University of Southern Queensland
Faculty of Engineering and Surveying

The Development and Implementation of a Knowledge Management System for the NDCG Access Line of Business

A dissertation submitted by

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Abstract

Today's commercial environment dictates the way companies must operate. In a world where knowledge means success, an organisation must leverage as much out of its knowledge assets as is possible. NDCG is no different. In an effort to capture new knowledge, and to make the best possible use of their existing knowledge assets, a knowledge management system has been developed and implemented throughout the Access Line of Business.

This dissertation investigates the development and implementation of a knowledge management system in the NDCG Access LOB, a business unit of Telstra. This organisation was increasingly relying on a small group of technical specialists to both create new knowledge, and share and distribute knowledge throughout the organisation. This project developed the means of divesting a large amount of the responsibility for sharing knowledge away from this central group, and placed it with the general staff.

Improved work practices, designed at changing work cultures, and Intranet technologies have been used to ensure knowledge is shared, and is not lost from the section whenever there are staff movements. The project highlights the possibilities that are achievable in this field, and the methods used to produce results.

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ENG4111/2 *Research Project*

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I would like to thank my associate supervisor, Rodney Walke, who provided me with the opportunity and the incentive to undertake a project of this scale. Thanks also go to the management of NDCG Access Line of Business, for allowing me to implement these changes in the workplace.

I thank my parents, for bringing me up with the persistence and doggedness to keep going no matter what. I would also like to thanks all those around me who have supported my endeavours leading to this point, convincing me that I would make it.

To my children, Amber and Heath, I can only say, "Daddy can play with you at last". To Julia, my wife, I can't imagine what it has been like to put up with me, not just for this project, but for the nine years leading up to it. I'm sorry for all those nights, late home from work, only to disappear into the study.

Tony Delisser

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Glossary

CSD

Company Standard Document. These are the work instructions and standardised documents that are written by NDCG.

DBoR

Database of Reference. These are the databases Telstra use as their main references for network infrastructure.

FAQ

Frequently asked question.

Field Operatives

These are the design and construction staff working for Access LOB.

IT

Information Technology

KM

Knowledge Management

LOB

Line of Business

LTS

Local Technical Support. As part of the communication flow process, these people act as local support to a regionally and technically discrete group.

NCR

Non-Conformance Report. An external-contracting group audits completed services. An NCR is issued each time a defect is found with a completed service.

NDC

Network Design & Construction. This group was involved in the network infrastructure build for Telstra in the 1990s and was then separated as a wholly owned subsidiary of Telstra in 1999.

NDCG

Network Design & Construction Group. NDC became NDCG after reintegration back into Telstra.

PIP

Project Implementation Plan. A project management tool that lays out how a project is to be implemented.

Project Director

This person controls the Access LOB staff for an entire geographic region, such as Queensland.

Project Manager

This person controls either a major project, or a program of work, ensuring it is managed efficiently to completion.

TQM

A management strategy that focuses on continuous improvement.

TSC

Technical Support Coordinator. As part of the communication flow process, this person coordinates technical support and information distribution.

WTL

Work Team Leader. A WTL supervises a workgroup of up to thirty staff.

WPI

Work Package Instruction. NDCG formerly worked under contract conditions for Telstra. Any change to these conditions was initiated through a superintendent's instruction. Since re-entering Telstra, they work under a work package rather than a contract, and changes to conditions are managed with work package instructions.

Wide-band

A suite of customer data & voice services of 2Mb/s and above.

Chapter 1

Introduction

In today's economic climate, efficient use of an organisation's resources is a prerequisite of success. Unlike last century, physical resources such as raw materials and machinery are not the only resources that count. Today, knowledge and the ability to create and use new knowledge is just as important, or in many industries even more. This is true of the telecommunications industry, where knowledge is evolving constantly, and unless an organisation can create, translate, and share knowledge efficiently, it will flounder in the competition.

Knowledge Management is a field of management that has grown over the past decade to become a priority in businesses around the globe. Providing staff with the knowledge and information they require to efficiently carry out their jobs to their fullest potential is the primary focus of any knowledge management (KM) initiative.

These ideas are not new, and have indeed been a part of industry since industry began. The difference now is that most industries have become much more knowledge intensive, so that these ideas have taken on a much more significant role.

1.1   Project Aim

The aim of this project was to develop and implement a KM system for the Access Line of Business in NDCG, and to foster a workplace culture that promoted sharing. This aim was derived from the regard higher management had for the abilities of the staff, and the difficulties they saw these staff face in acquiring all the knowledge and information they required to perform the tasks that contributed to their jobs. Hand in hand with this aim went the productivity and quality improvements that would be realised upon successful completion.

The project was to set in place a means for the sharing of technical information throughout the geographically and technologically diverse areas of the company, and to control the flow of information between the technical specialists and the field operatives.

1.2   Dissertation Overview

This overview of the dissertation will help the reader to understand the various sections and how they fit together. Chapter 1 gives a brief outline of the aims of this project. For the project aim, and an overview of the milestones and objectives set out for this project, refer to Appendix A.

Chapter two gives the reader a background to the field of knowledge management. It focuses on many of the definitions of the various aspects of knowledge management, and looks at the findings from some of the literature on the subject. The background literature covered in this chapter provides the understanding required to continue through the work covered in the project.

Chapter three provides information on the Access Line of Business in NDCG. This background on the group, and a little knowledge of its expected future helps to show the reasons behind the project. Section 3.3, on organisational culture,

provides an insight into some of the problems that led to, and were likely to affect the project from the outset.

Chapter four investigates the drivers behind the project. It looks at the role of the technical specialist, and where that role should be, and at the flow of knowledge and information in the organisation. This chapter also looks at the knowledge that has left the company, and briefly at what this could be costing the company.

In Chapters five and six, the major KM initiatives developed during this project are investigated, along with some of the theory behind them. These are grouped into two areas. Chapter five looks at the initiatives implemented to assist in the creation of new knowledge, where-as Chapter six concentrates on those initiatives set in place to assist the flow of knowledge and information throughout the organisation. Reference is also made to Appendices B, C, D and E, which provide some of the documentation associated with these initiatives.

Chapter seven focuses on the management of the project. It gives insight into how a project like this is managed, from conception, through to hand over. The project management methods employed by NDCG are utilized for this project, so they are also briefly studied. The Project Implementation Plan developed for this project is attached as Appendix F. Chapter seven also takes a closer look at some of the roadblocks encountered, and how, as part of a major project, they were dealt with.

Chapter eight discusses the measurement of KM initiatives. Although knowledge management is a rapidly growing area of management studies, there are few thoroughly researched measurement techniques employed. This chapter looks at the balanced scorecard, a technique used to measure business success from other areas, that is starting to be developed for use in knowledge management. It also looks at what measures we can use to gauge the success or failure of management change. Although only in the early stages of such a large management change, some early results of the project are discussed here.

Chapter nine ties together the results of the project with the initial aims, to discuss the end benefits, and where it is likely the project will proceed from here. It discusses what further work is required to reach the main objectives set out at the start. It also looks at what new work should be done to continue the gains reached to this point.

Chapter 2

Knowledge Management and Today's Business

In the never-ending search for a competitive edge, businesses are looking for new tools to improve their management techniques. Sometimes these tools are popular for a brief period, sometimes for discrete areas, but occasionally one comes along that will change the way management looks at the world. TQM came along in the early 1990s, and more recently knowledge management has arrived.

2.1   Knowledge

The Concise Oxford dictionary defines knowledge as a result or product of knowing; information or understanding acquired through experience; practical ability or skill; cognition. This is a wide definition and can be more refined to what we require. Standards Australia (2003) provides a definition of knowledge as 'A body of understanding and skills that is constructed by people. Knowledge is increased through interaction with information (typically from other people)'. This definition agrees with the dictionary definition, but goes further, by referring to knowledge, as increasing through interaction with information from other people. It is this knowledge that is gained through the interaction with others that we are looking to gain from with knowledge management.

2.2   Knowledge vs. Information vs. Data

Knowledge, information and data are linked, but cannot be viewed as the same thing. Data are the raw facts and symbols, which on their own provide no real meaning. Information is the raw data, organised in such a way as to give it meaning. Knowledge takes this one step further and assumes a purpose to the information. Figure 2.1 below shows the path data takes to become information and then knowledge.

