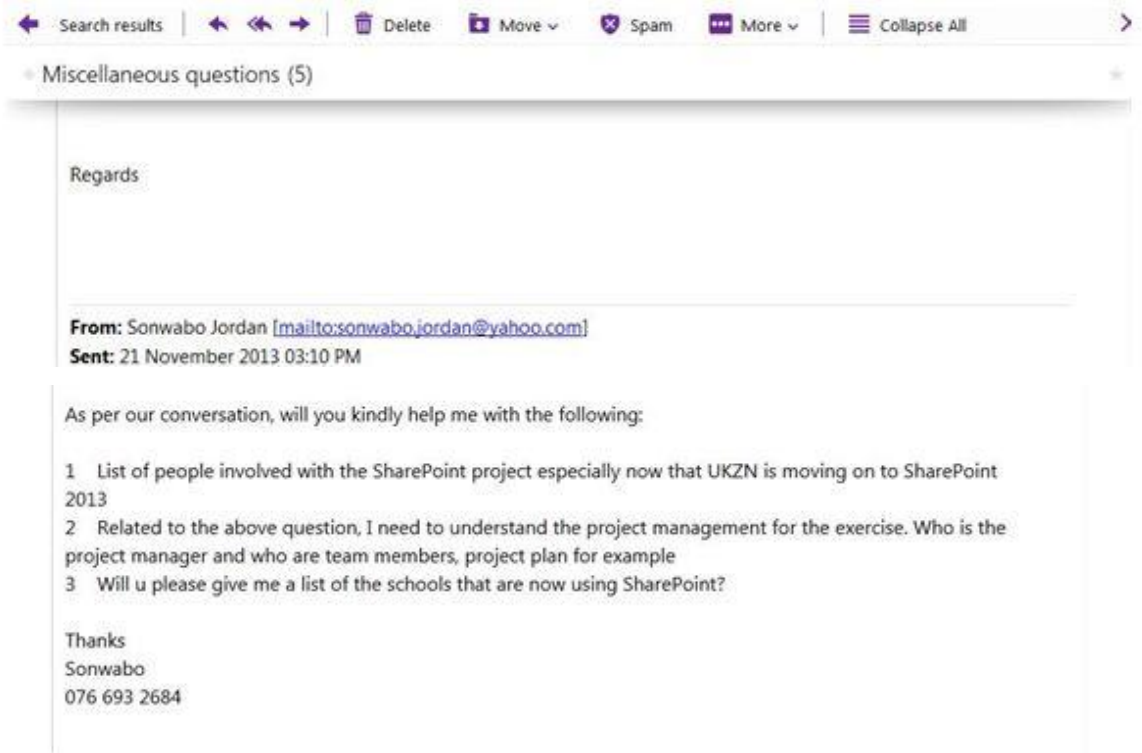• A further 5 years senior management experience with proven business strategy experience.

• Demonstrable knowledge of current principles and practices for the management information and business intelligence technologies, system/business analysis, design and operation

• A good understanding of the needs and drivers of higher education and the opportunities for ICS to enhance research, teaching & learning

Advantages:

• A relevant masters qualification
• Experience in business process re-engineering
• Knowledge of ISO certification processes, ITIL and CoBIT, or equivalent quality assurance and standards systems

APPENDIX 7.3

EMAIL CONVERSATAION WITH SHAREPOINT INFRASTRUCTURE
ADMINISTRATOR AT UKZN.

I am the SP Infrastructure Administrator. There is no help desk per

se, I deal with the SP issues as well, once we grow big enough, ICS User Support will take over the end user support function. There is a SP developer role, we have employed an external consultant to fulfil this role as the skills in-house are short. The idea is to also skill the in-house developers.

Hope this helps.

● Closing thoughts on SharePoint (4)   ★

This is probably my last question - and thanks indeed for the invaluable information you've made available during the entire research period.

If you were to look back to the time you got involved with SharePoint, what would you say are the take-aways for you? In other words, what went well, that is things you would like to repeat when involved in another project? Similarly, what are the key lessons? In other words, things that did not go so well and would probably be avoided in the future?

Thnks
Sonwabo

The introduction of a document management system to UKZN. Moving from a manual system to an electronic one, is something that was positive. It was a huge mind-set change for people to work with documents differently, thereby training was key. That is something that I would do the same. Training users to understand the system is something that I would do again. It is also key to give users what they want and not for IT to introduce something they think the user needs.

