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USING COLLABORATIVE WEB 2.0 TOOLS IN ENTERPRISE SYSTEM IMPLEMENTATION TO ASSIST WITH CHANGE MANAGEMENT AS A CRITICAL SUCCESS FACTOR

Mini-dissertation by

PIETER GELDENHÜYS VAN SCHALKWYK
(25368614)

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Study leader: Dr H Lotriet

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“I am change. I work for you, with you, and along side of you. I am your partner and competitor. I am an opportunity and a threat. I am a Lion and you are the Gazelle. I will not come at you straight ahead and announce my arrival with an executive memo. I will leap over you or go around you. If you stand in my way, I will run over you. I will replace you either through advanced technology, outsource you with more productive resources, or eliminate your job when I destroy your business model.

I am change. While you cut my coffee, eliminate my training, and reduce travel in the name of cost transformations, I am buying iPhones, reading Business 2.0 and seeing the world on my own dime. I can read Peter Drucker and know 99% that you learned during the 1980’s. While you attempt to polish the last grain of efficiency from enterprise 1.0, I have moved to Enterprise 2.0. You stand in fear of 2.0 while I and millions of people like me are embracing it. I can destroy your business by simply posting a bad experience on a weblog. At the same time, I can make your business by buying into your brand and helping define the experience.

I am change. While you try to make your organisation more efficient, I will replace you. You love control and hierarchal structures which focus communication from the top down. I will communicate from the ground up. You have 5 direct reports that are bound to listen to you. I have millions of people that will listen to me and what I have to say. You focus on the physical and I focus on the meta-physical. I am agile, flexible, and I can emerge and disappear in a matter of seconds. I can be inside any organisation in six tenths of a second and creating value in moments.

You grew up with my grandparents; tradition. You embraced my parents; re-engineering. Now it is my time, change is here and it’s already later than you think. I will not seek you out but our confrontation is inevitable. My children, yet to be named, will create a tear in the fabric of value and the basic definition of what is means to be human. Are you ready?”

(Stephens, 2007)

Contents

List of figures

Chapter 1: Introduction and overview

1.1 Introduction

Remaining competitive in the business environment is a key driver for connecting information from various sources in a business through a single entity (Finney & Corbett, 2007, p. 329). Organisations have looked for the silver bullet that will solve all information management problems and "enterprise systems appear to be a dream come true" (Davenport, 1998, p. 121). These enterprise systems promise seamless integration of all the information that flow through all business areas. Davenport (1998, p. 121) lists financial and accounting information, human resources information, supply chain information and customer information as business areas where business managers have previously struggled with incompatible information systems and inconsistent operating practices. "The promise of an off-the-shelf solution to the problem of business integration is enticing" states Davenport (1998, p. 121). Ettlie et al. (2005, p. 953), however, makes a powerful argument that all the delivered wisdom to date around shows that enterprise system implementation is one of the most hazardous projects that an organisation can undertake.

Enterprise system implementations and more specifically Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) solutions have a documented history of failed implementations. Many authors such as Davenport (1998, p. 122); Finney and Corbett (2007, p. 329); Nah et al. (2001, p. 286); Holland and Light (1999, p. 30) and Vathanophas (2007, p. 433) have researched the failure of ERP to deliver on its promise. Umble et al. (2003, p. 244) cites Standish Group research that 90% of ERP implementation projects are late and exceed their budget. Gargeya and Brady (2005, p. 501) found that 70% of ERP projects failed to have all the functionality implemented that was initially planned. Some examples of the failed implementations are more severe and Davenport (1998, p. 122) highlights that FoxMeyer Drug argued that its ERP implementation was partly responsible for its bankruptcy while Mobil Europe spent hundreds of millions of dollars in the nineties only to abandon the ERP implementation project.

ERP solutions as a key enterprise system has been well researched by a number of authors that include Akkermans and van Helden (2002); Davenport et al. (2004) and Soja (2006),

who analysed the value to business, perceived benefits, successes and failures as well as critical success factors for implementation. All of these authors make a case for enterprise systems and the competitive advantage that it brings to organisations that implement this successfully. Information and Communication Technology (ICT) is seen as "an indispensable ingredient in several strategic thrusts which businesses have initiated to achieve competitive advantage" (Kruger, 2001, p. 6). Many organisations have enterprise systems at the core of their business.

Business Process Management Suites (BPMS) are newcomers to the enterprise systems domain with the promise to connect more systems, orchestrate more processes, involve more users and provide more controls to business users to help organisations achieve the elusive competitive advantage that they are looking for.

The research study will address the critical success factors for successful enterprise system implementations that were identified by other researchers specifically in the ERP and CRM domains and look at the application of new technologies, specifically Web 2.0, to ***enable*** these success factors for BPMS enterprise system projects.

1.2 Problem Statement

1.2.1 Background to the problem

Davenport et al. (2004, p. 16) lists integration, process optimisation, and the use of enterprise systems data as the primary components for achieving value from enterprise systems. Creating a competitive advantage through these components is the key reason for organisations adopting these large scale solutions. These systems currently address various business requirements but started off as back office systems for the integration and automation of transaction intensive processes, typically in manufacturing, finance and human resources (Davenport, Harris, & Cantrell, 2004, p. 17). Enterprise systems are largely based on business process management with the notion of processes as the central entity and that enterprise systems provide the necessary tools to design or orchestrate processes as well as execute and evaluate these processes (Moller, 2005). Typical examples of enterprise systems include:

a. Enterprise Resource Planning (ERP) solutions;
b. Customer Relationship Management (CRM) solutions;

c. Supply Chain Management (SCM) solutions; and
d. Business Process Management (BPM) solutions.

Enterprise systems are characterised by specific attributes that each have a major impact in the organisations where it is deployed (Markus & Tanis, 2000, p. 176). These characteristics include (Markus & Tanis, 2000, p. 176):

a. Integration of data throughout the organisation;
b. Packaged solutions from vendors rather than bespoke or in-house developed applications;
c. Based on Best Practices in the specific organisational domains such as supply chain management or human resources;
d. Some assembly required to accommodate specific integration and architectural requirements; and
e. Evolving as business and technology requirements change.

Business Process Management Suite systems have these characteristics and are a new addition to the enterprise systems domain as it was previously seen as an emerging technology. It has only recently been recognised as an enterprise application (Gartner, 2007, p. 26). BPMS is seen as a specific technology in the broader BPM arena and is now added to the BPM hype-cycle as published by Gartner Inc. (Gartner, 2007).

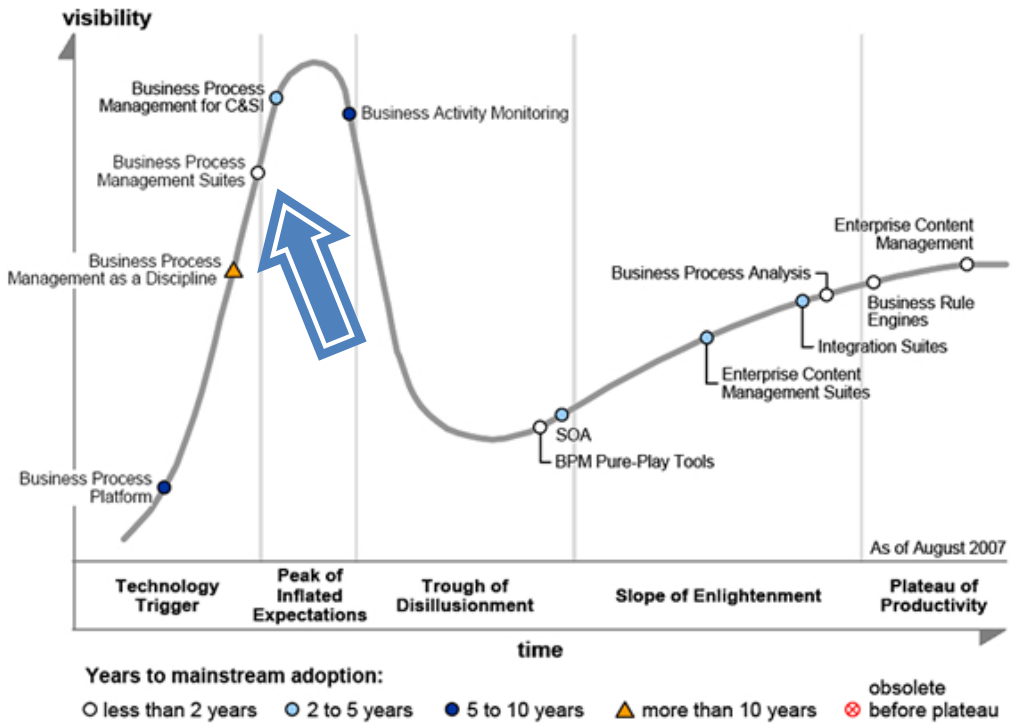

Figure 1 - Gartner BPM hype-cycle (Gartner, 2007, p. 5)

The Gartner hype-cycle for BPM provides a view from a business perspective of the anticipated challenges faced by BPMS enterprise solutions even though the BPM hype-cycle is not based on academic research. The future prediction for BPMS is based on similar patterns that Gartner observed for other enterprise system methodologies and technologies. One of the challenges faced is that the adoption rate is quite fast in comparison to some of the other BPM components as illustrated by the hype-cycle graph (Gartner, 2007, pp. 5, 26). The predicted mainstream adoption is less than two years and this does not leave BPMS implementers much time to establish successful implementation methodologies.

In addition to this, the Internet has developed significantly over the past decade and introduced a new range of technologies and ways of work. "From stunning increases in computing power, network capability, and reach, to the growing accessibility of the tools required to get organised, create value, and compete, this new Web has opened the floodgates to a worldwide explosion of participation" (Tapscott & Williams, 2006, p. 19). These new technologies create a number of opportunities and applying it to the implementation of enterprise systems still requires further research to establish whether it provides meaningful advantages.

BPMS technology is still early in the enterprise system maturity curve and it would be beneficial to investigate the challenges faced by other enterprise systems and identify specific areas that can be addressed during the implementation of a BPMS solution that will have a positive impact on the deployment of BPMS technology. The problem that BPMS projects face is that they will develop the same reputation for failed implementations as other enterprise system projects. There have been a lot of new technological developments, specifically in the Internet environment, that may be able to support the critical success factors for enterprise system implementation. The challenge that business users face is, however, contextualising the use of the new technology with the problems associated with enterprise systems implementation.

Combining the known critical success factors for enterprise system implementation with the possibilities that new Internet technology like Web 2.0 brings may provide a new contextual model to look at these, not in isolation, but as part of a changing collaborative world to minimise the risk of failed BPMS projects.

1.2.2 Objectives of research

The aim of this paper is to provide enterprise system and BPMS implementers an alternative approach to address those critical success factors that can be supported by new web based collaborative technology and to propose a typical model or configuration to deploy this approach as a methodology.

In order to achieve this aim the following objectives are identified:

a. Gain an understanding of enterprise and BPMS systems and the history of failed enterprise system implementations;
b. Identify and analyse the critical success factors of enterprise system implementation with a specific view on those that require communication and collaboration that can be supported by a Web 2.0 technology;
c. Gain an understanding of change management as a critical success factor for enterprise system implementation and the role of communication and collaboration as components of change management;
d. Research the current state of Web 2.0 collaborative technology and determine the components that may be useful to support the specific requirements identified for change management as a critical success factor in enterprise system implementation;

e. Propose a model using Web 2.0 tools in the BPMS deployment;
f. Identify areas to be investigated in future research such as a case study.

The application of the principles identified and researched for the model is demonstrated through the application of the principles to a specific case, in this instance the FlowCentric Business Process Management Suite.

1.3 Research Plan/Design

1.3.1 Methodology

In order to contextualise enterprise system implementation and its associated critical success factors with new Web 2.0 technologies, data was collected on a non-empirical qualitative basis. Literature was analysed to identify the critical success factors associated with enterprise system implementation and to define the requirements of those critical success factors that would benefit from Web 2.0 technology. The literature survey was extended to include the current state of Web 2.0 technology and its components that would support the objectives of the study.

By linking the requirements identified from the critical success factors for enterprise system implementation with the possibilities that Web 2.0 collaborative technology provide, a proposed model has been defined on an empirical basis.

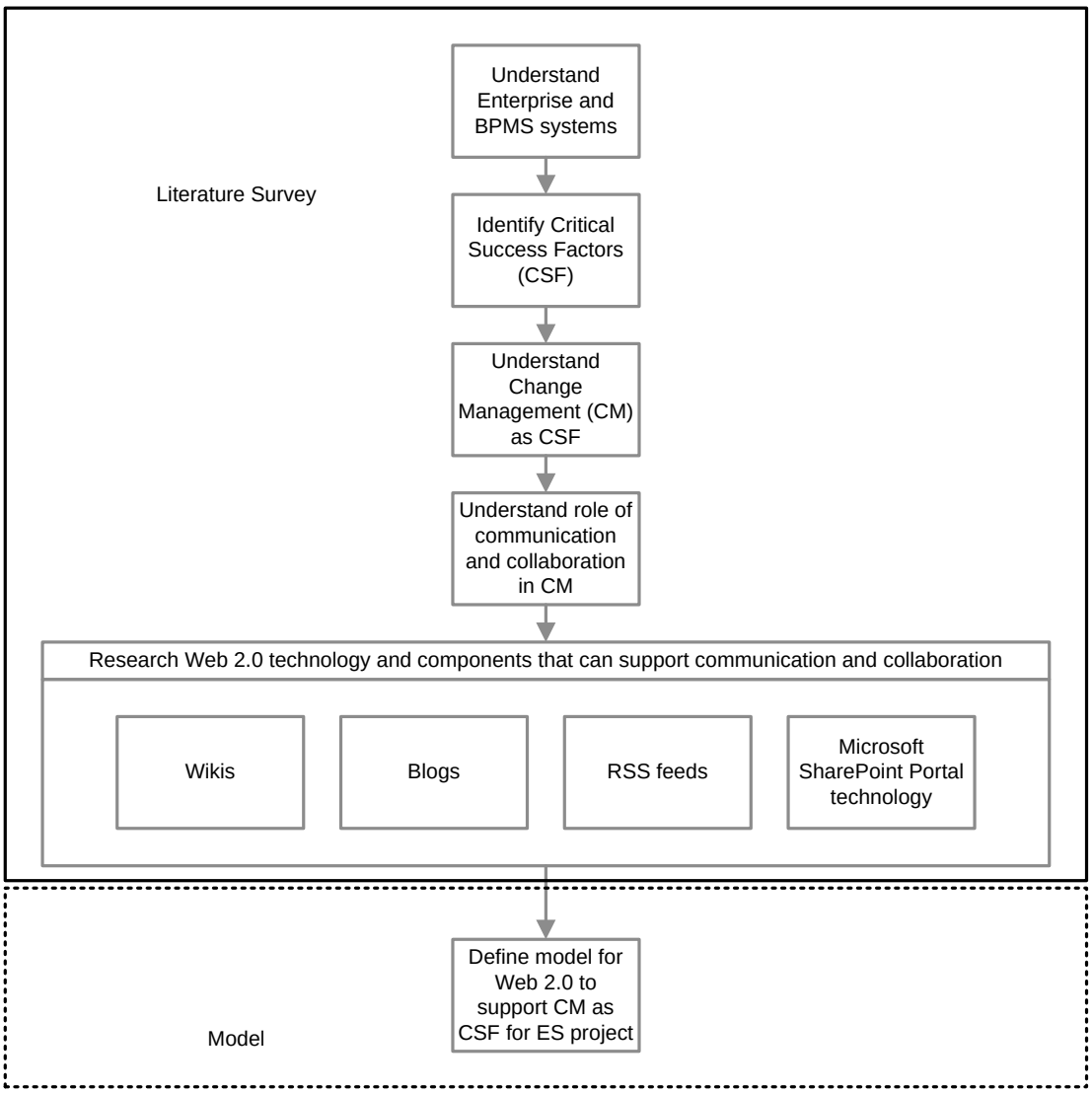

Figure 2 - Research approach

1.3.2 Assumptions

Enterprise system is used as a collective term for a range of business software applications that are generally found in large scale organisations. It is assumed, for the purpose of this study, that the enterprise systems are packaged solutions that are based on best practices and generally require multidisciplinary implementation teams to define the systems requirements, implement the application and train users. It is further assumed that the data sources for these enterprise systems are dispersed throughout the organisation and they require modelling to

describe the architectural relationship between all elements of the solution and its environment.

1.3.3 Limitations

The proposed "Elixir" model is a theoretical framework developed on supporting technology and the practical implementation and evaluation of the model is not part of the scope of this study. It should be taken into consideration that the proposed model is one of many possible ways to address the critical success factors for enterprise system implementation, and should therefore not be seen in isolation from the other factors that contribute to project success.

1.4 Chapter Selection

Apart from chapter one, the following chapters were included in the mini dissertation.

Chapter 2: Enterprise Systems and Business Process Management Suites. It is important to understand enterprise systems and specifically business process management suites and their typical characteristics in order to understand how to address the potential problems that BPMS implementers may face. In this chapter enterprise systems, their reputation for failure, BPMS as a specific type of enterprise system and FlowCentric is a specific example of such a system were analysed. Specific topics that were addressed are:

a. Enterprise Systems;
b. History of Enterprise Systems failure;
c. Business Process Management (BPM) as a management methodology;
d. Business Process Management Suite (BPMS) as enterprise systems; and
e. FlowCentric BPMS.

Chapter 3: Critical success factors in enterprise system implementation. There is a substantial body of knowledge around the critical success factors that are associated with success for the enterprise system implementation. ES implementers can gain valuable knowledge from lessons learned which is applicable across the range of ES applications. In order to critically review the application of these critical success factors to the proposed collaborative model, special emphasis is placed on the following topics:

a. What is a critical success factor?;
b. Critical success factors for enterprise system implementation; and

c. Change management as a specific critical success factor that can be supported by collaborative technology.

Chapter 4: Change management for enterprise systems implementation. The aim of this chapter was to gain a better understanding of change management in enterprise systems implementation, collaboration and communication support, and the role of teams in change management. In addition, models used by open-source development teams were researched to understand if the models are applicable to the collaborative environment needed to satisfy the requirements of change management as a critical success factor in enterprise system implementation. The literature survey also addressed the knowledge management requirements of teams working in such a collaborative environment. Specific topics that were addressed were therefore:

a. Understanding change management in enterprise system implementation;
b. Communication and collaboration;
c. Teamwork and virtual teams in organisations;
d. Knowledge management requirements; and
e. The open-source approach to collaboration.

Chapter 5: The current state of Web 2.0 collaborative technology. It is important to get a view on the current definition and status of the trends and application of Web 2.0 in order to propose a collaborative model based on new technology. The components of Web 2.0 applicable to communication and collaboration were identified and included wikis, blogs and RSS feeds. It would be beneficial if all the required components were available in a single packaged solution for ease of deployment of the proposed model and Microsoft SharePoint portal was reviewed at a high level to determine its suitability. In this chapter special emphasis was placed on:

a. The development of Web 2.0;
b. Web 2.0 and the enterprise; and
c. Microsoft SharePoint Services in the enterprise.

Chapter 6: A proposed model for using Web 2.0 tools in BPMS deployment. Providing a contextual model that takes both enterprise system and the new Web 2.0 technology into consideration requires that these two concepts are synthesised in a single model to determine if it would be suitable to support change management as a critical enterprise system

implementation factor, through improved collaboration and communication. It looks specifically at the application of wikis, blogs, RSS feeds, knowledge management and team surveys to provide a Web 2.0 based collaborative environment. This chapter specifically addresses the following:

a. Elixir BPMS model overview;
b. Objectives for the Elixir collaboration environment; and
c. Components of the Elixir model.

Chapter 7: Conclusion. The final chapter summarises all facts, arguments, findings, proposed models and recommendations of this mini-dissertation. It should be read in conjunction with Chapter 1 to provide a comprehensive overview of the research problem and how it was addressed.

1.5 Terminology

1.5.1 Definitions

Blog: A blog is derived from the word weblog and refers to a website that contains dated entries in reverse chronological order showing the most recent entry at the top. A blog is essentially an online journal that is authored by an individual or a group (Boulos, Maramba, & Wheeler, 2006, p. 2).

Business Process Management: BPM is an IT-enabled management discipline that requires organisations to move to process-centric thinking and reduce reliance on traditional functional structures or silos (Gartner, 2007).

Change Management: The process of continually renewing an organisation's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers (By, 2005, p. 369).

Critical success factors: Critical success factors are a limited number of focus areas where satisfactory results will ensure the success of the bigger project, implementation or organisation (Rockart, 1979, p. 83).

Enterprise Systems[1]: An enterprise system is a packaged, complex (but configurable) solution based on best practices that integrate information across all or most of the business functions, into a single enterprise repository to support strategic, tactical and operational goals that service a broad range of stakeholders, provide support for business decision-making and extend the reach of the organisation to its suppliers and customers. It has a significant organisational and change management impact and requires advanced information and communication technology infrastructure to support it in an organisation.

Wiki: Wikis are defined as fully editable websites where visitors can read, re-organise and update the structure and content of a wiki that includes text and pictures. This open editing functionality can be accessed using a web browser (Augar, Raitman, & Zhou, 2004, p. 95).

1.5.2 Abbreviations

BDFL	Benevolent Dictator for Life
BPM	Business Process Management
BPMS	Business Process Management Suite
BPR	Business Process Re-engineering
CIO	Chief Information Officer
CM	Change Management
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
ES	Enterprise System
ICT	Information and Communication Technology
IT	Information Technology
MOSS	Microsoft Office SharePoint Server
OSD	Open-source Definition
RSS	Really Simple Syndication
SCM	Supply Chain Management
TAM	Technology Acceptance Model
TQM	Total Quality Management
WSS	Windows SharePoint Services

[1] This definition is derived from the literature review in chapter 2.

Chapter 2: Enterprise Systems and Business Process Management Suites

2.1 Introduction

Enterprise Systems are a key part of everyday life in large organisations. These enterprise systems manage business processes in either a structured and rigid application like ERP and CRM solutions or an agile and flexible application such as a BPMS. All these various solutions are applicable to specific business challenges and requirements and some may be more suitable in specific situations than others. Enterprise systems unfortunately have a reputation for failed implementation and this is critically evaluated in this chapter. This reputation sometimes overshadows the value of the benefits that can be derived from using the systems. It is necessary to understand the characteristics of these enterprise systems and some of the research on their failures in order to improve the success rate of enterprise system implementation.

2.1.1 Aim

The aim of this chapter is to provide an understanding of enterprise systems and their history of failed implementations. It defines the value that BPM brings to organisations and reviews BPMS as a new edition to enterprise systems. The development of a proposed collaborative model focuses specifically on FlowCentric as a BPMS solution. The proposed methodology may or may not be applicable to other BPMS solutions as FlowCentric was the primary focus. FlowCentric is used as a typical BPMS tool set for the purposes of this study.

2.1.2 Scope

Enterprise System is a broad and collective term and the scope of this chapter is to provide a basic definition and historical review of both the application and success in the market. It provides a business perspective on the value of BPM in the enterprise and evaluates BPMS as enterprise systems. This chapter also provides a high-level understanding of the FlowCentric tool, its components and how it is employed in an organisation.