Bhatt (2001) gives an excellent example of this relationship. A doctor elicits a great deal of information from a patient when he visits. The information that has no real meaning for the doctor is left aside, but still retained, simply as data. The information that has meaning (relevance) is retained by the doctor, and assimilated to his existing knowledge base, to create more knowledge, thus enabling a diagnosis. Bhatt goes on to explain that this initial data that is left aside, may having meaning to another (a specialist) so is still important. Data and information becoming knowledge, is dependent upon the situation and the individual. The above example shows the existing knowledge base often dictates the distinction between data, information, and knowledge (Bhatt, 2001).
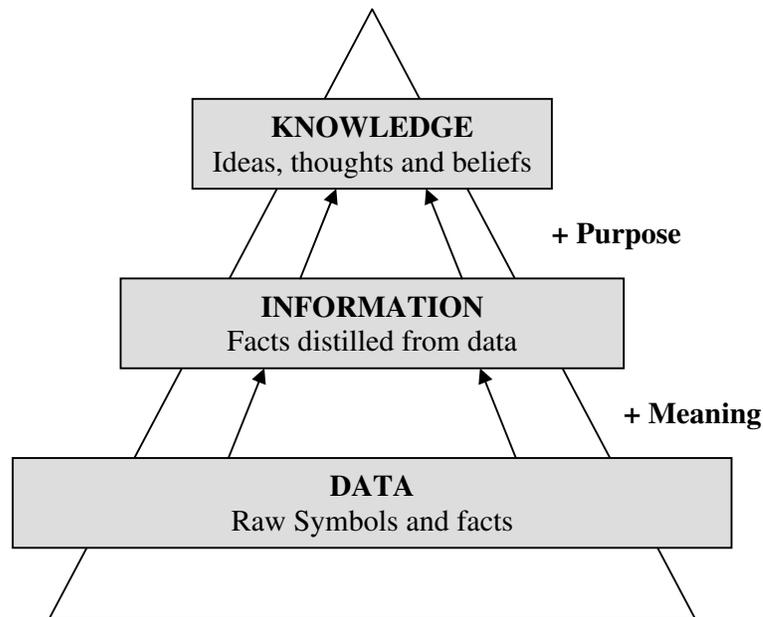
Figure 2.1: Data plus meaning gives information. Information plus purpose gives knowledge. (Telstra, 2003)

2.3   Knowledge Types

Now that we know what knowledge is, we can further define it by type. Knowledge exists in many forms. Yahya and Goh (2002) define two broad classifications of knowledge. Individual knowledge, that which resides in the minds of individuals, and organisational knowledge. Organisational knowledge is the knowledge that is formed through the interactions between technologies, techniques and people. Whilst individual knowledge is strictly tacit knowledge, organisational knowledge can be either tacit or explicit. It is this organisational knowledge that is the main focus of knowledge management.

2.3.1 Tacit Knowledge

Tacit Knowledge is "Knowledge that resides in a person's mind and may include aspects of culture or ways of doing things" (SA 2003) Sanderson takes it further in that tacit knowledge is not only in the mind, but is in the physical skills of an individual. Tacit knowledge is not a new term. As far back as 1958, Michael Polanyi was writing about tacit knowledge, and the methods of sharing and transferring this knowledge to become explicit (Polanyi 1958).

Survey research by Delphi, quoted in Sanderson (2001), indicated that tacit knowledge is of almost equal importance to organisations as explicit knowledge. The survey of 400 CEOs showed they considered 42% of an organisation's knowledge to be in the heads of the employees, that 61% of respondents agreed that tacit knowledge sharing was not to an acceptable standard, and 83% thought that it would benefit the company to improve tacit knowledge sharing.

2.3.2 Explicit Knowledge

Explicit knowledge is "Knowledge that has been recorded as information in a document, image, film clip or some other medium" (SA 2003). By this description, explicit knowledge in an organisation can be looked upon as the work instructions, the manuals and the procedures that document the work that is to be done. It is also the codified data and information that has been collected and recorded. This can include almost any type of data, such as customer or supplier details, audit results, databases of internal information, e-mails and other documents. This knowledge is easily exchanged, but due to the vastness of it, can some-times be difficult to find.

2.4   Today's Organisation

Peter Drucker (1999) provides a view on the path today's organisation is moving along. He sees the knowledge worker, along with the knowledge business taking over from the manual worker and the manufacturing business. Burnstein and Linger (2003) contend that it is the transformation of organisational knowledge into outcomes that creates value. The value of many of the world's largest companies is not in their physical assets, but in their intangible assets such as knowledge.

The economic world is becoming interdependent. What were once separate companies, merged to become larger companies, or worked together in networks. These then combined again such that the size of these corporations and networks span the globe (Skyrme, 1999). This globalisation of the economy has meant that what happens in one corner of the world, can now affect the rest of the world in a matter of minutes.

What has led to this change has been the increase in communication capacity. The telegraph was seen as a major breakthrough in the nineteenth century when it opened communication channels across continents. Today's high-speed communication channels can transfer almost limitless amounts of data and information across the world in seconds. Air and freighter transport allows human and cargo transport to flow quickly around the world. Companies no longer need to base their centre of production near their markets, nor with the changing commercial laws around the world, do they need to base their offices near their traditional homes. Many of these giant corporations have diversified to such an extent, they no longer resemble the companies or the products on which they were founded.

The 21st century economy is a service and knowledge related economy, rather than the industrial and manufacturing economy of the 20th century (Skyrme 1999). The health, education, telecommunications, finance and IT industries are knowledge intensive industries that have grown remarkably in the past twenty

years. The traditional "top companies" in USA such as General Motors, have been overtaken by others such as Microsoft and IBM.

Many of the traditional labour intensive industries have either contracted, or modified practices to enable a shrinking of their workforce. The new industries are often knowledge and technology intensive, and therefore do not require a large concentrated workforce. This has lead to the growth of many smaller companies and self-employed people. Between 1980 and 1990 in the USA, around three million jobs were shed by the top five hundred companies. During the same time over nineteen million were created by smaller companies (Skyrme, 1999).

Skyrme notes five major trends in today's economy.

- Every industry is becoming more knowledge intensive.
- Smarter products are being produced that can do more and provide value adding.
- Higher information to weight ratios. For example, the value of the electronics in goods is often worth more than the traditional item.
- Higher value of intangibles. The market value of a company is higher than the value of its assets. This is even more so in the more knowledge intensive industries.
- There is now a trade in these intangibles. Finance and futures markets are huge, but there are no physical assets traded.

All of the above examples show the changing economic landscape and the value that knowledge is gaining.

2.5   What is Knowledge Management?

Standards Australia defines Knowledge Management as:

'A multi-disciplined approach to achieving organisational objectives by making best use of knowledge. It involves the design, review and implementation of both social and technological processes to improve the application of knowledge, in the collective interest of stakeholders.'

If we examine this definition, it contains the basic parameters of the many other definitions found in articles and texts on the subject. It defines Knowledge Management as multi-disciplined. Both Yahya and Goh (2002), and Meso and Smith (2000), refer to a combination of technology infrastructure, organisational infrastructure, corporate culture, knowledge and people. To develop these areas, requires work in both technical and human resource management disciplines.

The achievement of organisational objectives is important. Unless there are specific objectives laid out which align with the organisation's objectives, there will be difficulty making the staff understand the importance of the system. Chourides et al. (2003) found in one of their studies that unless the Knowledge Management strategy followed traditional strategic planning activities, such as defining missions and objective, and conducting internal audits, the knowledge management system could very well fail.

The Australian Standard makes note of both the social and technological processes involved. These two processes are highlighted in most of the literature. McDermott and O'Dell (2001) look at the social processes involved in knowledge management. They concentrate on the culture of the organisation. They see the culture of the organisation as the major determining factor in the success of KM projects, and that the project should be adapted to suit the culture.

Technology must also be adapted to suit the organisation. Edenius and Borgerson (2003) study the usefulness of an Intranet system to knowledge management. Their methods are quite successful in smaller companies, but with an organisation of over one thousand staff, NDCG could not use the same methods, such as free (i.e. no restrictions on who can upload) and encouraged uploading to the Intranet. Binney (2003) lists a large number of the technologies in use to assist Knowledge Management. Some of these will be covered in section 2.8.