From a lessons learnt perspective, I would have got more support from management, and every time a team member on the project left, I would replace them with another member. Also, to diversify skills sets, depending on the product and the streams, the correct skills set should be allocated to the correct people.
Had I known how long this project was, I would have followed a proper project plan & methodology.

Regards

APPENDIX 7.4

SPS 2010 USAGE WITHIN COLLEGES

UKZN follows a College-School model with each college headed by a Deputy
Vice Chancellor whilst the schools are headed by a Heads of Schools.

College of Humanities	Usage
The School of Applied Human Sciences	None
School of Arts	None
School of Built Environment and Development Studies	None
School of Education	None
School of Religion, Philosophy and Classics	None
School of Social Science	None
College of Agriculture, Engineering and Science	Usage
School of Engineering	None
School of Agriculture, Earth and Environmental Sciences	Yes
School of Chemistry and Physics	Yes
School of Life Sciences	None
School of Mathematics, Statistics and Computer Science	None
College of Health Sciences	Usage
Clinical Medicine	None
Health Sciences	None
Laboratory Medicine and Medical Sciences	None
Nursing and Public Health	None
College of Law and Management Studies	Usage
Graduate School of Business and Leadership	None
School of Law	None
School of Accounting, Economics & Finance	None
School of Management, Information Technology & Governance	None

APPENDIX 7.5

SPS 2010 USAGE WITHIN CLUSTERS

UKZN is run and managed by an executive committee that is headed by the Vice-Chancellor with the following committee members who are then heads of the respective clusters as shown in the table below.

Cluster Name	Sub cluster	Usage
Chief Financial Officer		No
Student Services		No
Human Resources and Equity		No
Teaching and Learning		Yes
Research		Yes
Registrar		Yes
Corporate Relations		Yes
Physical Planning and Operations		
	Energy Management	Yes
	ICT	Yes

APPENDIX 7.6

GUIDING QUESTIONS FOR LINE OF BUSINESS EXECUTIVES

Cluster		
Head of cluster		
Date of interview		

Question 1

What is your involvement with SPS 2010 project?

Typical answer(s) expected

1. Requirements gathering

2. Technical planning

3. Feasibility analysis

4. Deployment

5. Proof of concept

6. Architecture

7. Budget decisions

Question 2 (dependent on answer to Q1)

How would you define or describe SharePoint Server technology?

Question 3 (dependent on answer to Q1)

Given the broad and very comprehensive nature of SPS 2010, what core

functionality most appeals to your cluster?

Typical answer(s) expected

1. SPS as a web platform – intranet, extranet, internet

2. SPS as collaboration platform

   • Team collaboration – a team site used by group of people from within and

> without traditional hierarchical structure, such group permanent or ad-hoc
> - Document workspace – single document center of attention for example large complex document spans over time (e.g., world cup bid book, technical manual, employee handbook)
> - Meeting collaboration – somewhat similar to document workspace emphasis is on coordinating and communicating meeting details
> - Document collaboration – common repository to manage documents
> 3. SPS as an integration platform – LOB integration exploiting native BCS capabilities
> 4. SPS as search provider – searching for content, people (skills, profiles)
> 5. SPS as a presentation layer – one stop shop as in portal technology
> 6. SPS as a development platform – SharePoint Designer, Visual Studio
> 7. SPS for social networking – internal blogs, wikis to share experience which is indexed and thus searchable

Question 4

Lists are central components of the SharePoint technology. To what extent have they been deployed in your cluster?

> *Typical answer(s) expected*
>
> Announcements
>
> Calendar
>
> Contacts
>
> Custom List
>
> Custom List in Datasheet View
>
> Discussion Board
>
> External List
>
> Import Spreadsheet
>
> Issue Tracking
>
> Links
>
> Project Tasks
>
> Survey
>
> Tasks

Question 5

Libraries are central components of the SharePoint technology. To what extent have they been deployed in your cluster?

Typical answer(s) expected

Library

Document Library

Form Library

Picture Library

Wiki Page Library

BUSINESS REQUIREMENTS DOCUMENT

UKZN DMS Implementation Project:

Business Requirements Document

Introduction

The DMS team will use this document to ensure that the business activities of the unit are captured, in order for the unit's site to be created appropriately.