In order to emphasise the aim, the following topics will be discussed:

a. Enterprise Systems;
b. History of enterprise system failures;

c. The value of BPM to organisations;
d. BPMS as enterprise systems; and
e. FlowCentric BPMS

2.2 Enterprise Systems

2.2.1 Definition of Enterprise Systems

Enterprise Systems started out as “back-office” systems according to Davenport et al. (2004, p. 17) with the specific view to integrate functions across various business domains that include manufacturing, supply chain, human resources and finance. “By integrating additional processes with a core back-office financial systems base, organisations stand to reap even greater benefits from seamless information flows within and across firms” Davenport et al. (2004, p. 17). This description by Davenport provides a basic definition of an enterprise system as a solution that integrate information across a range of business or functional silos, based on a core financial system and is threaded together by cross functional business processes. Davenport et al. (2004, p. 16) continues that business managers can make decisions based on real time information as a result of these enterprise systems that connect and manage the information flow across complex organisations.

The Ettlie et al. (2005, p. 968) definition for ERP solutions list, in addition to the typical modules of an ERP, the fact that it is usually based on or integrate with a relational database system, that it generally requires extensive business process analysis and a considerable amount of employee training and new work procedures. This definition provides some insight into the typical level of complexity associated with an enterprise system and the reason why it requires careful planning, proper project management and extensive change management. The complexity issue of enterprise systems versus other business applications is supported by Moller (2005, p. 485) by defining the differentiating factors in terms of complexity as:

a. the larger number and diversity of typical stakeholders;
b. the high cost of implementation and reliance on consultancy;
c. the integration of processes across various business units;
d. the custom configuration of software that represents core processes;
e. the change management requirements and political issues associated with these types of projects; and

f. the extended training and familiarisation requirements of the software.

Enterprise systems are central to delivering an effective business strategy according to Nah et al. (2001, p. 285). They provide an efficient way to use information technology to gain a competitive advantage in fiercely competitive markets. Nah et al. (2001, p. 185) defines enterprise systems through three key attributes:

i. the ability to integrate and automate a business' processes;
ii. the ability to share a common data and practices across the business; and
iii. the ability to produce and access information on a real time basis

These attributes of enterprise systems provide some insight into the nature of the solutions and a further analysis of the characteristics of these solutions provides a better understanding and general definition of enterprise systems.

2.2.2 Characteristics of Enterprise Systems

Characteristics of enterprise systems include those of Markus and Tanis (2000, p. 176) who list the following as key:

a. Integration of data throughout the organisation;
b. Packaged solutions from vendors rather than bespoke or in-house developed applications;
c. Based on Best Practices in the specific organisational domains such as supply chain management or human resources;
d. Some assembly required to accommodate specific integration and architectural requirements; and
e. Evolving as business and technology requirements change.

Another approach to the classification of enterprise systems is to consider the benefits derived from the use of these systems. Enterprise systems may then focus on specific business areas but as a technology it provides similar benefits in each area. Gargeya and Brady (2005, p. 503) list both tangible and intangible benefits of enterprise systems and specifically ERP adoption. They include productivity improvements, personnel reduction, order management improvement, information technology cost reduction, procurement cost reduction and revenue/profit increase as some of the key tangible benefits. The intangible benefits listed by Gargeya and Brady (2005, p. 503) such as information visibility, improved

processes, increased customer responsiveness, integration, standardisation and improved business performance support globalisation and growth strategies of most enterprises. Al-Mashari et al. (2003, p. 352) provide a different classification framework for the benefits of ERP systems that is more appropriate for the broader based classification of enterprise system benefits. The classification framework recognises the following five benefit groups:

i. Operational: This group focus on efficiency gains through cost reduction, cycle time reduction, productivity and quality improvement as well as customer satisfaction;
ii. Managerial: Better human resource management, decision-making, planning processes and performance management are addressed in this group;
iii. Strategic: This group focuses on the benefits of innovation, support for business growth and strategic alliances, increased differentiation and cost leadership;
iv. IT infrastructure: The benefits of this group manifest as increased business flexibility, transactional cost reduction and increased IT throughput capability; and
v. Organisational: This group focuses on the benefits of building a business vision, facilitated business learning and improved support for organisational change.

Davenport et al. (2004, p. 18) identifies three key value drivers of an enterprise system as:

i. Integrate: Creating a unified environment for processes and data that provides better integration to the organisation and its processes as well as customers and suppliers;
ii. Optimise: Standardise processes using best practices, ensure that processes are optimised and that best practices support the strategic objectives of the business; and
iii. Informate: "Organisations 'informate' when they use information to transform work" Davenport et al. (2004, p. 19). An enterprise system allows organisations to turn data into contextual information for business analysis and decision making.

All these definitions and characteristics have common elements that are used to create a definition for an enterprise system. An enterprise system is a packaged, complex but configurable solution based on best practices that integrate information across all or most of the business functions into a single enterprise repository, to support strategic, tactical and operational goals that service a broad range of stakeholders, provide support for business decision-making and extend the reach of the organisation to its suppliers and customers. It has a significant organisational and change management impact and requires advanced information and communication technology infrastructure to support it in an organisation.

Enterprise systems are not always successful in achieving their goal and this is mainly due to the complexity factors defined by Moller (2005, p. 485). The following section will address some of the cases where enterprise systems were not successful.

2.3 History of Enterprise System failures

The objective of this part of the study is not to provide an exhaustive list of failed implementations but rather to provide evidence that enterprise system implementations can be problematic and disruptive if precautions are not taken during the implementation of these systems. The objective of later sections of the study is to identify those critical success factors that will contribute to the effective delivery of these projects with a specific focus on applying it to BPMS enterprise applications. It is important to highlight the fact that these implementations do provide significant challenges to system implementers.

Enterprise system implementations and more specifically Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) solutions have a documented history of failed implementations. Many authors as well as Davenport (1998, p. 122); Finney and Corbett (2007, p. 329); Nah et al. (2001, p. 286); Holland and Light (1999, p. 30) and Vathanophas (2007, p. 433) have researched the failure of ERP to deliver on its promise. Umble et al. (2003, p. 244) cites Standish Group research that 90% of ERP implementations projects are late and exceed their budget. Gargeya and Brady (2005, p. 501) cites Gartner that more than 70% of all ERP projects fail to be fully implemented and categorise these failures as complete failures and partial failures. Complete failures include projects where the implementation was abandoned prior to completion or where organisations suffered significant financial losses due to the enterprise system implementation failure. Partial failures resulted in disruption in daily operations and "tenuous adjustment processes for the company" (Gargeya & Brady, 2005, p. 502).

Similarly Robey et al. (2000, p. 1) found that enterprise systems are not only known for significant budget overruns but estimate that up to 50% of these projects fail to achieve the anticipated benefits because managers underestimate the change management requirements. This reasoning as to why these projects fail provides guidance on areas that can be addressed in this study of enterprise systems and the critical success factors.

Some examples of the failed implementations are more severe and Davenport (1998, p. 122) highlights that FoxMeyer Drug argued that its ERP implementation was partly responsible for its bankruptcy while Mobil Europe spent hundreds of millions of dollars in the nineties only to abandon the ERP implementation project.

The evidence of failed enterprise system implementations and current research literature is limited to ERP and CRM projects. In order to predict that BPMS solutions may follow a similar trend, it is necessary to gain a better understanding of BPMS as enterprise software applications.

Business Process Management Suites solutions are new to the enterprise system space and have only recently been recognised as such by industry research organisations that include Gartner (2007, p. 26). The following section provides a brief description of BPM as a management methodology and discusses BPMS as enterprise applications that support BPM efforts in an organisation. It positions BPMS as an information technology based enabler of BPM. The discussion positions the BPMS solution as a typical enterprise system that can benefit from the lessons learnt in other enterprise systems applications, if the critical success factors for implementation are addressed from the start.

2.4 Business Process Management as a management methodology

This section focus on BPM to provide an understanding of the scope of an enterprise system that support BPM in the organisation. It is not intended to provide extensive research on the subject, but rather to put the requirements for implementing supporting enterprise applications like FlowCentric into perspective.

Business ProcessManagement is not a new term but has seen a revival in the past few years with the rise of Business Process Management Suites (BPMS) as enterprise systems. There are many definitions of BPM and research firm Gartner (Hayward, 2007, p. 1) defines BPM as an IT-enabled management discipline that requires organisations to move to process-centric thinking and reduces reliance on traditional functional structures or silos. Hill et al. (2006, p. 4) states that it has evolved from previous management practices such as total quality management (TQM) and business process reengineering (BPR). Gartner (Hayward, 2007, p. 1) extends the definition to include the business process lifecycle from process design to monitoring and optimisation as the scope of BPM projects. The process lifecycle

contains key elements that are addressed by BPMS solutions as enterprise systems and will be reviewed in that section of this study.

Business Process Management thinking requires a paradigm shift in thinking as organisations are generally designed around functional silos rather than from a process perspective. Gartner (2007, p. 3) proposes a process orientation as an organising construct rather than what it terms as “reliance on traditional function and product-centric organisational structure”. An organisation will, for example have sales, marketing, finance, administration, warehousing and distribution departments that each function in isolation. This is a functional silo perspective. The same areas of business are involved in an order-to-cash process cycle from a process-centric point of view but focus on the output of the process rather than the individual business unit.

Burlton (2001, p. 11) sees hyper-competition, growing organisational complexity and reach, rising external stakeholder power and e-business technology as the major forces that drive organisations to revisit business processes. Hyper-competition is further fuelled by shrinking business cycles, the commoditisation of products and services, and the provision of knowledge as a product or service. This requires organisations to be agile in their approach to business processes and to have the ability to react to changing market conditions.

Business process management is not a technology but rather an approach that focuses on differentiating organisations through their processes and to drive operational efficiency. This process differentiation is in many cases the only element that provides a competitive advantage between competing enterprises. McAfee and Brynjolfsson (2007) use the term “creative destruction” for the highly competitive environment where a business such as a search engine or online marketplace can quickly dominate the market, but just as easily be destroyed by a new approach or a competitor. A study by McAfee and Brynjolfsson (2007) into various industries shows that process innovation and replication is emerging as a characteristic of successful enterprises in the current business economy. “While creating an innovative business process is less visible than developing a new product or investing in factories, our research shows it is actually more important to a company's success. Intangible process capital is changing the way companies operate and the capabilities they possess. As a result, it also is changing the way they compete” (McAfee & Brynjolfsson, 2007).

Martin (2007) takes a view that not all processes provides competitive advantages and states that typical organisations have two or three processes that differentiate them completely while the remaining processes may not differentiate them but still be mission critical in supporting the business. Martin (2007) classifies these processes as core processes (differentiating) or commodity processes (operational efficiency). Both require a high level of agility and flexibility to, not only, provide a competitive advantage by adjusting processes to business and market conditions but to ensure the operational competiveness of the enterprise. This is achieved through the deployment of BPMS in organisations and the following section discusses the role of BPMS as enterprise systems. The objective of a BPMS in support of BPM is to use technology to create executable processes that have the business rules and human knowledge embedded.

Implementing a BPM methodology through BPMS requires that process change management is addressed as a specific element. Business process management change has been well researched from a Business Process Re-engineering (BPR) perspective and a number of authors including Davenport (Davenport, Harris, & Cantrell, 2004), Vathanophas (2007) and Kettinger and Grover (1995) highlight the change requirements associated with new business process deployments. The specific views of Kettinger and Grover (1995, p. 14) in 1995, on the principles of business process change, is of interest and still applicable in the current context of deploying BPMS.

Kettinger and Grover (1995, p. 14) provide a list of 10 principles of business process change, but the main aspects of those principles can be summarised as follows:

a. It should be strategy-led with visionary leadership from senior management, but it should also recognise the value of participation of all other participants at various levels in the organisation;
b. Should minimise the resistance to change by having an effective change management approach;
c. Should challenge existing assumptions on organisational systems and their learning capacity;
d. Should leverage the information technology platform to facilitate knowledge sharing; and
e. Should manage relationships throughout the organisation and ensure a cooperative environment for implementation.

Sections to follow in this mini-dissertation address change management as a specific critical success factor but the list of Kettinger and Grover (1995, p. 14) provides some insight to the challenges that process orientation in enterprises face. Business Process Management Suite implementers should take these into consideration when deploying these new technology tools.

2.5 Business Process Management Suites as enterprise systems

The objective of this section is to demonstrate that BPM solutions and specifically BPMS are categorised in the enterprise systems domain as it exhibits the same characteristics and attributes as ERP and CRM solutions described earlier in this chapter of the study.

Business Process Management Suite technology is relatively new according to Gartner (2007, p. 10) and focuses on providing an enterprise toolset that can manage business processes throughout its lifecycle in an organisation. Organisations like Gartner define the BPM lifecycle as: define, model, simulate, deploy, execute, monitor, analyse and optimise (Hill, 2007). The objective of a BPMS is to support these BPM elements throughout the process lifecycle. Shaw et al. (2007, p. 92) defines the difference between BPM and BPMS as “a business process is a socio-technical system, executed by humans and machines, and a BPMS is a purely technical system”. According to Shaw et al. (2007, p. 92) BPMS support BPM as these technical systems are joined to the business processes throughout the wider socio-technical systems in an organisation.

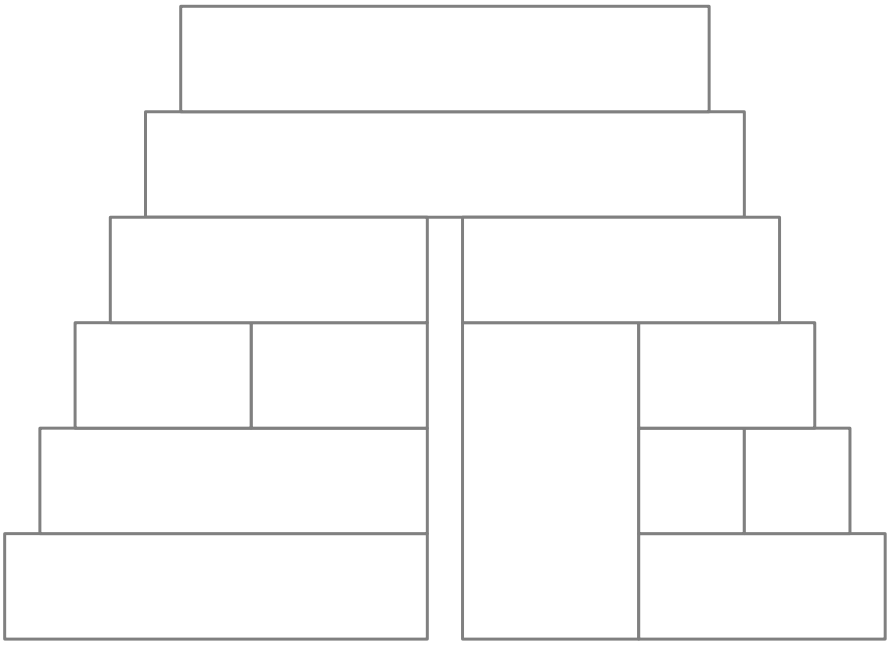

Figure 3 - BPMS Pyramid Architecture (Shaw et al., 2007, p.93)

Shaw et al. (2007, p. 93) provides a model, shown in Figure 3, that describes this socio-technical relationship. This model positions BPMS in an enterprise and provides a view of the complexity associated with the implementation of these systems. All the underlying elements need to be addressed in a typical BPMS implementation.

BPMS solutions evolved from various disciplines that include workflow, document management and business rules management. Reijers (2006, p. 390) states that a BPMS is based on workflow systems but a BPMS extends it by offering more diagnostic capabilities (both during the design and execution) and it is better suited to enterprise application integration that spans business to business integration. “Taking a workflow-oriented perspective, a BPMS is seen as primarily taking care of the automatic allocation of work to qualified and authorised resources – humans and/or applications – in accordance with a predefined schema of the process, the available resources, and their dependencies” (Reijers, 2006, p. 390). The reference to predefined schemas implies that processes are mapped and modelled prior to execution. These are typical characteristics identified earlier in this chapter for enterprise systems. It aligns with the integrate, optimise and informate value drivers that Davenport et al. (2004, p. 18) defined for enterprise systems.

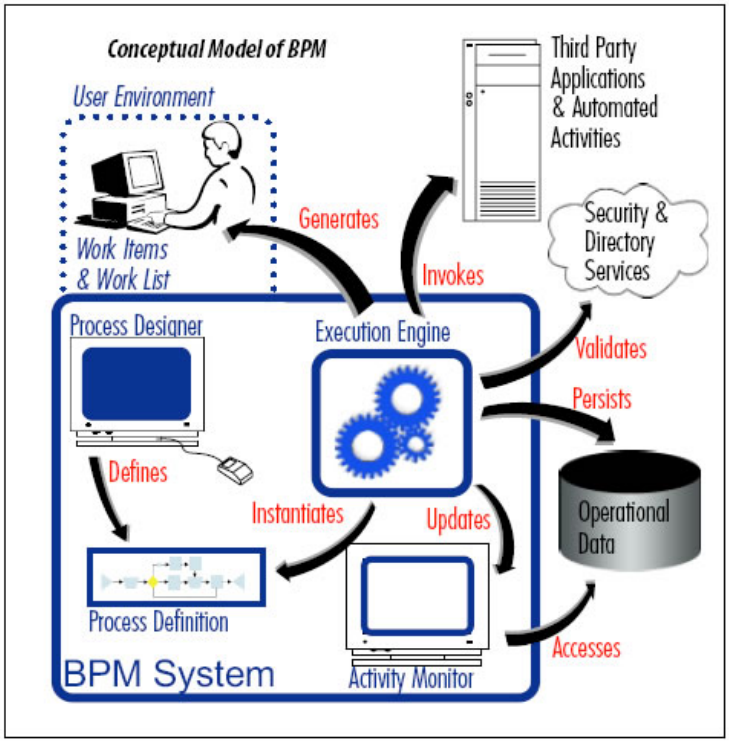

Figure 4 - Conceptual Model of BPM (Delphi Group, 2005, p.5)

Delphi Group (2005, p. 5) provides a conceptual model and a definition for a BPMS. “A BPM system is defined by the components of an Execution Engine, Process Designer, Process Definitions, an Activity Monitor, and user interface which may be a combination of a Windows client application, HTML-based Work Portal, or an exposed API or Web services interface” (Delphi Group, 2005, p. 5). Explicit process models are central to Gartner’s (2007, p. 10) definition of BPMS. Business Process Management Suites makes explicit process models executable by interpreting these models at runtime and bound to the physical resources referenced in the model. “Business managers use the BPMS’s graphical process model to see and directly monitor and manage all interactions between human, system and information resources and adjust behaviour and execution flow in response to changing market dynamics to improve business performance outcomes” (Gartner, 2007, p. 10). Gartner (2007, p. 11) summarises the capabilities of BPMS applications as a single product experience for users that:

a. Supports the modelling and analysis of business processes with a view to understand, communicate and optimise these processes;
b. Supports the relationship between the model, the execution and the required resources. Any change to the model will manifest in the execution and the dependencies on resources which are also effected;
c. Coordinates interaction patterns between users that include human-to-human, system-to-system, human-to-system, human-to-information and content interdependencies;
d. Provides contextual information (structured and unstructured) that can be manipulated as part of the business process;
e. Supports the definition and manipulation of business rules;
f. Supports individual user and group collaboration in the context of the business process;
g. Supports business activity monitoring that include the monitoring, analysis and reporting on process metrics and parameters;
h. Supports process optimisation and simulation for process improvement; and
i. Supports the configuration management of all the process components that include versioning, access control and security.

These capabilities support the classification framework of Al-Mashari et al. (2003, p. 352) for enterprise systems based on supporting operational, managerial, strategic, IT infrastructure and organisational requirements.

Business Process Management Suite applications share other similar characteristics with other enterprise applications. Orlikowski and Hofman (1997, p. 12) state that even if there is typically some upfront understanding of the magnitude of implementing, for example, a comprehensive and fully integrated supply chain solution, the depth and complexity of all the integrated activities is only understood once the project is completed. This is also very true of BPMS implementations where there is generally an understanding of the initial scope but that the process requirements evolve as the project progresses and the final set of processes are only known after user acceptance testing. It sometimes requires process improvement initiatives to refine and fine tune processes in the organisation even further. This dynamic nature of business processes requires a formal approach to manage process change.

The technology, management, human and process "fail factors" for BPMS that Reijers (2006, p. 391) identified are similar to those discussed under the history of enterprise system failures. The characteristics shared by classic enterprise systems such as ERP and CRM solutions discussed earlier in this chapter provide evidence to classify BPMS applications as enterprise solutions. Business Process Management Suites should, therefore, subscribe to the same critical success factors as conventional enterprise systems.

2.6 Background to FlowCentric BPMS used as a typical case

This section provides some background information on FlowCentric as the aim of the study is to provide enterprise system and BPMS implementers an alternative approach to address those critical success factors that can be supported by new web based collaborative technology and to propose a typical model or configuration to deploy this approach as a methodology. FlowCentric is one of a number of BPMS products in the market that include Metastorm, Savvion, Tibco, Ultimus and Singularity. FlowCentric is used as an illustrative example of a BPMS solution but the proposed model is also applicable to other BPMS products as well. FlowCentric was chosen for the case study based on the author's experience with the implementation of the product.

Even though the aim of the study is to assist FlowCentric implementers with a proposed Web 2.0 collaboration model, the principles can also be applied to other enterprise systems such as ERP and CRM solutions. It is, however, necessary to be familiar with the various components of the FlowCentric solution as well as implementation and collaboration requirements that are currently identified for each, to put the proposed model in context with a typical BPMS product like FlowCentric.

2.6.1 FlowCentric BPMS in the enterprise

FlowCentric Processware is a complete BPM environment that spans the complete life cycle of enterprise process management. It provides a single process management environment to deliver simple processes that mainly require workflow or basic automation through to complex composite process applications that are SOA enabled. FlowCentric supports the complete lifecycle of mapping, modelling, building, optimising, deployment, execution and monitoring of complex mission critical processes in support of operational, compliance and strategic business objectives.