The final part of the definition is to improve the application of knowledge, in the collective interest of stakeholders. This is the main purpose of adopting a KM framework. The aim of the system is to allow the creation and adoption of new knowledge in the organisation, and to allow the unhindered flow of this and existing knowledge, both tacit and explicit, throughout the organisation, to those areas that require it. The following diagram provides a visual interpretation of the ideal knowledge flow in an organisation.
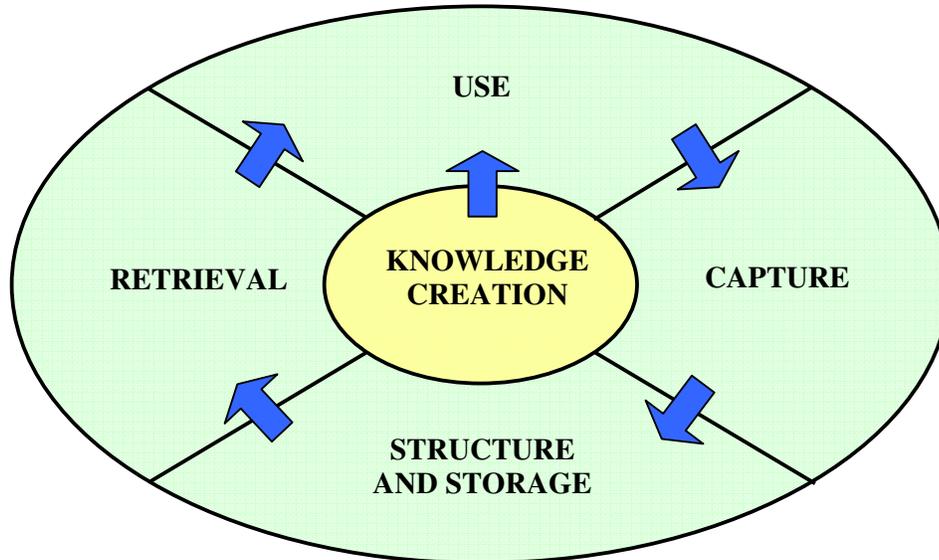
Figure 2.2: Knowledge Flow (Chamorro et al. 2003). This diagram shows the flow of knowledge from the creation, for a use, then the capture of the knowledge to be stored, retrieved and re-used.

2.6   Why is it so Important?

Section 2.4 highlighted the importance of knowledge in today's economic environment. Knowledge is now a crucial component of successful organisations. Burnstein and Linger (2003) state that the management of this knowledge must become an explicit part of an organisation's strategy. Drucker (1999) contends that the knowledge worker must now be managed as an asset of the company, rather than a cost.

In many organisations today, the knowledge worker is a contractor, working for a labour hire company. There are no loyalties to the company. Workers are looking for a workplace where they are happy. Because of these factors, workers are now changing employer more often than ever before. If the knowledge that they have created, and are using is not managed correctly, it will be lost to the company, probably to a competitor. It is for this reason that knowledge management is taking such an important role in companies today.

2.7   The Knowledge Map

The knowledge map is a tool used by KM practitioners to provide a visual guide to knowledge areas and knowledge flows in the organisation. It is usually developed using knowledge audits, and can serve two purposes. It can provide a detailed reference for the practitioner to find where there are blockages in knowledge flow, or areas of knowledge isolated, or it can be used as one of the knowledge distribution tools (Eppler 2003) available.

Knowledge auditing is the process of reviewing the organisation, or a part of it, to determine the knowledge it contains and in what form, the knowledge it requires, and the knowledge flow paths (Standards Australia 2003). The results of these audits can be mapped to provide a visual representation of the knowledge and its flows in an organisation.

2.8   Technology

Technology can become a major part of knowledge management. It is not though, the only tool of knowledge management. Technology can provide the means to transfer tacit knowledge to explicit, or provide staff with the means of reaching others who can provide them with tacit knowledge to share, but it is in the locating and distributing of explicit knowledge that it finds its most valuable use.

Standards Australia (2003) highlights workflow programs, Intranets, electronic records, document management systems and information systems. Binney (2001) goes further and lists numerous technologies as enablers, the tools that assist in the management of knowledge. Table 1.1 below groups them into the elements of the KM spectrum

Table 2.1: Enabling Technologies (Binney 2001)

Application	Technology
Transactional (Knowledge is embedded in the application)	• Expert Systems • Cognitive Technologies • Probability Networks • Decision Trees • GIS
Analytical (Enables knowledge to be interpreted from vast amounts of data)	• Web Crawlers • Data Analysis tools • Neural Computing
Asset Management (Management of knowledge assets)	• Document Management tools • Search Engines • Knowledge Maps • Library Systems
Process (Improvement in processes)	• Workflow Management • Process Modeling tools
Developmental (Increasing competencies of knowledge workers	• Computer Based training • On-line training
Innovation and Creation (Providing an environment promoting innovation)	• GroupWare • E-mail • Chat Rooms • Video Conferencing • Search Engines

2.9   Sharing Knowledge

There are several methods of sharing knowledge. These are dependent upon the type of knowledge we wish to share. If it is tacit knowledge that we wish to share, demonstration, and storytelling become the most powerful of tools. It is while the knowledge is still tacit that social and cultural factors are important. According to McDermott and O'Dell (2001), a culture of knowledge sharing is one of the most important factors in a successful KM system. Culture can be viewed as 'the shared values, beliefs and practices of the people in the organisation' (McDermott & O'Dell, 2001). Aligned strategies and the support of all levels of management are important in creating a positive culture.

Karhu (2002) and Leistner (2001) prescribe the use of knowledge stewards to gather the tacit knowledge from others. These people through interview and observation, will transfer the tacit knowledge from individuals or groups to explicit knowledge, and refine it to a form that is usable to others. This method has some application to the project, but with the added expense, and the specialisation of many of the areas, it is often best left to staff in the individual areas to make this transfer, and provide the information in explicit form to all.

Most literature espouses the benefits of capturing and sharing this tacit knowledge, although not all. Although Karhu (2002) does believe in the value of this transfer, he does warn of the limitations in the traditional methods of sharing, such as observation and imitation. He believes that experts are continually modifying, developing and improving their methods (tacit knowledge), so plain observation is limited in its value. He believes mentoring to be a much more powerful tool, although this provides limitations, such as the number of people that can receive the knowledge and the need to be in the same place at the same time.

Sanderson (2001) provides arguments for and against the transfer of tacit knowledge. He argues that a great deal of knowledge is lost when transferred to explicit knowledge. Claxton (1999) states that by trying to articulate tacit knowledge, you are restricting yourself to the fraction of the knowledge that you

can put into words. Sanderson also cites authors that give reasons such as the context dependency of tacit knowledge, and the constraint that explicating the knowledge may have on learning and innovation. The argument that best transfers to the NDCG situation is that of creating information overload through the gathering of too much irrelevant information.

Even with these arguments, the case for knowledge transfer and sharing is important. McDermott and O'Dell (2001) found that companies studied saw sharing knowledge as the way to solve business problems. Malik (2004) also found that knowledge must be shared across the organisation to become a potential asset.

Peter Drucker provides a valuable view of knowledge sharing. Drucker is well known for the many management texts he has authored over the past fifty years. Drucker (1999) proposed that to acquire the information and knowledge that a knowledge worker requires for their work, they must ask two questions. The first is what information do I owe those with whom I work? The second question is what information do I need myself, from whom and in what timeframe? By asking the first question, they open the communication channels, which allows information to flow back to answer the second.

Simply transferring the tacit knowledge into explicit is not enough. We must also look at the ways of sharing the knowledge once it has become explicit. These days, most companies rely on information technology to provide the vehicle for explicit knowledge sharing. Indeed, with the amount of knowledge that must exist in the files of organisations across the globe, it is the only effective way to share the huge amounts of explicit knowledge efficiently. This is not to say that IT is the answer to knowledge management, but for the transfer of explicit knowledge, it is certainly the tool of choice. Within the context of IT, we have available, Internet and Intranet technologies, databases, data mining and search engines, and e-mail, as the prominent few.

2.10   Knowledge Workers

The Knowledge worker can be defined as a worker who relies on his knowledge, rather than his manual dexterity to perform his job. He should know more about his job than his manager, perhaps more than anyone else in the company does (Drucker 1999). The knowledge worker is not a subordinate to his supervisor, but is now an associate. This is in stark contrast to last century, when the manual worker was reliant upon management to provide him with the tools and machinery to produce. Knowledge worker productivity is dependent upon the worker being seen as an asset, rather than the traditional view of a cost. Innovation must be a part of the work, as must continual learning and teaching.