If you are unable to determine the answer to any of the questions, simply note the users response in the space provided and revert back to the DMS project team.

User Requirements Questions

User Information

Kindly complete the fields below to provide an overview of the Document management needs and requirements of your own department.

Questions and/or notes can be made alongside the check boxes.

User details

Department Name:	
Date of Assessment:	
Possible URL: e.g Human Science humsci.ukzn.ac.za	

User management

Current Number of users

Current Amount of Da

Are there any External users

If yes, briefly describe their access requirements

1. **Who is responsible for signing off the user requirements assessment?**
   (include designation and contact details)

   _____

   _____

   _____

   _____

   _____

2. **Outline briefly your department's functions and business processes** (*eg.
   Workflow, processes, daily tasks, output products, paper trails, meetings, etc*):

3. **List all users and access requirements to the documents** *(use the Permissions block below as a reference)* **to within your department /team**:

Permissions:

- ☐ Full Control - Has full control.
- ☐ Design - Can view, add, update, delete, approve, and customize.
- ☐ Manage Hierarchy - Can create sites and edit pages, list items, and documents.
- ☐ Approve - Can edit and approve pages, list items, and documents.
- ☐ Contribute - Can view, add, update, and delete.
- ☐ Read - Can view only.
- ☐ Restricted Read - Can view pages and documents, but cannot view historical versions or review user rights information.

User (full name)	Novel Login	GroupWise ID (*Only if Novel Login is different*)	Access Rights

2. **Department /Team Organogram**

Illustrate below, all your department /team members in their respective roles within the hierarchy of your department /team (*eg. Manager, PA, etc.*)

1. **Check all boxes that are applicable to you /your unit**:

You have content that you want to make available to all employees. (i.e., policies, procedures, news releases, product information, etc.)	
You have content that you want available only to a controlled (select) group of employees. (i.e., team information for a specific audience such as project status, management reports, etc.)	
You have content targeted at a specific group of employees, but all employees could view it. (i.e., company campus information, division procedures, strategy, etc.)	
You want a collaboration area for employees to work on documents, projects or meetings.	

2. **What type of content /document /information requests do you <u>receive</u> and <u>provide</u> to other people?**

3. **How often-changing is the content you want to provide?** (Tick checkboxes)

Daily	
Weekly	
Monthly	
Yearly	

4. **How many people contribute to or are responsible for this content?** (Tick checkboxes)

Less than 5	
Less than 15	
Less than 30	

More than 30	☐

5. Do you want to provide any of the following types of content? (Tick checkboxes)

Document libraries *(similar to cabinet or folder structure)*	☐
Surveys	☐
Lists (*events, links, announcements, tasks, contacts, custom, etc.*)	☐
Discussion boards	☐
Forms	☐
Images/graphics	☐
Workspaces (*Group collaboration: documents, meetings, projects etc.*)	☐
Other	☐

Please describe:

_____

Document Library – [*Only complete if document libraries are a type of content you want to provide*]

6. Where do the documents currently reside, and what type of information /format do they contain?

7. Who needs access to these documents?

	YES	NO
- [Tick checkboxes YES *or* NO *to the right, to answer questions below]*		
Will the documents need versioning?	☐	☐

255

Will the documents need an approval process before being posted for all users to see?

Search functionality

- *[Tick checkboxes* YES *or* NO *to the right, to answer questions below]*	Y E S	N O
8. Do the users only need to search contents located on the site?		
9. Do the users need advanced search features such as searching other sites, file shares, databases, documents?		
10. Do the users need to have the ability to narrow their search results via selecting topics to search? [*Eg. Search only within Human Resources*]		

Audience

Tick all boxes that are applicable to your team's /department's audience :

11. Is the content you provide to your audience short-term or long-term? [*i.e. How long does content remain valid*] (Tick applicable checkboxes)

< 1 month	
1 - 6 months	
6 - 12 months	
1 - 2 years	
2 + years	

Site Management

A site manager is responsible for managing your departments /team's sub sites & workspaces and for adding/updating areas for content contribution. Either your site manager or a designated security administrator will be responsible for adding users as a reader to the site. This is a compulsory requirent for all departments/sections.

Who will be the departmental site administrator (*assists with general site administration and user rights administration [adds users into groups])*

```


```

Special Requirements

Please state other special requirements that is specific to your department/section.