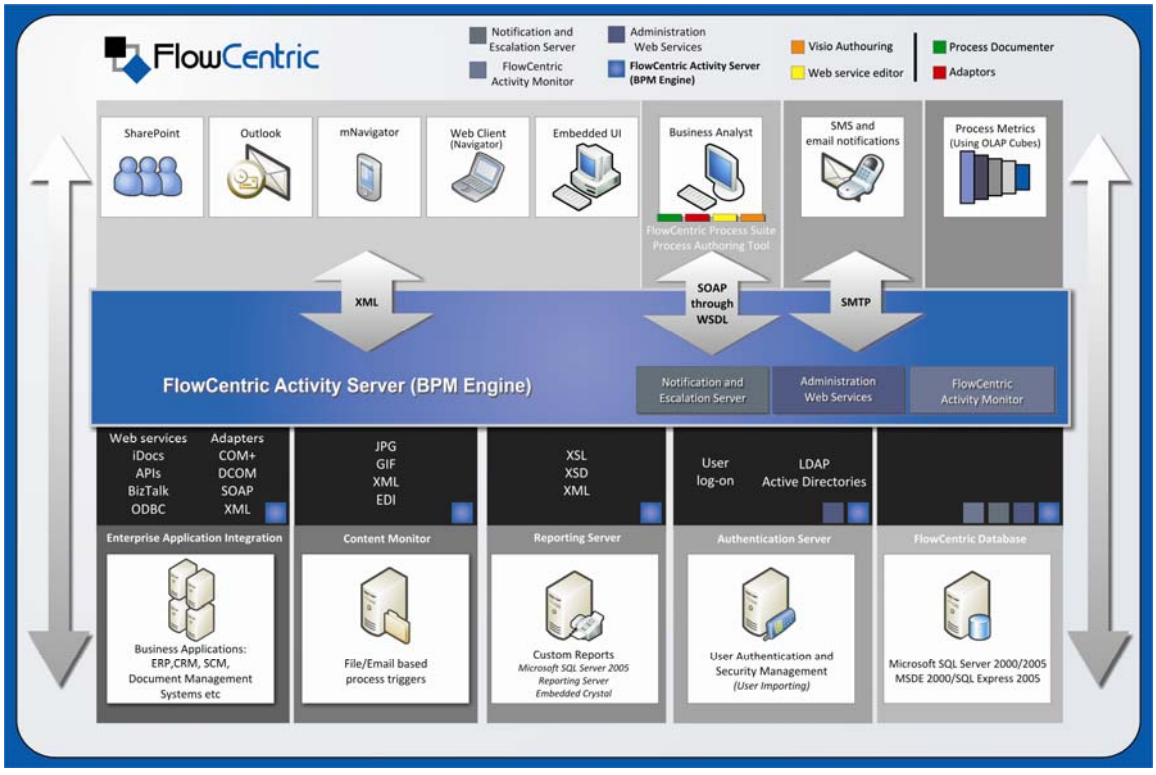

Figure 5 - FlowCentric Server Components (FlowCentric, 2007)

The FlowCentric BPMS solution consist of various components that include a graphical process or three environment, the Process Suite (a server based business process management

and workflow engine), the Activity Server and the Navigator (an end-user interface through which the processes are deployed). The Activity Server consists of various technical components that are illustrated in Figure 5. These technical components are generally associated with enterprise systems.

FlowCentric Processware enables process owners and process analysts to deliver digitally guided processes through drag and drop process orchestration. The orchestration process in the FlowCentric Process Suite includes form design, application integration, business rules management, process logic and activity monitoring.

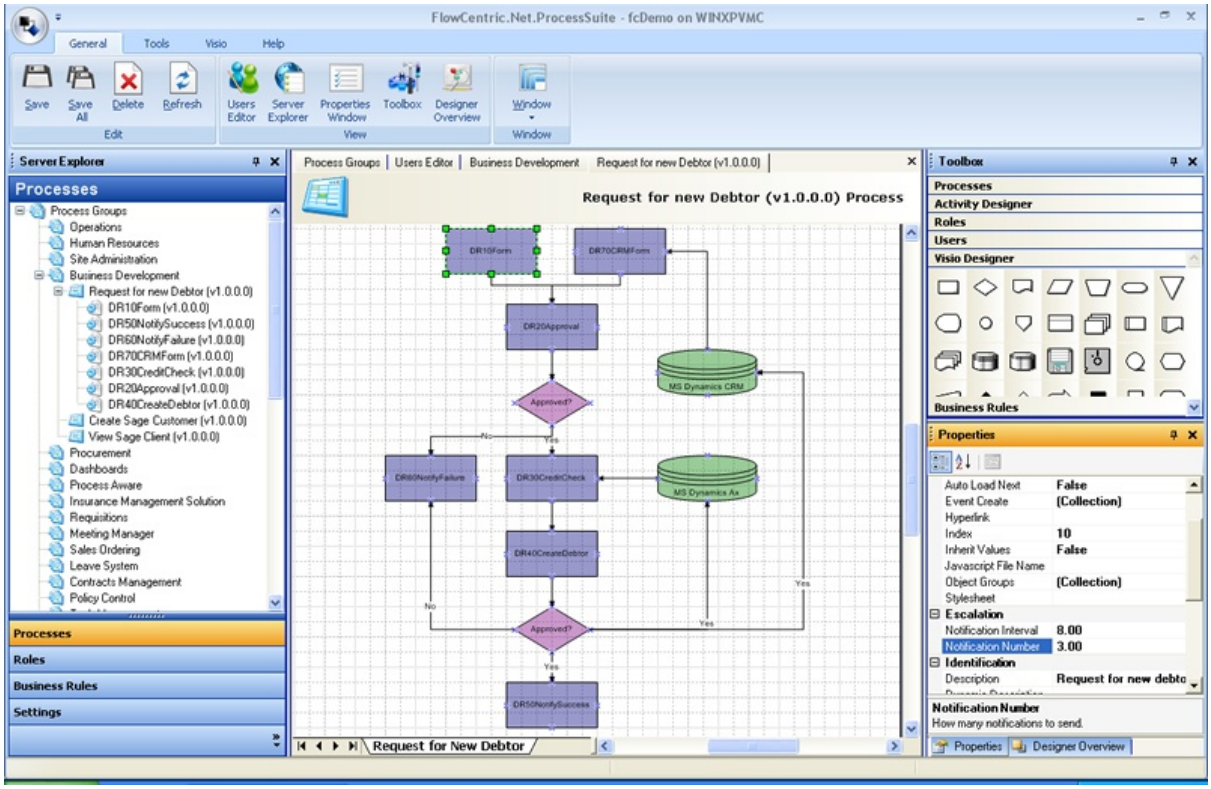

Figure 6 - FlowCentric Process Suite (FlowCentric, 2007)

The Microsoft Office 2007 look and feel of the FlowCentric Process Suite provides an intuitive interface to business users and information workers without the need to understand complex coding solutions.

Business processes are delivered to end-users through the FlowCentric Navigator that supports Microsoft Outlook, Microsoft SharePoint, various web browsers and mobile clients.

Process owners and analysts can view process metrics and analytics through the familiar interface of Microsoft Excel or Microsoft PerformancePoint Server.

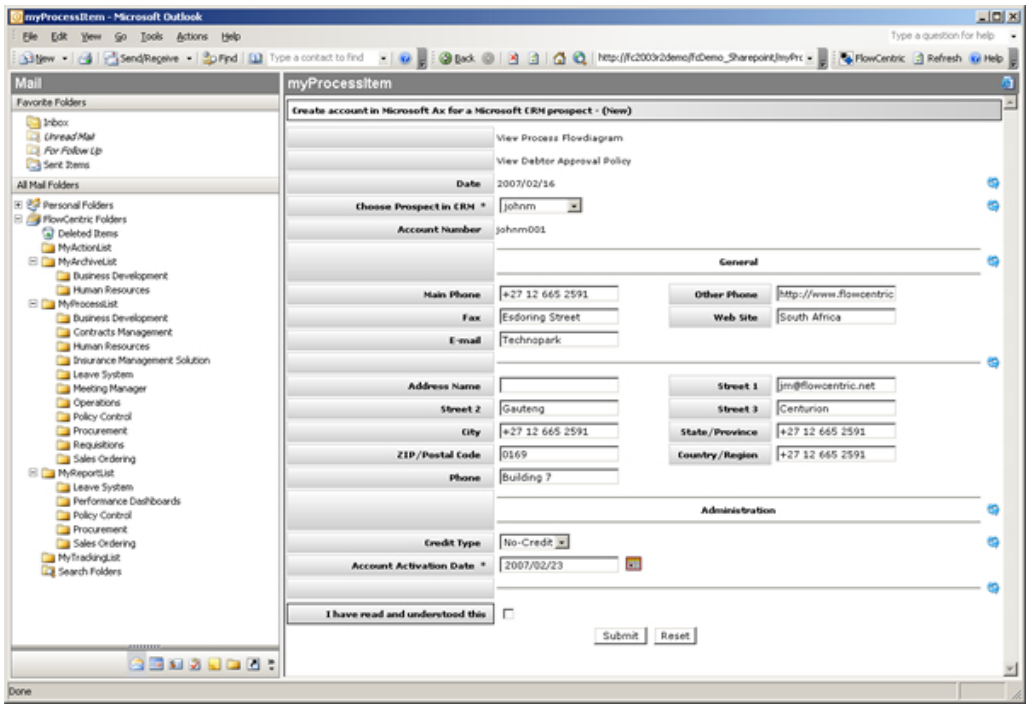

Figure 7 - FlowCentric Navigator in Microsoft Outlook (FlowCentric, 2007)

FlowCentric manages processes throughout the life cycle and typically starts with mapping and modelling of the processes in an organisation. The FlowCentric Process Suite is used to capture the process requirements in the organisation. The objective during this phase of the life cycle is to understand the process requirements, define functional specifications and model the outcomes of the processes with a visual tool. The FlowCentric Process Suite allows business analysts and solution architects to specify additional metadata around a process such as notification and escalation parameters, tracking capability, responsible users or groups and integration with the external systems.

Establishing user requirements during the mapping and modelling phase is one of the critical challenges faced by FlowCentric implementers as users are in many cases new to process orientation, the FlowCentric tool set and the critical evaluation of their own processes. The implementation process tends to be consultant driven and the domain knowledge of the consultant guides the process. This leads to situations where user requirements are partially or incorrectly specified. The requirements gathering process generally also involves only a few users in a specific process area that can be accommodated into structured workshops.

The processes that are subsequently delivered during the implementation phase may suffer as a result of organisational and political reasons. This may be why users do not accept the processes specified by their peers. Change management issues must be identified and addressed from the initial mapping and modelling phase and providing a collaborative environment to collectively define the BPM requirements may improve the end user acceptance of the processes delivered through FlowCentric.

Once the process is modelled the analyst or business user can define the screen for the process block on the Visio diagram by double-clicking on the specific Visio block. This drills down one level below the Visio diagram into the FlowCentric Process Repository to define the screen layout, external application and information integration as well as the process and business rules for the specific activity.

The FlowCentric Process Navigator is automatically generated in a web based format once the processes are defined in the FlowCentric Process Suite. The Navigator is deployed to end users as a workflow and process management front-end and can be viewed as a web page, in Microsoft Outlook, or in various portal technologies like Microsoft SharePoint. The objective of the proposed Web 2.0 collaboration model would be to provide information from the mapping and modelling phases as a knowledge base and a repository to end users in the FlowCentric Navigator. The current interface has the ability to link to external documents and policies for web links.

In deploying the solutions to large corporate enterprises, FlowCentric realised that change management is in many instances more important than the technology used. Changing the way the processes operate inside an organisation can have a severe operational, political and organisational impact. It is hoped that the proposed collaboration model will involve people from an earlier stage and encourage more user involvement.

2.6 Summary

The aim of this chapter was to gain a better understanding of enterprise systems, their history of failed implementations as well as establishing that BPMS application qualifies as enterprise systems. The definition and characteristics of enterprise systems proved to fit the profile of BPMS applications and the critical success factors for enterprise system implementations that are evaluated in the next chapter can also be applied to BPMS

implementations. Some of the specific challenges encountered by FlowCentric as a BPMS were defined with the possible view to support these with Web 2.0 collaborative technology.

Chapter 3: Critical success factors in enterprise system implementation

3.1 Introduction

Chapter 2 provided a definition of enterprise systems, defined some unique characteristics and demonstrated that the implementation of these applications is not always successful. It was shown in Chapter 2 that inadequate change management is one of the key reasons why enterprise system implementations fail. In order to minimise the risk of failure, researchers, enterprise system vendors, system integrators and end users have tried to identify the critical success factors that would contribute to a successful implementation. The following section identifies those critical success factors that can be supported through the communication and collaboration capabilities of Web 2.0 technology with a specific view on supporting change management.

3.1.1 Aim

The aim of this chapter is to critically review and report on the available evidence pertaining to the critical success factors for enterprise system implementation and identify those associated with change management that require improved communication and collaboration which can be facilitated by Web 2.0 technology.

3.1.2 Scope

This chapter specifically focus on the definition and identification of critical success factors for enterprise system implementation and the establishment of the ranking of both technical and non-technical factors to determine the level to which a project's success can be influenced by addressing change management through improved collaboration and communication. The chapter analyses:

a. What is a critical success factor? and
b. Critical success factors for enterprise system implementation.

3.2 What is a critical success factor?

The origins of critical success factors can be traced back to the sixties and seventies where researchers at the McKinsey & Company, Massachusetts Institute of Technology (MIT), Harvard Business School and companies including IBM investigated the use of key indicator

systems to assist managers in managing the "right" activities. Rockart (1979, p. 83) describes critical success factors as those "areas of activity that should receive constant and careful attention from management". Critical success factors are a limited number of focus areas where satisfactory results will ensure the success of the bigger project, implementation or organisation. Rockart (1979, p. 85) states that critical success factors should be directly linked to supporting the attainment of the organisational or project objectives. The critical success factors are unique to each endeavour and should be constructed to suit the specific application. It is furthermore important to constantly monitor or measure the current status of performance for each critical success factor and to make the information available to managers that use these critical success factors (Martin E. W., 1982, p. 1).

Constantly measuring these critical success factors requires some form of management control system and Rockart (1979, p. 86) describes the requirements of such a critical success factor control system with a series of "musts":

a. It *must* be tailored to the specific requirements and strategies of the organisation, project or implementation;
b. It *must* identify the relevant critical success factors with its associated measures that should receive careful and continuous management attention; and
c. It *must* highlight the performance of the key measures on an ongoing basis.

Rockart (1979, p. 88) continues that the benefits of managing critical success factors extend beyond top level executives and that the effort of identifying and tracking these critical success factors at other levels of the organisation has the following benefits:

a. It provides managers with the clarity to understand where to focus their management attention;
b. It forces managers to develop good measures for critical elements and ways to report on them;
c. It provides some insight into the amount of right information that must be collected and reduces time spent on gathering irrelevant information;
d. It moves the organisation away from building reporting systems around data that is easy to collect and focusses attention on data and information that is relevant to the success of the endeavour;

e. It acknowledges that reporting requirements may change during the life cycle of the project of implementation and that change should be viewed as a productive component of the management process; and
f. The thought processes in the critical success factor approach are sometimes more useful than the data from the measurement system. Ensuring a balance of all critical success factors generally has a positive impact on the outcome of the project or implementation.

Martin (1982, p. 129) found in a study on the practical implementation of the critical success factor methodology in an enterprise system implementation project that it provided clear focus to the vital issues which needed consideration, it proved to be practical and intuitive, it was a natural link between tactical and strategic planning and it provided assurance that critical information needs were clearly identified and explicitly expressed in the planning processes.

3.3 Critical success factors for enterprise system implementation

The critical success factor methodology can be applied to various management projects and enterprise system implementations are typically complex by nature (Akkermans & van Helden, 2002, p. 35). Projects of this nature require careful consideration during planning and implementation and it can be supported by a critical success factor approach to improve the probability of success. Finney and Corbett (2007, p. 330) highlight the reasons for using the critical success factor approach in enterprise system implementation as the probability of achieving success through saving time and costs and improving the quality and efficiency of the system.

Using critical success factors in enterprise system, and specifically ERP and CRM, implementations have been the topic of many academic studies. There is an extensive body of knowledge on the use of the critical success factor approach in enterprise systems implementation. Authors like Finney and Corbett (2007, p. 332) and Soja (2006, p. 420) provide a summary of the available literature published in various journals. The objective of listing the critical success factors identified by the various researchers is not to have a definitive list, but rather to categorise these factors and to identify those that can be supported by collaborative technologies.

Nah et al. (2001, p. 286) embarked on an extensive literature study to identify the critical success factors for the successful implementation of enterprise systems. Eleven factors were identified and ranked based on frequency cited in the articles:

i. ERP teamwork and composition;
ii. Change management program and culture;
iii. Top management support;
iv. Business plan and vision;
v. Business Process Reengineering (BPR) and minimum customisation;
vi. Effective communications;
vii. Project management;
viii. Software development, testing and troubleshooting;
ix. Monitoring and evaluation of performance;
x. Project champion; and
xi. Appropriate business and IT legacy systems.

Soja (2006, pp. 421-423) compared findings from various studies and constructed a list of 26 critical success factors in 5 categories for enterprise systems implementation. The five categories that Soja (2006, p. 421) defined consist of implementation participants, top management involvement, project definition and organisation, project status and information systems. Some of the critical success factors in the various categories include team composition, team involvement, motivation system, top management support, awareness and participation, organisational change, monitoring and feedback and implementation promotion (Soja, 2006, p. 422). A number of these critical success factors are not generally associated with system implementation projects that tend to focus more on the technology aspects and requirements of the enterprise system.

Nah et al. (2001, p. 295) identified that of the 11 critical success factors listed above, 2 factors are key in enterprise system implementation. Teamwork and composition is the first factor that has a major impact on project success while organisational culture and change management is equally important to project success (Nah, Lau, & Kuang, 2001, p. 295). Both of these factors are organisational factors rather than technical factors. It correlates with the findings of Soja (2006, p. 422) where a large number of critical success factors were based on “soft issues” rather than technology requirements.

Finney and Corbett (2007, p. 340) conducted an extensive literature survey on critical success factors cited for enterprise systems implementation and the results of their investigation is summarised in **Table 1 - Critical success factors in literature (Finney & Corbett, 2007, p. 340)**.

Critical Success Factor Category	Number of instances cited in literature
Top management commitment and support	25
Change management	25
Business Process Reengineering and software configuration	23
Training and job redesign	23
Project team: the best and the brightest	21
Implementation strategy and timeframe	17
Consultant selection and relationship	16
Visioning and planning	15
Balanced team	12
Project Champion	10
Communication plan	10
IT infrastructure	8
Managing cultural change	7
Post-implementation evaluation	7
Selection of ERP	7
Team morale and motivation	6
Vanilla ERP	6
Project management	6
Troubleshooting/crisis management	6
Legacy system consideration	5
Data conversion and integrity	5
System testing	5
Client consultation	4
Project cost planning and management	4
Build a business case	3
Empowered decision makers	2

Table 1 - Critical success factors in literature (Finney & Corbett, 2007, p. 340)

Their findings also highlight a greater importance and focus on organisational behaviour rather than on technical considerations. It is, however, important to note that enterprise system implementers should focus on all the critical success factors and not just on the "soft issues". It is important to keep a balance of both technical and "soft" issues but it does highlight the fact that organisational issues have a major impact on system success (Finney & Corbett, 2007, p. 339).

Enterprise systems implementation results in disruptive organisational changes according to Al-Mashari et al. (2003, p. 353). Their taxonomy of critical factors is based on the "levels of ambition" within an organisation to achieve success in enterprise system implementation and manage their disruptive organisational changes rather than a list of project elements as proposed by some of the other authors. The perspective on "success" does not provide tangible elements that can be ticked off on a checklist but it describes an attitude towards enterprise system implementation that will contribute to its success.

Al-Mashari et al. (2003, p. 356) classifies this success into four categories that are used to determine the critical success factors:

i. *Correspondence success*, where the implemented system delivers on the initial objectives;
ii. *Process success*, where the project is delivered within time and budget constraints;
iii. *Interaction success*, where the users have a positive attitude towards the system; and
iv. *Expectation success*, where the system matches the user's expectations.

This "success" view on the critical success factors provides a perspective that is strived for in developing the collaborative Web 2.0 solution to support enterprise system implementation. Ensuring that the system delivers on its initial objectives combined with delivering the project within time and budget, having customers with a positive attitude and the process management solution working to users expectations is ultimately the aim of any BPM project.

These categories have a significant emphasis on "soft issues" that include user attitude and expectation management. Al-Mashari et al. (2003, p. 361) suggests that nearly 50% of ERP implementations fail due to managers that underestimate the organisational changes that are required and the far reaching impact of these changes.

Ettlie et al. (2005, p. 954) found in a survey of 60 Fortune 1000 firms that leadership (social learning theory), business process reengineering and acquisition strategy accounted for 43% of the variance in adoption of a new enterprise system.

In a study of 44 companies conducted by Gargeya and Brady (2005, pp. 509-510) on both successful (25) and unsuccessful (14) SAP implementations the importance of internal readiness and training, management support and dealing with organisational diversity were at the top of the list.

The findings from these studies highlight that critical success factors may differ from organisation to organisation and from project to project, but the organisational behaviour issues are critical to the successful implementation of an enterprise system.

3.4 Summary

Change management, teamwork, management participation and collaboration are common themes in all the studies and literature. Project success is not necessarily determined by technical issues as the research showed that managing the "soft issues" ranks at the top of the list of priorities that need to be addressed during enterprise system implementation.

In order to understand how to address these critical success factors during an enterprise systems implementation, it is important to understand the elements of change management in an organisation itself. The next chapter will provide an understanding of change management associated with the implementation of new enterprise systems. It will look at change management from a collaboration and communication, teamwork and knowledge management perspective. It will look at the open-source software development approach from a collaborative change management perspective to determine whether if it is applicable to the development of the proposed Web 2.0 collaboration solution that will support enterprise systems implementation projects.

Chapter 4: Change management for enterprise systems implementation

4.1 Introduction

The research on the critical success factors for implementing enterprise systems as discussed in the previous chapter highlights the importance of change management, teamwork, management participation and collaboration as key factors in this process. They form part of the organisational behaviour during system implementation and it extends to areas such as management participation, project communication and understanding cultural diversity during the implementation process. The previous chapter showed that changes such as the way that people work and the introduction of new business systems can bring a level of uncertainty to the workplace. There are a number of reasons why enterprises change and employees resist. This chapter will address some of these reasons through a literature survey of both the change management body of knowledge as well as collaboration and teamwork. The study will also consider the open-source development approach that has effectively managed to share knowledge, work collaboratively and handle change management in virtual groups, to understand the relevance of this approach to the development of a Web 2.0 collaboration solution.

4.1.1 Aim

The aim of this chapter is to critically review the role of change management, communication and collaboration and teamwork (specifically focussing on virtual teams) as well as their knowledge management requirements in enterprise system implementation. It will review the success of open-source teams in the collaborative development of solutions to determine if some of those collaborative behaviours can be used in the development of a Web 2.0 collaboration solution for enterprise system implementation.

4.1.2 Scope

The field of change management in organisations is well researched and the scope of change management will be limited to the implementation of enterprise systems for the purpose of this study. The behaviour of groups in adopting new technology solutions will be investigated in a literature survey of the existing body of knowledge that exist in this domain. It is important to understand the drivers for change as they will impact on the development of a

Web 2.0 collaboration solution to support the change required during the implementation of an enterprise system. This chapter will specifically address:

a. Understanding change management in enterprise system implementation;
b. Communication and collaboration;
c. Teamwork and virtual teams in organisations;
d. Knowledge management requirements; and
e. The open-source approach to collaboration.

4.2 Understanding change management in enterprise systems implementation

"Change is part of life. Change has intrigued, scared, excited, and mystified us for many centuries and continues to challenge individuals from all walks of life. It is synonymous with upheaval and chaos from a business perspective" (Szamosi & Duxbury, 2002, p. 184).

Clegg and Walsh (2004, p. 217) list the following as reasons why organisations promote increasing rates of change:

a. Increasing uncertainty and competitiveness in market places;
b. Changes in the technology that enable and support new ways of work;
c. Globalisation trends;
d. The reduction of barriers of entry to certain markets due to e-commerce technology;
e. The perceived need to reduce costs;
f. To improve quality; and
g. To be more responsive to customer needs.

All of these reasons are the characteristics associated with the BPM in Chapter 2 of the study. BPMS tend to change the business processes that employees are used to and bring with that a level of uncertainty not only in terms of new technology but also the impact that the process redesign may have on the organisation. The impact is not only technical but also social, political and personal in some instances where jobs may be compromised by the implementation of the system. Business Process Management Suites suffers the same resistance to change due to its characteristics as an enterprise system and Kreitner and Kinicki (2004, p. 686) lists 10 reasons why employees in an organisation resist change:

i. A predisposition against change is highly personal and deeply ingrained;
ii. Fear of the unknown and the surprise factor;
iii. Where there is a climate of distrust in the organisation, project or management;

iv. Lack of confidence and the fear of failure;
v. Loss of status or job security;
vi. The power of groups and peer pressure;
vii. Disruption of cultural traditions or group relationships;
viii. Conflict between team members with different personality traits;
ix. Lack of tact or poor timing; and
x. Non-reinforcing reward systems.