Drucker (1999) defines the "Technologist" as someone between the manual and the knowledge worker. This is the category most of the NDCG staff would fall into. A great deal of the function of their jobs is of a manual nature, but they require the skills of a knowledge worker in preparation to do the manual work. Drucker provides a good analogy with the role of the surgeon. The actual operation itself is manual work, simple cutting and stitching, but there is a great deal of knowledge work that has gone into the preparation, such as the diagnosis and determining what and where to cut.

The knowledge worker or technologist is dependent upon a well-managed knowledge system, much more so than the manual worker was. He relies on access to the knowledge required to perform his work due to its changing nature.

2.11   Learning and Training

Learning and training are two very important components of knowledge management. To truly work efficiently, knowledge must be internalised in the workers, so that it becomes a part of them. To do this, the process of knowledge transfer must take place. There are two distinct transfer types involved. The first is tacit to tacit knowledge transfer. This is the transfer of knowledge through imitation, mentoring, story telling and other person to person methods. It is much

easier for this type of transfer to take place face to face, but certain technologies such as video conferencing do allow it to take place over diverse geographic regions.

Explicit to tacit transfer is that which occurs to the individual, when there is an understanding of something that is read or viewed, and the knowledge is learned by the individual. This type of knowledge transfer can be achieved easily over geographic and time differentials between the knowledge giver and receiver.

With the increase in the knowledge intensity of most industries, there has been a focus on training and development of the worker. When the typical job involved standing on a production line and bolting a widget to panel, training was simple, and once completed, was not required again until the employee changed jobs. Today, knowledge intensive industries continually provide training, to allow staff to keep abreast of the knowledge they require for their work. Learning outside of the workplace is also important, for the tendency to outsource jobs has meant the employer will often be looking for the prospective contractor to come with the required knowledge already learned.

2.12   Creating Knowledge

There are two strategies that can lead an organisation to success. They are to concentrate on core competencies (Drucker 1999) and innovation. It is the recognition of core competencies, then development and protection of them that has lead to the success of companies such as Coca-Cola. It is innovation that has led to the success of many others, such as IBM, Cisco and 3M. It is the pursuit and capture of new knowledge that enables these innovative companies to succeed. The importance of capturing all knowledge is shown with the example of post-it notes. The research department of was developing glues, when they came across a formula that did not set. This was put aside at the time, but because the knowledge was not lost, it found its way into becoming a part of the post-it note.

Wiig and Jooste, in Holsapple (Vol 2. 2003) claim knowledge and intellectual capital are the central drivers of enterprise performance. The creation of new knowledge is the core of a good KM system. It is the beginning of the knowledge that is to be distributed. It is where the innovation that drives the organisation comes from. Without the creation of new knowledge, the organisation is continually trying to keep up with competitors, and will find success difficult.

Chapter 3

NDCG Access Line of Business

3.1   NDCG

NDCG stands for Network Design and Construction Group. NDCG is a division of the Infrastructure Services business unit of Telstra. Infrastructure Services is, as the name implies, concerned with Telstra's infrastructure build and maintenance. NDCG has historically been responsible for the design and construction of a major portion of Telstra's network, nationwide.

Today, NDCG has broadened its outlook, and provides the following services to both Telstra and the rest of the telecommunications industry.

- Consultancy services for any aspect of communication networks
- Project Management
- New Generation IP/Data solutions such as GWIP, Blackberry, WiFi, WLAN, Video Conferencing and VOIP.
- Design, construction and maintenance of copper, wide-band, broadband and fibre optic networks
- Switch and router network design, installation and support.
- Service management
- Fibre to the Premises (FTTP)

- Customer backbone cabling
- Managed network services
- Wireless network solutions, including GSM, CDMA, satellite, fixed radio, broadcasting and wireless broadband.
- Systems integration

It is obvious by the broad range of services, especially high technology services, how important knowledge is to the organisation.

NDCG is broken into a number of lines of business, which look after specialised areas of expertise, under separate contracts from within and outside of Telstra.

3.2   Access Line of Business

Access Line of Business is a group of over one thousand staff concerned at least in part with nearly all of these services. The main focus is wide-band work, the provision of high-speed (2Mb/s and above) services to business and government organisations. There are many different wide-band services, which can be provided on both fibre and copper infrastructure. Services other than wide-band are now making up more than 30% of the groups work, with around 50% of Queensland staff now requiring the knowledge to complete this other work.

The group nationally is made up of twelve hundred staff, with major design and construction offices in each capital city, as well as small design groups in Townsville, Newcastle, and Ballarat. There are also small construction depots in many of the regional cities around the country.

3.2.1   History

Access LOB, as a part of NDC and then NDCG, has had a volatile past. Initially involved in almost exclusively wide-band work, the variety of services provided has grown. The line of business was created with the merging of the regional

Customer Wide-band, and Data & IP groups. During the late nineteen nineties, wide-band work was growing at rates of around 30% per year. During this period the group grew rapidly. It was during this rapid growth that NDC were separated from Telstra as a wholly owned subsidiary. Staff were given the option of moving to the new company, attempting to find another job elsewhere in Telstra, or leaving Telstra with redundancy.

In the ensuing years, wide-band work fell away, with the collapse of the "tech-bubble" driving customer demand down. For the first time in many years, work levels dropped. Access was not the only area to suffer these problems. Other areas of NDC, which were reliant upon all of their work from Telstra or other carriers, were also experiencing drops in work levels. Telstra were in the process of placing a greater portion of their work on the open market, and NDC was not winning some of these contracts.

It reached a point in 2002 that NDC Limited was forced to lay off a number of staff across various lines of business. This process was repeated another three times over the next eighteen months. Access LOB lost a number of experienced staff during this period, and the workplace culture changed markedly. A culture of knowledge hoarding and mistrust developed which has only recently started to change.

In 2003, it was decided that NDC Limited would be reintegrated back into Telstra as NDCG, to become a part of Infrastructure Services. In August, staff again became a part of Telstra, with the integration continuing into 2004. When coming back into Telstra, the line of business structure of NDC Limited was maintained. This structure separated work groups into nation wide, product-group specific business units. The control of each line of business was at a national level. Although not decided yet, it is possible that as the management structure of Infrastructure Services is regionally based, NDCG could also change to a regionally based system. For this reason, it is important to implement this KM framework now, to achieve national best practice, while national coherence is still strong.

3.2.2   The Future

The area in which the Access LOB operates is technology driven. As new technologies develop, customers start to demand them, thus ensuring a constant demand for new knowledge in the group. This area of Telstra is at the forefront of technology, and as such, the creation and translation of new knowledge is essential to ensure the group can meet expectations.

The wide-band technologies, although shrinking, are still a major portion of the group's workload. A portion of this work is currently being offered under contract to external companies. This will be used to ascertain any gains possible through contracting out the work. For this reason, Access LOB must make every effort to maintain, and improve efficiencies.

NDCG is still in the process of reintegrating into Telstra. As a part of its mission, it is to provide all possible assistance to other areas of Infrastructure Services. This will mean even more products and systems for staff to become familiar with. For this reason, a reliable method of distributing information and an easy to use method of finding documented knowledge is essential.

3.3   Organisational Culture

Organisational culture is one of the greatest determining factors in the success of a knowledge management program (McDermott & O'Dell 2001). Kayworth and Leidner (2003) cite numerous authors and studies, naming organisational culture as a major barrier to knowledge management initiatives.

The three areas of organisational culture that hinder knowledge sharing which Kayworth and Leidner (2003) refer to in their article are knowledge hoarding, trust (or lack of) throughout the organisation and highly formalised cultures. The first two of these affect the knowledge sharing propensity of the staff, whilst the

third hinders innovation and knowledge creation. The area this knowledge management project focuses on is that of knowledge sharing. The organisational culture of NDCG, and in particular, the Access LOB is therefore going to be a major determining factor in the success of the initiatives introduced.

3.4   Survey Results

Every six months, Telstra conduct an employee opinion survey that asks staff to answer questions relating to leadership, job satisfaction and local work environment factors. The most recent survey results available, April 2004, were used to gauge elements of workplace culture, and the staff's feelings towards knowledge flow in their area.