UNIVERSITY OF KWAZULU-NATAL
COLLEGE OF AGRICULTURE, ENGINEERING & SCIENCE

PROGRESS REPORT

ON

HIGHER DEGREE CANDIDATES - 2012

Please complete and return document to the College Office on or before 26 October 2012

SECTION A: To be completed by the candidate
Name: Student Number:
Postal Address:
Fax Number: **E-mail Address:**
Telephone Number : (H)   (Bus)
Degree registered: Year of study: ***** See over page**
Subject of Study :

SECTION B: To be completed by the Supervisor and Student:
1. In the last 12 months the candidate has seen me: (Please tick)

Frequently		
Occasionally		

Never		

2a. The candidate's progress is / is not satisfactory (Please delete one)

2b. The candidate's progress is not satisfactory for the following reason/s:

2c. I recommend the following: Please tick relevant box

Continuation		Warning		
Cancellation		Other		

3. The candidate is expected to complete the research and to submit the completed thesis/dissertation in:

3 months		6 months		12 months		Not yet ready		

4. Comments by student regarding progress made.

Additional comments: **(Include a time-line and completion programme for students who are about to or have reached the maximum permitted time for their degree)**

Signature of Supervisor: Date:

Signature of Student: Date:

Signature of Academic Leader Research: Date:

Recommendation of Dean & HoS: (please see over page)

Registration should not exceed the following   - Maximum Period of Registration:

MSc	:	Full-time	3 years (6 semesters)
		Part-time	5 years (10 semesters)
PhD	:	Full-time	4 years (8 semesters)
		Part-time	6 years (12 semesters)

Candidates and Supervisors are urged to make every effort to ensure that the qualification is completed within the progression period as stipulated in the Rule Book.

Minimum Period of Registration:

MSc	:	Full-time	1 year (2 semesters)
		Part-time	2 years (4 semesters)
PhD	:	Full-time	2 years (4 semesters)
		Part-time	4 years (8 semesters)

Only in exceptional cases will motivations for extension be considered.

Perran et al (2011) identify the following specific key roles for SharePoint technology deployment.

Role	Description
SharePoint Owner	The overall success of SharePoint deployment is the main call of this role. This role has the responsibility of ensuring that the implementation remains congruent with organizational goals and initiatives
SharePoint Infrastructure Administrator	Primary function of this role is the installation, configuration, operations and maintenance of the SharePoint farm.
SharePoint Solution Architect	The primary function of this role is to maintain a communication link between the corporate IT support and the end user community. This role is also charged with administration of top-level site creation, search configuration and SharePoint user security
SharePoint Branding Specialist	Responsible for SharePoint branding and solution layouts
SharePoint Help Desk	Day to day end user support
SharePoint Developer	Extending functionality of SharePoint through custom development using languages like .NET and Java
SharePoint Site Owner	Designated user gathers and defines requirements for proposed solution usually within a department or for a specific solution
SharePoint Site Designer	Responsible for the design of the SharePoint site based on the direction from the Site Owner
SharePoint Power Users	Typically experienced user who manages other user access to the site, uploads content, designs site, and manages first-level user support
SharePoint Contributors	Day to day collaboration through various site content such as lists and libraries
SharePoint Readers	Day to day end user activity as they browse/search SharePoint sites to access forms, policies or general information

Understanding the Pillars of a Governance Framework (Perran et al, 2011)

18 July 2013

Mr Sonwabo Seedwell Jordan 882219688
School of Management, IT and Governance
Pietermaritburg Campus

Protocol reference number: HSS/0996/012M
Project title: Microsoft SharePoint Server 2010: A Case Study of the Corporate Governance Guiding its Selection, Deployment and Commissioning at the University of KwaZulu-Natal, South Africa

Dear Mr Jordan

I wish to confirm that your application in connection with the above mentioned project has been approved. **Approval of a change of project title**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach/Methods must be reviewed and approved through an amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number. Please note: Research data should be securely stored in the school/department for a period of 5 years.

Best wishes for the successful completion of your research protocol.

Yours faithfully

Professor U Bob (Chair) & Dr S Singh (Deputy Chair)

/px

cc Supervisor: Professor Brian McArthur
cc Academic Leader Research: Professor B McArthur
cc Post Graduate Administrator: Ms D Cunynghame