Many of these reasons were observed in the practical implementation of the FlowCentric BPMS. The objective of enterprise system implementations such as new BPMS is not only to improve organisational efficiency, but it is also used in many organisations to stimulate new process innovation (Gartner, 2007, p. 11). It would be beneficial if a Web 2.0 collaboration solution could address some of these reasons for resistance to change by including employees in the process design thereby limiting the surprise factor, minimising distrust, limiting the fear of failure and leveraging the power of groups and peers. Allowing a contributory environment that is open and not based on a hierarchy of the organisation may allow for innovative ideas from various layers of the organisation to be included in the enterprise system implementation. The proposed collaboration solution should capture the innovative ideas and provider repository to store and share the knowledge with the rest of the organisation. Current practices are based on conventional process specifications that are typically constructed in small user specific workshops and documented in conventional word processing tools such as Microsoft Word. The objective of the Web 2.0 collaboration solution would be to provide a transparent and open platform where end users understand the full scope of the BPMS project. The users may be part of the process redesign and can even be included in defining the requirements for the new business processes.

In order to propose a collaborative Web 2.0 solution to support change management for BPMS implementation the remainder of this chapter will look at the characteristics of organisational change, how change is effected in organisations and how it would apply to enterprise system implementation projects. It will look at the impact of non-technical components of enterprise implementation projects such as communication and collaboration, and teamwork as part of the change process. The objective of the collaboration process is not only to address teamwork issues but to ensure that knowledge is created, shared and maintained as part of the process. The knowledge management requirements of virtual teams

will be addressed as part of the study. Open-source developers have had a number of proclaimed successes in enterprise application development and have been using collaborative technology to support the development of these systems through virtual teams of geographically dispersed people. The use of collaborative technology by Open-source developers will be reviewed to see if it is applicable in the development of a Web 2.0 collaboration solution to support change management as is a critical success factor in the implementation of enterprise systems.

The various stages and phases of organisational change behaviour will be investigated in this section to understand the role of collaboration and communication and the technologies that can possibly assist and support this.

“Enterprise systems implementation results in disruptive organisational changes” (Al-Mashari, Al-Mudimigh, & Zairi, 2003, p. 353). Almost all the authors that were researched for the critical success factors for enterprise systems implemention, mentioned the organisational impact of these projects. The research of Gargeya and Brady (2005, pp. 509-510) shows that 40% of the respondents in failed SAP implementations cited change management as the biggest contributing factor. It is the highest indicator of all the measures in failed implementations whereas management support and previous implementation experience ranked highest in the study of successful SAP implementations (Gargeya & Brady, 2005, p. 509).

Understanding what is meant by change management requires a formal definition. By (2005, p. 369) provides a definition for change management as “the process of continually renewing an organisation’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers” that addresses the strategic impact of change management in an organisation.

According to By (2005, p. 370), 70% of change programmes fail due to the fact that the need for change is unpredictable, reactive, discontinuous; ad hoc and initiated by external events and often crisis. Organisational change can be divided into three major categories based on 1) rate of occurrence, 2) how it comes about, and 3) by scale. Scale is further broken down into i) fine-tuning, ii) incremental adjustment, iii) modular transformation, and iv) corporate transformation (By, 2005, pp. 370, 377). Enterprise system implementation, such as BPMS,

typically falls into the last 2 categories in terms of scale, has a discontinuous rather than incremental rate of occurrence and is generally brought about from a strategically planned perspective as described by the characteristics defined in Chapter 2 by Al-Mashisari et al. (2003, p. 352) and Davenport et al (2004, p. 18). Discontinuous change requires that users discontinue their old way of working and adopt a new way of working. New enterprise systems implementations are also sometimes used to force changes in the way people work. Incremental change is sometimes difficult to achieve due to people's resistance to change while a major new disruptive enterprise system solution will force business process and organisational change. "...there is nothing better to get people on the same page" (Markus, 2004, p. 5). Enterprise systems such as BPMS are designed to optimise processes and almost always require a fundamental change in the way people work.

This change in the way of working leads to one of the significant organisational change issues that is emerging and it relates to the receptivity of employees to change (Frahm & Brown, 2007). Receptivity to the implementation of new enterprise systems does not only consist of the psychological change but it may also require new technical skills in the use of the systems. The improvisational model for technological change, as proposed by Orlikowski and Hofman (1997, p. 13), is based on two major assumptions and takes into consideration that the changes associated with technology implementations are an ongoing process rather than an event with an endpoint where the organisation can expect to return to a "normal" state. It also assumes that the technological and organisational change requirements cannot be anticipated ahead of the time and emerge as the project evolves. These conditions are typical in enterprise systems implementations and contribute to the high level of uncertainty during a project. The unpredictable nature of both the technology and change requirements requires an approach that not only takes the psychological effect of change into consideration but also the change in technical skills associated with the implementation of new technology such as BPMS .

Markus (2004, p. 4) coins the term "technochange" for technology driven organisational change. This comes about when Information Technology (IT) is used to trigger organisational change associated with high risk and potentially high reward. Enterprise system implementation is generally justified by a business case that tends to highlight the potential Return on Investment (ROI) based on high payback rewards. Technochange can be planned or completely unintentional. Some organisations implement new enterprise system due to

reasons such as addressing year 2000 concerns and get involved in the impact of the change while other organisations choose to implement new systems as a catalyst to improve their business agility and overall competitive advantage (Markus, 2004, p. 5).

Neus and Scherf (2005) provides a change management perspective from an open-source development point of view. The contrast between the "Brooks' Law" approach where a small team of "experts" develop a software solution and the "Linus' Law" approach where mass collaboration contributes to the development of a software solution provides interesting insights into the change culture of the two groups. Neus and Scherf (2005, p. 216) provides a simple definition for Linus' Law (named in honour of Linus Torvalds that developed the Linux kernel on the open-source model) that states "Given enough eyeballs, all bugs are shallow".

The traditional approach of enterprise system implementation projects is to gather a few subject matter experts, create an isolated team, develop a solution based on their understanding of the requirements and introduce it to end users in its final state. The open-source approach allows contributors from various areas in the organisation to participate in the requirements definition, configuration, testing, documentation and training on the solution. This process may be more suitable to assist with cultural change when deploying BPMS in large organisations.

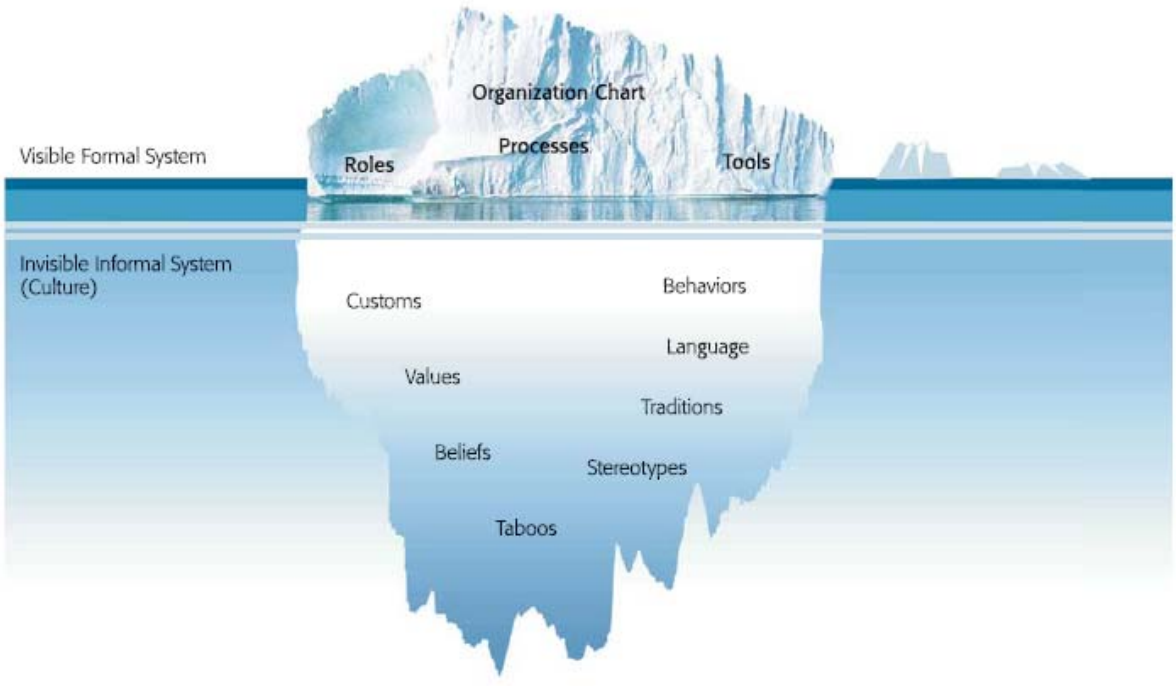

Figure 8 - Iceberg model of an organisation (Neus & Scherf, 2005, p. 218)

The analogy of moving an iceberg is used by Neus and Scherf (2005, p. 217) to describe the impact of cultural change requirements in organisations. The visible components of the organisation such as tools, processes, roles, and the organisational structure are a small part of an organisation. The organisational "culture" that includes behaviour, values, customs, heuristics, beliefs, stereotypes and taboos is generally invisible but contributes to most of the change management challenges as it is seldom addressed in change management planning.

In the open-source community the paradigm shift is to ask people to believe that common practitioners, peers and end users can make a contribution in the development process. It contrasts with the traditional approach where only designated experts are part of the development team. This cultural change requires careful consideration to ensure that all the elements are included and the obvious technical and organisational components are addressed.

Poorly planned cultural changes in organisations can have disastrous effects as depicted in Figure 10.

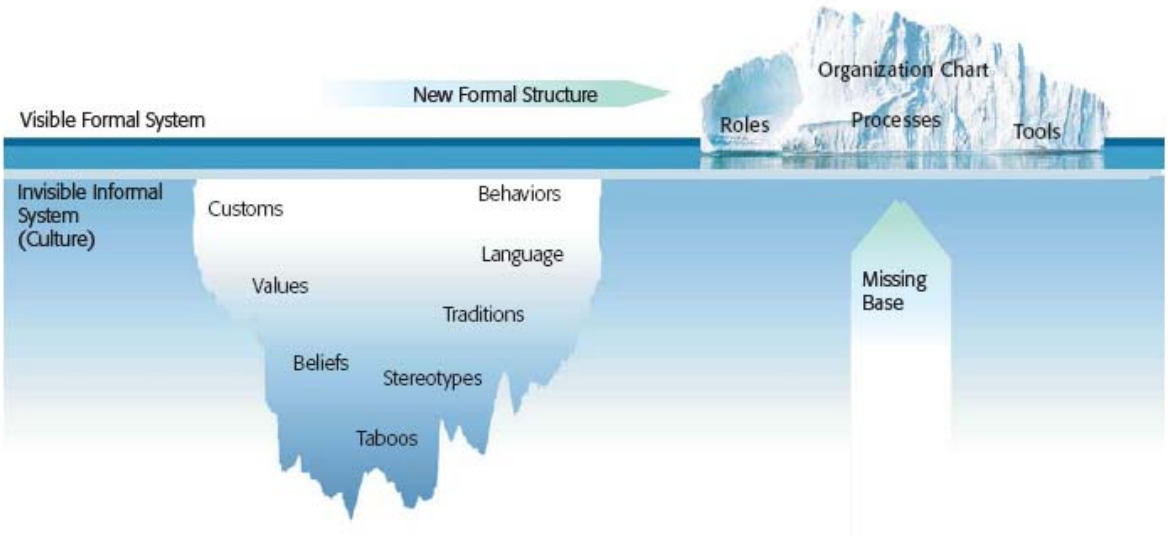

Figure 9 - Result of poorly planned organisational change (Neus & Scherf, 2005, p. 218)

Markus (2004, pp. 5-6) argues that using IT strategically to drive organisational change is fundamentally different from a conventional IT project and normal organisational change management. Conventional IT projects focus on improving technical performance where technochange projects use IT as a catalyst to improve business performance. Enterprise

systems such as BPMS focus on improving business processes that impact on the organisation rather than just technical improvement of the systems.

Implementing a BPMS may require an IT architectural review and it may provide the opportunity to introduce new technological approaches such as Service Oriented Architecture (SOA) but the primary reasons for implementing such a solution remains business focussed. The objective is to use Web 2.0 collaboration technology to assist with change management in enterprise systems implementation which implies that IT is used as a driver of organisational change. It contrasts to the implementation of a simple software application that is viewed as a conventional IT project. Implementing the new collaboration solution will have its own change management requirements, even if it is a catalyst to support change management for other projects. The challenge of using IT as a change agent is highlighted by Markus (2004, p. 5). “75% of organisational change efforts involving technology fail (even when the technology performs acceptably) because of people’s negative reactions to changes in their work, organisational business processes, and the technology they use” (Markus, 2004, p. 5).

Orlikowski and Hofman (1997, p. 11) state that there is a difference between how people think about technological change and how it actually gets implemented. Management tend to plan change initiatives to the finest detail, where in practice, it changes as certain business conditions change. It is these changing conditions that contribute to difficulties and challenges when trying to implement new technology based systems.

Markus (2004, p. 6) argues that conventional change management processes can assist in technochange but that conventional change management is not sufficient as it doesn’t address the unique requirements of IT-driven change such as the implementation of a new enterprise system. The expectations from an enterprise systems implementation is focussed on producing significant improvements to organisational performance that are generally defined in organisational goals and corporate metrics. Typical IT projects focus more on technological aspects and performance improvement (speed, reliability and functionality). Implementing a new release of a productivity suite such as Microsoft Office 2007 has much less technochange impact than implementing a new ERP, CRM or BPMS. Implementing these new types of applications requires a paradigm shift by users and a change to the way that they work and think. It is more difficult to “unfreeze”, “change”, and “re-freeze”

behaviour for new technologies such as groupware (that is open-ended and customisable) than conventional IT projects (Orlikowski & Hofman, 1997, p. 12). The conventional approach, according to Orlikowski and Hofman (1997, p. 12), allows organisations to prepare for change, implement the planned changes and then stabilise the change in the organisation. The situation is different for new technology such as groupware where a model for change accommodates a process of ongoing and iterative experimentation, use and learning. "Such a model sees change management more as an ongoing improvisation than a staged event" (Orlikowski & Hofman, 1997, p. 12). The use of Web 2.0 technology, and in particular wikis, which will be discussed later in the study is based on a process of collaborative improvement. A typical example of such a collaborative approach that is discussed later in the study is Wikipedia (www.wikipedia.org).

Business Process Management Suites are the next generation groupware solutions that are completely open-ended or "process toolset" that are fully customisable almost at all levels in the organisation as well as the platform. It also applies to the implementation of the Web 2.0 collaboration solution with previous synchronous behaviour which needs to be replaced with asynchronous thinking.

Another challenge with conventional enterprise system implementation is that of effect of "time and distance" and it is one of the issues that Markus (2004, p. 10) associates with technochange. Large scale enterprise systems implementations often require that certain individuals are removed from their day-to-day functions and placed in an isolated "project team". These are often subject matter and domain experts that redesign processes and systems. These projects often have long life cycles and typically remove these individuals for extended periods of time from their peers. This often creates resistance by other employees in the organisation to accept the changes to their processes and systems even though changes to processes may benefit them substantially. "Change processes in organisations are commonly fragmented and appear not to have been designed using the powerful logic underlying business process thinking" (Clegg & Walsh, 2004, p. 222)

This user resistance is a key factor in technology changes and Aladwani (2001, p. 269) proposes that there are two sources of user resistance to new technology such as ERP and other enterprise systems; perceived risk and habit. Perceived risk is based on a user's perception of the risk that they take by adopting a new technology while habit refers to the

existing practices of users when completing tasks and activities. Szamosi and Duxbury (2002, p. 186) identify the 3 reasons for organisational resistance to change as:

i. Technical barriers (habit and inertia);
ii. Political reasons (threats to coalitions may signal leadership problems); and
iii. Cultural reasons (lack of a change climate and regressing back to old habits).

Research by Ramayah and Lo (2007, pp. 420-428) confirms that "perceived usefulness" and "ease of use" have a major impact on user acceptance of new enterprise system. A change management approach that reduces user resistance due to perceived risk by communicating and addressing the usefulness a new system will support change management as one of the critical success factors as identified earlier in this study. Ramayah and Lo (2007, p. 421) explain a *technology acceptance model* (TAM) where a user's acceptance of IT is based on a combination of belief, attitude, intention and behaviour and that adaptation is influenced by ease of use. The perception is that the easier a technology or a systems is, the greater the utility of the solution. Shared beliefs in organisations on the application and value of a particular enterprise system also have significant outcomes in adopting the new system (Ramayah & Lo, 2007, p. 421). The last point warrants consideration for a change management approach where the shared beliefs around the utility of the new system can be managed and communicated. A collaborative approach may be used to address this communication requirement.

The observations made by Orlikowski and Hofman (1997, p. 12) that an ideal change management approach for a groupware type enterprise system should be based on iterative experimentation and learning, requires more communication and collaboration to minimise the risk of "perceived usefulness". In a study by Szamosi and Duxury (2002, p. 194) they found that communication of change is a critical component of effective organisational change management and that inadequate communication with employees and minimal opportunity for employee participation in the change process negatively effects change in organisations. The study also found bureaucratic resistance and favouritism as inhibiting change factors.

It is clear that managing change for enterprise system implementation, and specifically where new technology is deployed, is complex and challenging. It consists not only of technological

change factors but, also includes perceptions, attitudes and learning through iterative experimentation and use.

4.3 Collaboration and communication

This section will address communication and collaboration as some of the specific elements identified for change management success in the previous section.

Communication is highlighted in almost every single research article as one of the key change management success factors that will address perceived risk and change habits in an organisation. Barrett (2002, p. 219) states that without effective employee communication change is impossible and change management will fail. This section will look at the collaboration and communication requirements of an enterprise systems implementation project. The focus is mainly on the implementation of large scale enterprise solutions and the requirements of those teams. The objective is to understand what communication is required and what collaborative processes can assist with the implementation project.

Communication, an understanding of cultures, processes and roles, management and capabilities, as well as experience are listed by McAdam and Galloway (2005, p. 288) as key components of an enterprise system implementation.

Markus (2004, p. 17) states that the enterprise system tool that is implemented should itself motivate the users to learn what they need to know in order to perform their new process well. It seems that users would prefer to learn while using the system rather than to attend formal training about the system and changes to their processes.

In studying change management in a large corporation Szamosi and Duxury (2002, p. 195) found that inadequate communication and participation was at the top of the list when analysing how the organisation supported change management. The study identified the following elements of communication and participation in the analysis of the observations:

a. The organisation did not ask the employees if there is a better way of doing things;
b. It did not recognize employees as their greatest asset;
c. It did not share a common goal throughout the company's employees;
d. It did not allow employees to be flexible in the use of skill sets;

e. There was limited employee empowerment; and
f. It only provided verbal support for change.

New network technologies such as the Internet can improve both internal and external communication capabilities in an organisation and the lowering costs of these technologies make coordination and collaboration processes more efficient. This improves organisational performance (Gunasekaran & Ngai, 2004). “Electronic communication is less formal, reduces organisational barriers” states Gunasekaran and Ngai (2004) as it enhances innovation for large dispersed groups. Yamauchi et al. (2000, p. 330) argues that even though electronic media eliminates spatial and temporal boundaries, it does have limitations compared to face-to-face collaboration. Electronic media does not convey the social characteristics well such as anger, anticipation or friendliness. It is difficult to transmit equivocal messages and can often lead to misinterpretation. The value of communication and collaboration in the change management process is well researched but participation and getting people involved remains the key challenge for many change management initiatives, irrespective of the methods and technology used.

Kreitner and Kinicki (2004, p. 689) state that participation has historically been recommended to overcome resistance to change. Participation alone, however, is not the only requirement and Kreitner and Kinicki provide a list of six strategies that can be used in conjunction to overcome resistance to change. “Resistance to change is an emotional/behavioural response to perceived or imagined threats to an established work routine”. It ranges from complete acceptance to active resistance (Kreitner & Kinicki, 2004, p. 685). The strategies in Table 2 - Six Strategies for overcoming change (Kreitner & Kinicki, 2004, p **690)** have some form of communication and collaboration in common but the approach may differ for the various applications. All of the strategies are based on various forms of communication and collaboration and it provides some guidelines for the role of a collaborative Web 2.0 solution to support change management as a critical success factor for enterprise system implementation. Klein (1996, p. 44) states that publicising successes during the various stages of a change management process is very important and proving mechanisms for feedback and rectifying problems is equally as important. A collaboration and communication model for an enterprise system implementation should have the ability to provide this information timely and accurately.

Approach	Commonly used in Situations	Advantages	Drawbacks
Education + Communication	Where there is a lack of information or inaccurate information and analysis	Once persuaded, people will often help with the implementation of that change	Can be very time consuming if lots of people are involved
Participation + Involvement	Where the initiators do not have all the information they need to design the change and where others have considerable power to resist	People who participate will be committed to implementing change, and any relevant information they have will be integrated	Can be very time consuming if participators design an inappropriate change
Facilitation + Support	Where people are resisting because of adjustment problems	No other approach works as well with adjustment problems	Can be time consuming, expensive and fail
Negotiation + Agreement	Where someone or some group will clearly lose out in a change and where that group has considerable power to resist	Sometimes a relatively easy way to avoid major resistance	Can be too expensive in many cases if it alerts others to negotiate for compliance
Manipulation + co-optation	Where other tactics will not work or are too expensive	It can be relatively quick and inexpensive solution to resistance problems	Can lead to future problems if people feel manipulated
Explicit + Implicit coercion	Where speed is essential and where the change initiators possess considerable power	It is speedy and can overcome any kind of resistance	Can be risky if it leaves people mad at the initiators

Table 2 - Six Strategies for overcoming change (Kreitner & Kinicki, 2004, p 690)

Developing a communications framework or model for the change associated with implementing a new enterprise system such as a BPMS requires that certain communications goals are achieved with such a model. Barrett (2002, p. 220) provides some guidelines for the communication goals of an enterprise systems implementation project:

a. Messages must be clear and consistent on the vision and objectives of the project and on the benefits that it will have for the participants;
b. It must motivate employee support for the new way of doing things;
c. It must encourage higher performance and discretionary effort;
d. It must limit misunderstandings and rumours that may negatively impact on the project; and
e. It must align employees behind the strategic and performance improvement goals of the project.

Barrett (2002, p. 221) identifies targeted messages as a key practice in the communications requirements for effective change. “Targeted messages are very simply, information tailored to the audience, so that the information is relevant and meaningful, at the same time as it is consistent” (Barrett, 2002, p. 221).

“The creativity of a team is more than the sum of the individual creativity of its members” (Gordon & Tarafdar, 2007, p. 275). Innovation in an organisation can be stimulated with collaboration where one person’s ideas can initiate new ideas, viewpoints and contributions from other members of the collaborative team. Gordon and Tarafdar (2007, p. 276) state that collaboration and communication are organisational and IT competences. This must be seen in the light of the new collaborative technologies that are available and the way that people use these new technologies.