There were a number of questions that provide an indication of facets of the workplace environment. Access LOB are a group focused on customer delivery, and doing whatever it takes to get a service working. This has been brought out in some of the survey results. Access LOB recorded responses well above Australian cross-industry norms for questions regarding using initiative and being responsive to provide for customer needs. This type of attitude embedded into a culture leads to a positive environment to introduce changes that will improve the staff's access to knowledge and improve their ability to provide for the customer.

Another notable point from the survey was in the learning and development area. Staff in Access LOB in Qld recorded a response well below the national norm for being provided with opportunities for learning and development. This was a very low result, and falls short of the organisation's priorities of having a well-trained and knowledgeable staff.

The most significant results from the survey though, come in the communications area. For three questions regarding communications, Access LOB staff in Queensland, responded with very low levels of satisfaction. The responses were indicating a major shortfall in information flow. Staff expressed major concern over not being informed by upper management of the information that affected

them, and the company's future. They also expressed concern over receiving the information required to perform their jobs effectively. This result confirms the comments made by staff when interviewed at the commencement of this project. There was concern amongst staff that they often did not receive the Work Package Instructions (WPIs) that were sent through the project managers. These were important documents laying out changes to work practices.

Survey results showed a high level of staff involvement in local decision making. The new Technical Support Process discussed in section 5.3 aims to build on this trait, by using this local workgroup as a first level of escalation for technical support. This prescribes to the theories of Kayworth and Leidner (2003) and Bhatt (2001), of developing initiatives around workplace cultures, rather than drastically changing workplace cultures to suit KM initiatives.

A smaller survey conducted at the start of this project confirmed the communications problems, with the two lowest rating questions being "Knowledge is easy to locate", and "I am quickly informed of changes to our work practices". These two issues became the priorities of the project.

Chapter 4

The Issues

4.1   Why NDCG Access Line Of Business?

As stated earlier, the Access LOB is at the forefront of Telstra's technology. Their work ranges from simple cabling through to developing network solutions for major corporations and government departments. The large suite of products, and the geographic diversity of the business, means that individual staff must possess a wide range of skills and knowledge, to provide a number of different types of services in their areas. They must also have knowledge of other geographic areas, as some projects cross state boundaries.

As a technology driven organisation, with a high customer focus, it was important that all of their available knowledge was used to its fullest potential, and that every effort was made to develop the new knowledge required to stay at the forefront of competition. This management focus had been brought on through the four years that NDC Limited had existed as a subsidiary of Telstra, acting as a profit centre rather than a cost centre, and looking for new markets to enter.

4.2   The Drivers

It was becoming obvious to the senior management of the group, that a larger proportion of the technical specialists' time was being spent answering technical queries from the design and construction operatives. Although this was an integral part of the technical specialists' function, it was becoming so time consuming, that other duties, such as developing new knowledge and transforming existing knowledge into usable technical manuals, was being pushed aside. Their workload was climbing, and there was no noticeable difference to their output. What was also noticeable, after interviewing one of the technical specialists, and looking through a list of the requests for technical support handled over the past few months, was that most of the knowledge and information required by the field staff was available to them in some form. It was also expressed that local, experienced operatives, could have quickly responded to many of the queries.

The second driver was that Telstra was focusing on the quality of the work being done by NDCG, and although standards were high (less than 1.5% defect ratio for DBoRs), many of the defects that did occur were due to staff not knowing what the relevant standards were. These standards, along with other technical information, were often difficult to find, and were not always provided to those that required them.

Thirdly, having operated as a profit centre for a four year period, management did not want to see efficiency gains eroded now that the group had gone back to a cost centre. Telstra was still attempting to benchmark wide-band work against outside contractors. This meant that to maintain their position as the major workforce, productivity gains, value for money, and a quality output were of high importance. To continue the productivity gains, it was seen as essential that this type of project was implemented to ensure the best use of knowledge in the organisation.

4.2.1 The Role of the Technical Specialist

The technical specialists in Access Line of Business had a number of roles. The first was to create new knowledge within the organisation. Whether this was through research into new fields, or simply bringing new knowledge into the group from outside, it was important for the continued growth of new product suites, and it opened new markets for the group. A very good example of this was the "fibre to the premises" product. Whilst still separated from Telstra, NDC sought to increase its knowledge in the field, and through marketing this knowledge to the wider business community, began negotiations with property developers for the provision of fibre networks into housing estates in S. E. Queensland. After coming back into Telstra, contracts have been signed and developed into large projects.

The technical specialist is also required to interpret technical manuals and contractual requirements that come from Telstra and vendors. These documents are scrutinised, and after assessment, either accepted for use by the design and field operatives, or adapted into company standard documents (CSDs) for the staff to use.

The third job of the technical specialist is to assist the design and field operatives with technical queries. Before this project, the method was ad hoc, with staff from various regions usually contacting a technical specialist from their region, regardless of that specialist's workload or area of expertise. This often led to the specialist having to pass the work on, and staff often not knowing who was dealing with their query, or even worse, having it passed over by mistake.

What was needed was a process that allowed the technical specialist to concentrate on the "value-add" part of their role, whilst still providing efficient support for the design and field staff when it was really required.

4.2.2   Communication Paths

There are a number of communication paths throughout the Access LOB. Not all are addressed in this project due to the sheer complexity of such a task. The first path that this project does address is the flow of technical information and knowledge from the technical specialists to the design and field operatives, and feedback back to the technical specialists. The next is the request for technical support from the design and field operatives, and the corresponding response. The third is the communication and transfer of knowledge between peers. This latter is of great importance, as this is where the experience of key team members can be used to improve the overall knowledge base of the organisation.

4.2.3   Knowledge Lost

As discussed earlier, NDCG has been through a number of major changes over the past 5 years. Through each of these periods, there has been movement of experienced staff out of the organisation. When the company was separated, a number of staff decided to stay with Telstra, and a number of staff left the company. Unfortunately, due to the nature of redundancy systems in place in large organisations throughout Australia, it was more attractive for experienced staff to leave than newer staff. When the technology boom slowed, and competition grew in an ever-decreasing market, costs became a focus. Through four rounds of resource rebalancing, it was often the more expensive staff that were forced to leave the company. This too meant that a number of experienced staff left the organisation. Finally, when NDCG moved back into the wider Telstra environment, job opportunities opened for those more competent staff, where previously there were limited openings. Many valued staff were promoted into other areas of Telstra.

Through all this turmoil, a great deal of tacit knowledge was lost from the areas that lost staff. What became another issue, was when NDC lost contracts for certain technologies, the groups involved in those contracts were dissolved. Sometimes staff moved to new areas, and sometimes they left the company. As

there was no management initiative in place at the time to transfer the tacit knowledge to explicit knowledge, it was simply lost. NDC later won back some of these contracts. Design and construction groups faced major difficulties moving back into these areas when new contracts were won, as there were very few experienced staff, and very little of the know-how type knowledge required to interpret and implement the formal work instructions.

4.3   Knowledge as an asset

As discussed in chapter 2, knowledge is an important asset in today's business. NDCG has seen the value of this knowledge, and as such has decided to implement a KM framework. The value of this knowledge can be seen in all of the activities that the organisation takes part in. Improved knowledge and knowledge flows will improve the quality of the designer's work. It will improve the perception the field operative gives the customer, through being more knowledgeable in the equipment and services being supplied (Gamble and Blackwell 2001). Improved knowledge flows will lead to transfers of best practices, and thus greater efficiencies (Newman 2003). Improved knowledge will lead to higher morale (Australian Standards 2003) and greater job satisfaction of the employee.

Chapter 5

Finding New Information

5.1   Why Find New Information?

The telecommunications industry is a constantly evolving field. Over the past fifteen years, the industry has moved from analogue transmission, to digital, increasing speeds from 2 Mb/s standard high-speed transmission rates to gigabit transmission rates. The types of services too have changed markedly. Six years ago, the maximum high-speed data service available to a customer of Telstra was 2Mb/s. Today these are being overshadowed by 100Mb/s services, being used by customers in integrated networks across wide geographical regions.

Competitors are also entering into this market. Before the opening of the telecommunications market to competitors, Telstra were able to dictate what technologies were available. With rival carriers offering their own products, Telstra has had to keep abreast of changing technologies, and develop new products. It is for this reason that the creation of new knowledge and the adaptation of external knowledge to the Telstra environment are so important.

It is not only the creation of new technical knowledge that is important to Telstra. Knowledge of their customers and vendors is also an important facet of this new competitive environment. Telstra has always worked hard towards the development of new technical knowledge, but focus on commercial knowledge is new.