4.4 Teamwork and virtual teams in organisations

Research shows that more and more people are working in virtual teams. Hertel et al. (2005, p. 70) found that increasing de-centralisation and globalisation have lead to dynamic environments that features virtual teams where members are geographically dispersed and rely on electronic information and communication technology. The Internet has accelerated this trend.

Ahn et al. (2005, p. 564) defines a virtual team as “a group of people who interact through interdependent tasks guided by a common purpose working across space, time, and organisational boundaries using various communication technologies”. In a study of 376 business managers from different businesses in Germany, Hertel et al. (2005, p. 70) found

that 20% percent work predominantly in virtual teams, while 40% are regularly in virtual teams.

"Trust between peer teams significantly affects the efficiency, effectiveness, and quality of virtual team projects" states Edwards and Shridar (2005, p. 33) based on the findings of research into using virtual teams in the construction of industrial software. Edwards and Shridar (2005, p. 33) found that the trust levels are lower at the start of a project leading to reluctance to share information. This was attributed to insecurity and the teams did not look at themselves as partners working towards a common goal. Edwards and Shridar (2005, p. 33) found, however, that trust developed during the course of the project to a high level and state that given a suitable environment, it is possible to promote a good trust level between virtual teams. It is also requires well structured projects to positively affect the outcome of virtual teams working together according to Edwards and Shridar (2005, p. 34). This has significant impact for the development of a collaboration platform for enterprise systems implementation. It is important that the system addresses trust from the start and that there is some form of structure associated with it. The Web 2.0 solution should recognise teamwork, trust and structure with clearly identified roles as key components for an effective solution.

Hertel et al. (2005, p. 89) provides the following principles for the management teams:

a. Clear team roles and team goals that are not in conflict with commitment to other work units;
b. Careful implementation of efficient communication and collaboration processes that will prevent misunderstanding and conflict;
c. Continuous support for the team awareness and informal communication;
d. Creating experiences of interdependence within the team; and
e. Developing appropriate workshops and team planning concepts to support the initiation of the virtual teams.

The successes and failures of virtual teams are the subject of a number of current research projects. Clear and Kassobova (2005) conducted a study on the effectiveness of virtual teams from two universities (on two different continents) tasked to perform a number of tasks in various virtual team configurations. The results from the studies indicate a higher level of performance in the virtual teams than that of a control group, but a number of issues were also raised about the behaviour of virtual groups. The study was conducted over a two year

period and results varied significantly with the highest level of virtual team performance in the last semester. It must be noted that there were financial incentives associated with the study and the virtual team that performed best received financial reward. It is a significant observation in the acceptance in virtual team roles and is consistent with the change management requirements and approaches discussed earlier.

Edwards and Shridar (2005, p. 34) state that the use of technology positively affects the outcome variables of virtual teams and should be encouraged in the process. The synchronous nature of the communication is in many instances sufficient where geographical and language barriers may exist.

The concept of virtual teams will be central to the Web 2.0 collaboration solution to support change management as a critical success factor in enterprise system implementation of a BPM solution. Even though team members may not be geographically dispersed, the functional silos or hierarchies in organisations create their own segregation and it is not always practically feasible to get subject matter experts and contributors from various business areas into a single room. The virtual teams' setup also provides the shared space to record and review ideas, store artefacts and communicate. The proposed Web 2.0 collaboration solution should support these requirements of virtual teams. Knowledge sharing among virtual teams is one of the key success factors of this organisational form and one of the reasons why some open-source collaborative projects are highly successful.

4.5 Knowledge management requirements

One of the challenges that face enterprise system implementers is effective knowledge sharing across all the areas of the project. Ash and Burn (2003, p. 377) states that the capability to share knowledge, having a learning organisation and effective change management activities are not only important but can also be problematic. Knowledge generally resides across the organisation and making sure that all the sources, repositories and subject matter experts share the knowledge has been a long standing organisational problem.

The objective of knowledge networks is to allow participants to create, share and use various categories of knowledge artefacts using technology that ensures that it is easy to use. "E-business knowledge can be created and shared more effectively by a combination of new organisational designs and technologies" (Gunasekaran & Ngai, 2004, p. 283).

Ahn et al. (2005, p. 563) argues that contextual information is becoming increasingly important in the broader knowledge management paradigm. It is a crucial component to fully understand the knowledge requirements of an organisation, project or task. This also holds true for an enterprise system implementation. It is in this context that collaborative groups can contribute in the communications processes and do not only share technical but also contextual information. "In virtual collaboration environments, utilisation of contextual information is even more significant for several reasons" (Ahn, Lee, Cho, & Park, 2005, p. 563).

Firstly, due to the temporal nature of typical virtual teams, contextual information can be lost in the dynamic changes. Secondly, the distributed nature of virtual teams, typically through Internet technology, results in a narrow channel for communication. Ahn et al. (2005, p. 564) thirdly highlights that the non-routine and knowledge intensive tasks of these virtual teams require a high level of understanding along with contextual information.

Virtual teams for enterprise system implementation are typically project focussed, they are created at the start of the project and are typically discarded at the end of a project. The tasks of these teams are non-routine and knowledge intensive. Ahn et al. (2005, p. 565) describes this knowledge as diverse, heterogeneous and novel.

The knowledge and information developed as part of a virtual team where the project duration is generally limited to the specific project. It is normally discarded on completion of the project. There may be instances where the information and knowledge is re-used but then it is presented in a different context such as a reference or knowledge base.

This is consistent with the type of knowledge typically associated with enterprise system implementations. The information that is required for a business process specification can be originated in any area of the business and it will typically be unique to that business area. Knowledge on a specific business process is based on domain expertise and experience that makes it novel. The challenge is to turn tacit knowledge into explicit knowledge that is shared among all participants. The open-source community is one of the leading groups that have successfully created mechanisms to do this.

4.6 The open-source approach to collaboration

The objective of this section is to analyse the open-source software development model, understand how geographically dispersed groups work together in virtual teams and look at the application of this methodology to develop a collaboration solution using Web 2.0 technology for business process management implementation.

"Open-source software is software released under a license conforming to the Open-source Definition (OSD)" states Feller and Fitzgerald (2000, p. 58) and conforms to the following conditions:

a. The source code is available to the user;
b. The software is redistributable;
c. The software is modifiable, and creating derivatives are permitted;
d. The license must not discriminate against any user, group or field of endeavour;
e. The license must apply to everybody that the software is distributed to; and
f. The license cannot restrict aggregations of the software.

The fact that the source code of the software is available with the product lead to an industry where developers work collectively and collaboratively on projects to enhance these products. Well known successful examples include the development of the Linux operating system and the development of the Apache web server.

Feller and Fitzgerald (2000, p. 64) list some criteria that would warrant open-source consideration in the development of a software application:

- When reliability and stability of the software application is critical;
- When correctness is only established through independent peer review;
- When software is critical to the business;
- When the software is part of a communications infrastructure ; and
- When key and complex algorithms are part of the project.

These criteria are also applicable in large scale enterprise system implementations such as BPMS where the complexity of the processes requires peer review, the business rules may have a complex algorithm, it is part of the complex communications infrastructure, it is generally mission critical and reliability and stability are of great importance. The open-

source approach provides some insight into a collective and collaborative methodology used by large groups of contributors to develop large scale solutions using collaborative technology.

The open-source movement has brought a whole new dimension to collaboration and knowledge sharing. “The concept of collaboration based on the open-source paradigm is being used to improve multisite development and collaboration inside companies, and has even spilled over into the area of collaborative documentation and knowledge management with public and high profile projects such as Wikipedia.org or the ‘OpenCourseWare’ project at MIT” (Neus & Scherf, 2005).

Open-source developers rely heavily on electronic collaboration to develop enterprise level, reliable and innovative software according to Yamauchi et al. (2000, p. 329). The electronic environment imposes a number of restrictions that make it more challenging than “face to face” collaboration. Yamauchi et al. (2000, p. 329) states that it is surprising that open-source development is coordinated and consistent with continuous innovation as a result of the electronic collaboration environment that is used to exchange information.

It must, however, be noted that open-source contributors are mostly freelance contributors to a project and don’t face the same commercial pressures typically found in enterprise systems implementation projects. This is a key area where the open-source development approach differs from the requirements of the implementation of a Business Process Management Suite such as FlowCentric. Enterprise system implementation projects generally have tight project deadlines and are staffed by fulltime employees. Open-source developers, in contrast, generate code at their own pace and only once the contributor is satisfied with the content, it is published to the project. The open-source collaboration model does, however, provide evidence of successful, self organising groups that use electronic media effectively to design, develop and support complex software solutions.

The open-source model contrasts to conventional software development as summarised in the following table:

Traditional Approach	Open-source Approach
Brook's Law	Linus' Law
Hierarchy	Network
Experts	Peers
Teams	Communities
Cathedral	Bazaar
Perfection	Improvement
Construction	Evolution

Table 3- Contrasting approaches (Neus & Scherf, 2005, p 217)

There is an informal hierarchy in open-source development that ensures that the individuals earn the right to contribute to a project. The peer management processes are generally well understood and supported. It also applies to the proposed model for Web 2.0 collaboration for enterprise systems implementation. It is proposed to have a defined hierarchy and role structure based on the open-source software development model.

Sack et al (2006, p. 236) provides a view in Figure 7 of the hierarchical structure in the Python programming language (www.pyhton.org) open-source project. The structure from the top to the bottom reflect the seniority of the contributors:

i. BDFL refers to the project owner or "Benevolent Dictator for Life";
ii. Python Labs Core Team refers to those members that maintain code and help newbies;
iii. Python-dev members that discuss changes to the code base and support newbies;
iv. Advanced members that are experienced Python programmers who comment on the product, ask advanced questions and support newbies; and
v. Newbies who are novices to Python and are primarily looking for support.

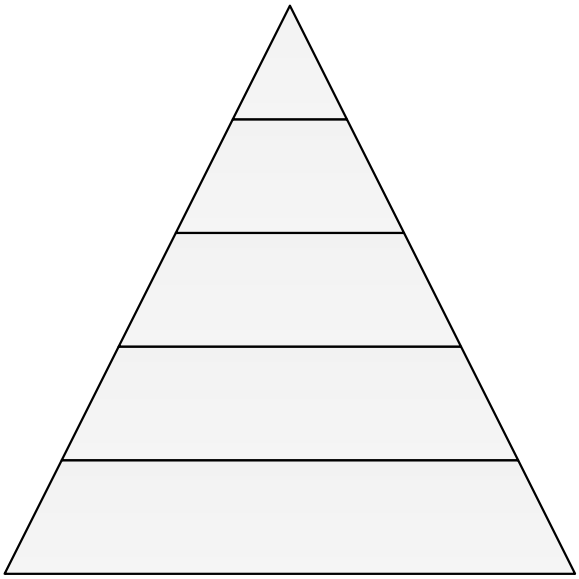

Figure 10 - Roles in Python project (Sack et al., 2006, 236)

This hierarchy is of particular interest in the development of a Web 2.0 based collaborative model to support the implementation of BPMS. A similar hierarchy is proposed for the Web 2.0 collaboration model. It is important to have a defined organisational approach due to the commercial nature of the projects, fixed implementation deadlines, and scarce resources.

What makes the approach to open-source software development of particular interest to this study is that it is similar to enterprise systems implementation projects, coordination intensive and often developed in geographically dispersed areas (Yamauchi, Yokozawa, Shinohara, & Ishida, 2000, p. 329). Enterprise system deployments may not always be geographically dispersed but implementing a solution in the different functional silos in an organisation can be very similar.

Bergquist and Ljungberg (2001, p. 305) refers to the “gift” relationships and behaviour that forms a cornerstone of the open-source movement. There is a definite difference in the behaviour of hackers versus open-source developers according to Bergquist and Ljungberg (2001, p. 305). Hackers have a culture of exchange that is based on scarcity and open-source developers have a culture of giving characterised by abundance. This has significant impact on the development of a Web 2.0 collaboration model for enterprise systems implementation as the approach would be to foster open and giving cultures rather than an exchange where only a few members benefit.

The behaviour of "giving" also fosters a culture based on reputation that is supported by the hierarchical structure. The open-source community is organised around a large group of producers and users. Tapscott and Williams (2006, p. 3) define these as "prosumers" where the producers of content are also the consumers and cite examples such as the Wikipedia.org, MySpace and YouTube communities. These are not open-source development projects but communities that generate content that is consumed by other members of the community in a similar approach to open-source development.

Berquist and Ljungberg (2001, p. 307) explain that the "gift" culture creates social interdependencies where there are certain powers associated with the ability to give. "To give away something is to express an advantageous position in relation to the recipient". This assists with developing the "reputation" of the giver or person who donates code that is in many instances the main driver in open-source communities.

Yamauchi et al. (2000, p. 330) makes an observation about the attitude of open-source developers that is of particular interest in creating a collaborative platform for enterprise systems implementation such as BPMS. One of the reasons why developers contribute to the project is to ensure that the features and functions that they particularly require is added to the product and to "Scratching a developer's personal itch", states Yamauchi et al. (2000, p. 330). The collaboration solution for enterprise systems implementation will give the contributor the opportunity to ensure that his specific requirements are documented in the process requirements for the BPMS.

The "emperor's clothes" test used by Neus and Scherf (2005, p. 221) provides an interesting insight into the open-source organisation. The test checks if there are ways in an organisation where a novice (end user or practitioner) can publicly call attention to the emperor's (the expert) lack of clothes (i.e., raise a quality issue) or if there is a range of gatekeepers that manage the communication flow. In an open-source organisation the novice would be able to publish any issue directly to the project website. Most conventional project organisations have a range of gatekeepers to ensure that issues are not raised in a public forum.

Research by Neus and Scherf (2005, p. 316) show that open-source projects can suffer from negative influences such as "elitism" that is protected by "flaming" contributions from

authors outside of the elitist group. It is argued that the openness of the open-source movement is often overstated. It is important to ensure that the proposed Web 2.0 collaboration solution does not suffer from the "elitist" challenge where certain contributors are "flamed" for organisational or political reasons. It will require top management support for the solution from that point of view to ensure that everyone is treated fairly and all contributions are evaluated based on the business value of the content.

"Virtual collaboration puts high demands on people having trust in each other. Giving away the best piece of code a person has produced demands strong social ties between the giver and the receiver" (Neus & Scherf, 2005, p. 316).

Yamauchi et al. (2000, p. 337) provide evidence of two case studies on electronic collaboration in open-source development projects where the traditional approach of coordination that precedes any activities are not appropriate in dispersed collaboration. Spontaneous work in specific areas of interest has a far greater impact in allowing individuals to innovate. It does, however, require an organisational culture committed to sharing, change and scrutiny by peers. It is anticipated that the behaviour of virtual teams or project teams for the Web 2.0 collaboration solution will be similar to that of open-source developers and it is important to recognise that some contribute as well as favour certain areas of the project more due to an inherent interest or being a subject matter expert.

4.7 Summary

Chapter 3 addressed the critical success factors associated with the implementation of enterprise system and identified change management and its components that include communication and collaboration and teamwork as key elements for project success. This chapter focussed specifically on the change management requirements for enterprise systems associated with new technology, the communication and collaboration requirements and the behaviour of teams and virtual groups. The effective way that open-source teams work were evaluated from a change management and collaboration perspective to determine if some of those characteristics can be employed in the development of a Web 2.0 collaborative solution for enterprise system implementation.

The objective of the Web 2.0 collaboration solution is to positively impact knowledge sharing, workload sharing and getting input and feedback from all levels in the organisation.

The conventional approach for the implementation of BPMS is to gather a few subject matter experts and let them design the processes in isolation. FlowCentric's experience in this area has shown that critical process information and subtleties in the operations and business rules can have a severe impact on automated processes if not understood. The fundamental approach of the Web 2.0 application would be to harness the "open-source" like specification and development methodology that has proven that enterprise system implementations can be developed by large groups of geographically dispersed individuals.

The open-source model is not a panacea for development practices and requires management and moderation. It can suffer from its own change management issues but, as an approach, provides evidence of successful collaboration of self organising development teams.

It does however provide a model to strive for in the development of a collaboration platform on Web 2.0 technology to support the implementation of enterprise systems implementation such as BPMS.

Chapter 5: The current state of Web 2.0 collaborative technology

5.1 Introduction

5.1.1 Aim

The aim of this chapter is to review Web 2.0 functionality to determine its suitability for the development of a collaborative solution to support change management as a critical success factor in enterprise system implementation.

5.1.2 Scope

This chapter specifically focuses on the development of Web 2.0, its components such as wikis, blogs and RSS feeds that are applicable to the development of a collaborative solution to support change management as a critical success factor in enterprise system implementation. It would be beneficial to leverage technology from a single technology platform and the suitability of Microsoft SharePoint is reviewed. The scope of the study is limited to Microsoft SharePoint as the objective is not to evaluate the various options available for deployment of the proposed solution.

The following topics are specifically covered:

a. The development of Web 2.0;
b. Web 2.0 and the enterprise; and
c. Microsoft SharePoint Services in the enterprise.

5.2 The development of Web 2.0

The concept of Web 2.0 was initiated by O'Reilly and MediaLive International at a conference brainstorming session in 2004 in order to distinguish the new generation products and services that were delivered on the Internet web (O'Reilly , 2005). In order to create a sense for Web 2.0 O'Reilly (2005) compared the two generations of web applications:

Web 1.0		**Web 2.0**
DoubleClick	→	Google Adsense
Ofoto	→	Flickr
Akamai	→	BitTorrent
mp3.com	→	Napster
Britannica Online	→	Wikipedia
Personal websites	→	Blogging
evite	→	upcoming.org and EVDB
Domain name speculation	→	Search engine optimisation
Page views	→	Cost per click
Screen scraping	→	Web services
Publishing	→	Participation
Content management systems	→	Wikis
Directories (taxonomy)	→	Tagging (“folksonomy”)
Stickiness	→	Syndication

This comparative list provides a view of the different approaches to the two web generations even though the technology base may be the same, the application and collaborative approach may be very different.

In Web 2.0 the web is seen as an application platform to deliver solutions and services rather than just technology infrastructure. Hinchcliffe (2006) defines a number of principles that describe Web 2.0 in terms of its use and application. Some of the principles include the fact that linking is that fundamental unit of thought, where everything is linked to each other, data in Web 2.0 belongs to those who create it, users must be prepared to share everything with enthusiasm, the web is the platform, everything is editable and can be changed, identities on the web are sacrosanct and not to be compromised and it embraces rapid change and feedback.

Angermeier (2005) constructed a bubble map to try and summarise all the elements that encompasses Web2.0.

Figure 11 - Web 2.0 Bubble Map (Angermeier, 2005)

“Network effects from user contributions are the key to market dominance in the Web 2.0 era” (O'Reilly , 2005). Craig (2007, p. 154) calls the evolution of blogs, wikis, social networking and other Web 2.0 applications a process of knowing that is community based and a collaborative endeavour. There is a new social environment that is undergoing significant change with the introduction of new and innovative tools that support new modes of collaboration and social organisation according to Craig (2007, p. 154).

Web 2.0 applications have received much attention from a social networking perspective and the websites such as Facebook and MySpace are gaining enormous traction. Users of these social networking applications are learning new ways to collaborate and communicate and Gilbane (2007) conducted a survey of 18-24 and 25-34 year olds on Facebook to get a view of the collaborative technologies that they think they will use in their work environment in the next two years. Although it is not a controlled survey it does show an indication that the younger generation is less likely to use email and would rely more on social networking in the work environment. Conventional collaboration through email is, however, still seen as the primary communication mechanism for business use.

The collaboration solution to support enterprise suite implementation projects such as BPMS on a Web 2.0 platform needs to ensure that it has more business value and it is not only built on the social networking aspects. It is important to ensure that the solution facilitates change management which is a critical success factor in enterprise systems implementation projects. The correct components of the Web 2.0 platform need to be identified and used to make it suitable in an enterprise environment. It should have a social networking component but is not intended for socialising on the Internet. It should support the communication and collaboration of projects specific information, making it accessible, editable and distributed among all team members. For this purpose it is important to understand the current thinking around Web 2.0 implementation in enterprises.

5.3 Web 2.0 and the enterprise

The use of Web 2.0 in the enterprise is often referred to as Enterprise 2.0 where the collaborative approach and tools of Web 2.0 are used in a business environment. Enterprise 2.0 focusses on those platforms that can be used by organisations to make the practices and output of the knowledge workers visible according to McAfee (2006, p. 23). These platforms focus not on the capturing of the knowledge but rather on making the knowledge useful specifically in a business context for Enterprise 2.0.

The objective of Web 2.0 applications in an organisation is to better distribute information and also to get employees to contribute and create the information. Knowledge sharing and capturing tacit expertise could be facilitated by Web 2.0 in an organisation. One of the principles of Web 2.0 is that it does not have consideration for a position on an organisational chart and should not suffer from bureaucratic control. This is, however, a characteristic of the culture of the organisation and requires top management support.

In an online web survey of 150 participants conducted by CIO Insight, Alter (2007) found that IT executives are using a number of Web 2.0 applications in their day-to-day work.

Web 2.0Application	Usage
Video over the web	54%
Wikis	49%
Blogs	48%
RSS (Really Simple Syndication)	47%
Podcasts	39%
Social networking (e.g., tagging, social bookmarks, del.icio.us, LinkedIn, Technorati)	33%
Expertise location and sharing	21%
Mashups	13%
Virtual worlds (e.g., Second Life)	12%
Instant mobile updates (e.g., Twitter)	11%
None of the above	11%

Table 4 - Web 2.0 applications that CIOs use (Alter, 2007)

Hinchcliffe (2007) provides an updated view of Web 2.0 in the enterprise. His model distinguishes between internal and external views from a social and technical perspective.

Figure 12 - Web 2.0 in the Enterprise (Hinchcliffe, 2007)

The objective of using Web 2.0 technology in an enterprise environment is to support the way people work by creating a collaborative and cooperative environment. Rama and Bishop (2006, p. 199) provide a model for computer supported cooperative work (CSCW) that describes the two dimensions, space and time, that categorise how people use technology to work together.

		TIME	
		Same Time (Synchronous)	Different Time (Asynchronous)
SPACE	Same Space	1st Quadrant Spontaneous collaborations, formal meetings and classrooms	2nd Quadrant Design rooms, Project Scheduling
	Distributed	3rd Quadrant Video conferencing, net meetings and phone calls	4th Quadrant Emails, blogging, authoring, voice mails, fax

Table 5- CSCW Quadrants (Rama & Bishop, 2006, p 199)

Blogging is categorised by Rama and Bishop (2006, p. 200) as a group support technology that allows users to:

a. Communicate and collaborate using web pages;
b. Possibly remain anonymous;
c. Provide comments and feedback on other people's views; and
d. Manage and coordinate multiple posts or projects.

The diagram depicts how people work andit illustrates the division of tools among their work space and time. The first quadrant is based on the conventional face to face meeting and collaboration situations while the second quadrant shows environments where asynchronous collaboration can happen. Wikis also fall into this category and differs from blogging in the fourth quadrant in that the messaging does not need to be sequential. Some tools like Microsoft SharePoint provide a collection of tools in the same application that include

discussion forums, wikis, blogs and document repositories. It also provides an indication of the "online" status of a user, but can sometimes be used for spontaneous and ad hoc collaboration.

Hollenbeck and Cohen (2005) used Microsoft SharePoint technology as collaboration platform for 300 mid-level managers in an organisation to initiate a dialogue around change management. It consisted of anonymous discussions around five predefined topics where management wanted specific feedback. During a 4½ day test period, Hollenbeck and Cohen (2005, pp. 81-82) monitored the SharePoint site and logged 12 075 hits on the discussions. Due to the confidential nature of the survey, the exact number of unique visitors was not established, but an analysis of the discussions showed that more than 240 managers participated during this period. Hollenbeck and Cohen (2005, pp. 86-87) observed that it was a highly successful exercise in collaborative communication using new technology, it had full commitment from the management team, and the exercise was well structured and monitored. "Perhaps even more compelling is the potential for adoption of new technologies, such a SharePoint, into the daily lives of an organisation" states Hollenbeck and Cohen (2005, p. 86).

McAfee (2006, p. 26) highlights that Enterprise 2.0 implementations still require a structured approach that doesn't happen automatically. He lists a receptive culture, a common platform, an informal roll-out and managerial support as critical success factors in deploying Web 2.0 applications in an enterprise.

There are, however, challenges or threats with the introduction of Enterprise 2.0 applications and McAfee (2006, p. 27) identifies the fact that knowledge workers are busy and will not have time to use the new technologies, despite training and the fact that it may be a requirement of the project. The other threat is that the tools are being used as intended but that outcomes differ from the intended plan with the use of the tool. This is a particular threat to the use of Web 2.0 technologies in the development of a collaboration tool for enterprise system implementation. All the functionality of the tool may be used by the group, but it may not affect change management which is a critical success factor of enterprise implementations. In this case it will just add to the workload of the project members and may even have a negative impact on the project.

Common components of Web 2.0 that are used in the deployment of enterprise application include wikis, blogs, RSS feeds, Mashups, instant messaging and possibly social networking. The following sections will describe some of these tools in more detail with a particular focus on how to utilise these tools in the development of a solution to support change management as a critical success factor in the implementation of enterprise systems. Social networking and instant messaging are excluded from the discussion as these may be Web 2.0 tools but are not used in the proposed collaboration model.

5.3.1 Wikis for collaboration in Web 2.0

McKiernan (2005, p. 1) states that wikis are disruptive technology with dynamic possibilities and cites Wikipedia that "disruptive technology is new technological innovations, product or services that eventually overturns the existing dominant technology in the market".

Wiki is a Hawaiian term for "quick" or "super fast" and was coined by Howard Cunningham to describe the new generation websites that anyone can edit according to McKiernan (2005, p. 14). Augar et al. (2004, p. 95) defines wikis as fully editable websites where visitors can read, re-organise and update the structure and content of a wiki which includes text and pictures. This open editing functionality can be accessed using a web browser and Augar et al. (2004, p. 95) cites Wikipedia as the most well-known example of a wiki website. Louridas (2006, p. 88) extends the definition to software that make it easy for anyone to edit web sites and a philosophy around how users should edit these websites. The philosophy and the approach to creating and maintaining these websites is in many cases more important than the actual technology that supports it.

Ramos and Piper (2006, p. 570) states that Wikis are meeting the earlier hopes for the Internet, as they allow for a democratic community of users to create its own content in an open model of knowledge creation and communication. The fact that some users can create and shape their own content, while other users can modify the original contents will make the use for wikis grow according to Ramos and Piper (2006, p. 570).

A Wiki is unusual from the perspective that it allows both the organisation of contributions to be edited as well as the actual content itself according to Kajewski (2007, p. 423). "Allowing everyday users to create and edit any page in a website is exciting in that it encourages democratic use of the web and promotes content composition by non-technical users"

(Kajewski, 2007, p. 423). Ramos and Piper (2006, p. 570) state that the ease with which information can be introduced or challenged by users and a Wiki, can lead to the creation of authoritative, comprehensive and useful online documentation.

Long (2006, p. 158) identifies three areas where wikis will have a significant impact:

i. The documentation used in the corporate world such as agends, reports and project management reports can be put together by collaborative teams and this will impact on the ability to get an early consensus among participants;
ii. To create more complete and dynamic portals for higher education, that will utilise the collaborative features of wikis; and
iii. Libraries could use the collaborative nature of wikis for the managing collection and development of reference services.

These requirements are very similar to that required by a Web 2.0 collaboration platform for the implementation of enterprise solutions such as BPMS. Much of the information and content required during an enterprise systems implementation project is created by non-technical (web and programming technology) users. The objective of a collaboration solution would be to assist these users to organise information and content to the specific requirements of the project. A Wiki provides a flexible mechanism where the structure and content can change as the context of the project develops. Typically any user can edit content or a Wiki page that was created by someone else. A key principle of a Wiki, as highlighted by Louridas (2006, p. 88), is that these edits are visible to all users and the identity of the editor is displayed with the changed content. Incorrect content is generally very quickly corrected by other editors. Tapscott and Williams (2006, p. 75) cite an MIT study where obscenities that were randomly inserted into Wikipedia, were removed in an average of 1.7 minutes.

McKiernan (2005, pp. 25-28) lists some of the advantages of using a wiki as:

a. It provides a mechanism to asynchronously involve experts, peers and other participants in collaborative work;
b. It provides a way of capturing thoughts and notes for dynamic and evolving projects where no proper media format exists;
c. It facilitates the exchange of ideas for small teams and projects;
d. It is a more creative environment to expand a knowledgebase in an organisation;
e. It creates a level playing field where all opinions have equal exposure;

f. It provides a more efficient communication mechanism than emails and discussion forums;
g. It's getting everyone on the "same page";
h. It harnesses the power of diverse individuals to collectively contribute to the project;
i. It provides a forum for individuals to development their knowledge and share it with others; and
j. Providing innovative reference repositories for all aspects of projects in an organisation.

These advantages are very relevant in the development of a collaboration solution on Web 2.0 technologies to support and the implementation of enterprise solutions. It addresses many of the current problem areas of an enterprise system implementation and it supports many of the critical success factors discussed earlier in this study. Wikis will form a key component of the proposed solution to use collaborative Web 2.0 tools in enterprise system implementation to assist with change management as a critical success factor.

There are, however, some challenges associated with the use of wikis. Some of these challenges according to McKiernan (2005, pp. 29-30) are:

a. It can be a cumbersome task to edit and maintain the Wiki content for some individuals;
b. The perceived lack of control, a formal hierarchy and accountability;
c. The issues associated with legal liability, privacy and security;
d. The concerns around accuracy, comprehensiveness, balance, consistency and reliability of the content that is created within a Wiki;
e. The fact that Wikis are cumulative and asynchronous rather than serial; and
f. The content of the Wiki is never really finished and it tends to have a mixed degree of quality and finality.

Giles (2005, pp. 900-901) found in a comparative study of errors in science entries on both the online versions of Encyclopaedia Britannica and Wikipedia that there was a surprisingly small difference. Wikipedia contained four inaccuracies per entry to Britannica's 3. The key difference between the two though, according to Tapscott and Williams (2006, p. 75) is that the errors cited in Wikipedia have since been fixed while the Britannic errors remain.

According to Ramos and Piper (2006, p. 573), the group ethos is a major factor in keeping the content in a credible state through continuous monitoring and correction to reduce its vulnerability to abuse and vandalism. The organisational levels and reporting hierarchy must be considered in The development of the proposed collaboration solution and care must be taken to ensure that organisational politics and level of authority in the organisation do not adversely affect the ability of anyone in the organisation to contribute freely to the project.

The scope of the wikis for the Web 2.0 collaboration solution for enterprise system implementation is not of an academic nature and the solution will rely on the peer review mechanism to ensure the highest level of accuracy and completeness. It is expected that subject matter experts will contribute and review the information related to the solution.

Louridas's (2006, p. 90) experiences in implementing wikis in software development is particularly relevant to the implementation of a collaboration platform for enterprise system projects. Louridas (2006, p. 90) found that Wikis were particularly useful in distributed projects to organise, track and publish work and the versioning capabilities allow an audit trail of changes during the project. It can be a project documentation repository at the simplest level or a comprehensive collaboration tool if used more extensively. Wikis are especially useful as discussion media according to Louridas (2006, p. 90) and some of the additional benefits include the fact that content is stored in context and that Wikis tend to be more user friendly than email archives.

"More important than the particular Wiki implementation, however, is being sure that the Wiki really fits in the culture of the project or organisation" states Louridas (2006, p. 91) and this relates back to the organisational changes discussed earlier in the study.

5.3.2 Blogs for collaboration in Web 2.0

A blog is derived from the word weblog and refers to a website that contains dated entries in reverse chronological order showing the most recent entry at the top, according to Boulos et al. (2006, p. 2). A blog is essentially an online journal that is authored by an individual or a group. The blog entries can contain information that is linked to other sections, web sites or documents and images. Blogging tools generally allow the creation of commentary on the other posts or entries.

Boulos et al. (2006, p. 2) remarks that blogs often attract a large and dedicated readership, as they share knowledge, reflect on issues and stimulate debates. Interested readers can subscribe to a blog by using RSS which will be described in the next section. Tapscott and Williams (2006, p. 39) call blogs "the world's biggest coffee house" as the tools allow non-technical users to create and publish websites without using complex programming tools. Word processor packages such as Microsoft Word 2007 allow users to create and publish blogs in the same way as creating a normal document. There are various Open-Source and hosted blogging tools available where users can create an account and start publishing within minutes. The interactive nature of publishing and the ability to provide commentary turns static web pages into collaborative conversations according to Tapscott and Williams (2006, p. 40).

There are various applications for blogs in business even though most of the current blogs are on the Internet rather than an intranet. McAfee (2006, p. 21) cites an example where an employee came up with an idea to improve their intranet, posted the requirement to an internal blog, where three minutes later a colleague responded with a proposed solution and how to implement it. The example shows that, in 64 minutes, an idea was generated, solution proposed and the full details submitted to the responsible person in the organisation to authorise the changes. It required no project team, project plan or formal structure to propose changes to an enterprise implementation that supports innovation in the organisation.

A blog should be particularly useful as a communication tool in a project environment. The objective would be to use a blog in a collaborative solution to support the implementation of enterprise systems and particularly BPMS. It is anticipated that a blog can be used to communicate the status of the project, and provide critical information from a project management point of view while allowing feedback from team members on various aspects of the project.

A blog can be used to show top management support for a project by providing regular status updates and feedback as part of a change management process. The type and tone of comments can give managers a feel for the "soft" issues of the project. It is, however, important that management does not use feedback and comments in a negative way, as it will harm the credibility of the tool. It is important to establish trust among management and

peers as Edwards and Shridal (2005, p. 33) found in their research of setting up global virtual teams in open-source software development.

5.3.3 RSS feeds and Mashups for collaboration in Web 2.0

RSS is a web content syndication format and the acronym stands for *Really Simple Syndication* (RSS Advisory Board, 2007). O'Reilly (2005) state that RSS is the most significant advance in web site architecture as it allows not just linking to a page but actually subscribing to it. A subscriber will get a notification every time the website page changes and O'Reilly (2005) calls it "the incremental web" or the "live web".

These notifications can be viewed in an aggregator such as Microsoft Outlook 2007 or Google Reader to provide users access to all the changes in all the websites subscribed to. This is particularly useful when it is important to track changes in, for example, the project management blog or the Wiki with the latest product update information. Products such as Microsoft SharePoint provide RSS feed functionality on items such as content, discussion forums, workflows, wikis and blogs. This is of particular relevance to the proposed collaboration solution for enterprise systems implementation where it would be beneficial if the project team received updates from the solution as the changes happen.

Mashups provide an enhanced way of syndication where components of various web sites are strung together to create a new webpage that is commonly referred to as a mashup. Taking web parts from various parts of a project website and creating a new user specific view allows team members to create their own "dashboards" for example. It allows for the connection of data sources to provide a single user interface, once again using tools that don't require programmatic skills.

"Users are able to access data, rework it through another application to collaboratively create new content referred to as Mashups" states Craig (2007, p. 155) where the original web site is accessed through a publicly available Application Programming Interface (API).

The initial version of the proposed solution for collaboration during the implementation of enterprise systems like a BPMS will not include Mashups but it could be used in later enhanced versions of the model. It should, however, utilise RSS feeds from initiation.

5.4 Using Microsoft SharePoint Services as a typical Web 2.0 environment

The SharePoint development tools are familiar and available for the development of the collaboration solution, as FlowCentric is a gold certified Microsoft partner. Most of FlowCentric's customers are large enterprises where corporate IT policy determines to a large extent what tools can be used. Kenney (2007) cites research conducted by Forrester where 61% of the 119 respondents, CIOs of companies with more than 500 employees, stated that they would buy Web 2.0 products as a suite from a large incumbent vendor.

The overview of Microsoft SharePoint will focus on the specific components required for the Web 2.0 collaboration solution for enterprise system implementation. It is not intended as a detailed product review.

"Office SharePoint Server 2007 provides a single, integrated location where employees can efficiently find organisational resources, access corporate knowledge, and leverage business insight to make better-informed decisions" (Microsoft, 2007). The capabilities of SharePoint are delivered mainly through two product sets namely Windows SharePoint Services 3.0 (WSS 3.0) and Microsoft Office Sharepoint Server 2007 (MOSS 2007). Microsoft Office SharePoint Server 2007 for Search and Microsoft Office Forms Server 2007 are the remaining components of the Sharepoint solution. The functions required for the Web 2.0 collaboration solution are found in WSS 3.0 and MOSS 2007.

Windows SharePoint Services 3.0 can be used for a virtual team site, large enterprise portal solutions and external Internet websites. It is primarily built around storage capability, security, management capability, ease of deployment and extensibility. It provides collaboration through document repositories, wikis and blogs, RSS support, discussion boards, task management, calendars and contacts and email integration (Microsoft, 2007, pp. 5-6). Microsoft Office SharePoint Server 2007 provides in addition to WSS 3.0, extended enterprise implementation features such as enterprise search, business forms and integration and business intelligence solutions (Microsoft, 2007, pp. 8-9).

Although Microsoft SharePoint is not the only environment suitable for the development of the proposed model, it is chosen as the platform due to FlowCentric's availability of skills with the product.

5.5 Summary

The approach to how the internet and its associated technology is used has changed over the past few years and the emergence of the term “Web 2.0” implies a second generation of applications and ways to use the internet.

This chapter provides an overview of the current status of Web 2.0 technology and its components that are specifically applicable to the development of a Web 2.0 collaborative solution to support change management as a critical success factor in enterprise system implementation. It draws a comparison between what is regarded as Web 1.0 and Web 2.0 in terms of its application and typical technology components. It is evident from the literature surveyed that Web 2.0 has a strong following as social networking tools. It is this phenomenon that possibly lends Web 2.0 as an ideal change management tool through its collaborative nature in the social networking arena.

It discusses the application of Web 2.0 in an enterprise and reviews the current use of wikis, blogs and RSS feeds in a business context rather than in a social context. There seems to be a growing interest in the implementation of Web 2.0 type applications in the enterprise environment. Research by CIO Insight (Alter, 2007) shows that IT executives are increasingly using Web 2.0 tools such as wikis and blogs in their day-to-day work. This increasing awareness of Web 2.0 tools combined with the strong social networking characteristics of these tools provides an opportunity to define a model using Web 2.0 to support change management as a critical success factor in enterprise system implementation.

It is, for the purposes of this study, easier to use a single and mostly familiar Web 2.0 platform that contains most of the tools and applications required to create a proposed model. This chapter describes the application of Microsoft SharePoint as a single environment for all these Web 2.0 components that will address the requirements for the development of the proposed collaboration solution. There are many commercial and open-source tools available that provide all the functionality of Microsoft SharePoint, but SharePoint provides a good platform to demonstrate the model.

Chapter 6: A proposed model for using Web 2.0 tools in a Business Process Management Suite deployment

6.1 Introduction

The previous chapters demonstrated that the implementation of enterprise systems in organisations can be disruptive and it identified a number of critical success factors that can be addressed to improve the likelihood of success in the implementation of these systems. Change management was identified as an important, if not the most important, critical success factor that could be managed and monitored to ensure project success. Communication and collaboration as well as teamwork are key aspects of change management and the specific requirements of these elements were evaluated with specific reference to the implementation of enterprise systems. A review of Web 2.0 and some of its components, specifically those that could facilitate collaboration and communication in an enterprise environment provided a mechanism to develop a model of framework that would be particularly suited to support change management as a critical success factor in implementing an enterprise system such as FlowCentric BPMS.

6.1.1 Aim

The aim of this section is to define a Web 2.0 based model that will address the components of change management identified in Chapter 4 and that are required for enterprise system implementation with specific reference to FlowCentric BPMS.

6.1.2 Scope

Providing a contextual model that takes both enterprise system change management requirements and the new Web 2.0 technology into consideration requires that these two concepts are brought together in a single model to determine if it would be suitable to support change management as a critical enterprise system implementation factor through improved collaboration and communication. It looks specifically at the application of wikis, blogs, RSS feeds, knowledge management and team surveys to provide a Web 2.0 based collaborative environment. This chapter specifically addresses the following:

a. Elixir BPMS model overview;
b. Objectives for the Elixir collaboration environment; and
c. Components of the Elixir model.

The model will be referred to as “Elixir” named after the magic potion that the alchemists searched for to give eternal life.

6.2 Elixir Business Process Management Suite Model overview

Orlikowski and Hofman (1997, p. 11) use an analogy to two open sea navigation approaches used in earlier centuries. The European navigator creates a detailed plan with a defined course charted based on defined principles and the voyage is based on strictly sticking to the plan. Deviations from the plan require re-planning and re-charting before the voyage can be continued. Turkish navigators, in contrast, starts with an objective rather than a plan. The Turk sets of toward the objective and responds to conditions as the occur, mostly in an ad-hoc fashion. They monitor current conditions such as wind, current and the waves to determine a direction. All effort is directed towards achieving the goal, rather than to stay on course.

An enterprise systems implementation project such as a large scale FlowCentric BPMS solution requires a clear objective to drive the success of the project and an ongoing monitoring solution to give feedback on the direction that needs to be taken. The Elixir model is designed as a toolset for the navigator conquering the unchartered territory of business process management in large organisations. Unlike relying on the experience of the ship’s navigation team, the BPMS project requires input and collaboration from all areas of business to succeed in achieving the objectives of BPM and an organisational improvement methodology.

Orlikowski and Hofman (1997, p. 11) relates the story of the two types of navigators to how organisations attempt change management. Management tries to create and execute a strict change management plan where in practice, effective change management takes on the character of the Turkish navigator. This is not only true for change management in organisations but for many other management areas. Software project management, in particular, suffers from the same symptoms where project managers try to apply the discreet project management disciplines found in construction and engineering. Enterprise system implementation is bound to have a few surprises, unplanned events, new sources of data, integration problems and volatile project members.

The Elixir approach is based on the approach that an objective is better than a well defined plan. Just as the open-source model is based on a common objective [find source] rather than a complex project plan, so is Elixir trying to create a common objective for FlowCentric BPMS implementations.

In analysing the requirements for change during groupware technology implementations, Orlikowski and Hofman (1997, p. 12) concluded that it required unprecedented, uncertain, open-ended, complex, and flexible supporting technologies and initiatives to succeed. Elixir is modelled to achieve these objectives. “Such a model sees change management more as an ongoing improvisation than a staged event” (Orlikowski & Hofman, 1997, p. 12).

Orlikowski and Hofman (1997, p. 13) propose an improvisational model for change management that makes provision for three types of change:

i. Anticipated or planned, where change (both technological and organisational) is planned in advance and occurs as planned;
ii. Emergent, where change requirements arise spontaneously and are not initially planned; and
iii. Opportunity-based, where changes are introduced purposefully and intentionally in response to an opportunity, event or breakdown.

Elixir will aim to address all three types of change and provide a technology based platform to manage these change requirements from an objective rather than a planned approach.

The comparison that Olikowski and Hofman (1997, p. 13) draw between a jazz band where the musicians don’t agree beforehand on the notes that they are going to play, unlike a symphony orchestra, but rather agree on the musical composition and each band member is free to innovate and improvise within the framework of the composition. This provides some indication of the agile approach taken rather than the structured conventional approach as discussed in Chapter 4. It is intended as a framework similar to that of the musical composition rather than a definitive and rigid implementation plan.

The model is based on an implementation approach that will span the complete project life cycle from understanding the process requirements in the initial scoping and planning phases through implementation, testing and delivery and the eventual optimisation of processes in the organisation.

There are six unique threads that are managed throughout each phase from project management to the technology components, change management and training. Elixir is based on an extension of Deloitte Consulting FastTrack 4SAP methodology (Deloitte & Touche Consulting Group, 1995). The methodology is furthermore based on project management principles that include project phases and specific project threads. The objective of this study is not to examine or comment on the validity of the model, but rather to find a way to externalise the model to support change management as a critical success factor of the implementation of the FlowCentric BPMS as an enterprise system.

Thread	Phase / Elixir BPM	A Scoping and Planning	B Process Discovery	C Process and Services Design	D Configuration and Integration	E Testing and Delivery	F Continuous Optimization
1	Project Management						
2	Process Architecture and Engineering						
3	Technology Architecture						
4	Process and Systems Integrity						
5	Change Management						
6	Training and Documentation						

Table 6 - Elixir BPM methodology

Each intersection of phases and threats has specific tasks, deliverables and desired outcomes. Specific examples include setting up of the project office, selecting a project methodology, and preparing an initial project plan as part of project management during scoping and planning (A1).

The objective of the Web 2.0 collaboration platform is to assist in the change management that is required during all the phases to address all the threads and to ensure that the desired outcome is achieved for each. The activities, deliverables and the outcomes of each block on the Elixir model can be changed to accommodate the specific project, the maturity of the business and culture of the organisation. The proposed Web 2.0 model can be used as a

communication mechanism for the customisation of the methodology and to ensure that all project participants have the latest and relevant structure. It is not in the scope of the study to provide detail around each activity in each of the intersections of project phase and thread and the remaining section will focus more on the collaborative use of Web 2.0 technology to support the change management requirements as a critical success factor in using the Elixir model in an enterprise system implementation.

6.3 Objectives for the Elixir collaboration environment

The model alone is of little use if it cannot be implemented in a practical way. The main objective of the Web 2.0 collaboration solution is, as previously stated, to support the change management which is a critical success factor in the implementation of FlowCentric in an enterprise environment. FlowCentric as a BPMS is a enterprise system that fits the definition of Markus and Tanis (2000, p. 176) around integration of data throughout the organisation, a packaged solution, based on best practices, that it requires some assembly, and it is evolving as business and technology requirements change. A successful implementation requires that the typical critical success factors associated with enterprise systems that include top management commitment, change management, process reengineering and the list of others as identified by Finney and Corbett (2007, p. 340) are addressed during the project.

Change management features as a prominent critical success factor for enterprise system implementation, as shown in the literature survey of the study. It is consistent with the experience of FlowCentric in the marketplace where organisational culture and change management were found to be more important than technology or infrastructure. As BPMS are new additions to enterprise applications, change management is not only required from an end user perspective but also from a project team perspective. It requires a paradigm shift in how organisations are structured, typical functional silos, to a more process-centric organisation. The Elixir methodology with its defined phases and threads will provide some guidance to assist in the process but it requires the communication and collaboration solution that is not only easy to use, but can be used to get contributions from everyone. The objective is to follow an open-source development approach which is based on trust where contributors earn the right to be seen as subject matter experts and all content is shared and peer reviewed. Communication and collaboration are key parts of any change management programme

6.4 Components of Elixir model

The collaboration component of Elixir is based on Microsoft SharePoint technology and is essentially a set of web sites that support blogs, wikis, discussion forums and shared content. The configuration for the collaboration component of the Elixir will be unique for each project that will consist of the same tools and components. The components of Figure 14 show a simple configuration for the proposed Web 2.0 solution that contains all the elements that will be required to manage change as a critical success factor during BPMS implementations.