The creation and collecting of commercial knowledge can allow the organisation to follow best practice in the industry, align supply with demand, and concentrate on more potentially profitable areas of the business. A great deal of this knowledge is gathered through the field operatives, who meet with these external players on a day to day basis. The organisation must work on this area of knowledge creation along with the traditional technical knowledge areas.

5.2   The Processes Involved in Finding New Knowledge

This section looks at the processes involved in the creation of new knowledge for the organisation, particularly in the technical areas. Access LOB has a group of 7 technical specialists who are involved in the creation and conversion of knowledge for the staff of the organisation. The design and construction operatives and the project managers are also involved in the creation of new knowledge for the organisation

5.2.1   Technical Specialists

The technical specialists occupy what can be regarded as the knowledge core of the organisation. If we were to use Drucker's (1999) definitions of knowledge and manual workers, we would place the technical specialists clearly in the domain of the knowledge worker. He considered one of the overriding tasks of the knowledge worker to be continuous learning throughout their career. This is especially true of the technical specialists.

The aim of this part of the project was to facilitate this continual learning, through the diversion of other tasks, to allow the technical specialists to focus on creating new knowledge for the organisation. By "creating new knowledge for the organisation", I do not strictly mean entirely new or novel knowledge. Some of this knowledge is new, but a great deal of it is the adaptation of information and knowledge from outside the organisation to a form that is useful to the staff

inside the organisation. A great deal of their work is to convert Telstra and vendor documentation into useable work instruction for the field operatives.

Discussions with technical specialists revealed that a great deal of their time was occupied answering technical queries from construction and design staff. Some of these questions were of a nature that required the assistance of these higher level staff, but many were of a nature that could have been answered with the assistance of other field staff and the relevant documentation. What was required was a process to be developed and put into place which placed the technical specialists behind the first line of assistance.

Investigations into the make-up of the design and construction teams found that most of these teams consisted of a team leader, a number of experienced staff, and some less experienced staff. Many of these less experienced staff were still very experienced in some areas, though they may have only moved to a new area and were still acquiring the necessary knowledge to work efficiently, or to solve problems in that new area.

To make use of this existing experience and knowledge, and to facilitate knowledge sharing throughout the organisation, the Technical Support Process was developed. Once implemented, this process defined the steps staff go through when they have a technical query. The Technical Support Process formalised the assistance given by the local experienced staff, and provided a channel through which all requests for assistance must flow. The Technical Support Process is covered more fully in section 5.3.

5.2.2   New Knowledge from the Shop Floor

The knowledge created by general staff in their day to day duties is often overlooked when managers look at knowledge creation in their organisations. Although staff rely heavily on the knowledge and information passed to them from the technical specialists and other staff, a great deal of the knowledge they use on a regular basis, is that knowledge acquired through interacting with

customers, competitors and vendors. Drucker (1999) would refer to these staff as technologists. They work in a knowledge intensive industry, but must also have some of the manual dexterity and abilities of the manual worker.

Although there was little extra that could be done to increase the learning capacity at this level, what was noted, was that this knowledge should be shared throughout the organisation, rather than kept as tacit knowledge in the heads of a individual staff. What this project provided was a means of gathering this knowledge and storing it in a manner that enabled it to be found and retrieved when required by anyone in the country. This was part of the knowledge sharing initiative of the project, but also lays claim to assisting knowledge creation, as staff are more inclined to search for more knowledge and make it available to others if they see that others are doing the same for them. The Knowledge Management Intranet site examined in section 6.3 allowed the capture and retrieval of this knowledge nationally.

5.3   How do we gain the Advantage? The Technical Support Process.

As discussed above, the creation of new knowledge is integral to the success of an organisation. In a knowledge intensive, and continually advancing industry such as the telecommunications industry, this new knowledge is required to enter into the new markets as they appear. As mentioned in section 4.2.1 this new knowledge can lead to significant gains in market share and entry into new markets.

The reasons for developing the Technical Support Process were given above in section 5.2.1. What was needed was a process that not only achieved these objectives, but ensured that timely and accurate assistance was always available. The previous processes were not efficient, and did not always guarantee that a solution would be found straight away. Figure 5.1 shows a representation of the previous process. Staff simply called a technical specialist in their own region, regardless of his area of expertise or his current workload.
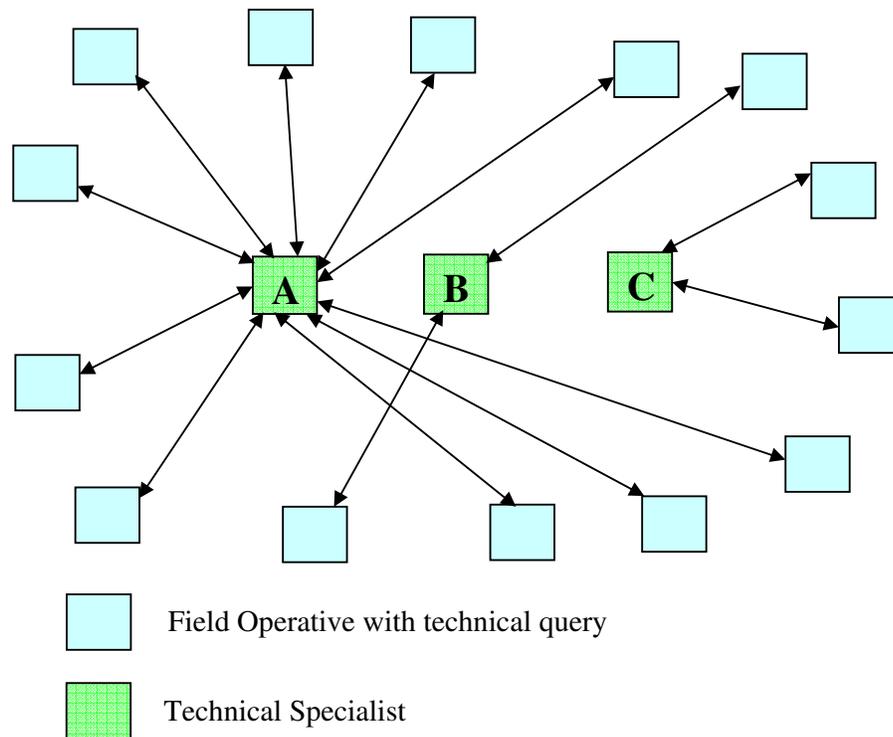
Figure 5.1: Technical support prior to the introduction of the Technical Support Process. This shows the situation where technical specialist A has been inundated with requests, while B and C have received far fewer requests and would be available to assist.

This new process provided for staff to attempt to solve the problem in the local workgroup first. This was through the assistance of experienced peers and relevant documentation. The access to this required documentation is another issue that will be discussed in section 6.3 when the Knowledge Management Intranet site is covered. This part of the new process was already happening in some areas, but in many, especially those areas that were located at the same site a technical specialist, such as design areas, this was bypassed. An overview of the new process is shown in figure 5.2 and the published documentation for NDCG staff is in Appendix B.

By far a majority of the queries and problems encountered by inexperienced staff could now be solved at this first level. If the problem could not be solved at this

stage, what is referred to as "level 1" escalation occurs. There is no strict time limit as to when this escalation should occur, but it is expected that it should be escalated once it is realised the problem will not be solved quickly on site, or after around one hour.
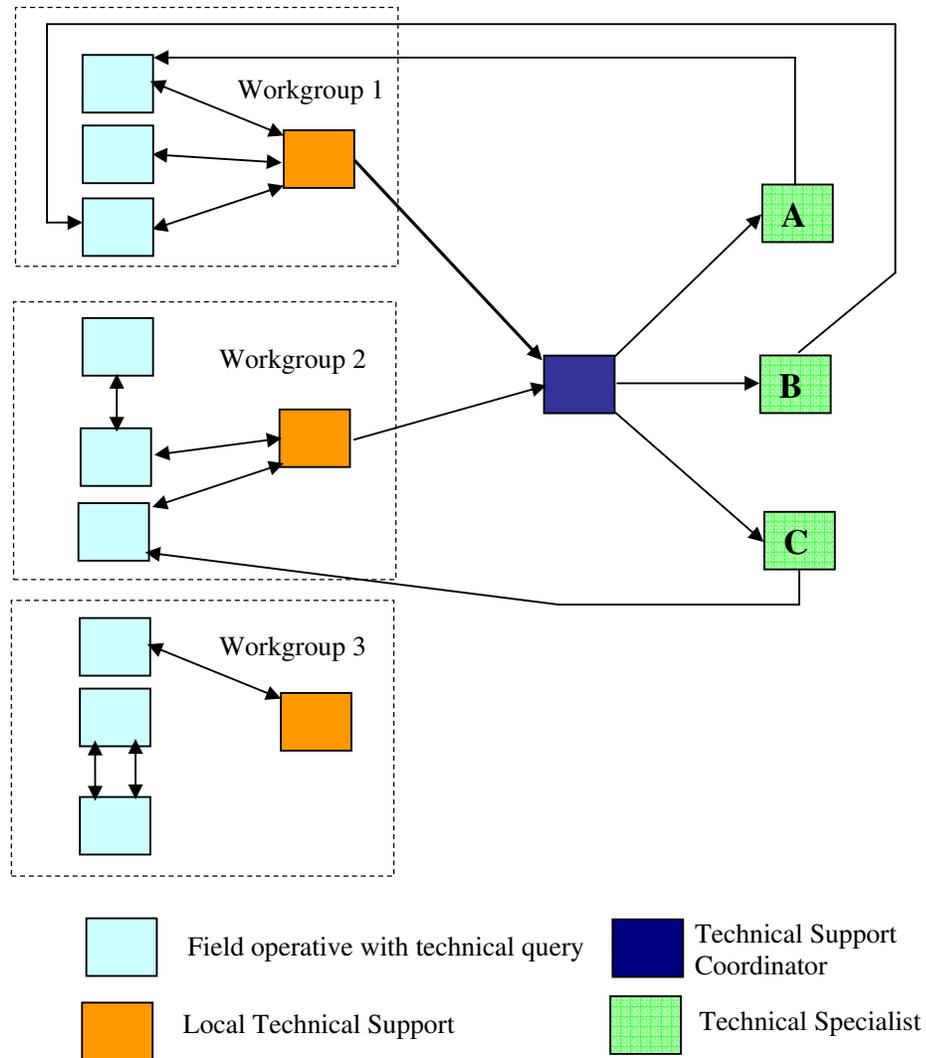
Figure 5.2: Technical Support Process using the new process. Of the nine queries, only 6 were escalated to the LTS, and only 3 were escalated to the technical specialists. The technical specialists' workload can also be spread.

The escalation at this point is still within the local workgroup. A Local Technical Support person (LTS) has been nominated for each workgroup. This LTS will usually be the Work Team Leader (WTL) or another very experienced operative. Some areas that deal with diverse technologies were allocated two LTSs. A great deal more technical queries can be solved at this point, through the sharing of the tacit knowledge of the experienced team member. These first two steps in the process are more important to the entire knowledge management system than they first appear. By promoting the sharing of knowledge throughout the team, it is hoped that the culture of knowledge hoarding that developed during the period of downsizing and redundancies can be turned around.

The third step in the escalation process occurs when the LTS, together with the originator of the query decide that they will not find the solution, or that it will take too long. At this point, the LTS will formalise the process. A "Request for Technical Support" e-mail template is available on the Knowledge Management Intranet site. The LTS completes the template, advising details of the problem, contact details for the staff involved, urgency of the problem, and what progress has been made to date. A copy of a completed request is in Appendix C. This template is also used when the solution is found by the LTS, and he feels that this problem could be an issue elsewhere, and his knowledge could be of use elsewhere.

All the requests are sent to a common point, the Technical Support Coordinator (TSC). The TSC works closely with the technical specialists, and knows each of their areas of expertise. The TSC also keeps abreast of their movements and their workloads. For these reasons the TSC is able to assign the request to the most appropriate specialist, considering their specialties, workload and availability.

As the requests arrive with the TSC, he logs the request into the technical support database, and if appropriate, adds it to the FAQ page on the Knowledge Management Intranet site. The technical specialist contacts the originator as soon as possible to verify the details of the request. In some cases the answer may be given straight away, but often investigation is required. Once a solution is given,

the details are entered into the database against the query, and both the query and response are entered on the FAQ page on the Knowledge Management Intranet site.

As mentioned previously, the LTS still forwards some resolved queries to the TSC. This is to allow them to be posted to the FAQ page to assist others that may be having the same difficulty.

This process was developed to address two issues of knowledge management in the organisation. The first, and the initial reason for the implementation of the entire program, was to enable the technical specialists to concentrate on their most important role. That role was to create new knowledge for the organisation. The second issue was that of attempting to turn around a culture of knowledge hoarding that existed amongst many of the staff. This culture had developed over the preceding few years, due in part to the rounds of resource rebalancing that the staff had been through.

Survey data collected from a sample of staff from each region revealed that there was a culture of hoarding knowledge. In an attempt to counter this, the process encourages staff to work with each other to find solutions, and to share their knowledge and experience.

Chapter 6

Inventing Only One Wheel

Yahya and Goh (2002) define two approaches to Knowledge Management. The first, a centralised approach, concentrates on developing a central core of knowledge. This becomes the focal point of the entire system, acting as the repository for the knowledge, the tool for gathering it, and the means of distributing it.

The second is the decentralised method. This approach does not concentrate on the transfer of tacit knowledge to explicit knowledge in a central core. Instead it puts the emphasis on promoting knowledge sharing activities amongst the employees and managers. Methods employed range from peer group meetings, to cross business unit sharing.

In a geographically disperse organisation such as NDCG, the use of peer groups is hindered due to areas of isolation. Although there was a small focus on this decentralised method, the sheer volume of knowledge, and the easy access to Intranet technology weighed in favour of a centralised approach.

6.1   Why Only One Way?

Due to the history of NDCG, many methods of practice developed for the same work throughout the country. Having operated as a regionally based organisation for a number of years, each region developed their own software tools, and their own processes. Once coming under a national structure, and working on national contracts, it was decided to develop a national "best practice" methodology. The idea was to look at work practices in each state, and develop a single "best practice" using the better parts of each regional variant.

The first area to come under this scrutiny was the design area. Six Sigma processes were employed to develop a single best design methodology, and to promulgate its use throughout the country. This was called Project Roadmap. Unfortunately due to the radical changes it imposed on some groups, without careful explanation of the total benefits, the project seemed to fail. Some areas adopted the new processes, but these were the areas that had minimal change to existing processes. The areas that would have faced major changes to their work methods simply did not adopt the new practices.

McDermott and O'Dell (2001) found the same type of resistance to new KM initiatives in their studies. To introduce management change, you should adapt to suit the culture, rather than attempt to force major change quickly.

The Queensland design group, for example, used one software tool to coordinate all its design activities, from receipting and appraising orders, scheduling, quality management, and collating the completed design, through to distribution to the field operatives. The Queensland group had also been instrumental in the development of this tool, from what was originally a "dog" of a system to the advanced automated tool it now was. The tool automatically loaded data into many of Telstra's DBoRs, and also the Project Managers' scheduling databases. Without realising the full implications of the changes required (new PM tools required, manual data load and the possibility of defects) the Roadmap team expected the staff to start using a new tool for half of their design activities. It

was not surprising that the change failed in Queensland and the old tool continues to be used.

There had been a culture of pride in this design tool amongst Queensland designers that was too strong for the roadmap group to overcome. Belgard and Rayner (2004) note that culture is the major barrier to organisational change. What this knowledge management project had to be wary of was falling into the same traps as Project Roadmap. Many of the objectives were similar, so the approach would have to differ.

With the implementation of a national line of business, overseeing a national contract, it became important to offer Telstra a common product nationally. Like roadmap, it was decided the best place to start this was in design. Work instructions and CSDs were already national documents, and with a common design process, it would be easier to achieve a common installation process.

6.2   Information Distribution Process

The distribution of knowledge and information is important to a technologically diverse organisation like NDCG. There were many different work instructions and CSDs, and even more Work Package Instructions (WPI). These were the changes that Telstra wished NDCG and other contractors to make to their current procedures. Management had to ensure that these documents reached all staff required to use them, in a time frame quick enough to ensure compliance.

The previous means of distributing this information was through the project management group. The technical specialist group assessed the instruction from Telstra, then once accepted, would distribute it to the regional Project Directors. The Project Directors would then distribute it to their Project Managers, whose responsibility it was to determine whether the operative staff required the instruction, and if so pass it on. There were major bottlenecks in this process, and also a great deal of wasted time.