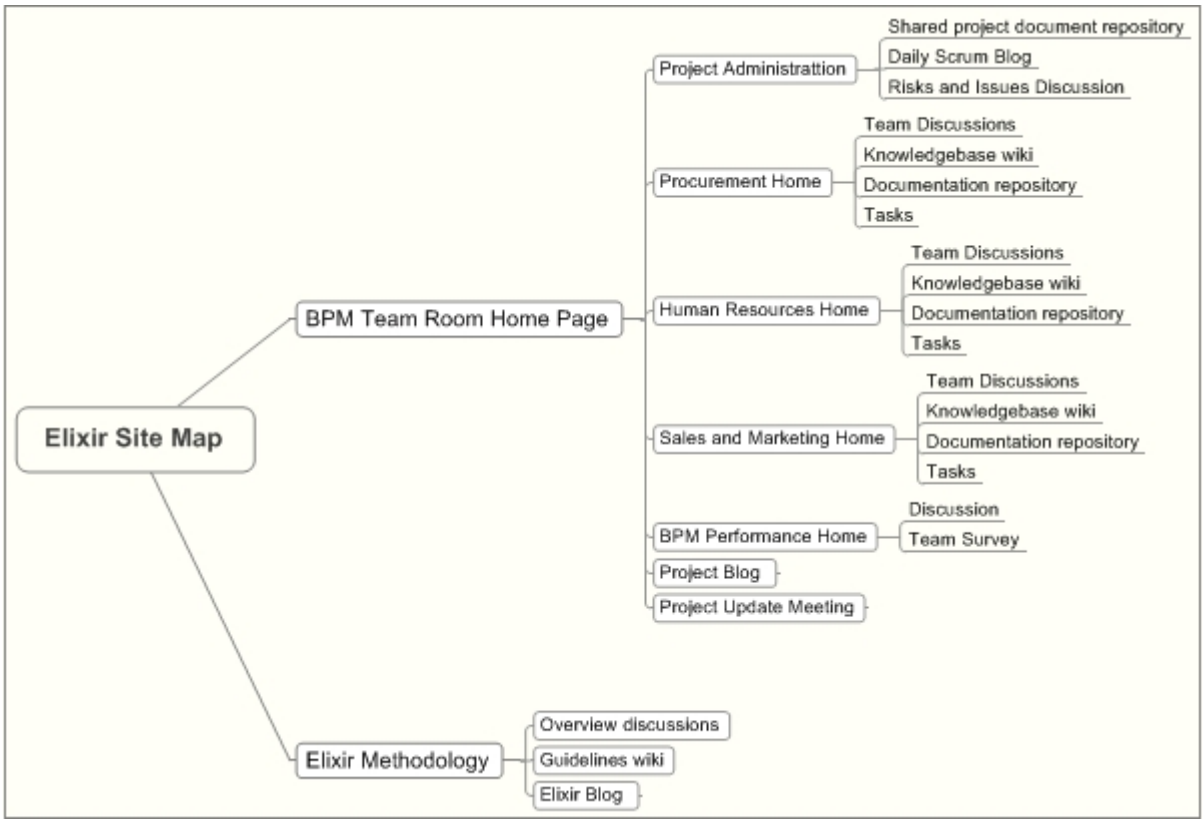

Figure 13 - Elixir site map for a sample site

An overview of the completed Elixir methodology that includes all the steps and components for each of the project phases and threats as discussed earlier in this document is published with the collaboration component to provide guidance on the overall implementation approach. The discussion on this part of the Web 2.0 site is excluded from the scope of the study and focuses on the BPM Teamroom that supports virtual teams with customised configuration of the collaboration components of SharePoint.

The sample site makes provision for a few business areas and project management requirements for discussion of the components of the Web 2.0 collaboration solution. In the enterprise deployment of the solution it is proposed that it is customized to the specific project areas and business processes that will be deployed in the organization.

The main BPM Teamroom in the sample site shows a landing page that includes project announcements, discussions, process value maps, calendars, workflow tasks and links to other web pages of the solution. The process value map is done in such a way that the user can select the desired process area by selecting the hyperlink on the image. The business value map puts the processes in perspective as a business user or process analyst can give a sense of where a specific process fits into the bigger picture.

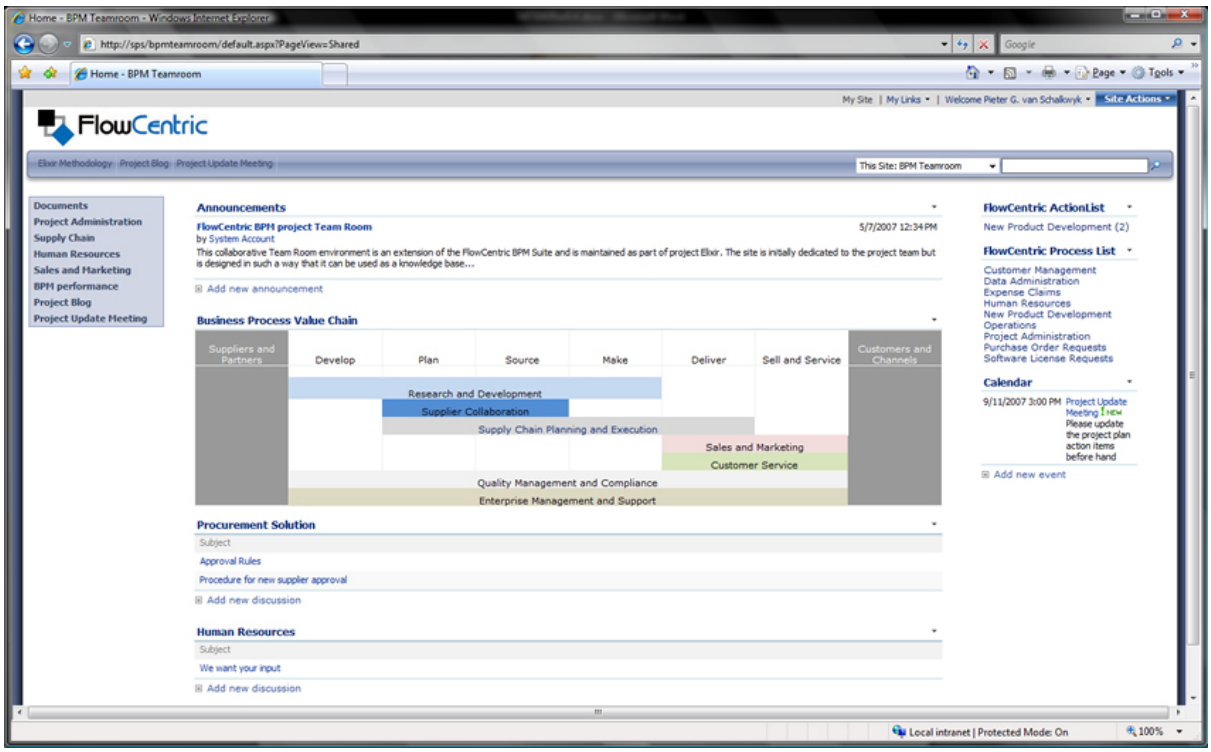

Figure 14 - Elixir Teamroon in Microsoft SharePoint

The announcements and discussions provide continuous feedback to project team members on any specific information that may be relevant to the team at that point in time. It can notify team members of new contributions, changes in scope and general project management information that can even be distributed to non project members, sponsors and end users to provide feedback on the status of the project. It provides transparency to the project, gives a sense of the level of motivation and attitude of the team members, and highlights potential challenges or threats to the project. It is recommended that those who are interested in these

announcements and discussions subscribe to RSS feeds that will notify them of any changes as soon as it is published. The advantage of subscribing to the RSS feeds is that project members do not have to wait for project status update meetings to be notified of projects specific issues.

The workflow tasks in the sample site are active web parts from the FlowCentric BPMS and display outstanding action items as well as accessible tasks to those with the relevant access levels. This provides real time notification of any new activities or outstanding tasks in the same collaborative Web 2.0 environment as the rest of the project information.

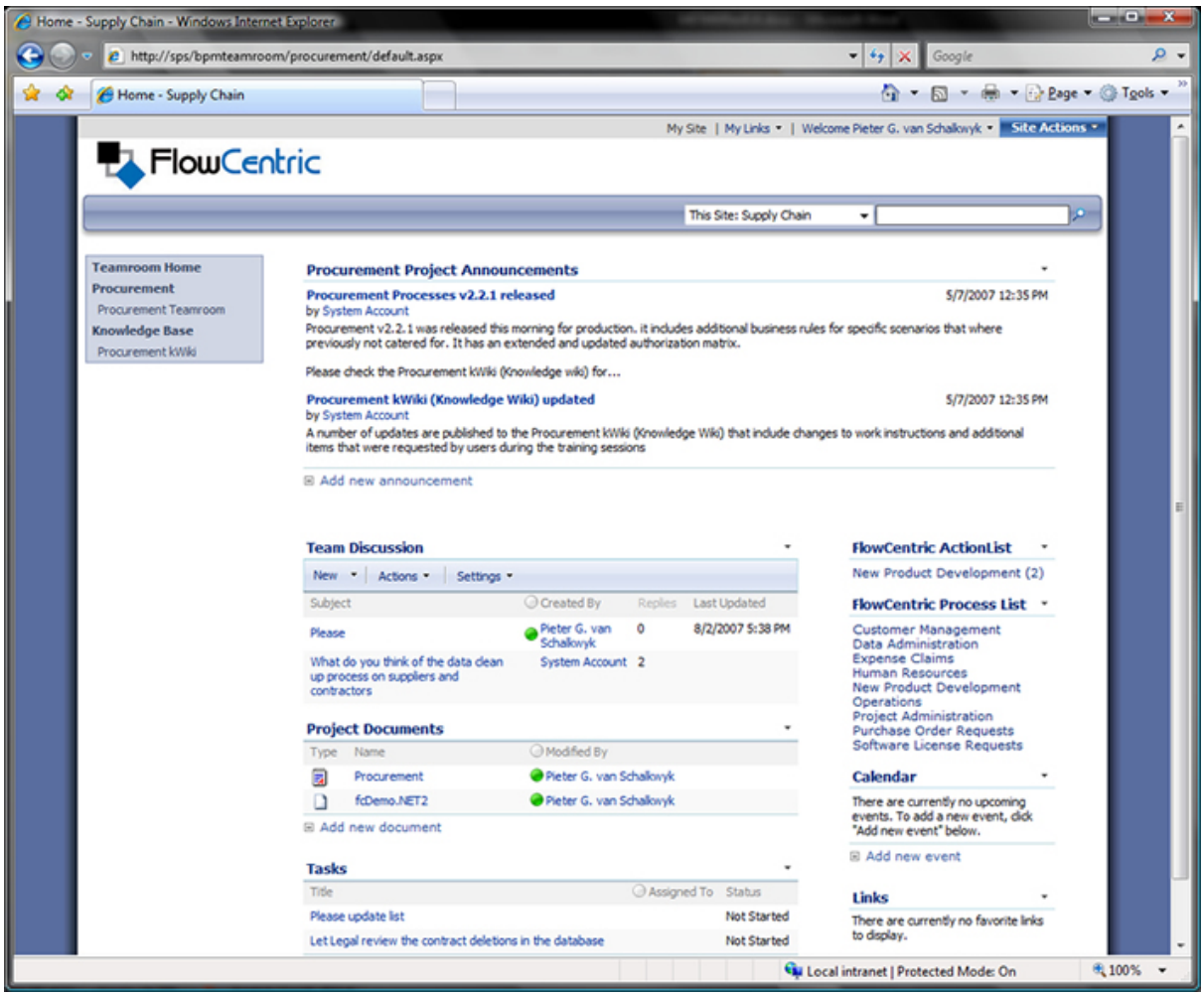

Figure 15 - Procurement Home page

The procurement Teamroom focuses specifically on the procurement aspects of the enterprise system implementation with a separate environment for team members that are involved in that aspect of the project. Access can be limited to specific users but it is proposed, in the light of the open-source spirit, to allow all users access to all areas to gain trust and improve

the quality of the information that is published in the various areas. The procurement Teamroom features its own discussion area, documents relevant to that section of the project, and specific tasks. It also provides a link to a procurement knowledge base wiki or referred to in the Elixir methodology as a kWiki.

6.4.1 Knowlegde Wikis in Elixir

The knowledge wikis or kWikis are a fundamental part of the Web 2.0 collaboration solution as it allows users at various levels of the organization to contribute to the collective knowledge of the specific domain.

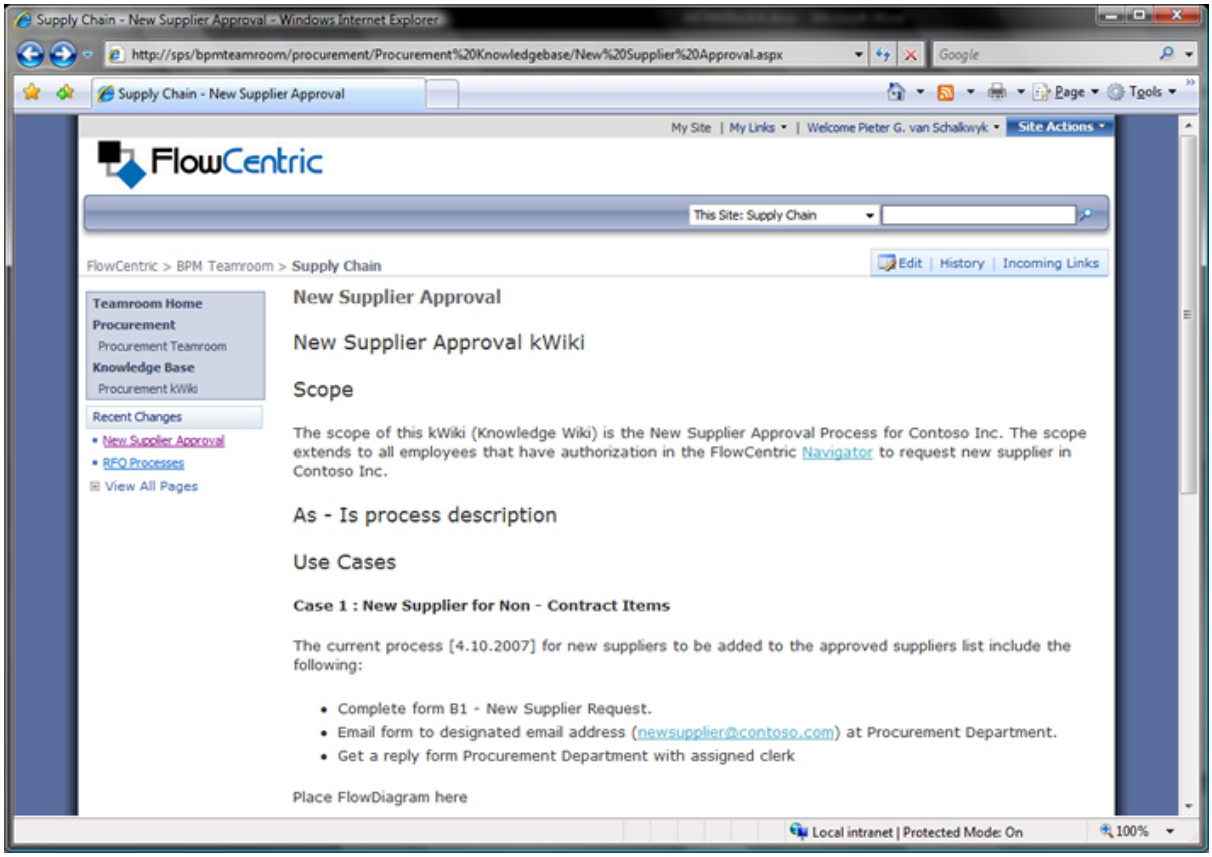

Figure 16 - Procurement knowledge base : New Supplier Approval

The procurement kwiki is used in the initial visioning and targeting phase to define the high-level scope of the process requirements and will be expanded in future phases of the project. The initial contributions are generally from subject matter experts that are assigned to the project team, but the objective is to allow business users that use the processes on a day to day basis to review and update the kwiki information. These users tend to identify scenarios and use cases that the project team may have not considered and also identify potential

challenges or threats with a specific process approach. The process discovery phase typically describe the current processes, or "As-Is" processes, as it is sometimes referred to. Using a Wiki to establish the details of the current processes increases the likelihood that all the possible process scenarios and variables are documented. A Wiki also allows end users to contribute during the process and services design phase to ensure that the proposed new process will achieve the desired outcome. It allows end users to be part of the "To-Be" specification of business processes. It is anticipated that this will have a positive impact on change management as end users will be involved from the initial design of the process and this should provide them with a sense of ownership.

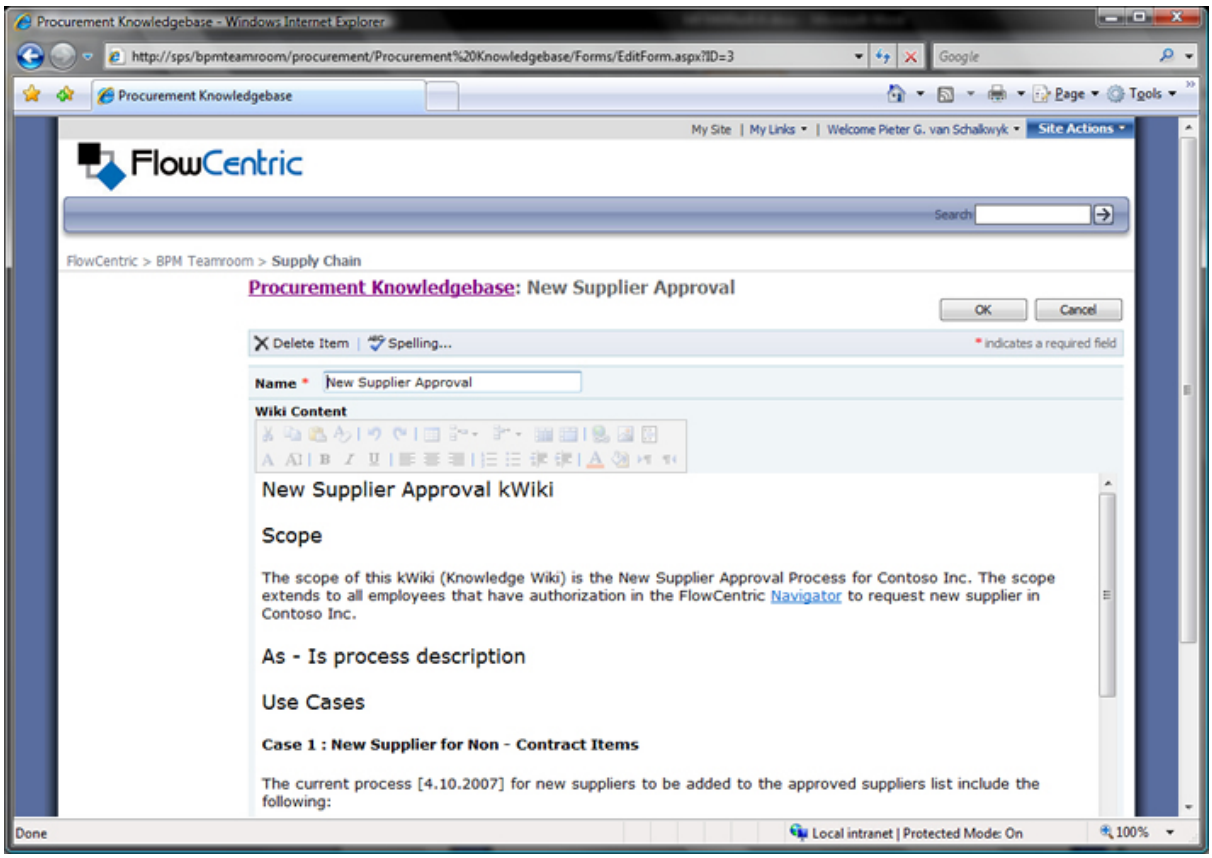

Figure 17 - Editing mode for a wiki

The procurement kwiki for the sample site links into a number of different wiki pages that are all relevant to the procurement processes in the organization. A typical process may be "New Supplier Approval" that is shown in its own web page. The kwiki describes the scope of the process, various use cases, specific constraints, roles and users that use the process and various other parameters that the subject matter experts may feel relevant. It develops with

more content as the project continues with improved levels of granularity and refinement as other team members, end users and even external consultants review and update information.

SharePoint provides an easy mechanism to edit wikis, as shown in Figure 14, but it retains information from previous versions to ensure that the content editor, typically the process owner, can roll back to previous versions if necessary. It also provides the name, time and date stamp of the last contributor. This, once again, follows the open-source approach where everything is transparent and all users can see who reviewed a specific section and what changes have been made.

These knowledge wikis are a key part of the requirements definition of the project and they provide a reference for testing as well as a future work instruction guide that can be linked in the FlowCentric Navigator component of the BPMS. It is also envisaged that the Wiki can be maintained after the deployment of the process with additional information and use cases that may not have been identified during the earlier phases of the project. It can form a reference for process improvement projects and user suggestions as well as proposed changes that could be managed in this wiki.

Defining user requirements for processes are, in Flowcentric's experience, one of the main challenges in the successful deployment of a BPMS solution. The traditional approach for defining requirements throughout the phases of the project team tend to be very focussed on the specific experiences of the team members and their particular views on how future processes should function. This approach provides many challenges specifically with change management and getting users to accept the changes in operational processes. Providing an open, transparent and peer reviewed environment will give contributors at all levels of the organization opportunity to refine the requirements and the future process specification. Implementation teams are currently still used to rigid process specification documents, but it is envisaged that once the Elixir collaboration solution has proved to be successful it will replace the conventional waterfall approach to defining the business requirements. It brings a new perspective and should assist in overcoming resistance to change as noted by Kreitner and Kinicki (2004, p. 689), by creating an environment for participation and involvement, education and communication, and facilitation and support.

It is anticipated that the wiki component of the Web 2.0 collaboration solution will make a significant contribution to managing the organisational change during the project and that it will support moving the entire "iceberg" in Neus and Scherf's (2005, p. 217) analogy as discussed earlier in the change management section.

It is proposed that a process owner is appointed for each process cycle, such as "procure to pay" and that these process owners also serve as content editors and final adjudicators as they are still primarily responsible for the output of the process. This is very similar to the Wikipedia approach where final editorial powers lie with designated individuals. This approach should also support Markus' (2004, p. 17) view that the implementation of an enterprise tool, such as SharePoint, should motivate users to learn how to use the system while using the system.

Any interested user can once again subscribe to a RSS feed to be notified of any changes in the Wiki. Notification of any changes can be fed to the subscriber's email with a hyperlink to the relevant wiki site that was changed. This will allow the user to review the changes and possibly edit it again if necessary.

6.4.2 Blogs and RSS feeds in Elixir

Project communication ranks high among the critical success factors for enterprise system implementation as shown in Chapter 2 of the study. Blogs have various applications in the proposed Elixir model and the two primary ones that are developed in the initial version will be discussed.

Keeping a large, geographically dispersed project team up to date with all the latest information, project status and risks or issues can be challenging. A project manager blog can be used to support the communication from the project manager on a real time basis. Team members can subscribe to the project manager blog through RSS to get immediate notification of any project related communication. Project risks and issues can be highlighted immediately with the communiqué where respondents can provide comments on an ongoing basis. It provides a transparent and open communication medium and the objective is to provide a platform for any project members to contribute, comment or question project information.

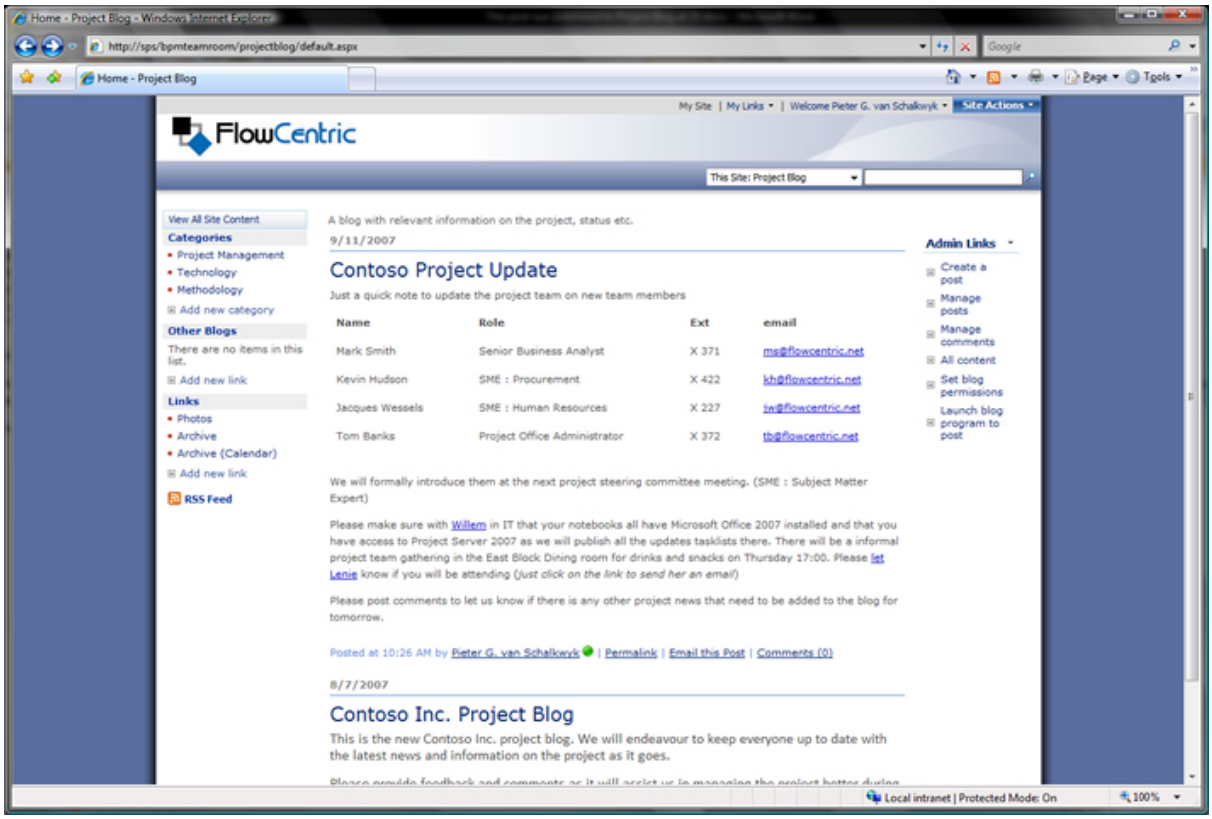

Figure 18 - Sample site project management blog

Posting a comment to a blog is a simple task in SharePoint while it keeps a journal of all the entries for the duration of the project.

It does require mature team to use it in a constructive way and not to use it for negative feedback, political agendas and “flaming” those who highlight potential issues, specifically if it is a junior person in the team.

Keeping a daily task lists journal is a further use of a blog in the Elixir methodology. The FlowCentric product development team currently use a daily SCRUM blog to log all the tasks completed for the previous day, list the tasks planned for today, and highlight impediments that impact on their ability to deliver against the project plan.

The journal list of completed tasks has some level of detail to it that describes specific approaches or methods used and serves as an audit trail for later reference. It provides feedback to the project manager on the current status of specific activities with the ability to post a comment and possibly request more detail on specific tasks that may require additional information.

Providing a list of tasks planned for the current day forces team members to commit to the group that certain tasks will be completed. The peer review mechanism ensures that the developers maintain a high quality task blog and they identify and list impediments or threats very early on when potential challenges are encountered. Team members also ensure that their tasks are substantial as the peers have full access to see what they are working on.

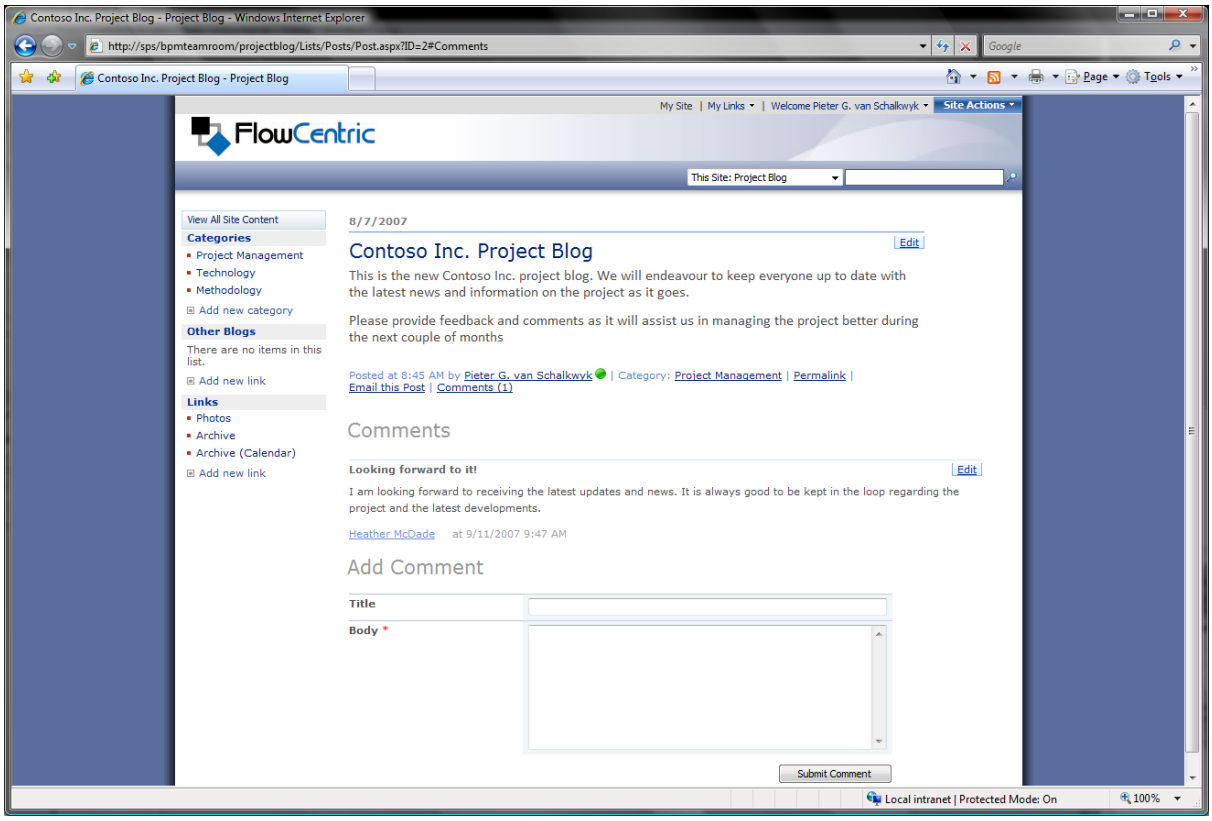

Figure 19 - Posting a comment to the project blog

Fellow team members can provide useful contributions in the forms of comments where they may have completed similar tasks, have domain experience, or have possible solutions to some of the impediments.

A further application of blogs in the Elixir methodology is to create subject matter blogs where domain experts can enter into a discussion before posting information to the relevant knowledge wiki. The blog publisher can make certain statements and ask questions in an open forum where contributors from various areas of the business can comment and provide answers.

A blog can be particularly useful to foster teamwork through real-time communication, continuous feedback and will support change management as a critical success factor in the implementation of enterprise systems.

6.4.3 Shared documents in Elixir

SharePoint can function as a document repository and can be used as part of the Elixir methodology to provide the right information to the right person at the right time. The configuration of the document management component is dependent on the requirements of the project. It is possible to create a single document repository for some projects while other projects may require individual repositories based on functional area, process or any other projects specific segment.

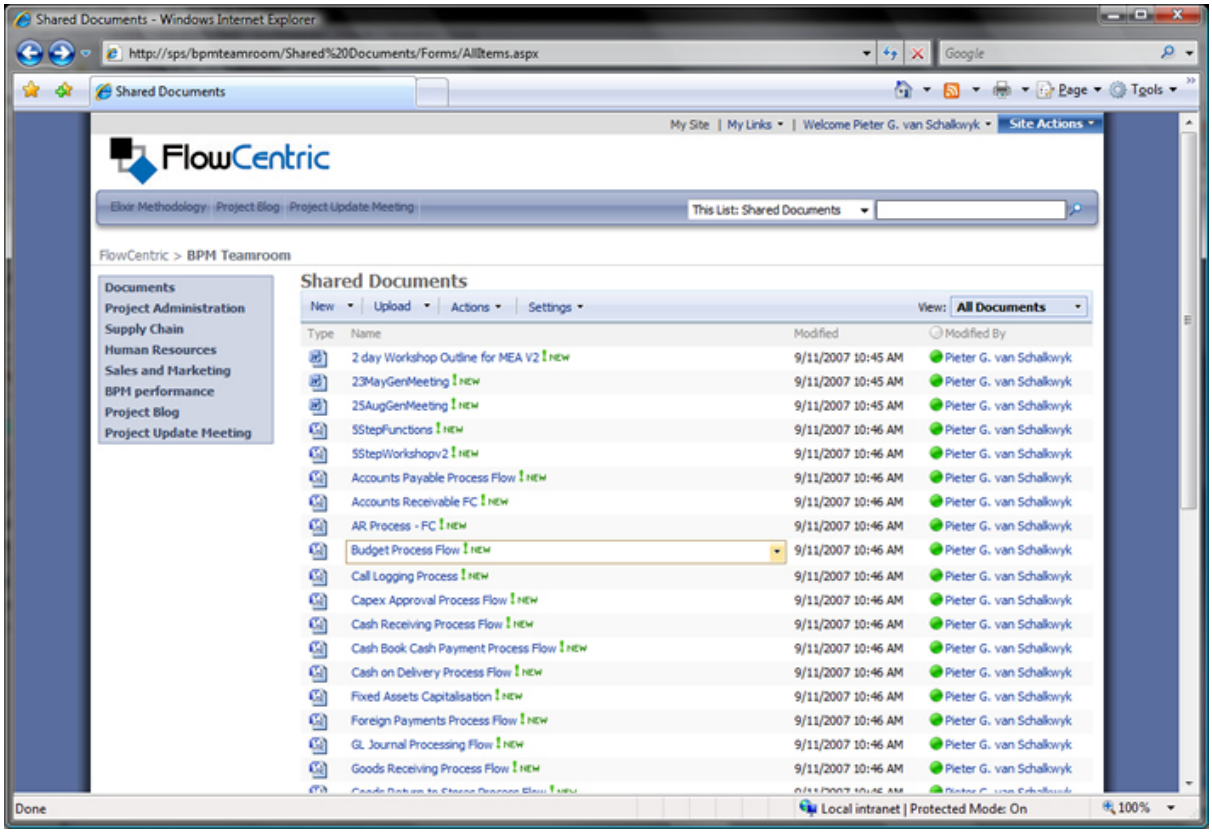

Figure 20 - Managing shared project documents

SharePoint has full versioning capability with extensive authoring rights. The scope of the current study excludes a detailed description of this functionality but the versioning capability provides a mechanism to control project documents according to project specific policies.

Users can be notified of changes to documents and document statuses through RSS feeds and this knowledge sharing capability ensures that virtual teams are supported in the creation, storage, management and use of project specific artefacts.

6.4.4 Team Surveys in Elixir

It is useful to have had some indication of employee morale and other organisational behaviour parameters in managing change while implementing an enterprise system such as a BPMS.

SharePoint provides the ability to construct team member surveys that can measure project specific questions during each phase of the project. The service will give the project management team some understanding of the organisational issues and specific items that need to be addressed.

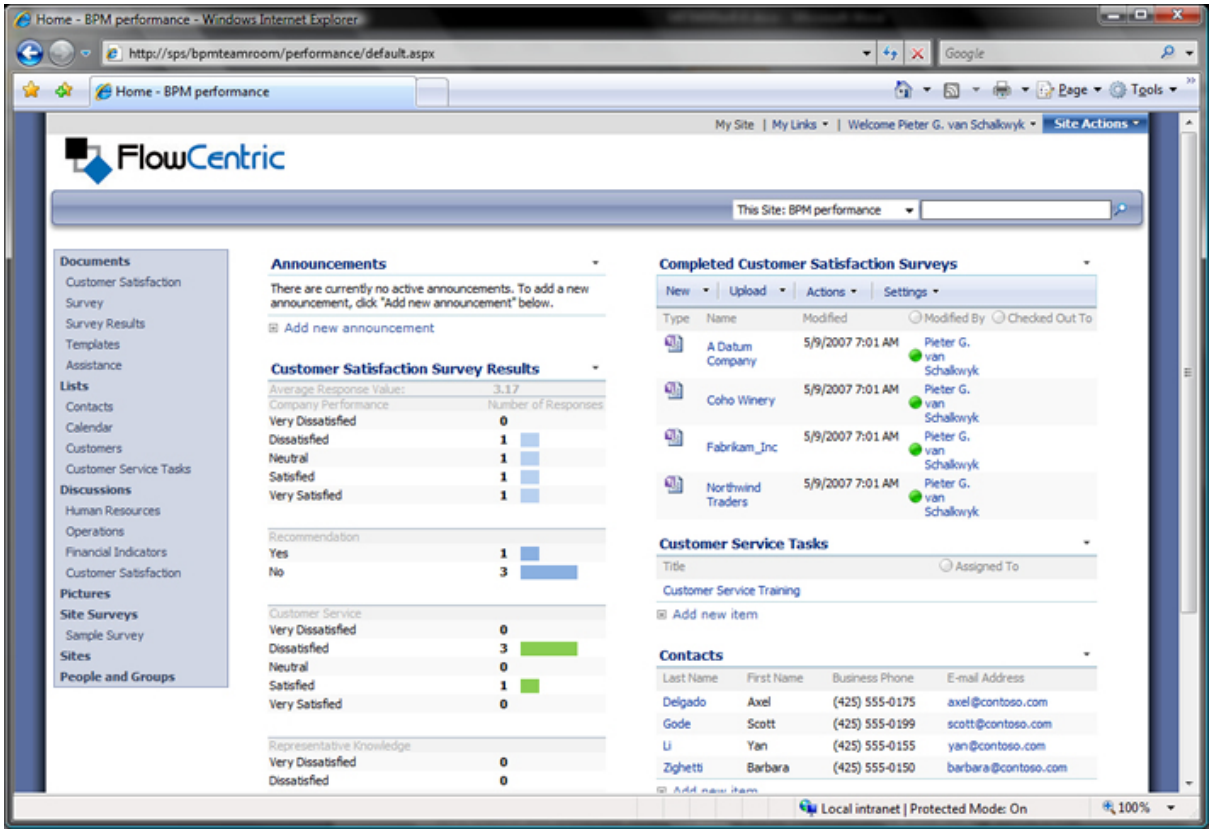

Figure 21 - Team survey

It provides a mechanism to measure the effectiveness of the Elixir Web 2.0 collaboration solution to support change management as a critical success factor in the implementation of enterprise systems.

6.4 Summary

The aim of this chapter was to define a Web 2.0 based model using the technology and tools described in Chapter 5 to address change management as a critical success factor for successful enterprise system implementation identified in Chapter 1. This will minimise the risk of enterprise systems, like the FlowCentric BPMS, failing during the implementation phases.

This chapter provides an overview of the implementation approach that establishes common goals for system implementation rather than a rigid plan based approach. This approach termed “Elixir” for FlowCentric BPMS implementations requires a collaborative approach in defining business process requirements and continuous refinement as the process evolves through the implementation lifecycle. The chapter focuses on the change management requirements for such a model, rather than on the implementation approach itself.

The collaboration components for the Elixir model were identified and possible scenarios using Web 2.0 technology were discussed with sample configurations for each element. The scenarios included a project based team repository or “team room”, knowledge wikis, blogs and RSS feeds, shared documents as well as team surveys.

Sample configurations were developed in Microsoft SharePoint to demonstrate the typical application of Web 2.0 solutions to support change management requirements during enterprise system implementation. The proposed model can be deployed on any suitable collaboration platform, but Microsoft SharePoint was chosen for illustrative purposes.

This chapter demonstrated the ability to use Web 2.0 technology to support the collaborative and change management requirements of a chosen implementation methodology for enterprise systems. The objective was not to define a implementation methodology or approach, but rather to establish the possibility of using Web 2.0 technology to support a typical collaborative challenges that enterprise systems, such as FlowCentric BPMS, faced during the implementation life cycle.

This chapter demonstrates that it is possible to support enterprise system implementation with Web 2.0 technology from the technical perspective but it would require practical

implementation and a follow up case study to determine if it would address the real world collaboration and change management challenges that organisations face during these projects.

7. Conclusion and recommendations

Implementing enterprise systems in medium to large organisations proved to be challenging if not problematic and researchers like Davenport, Holland and Umble provide evidence of the scale and impact of these failed implementations. Business Process Management Suites, such as FlowCentric, are newcomers to the enterprise system environment and research firms like Gartner are starting to investigate the business benefits of deploying such enterprise systems. The main concern of the study is that these BPMS products will suffer the same fate as the legacy of other enterprise systems.

It is necessary to understand the nature of enterprise systems and their specific critical success factors for system implementation in order to address the problem of a failed enterprise system project. A literature survey of the extensive research on enterprise system failure provides some insight into the challenges faced during these projects. The factors that differentiate enterprise systems from other applications as identified by Moller (2005, p. 485) provide some insight into the complexity and challenges faced during implementation. Moller (2005, p. 485) list these complexity factors as:

a. the larger number and diversity of typical stakeholders;
b. the high cost of implementation and reliance on consultancy;
c. the integration of processes across various business units;
d. the custom configuration of software that represents core processes;
e. the change management requirements and political issues associated with these types of projects; and
f. the extended training and familiarisation requirements of the software.

It was shown that BPMS, such as FlowCentric, also fall into the enterprise system category and that the same complexity factors have an impact on the future success of BPMS implementation. The critical success factors of enterprise system implementation were investigated in order to gain an understanding of the issues that need to be addressed to minimise the risk of project failure. A literature survey of the existing body of knowledge around critical success factors for enterprise system implementation showed that the following factors contribute significantly to the success of these projects:

a) Top management commitment and support

b) Change management
c) Business Process Reengineering and software configuration
d) Training and job redesign
e) Project team: the best and the brightest
f) Implementation strategy and timeframe
g) Consultant selection and relationship
h) Visioning and planning
i) Balanced team
j) Project Champion
k) Communication plan
l) IT infrastructure
m) Managing cultural change

It emerged that most of these critical success factors were not technical but rather centred around the human aspects of the implementation. Change management ranked second to top management commitment and support as a critical success factors for enterprise system implementation. This literature survey review is supported by the practical experience of the FlowCentric services division that are responsible for the implementation of the BPMS solutions in the enterprise. The typical challenges faced by process consultants are to extract and define current process practices while maintaining sensitivity to organisational politics and legacy structures. Proposing and getting buy-in to propose changes to the organisational processes prove to be challenging if the property change management support is not in place.

The objective of the study is not to address all critical success factors, but to identify those that can be supported through a collaborative Web 2.0 based technology model and the change management aspects enterprise systems implementation were chosen for further investigation. An analogy between open-source development projects and enterprise system implementation projects show the similarity of the collaboration requirements but it also highlights some of the organisational characteristics required for successful collaborative system design and development.

The study by Szamosi and Duxbury discussed in Chapter 4, section 3, identified that inadequate communication was at the top of the list of challenges facing effective change

management and that the following elements of communication and participation were typical issues encountered during the change management process:

a. The organisation did not ask the employees if there is a better way of doing things;
b. It did not recognize employees as their greatest asset;
c. It did not share a common goal throughout the company;
d. It did not allow employees to be flexible in the use of skill sets;
e. There was limited employee empowerment; and
f. It only provided verbal support for change.

Change management can also be effected through better teamwork models and supporting knowledge management structures that will address some of the above elements. The objective of the study was to define a model using Web 2.0 technology to provide an improved collaboration mechanism that will support change management for enterprise system implementation. In order to succeed in this objective it would need to address these elements of communication and participation. The open-source movement provides some guiding principles on how to effectively use web based collaboration tools but it also demonstrates some of the organisational characteristics, line of command and social behaviour requirements to make it successful.

Chapters 1 to 4 addressed the typical characteristics of an enterprise system, it provide some insight into the history of failed implementations and it identified and analysed critical success factors that would improve the probability enterprise system projects. It highlighted that change management is a high ranking critical success factor and specifically the communication and collaboration components thereof. This reasoning provides the opportunity to propose a collaborative tool that would support improved communication and assist with the change management at all levels of the organisation during enterprise system implementation. The advances and development of Web 2.0 technology provides a possible opportunity to be utilised as a platform for improved collaboration and communication.

Web 2.0 technology and applications are evaluated in Chapter 5 and its success in the social networking environment provides a basis for investigating their possible application in enterprise system implementation. Increased acceptance of wikis and blogs, for example, provides a level of confidence that these tools will be utilised if it is correctly applied to the requirements of an enterprise system implementation.

A Web 2.0 model, with specific reference to the FlowCentric BPMS product implementation methodology, is proposed in chapter 6. It is based on the typical collaboration and communication requirements of enterprise system implementation project identified in the prior sections of the study. It supports these requirements through the use of collaboration tools such as Microsoft SharePoint that in turn utilises wikis, blogs, discussion forums, RSS feeds, automated team tasks and shared documents. Although Microsoft SharePoint is one of many tools that can be used, it illustrates the concept of a common collaborative environment based on Web 2.0 that addresses the collaboration and communication needs of a typical enterprise system, such as the FlowCentric BPMS, implementation project.

The model is currently deployed as a small pilot with around 12 users in a South African financial institution. The initial response to the model is very positive but there is no formal evidence of the success of the model as it is a very small group and it is still very early in the project. Some concerns that have, however, emerged from this initial implementation is that it is not clear whether the perceived success can be attributed to the model, the small size of the team, or the users interest to experiment with new technology.

It is proposed that a formal case study is developed, as part of future research, once a suitable project is identified that will have a representative sample of users, have a long enough duration to prove the sustainability of the model, and proper measurements are defined to determine the success of the model.

The initial pilot does, however, provide some indication that a Web 2.0 based collaboration and communication tool would support change management as critical success factor of a typical enterprise system implementation project.

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