Firstly, some of these instructions were quite lengthy. It was impractical for all the Project Directors to read all the instructions. This meant that often the instructions were simply broadcast to all the Project Managers, even if the instruction did not relate to their area. The Project Managers were also under similar time pressures as the Project Directors, which meant many instructions were broadcast to all the work team leaders. Due to the workplace structure, and the fact that a team leader could be working with more than one Project Manager, some were receiving two or three copies of the one instruction. During the information gathering stage of this project, one WTL commented that he regularly received the same information from four different sources, sometimes more than once each. Others would occasionally not receive important instructions at all.

The length of these instructions would also mean that a team leader could then spend an hour scanning and reading a document, only to find that it had little or no impact on his work. If lucky, the team leader would then file away the document rather than send it on to his team. If not, the whole team could go through this same time wasting procedure.

What was required was a process that ensured all relevant information was passed on to those that required it, but not to those who didn't.

To do this, the Information Distribution Process was developed. An original draft was developed by the original TSC, but never implemented. What was required was refinement of this draft, and its implementation throughout the entire organisation. The strongest point of the original draft, and an area that had been implemented, was the review and overview of the WPIs by a common point. This technical specialist would assess the document, and if required seek input from other technical specialists, Project Directors and field operatives. Based on this assessment he would either accept the instruction or return it for amendment.
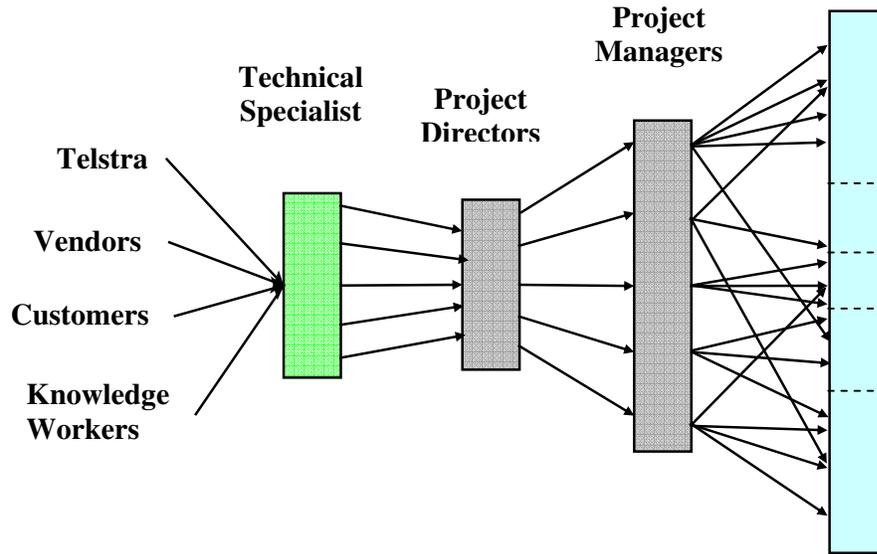
Figure 6.1: The original distribution method for technical information. There can be doubling up of notifications to staff, and gaps where no project manager has notified staff.
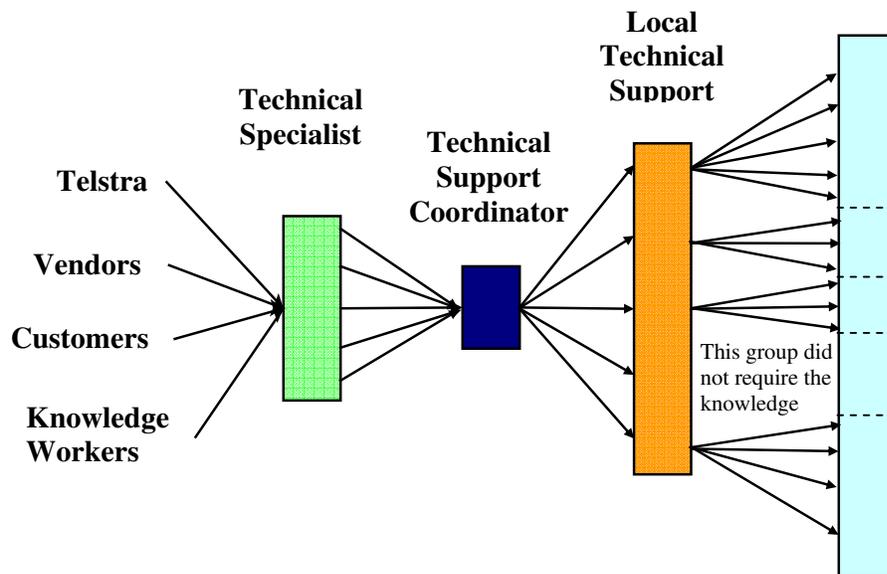
Figure 6.2: The Information Distribution Process. New knowledge enters the organisation through the Technical Specialists, and is funnelled through the TSC to the areas that require the knowledge only.

The new process continues from there. Once accepted, the technical specialist would forward the instruction, with a brief overview of its areas of relevance and implications, to the TSC. He would also provide a courtesy copy to the project directors, who could then forward it to the project managers with instructions not to forward to their operatives.

The TSC now has the document, together with a brief description and a list of the areas it will impact. The TSC maintains a database of the LTSs, and the work that each are involved in. He uses this to distribute the document to the LTSs working in the areas listed as relevant. This way, only those areas requiring the information will receive it, and only once.

The LTS will receive the document via email, and if in an area where staff have access to email, will forward it to those requiring it. If no email is available, the information will be distributed during the weekly toolbox talks, or monthly team briefs. If appropriate, the team leader will provide a concise statement of relevance with the document, to outline to his staff what effect it will have, and how it is to be implemented. At this point, the LTS can also send feedback to the technical specialists and project managers regarding any unforeseen impact the instruction will have. Figure 6.2 shows a diagrammatic overview of the process, and the entire Information Distribution Process documentation is attached as a part of the Communication Flow Process in Appendix B.

6.3 Knowledge Management Intranet Site

This website is the focal point of the entire project. Through its use, it is intended that documentation will be found locally, to answer many of the queries raised by staff. It will enable knowledge sharing between groups nationally. It will also provide other useful information and knowledge, which until now has been difficult to obtain.

Figure 6.3 shows an overview map of the site from the Site Manager tool. Appendix D contains a more complete layout, as well as page layouts. It was

constructed using the Telstra Intranet Site Manager Tool, which aids in the development and standardisation of sites on the Telstra Intranet.

Pages	Ver.	Status
☑ Home	3.0	Live
⬛ Local Knowled...	2.1	Live (U.P.)
⬛ Qld Local K...	3.1	Live (U.P.)
☑ NSW Local K...	1.0	Live
☑ Vic/Tas Loc...	1.0	Live
☑ Western Reg...	1.0	Live
☑ Audit/DBoRs...	3.0	Live
❌ Team Leader...	0.1	Not Live (U.)
☑ Technical Doc...	3.0	Live
☑ Project Manag...	1.0	Live
⬛ Frequently As...	1.1	Live (U.P.)
⬛ Technical Sup...	1.1	Live (U.P.)
☑ Local Technic...	1.0	Live
⬛ Useful Links ...	1.1	Live (U.P.)
☑ Special Projects	1.0	Live
☑ NSW DET Sch...	1.0	Live
☑ Site Map	1.0	Live
☑ Contact Us	1.0	Live

Figure 6.3: Knowledge Management Intranet Site map. This map shows sites currently under review (orange) and sites still to be published (red).

6.3.1 Local Knowledge Pages

These are the pages that have been developed to enhance knowledge sharing throughout the organisation. It is hoped that through this, regional practices can be aligned, possibly to the point of a single best practice.

It is accepted that no team wants to provide a poor product, or work with inefficient methods. As such, most teams would have, over time, modified their work practices to give what to them appears to be the most efficient way of working. What may be stopping many of these teams from improving their work practices, is that they simply do not know what is possible, and what some other teams have developed. A simple example involves the modifications the Queensland design team had done to the software tool in use, DES. All regions used this tool, but most did not have any idea of the automation that had been

worked into it. Some sections were struggling with tasks that others had automated. Once all groups knew of these improvements, they were only too happy to adopt these practices.

Most staff in each section of each region maintained their own small library of "how to" documentation. These were the small items of tacit knowledge, transformed to note form that elaborated on the documented work instructions to provide them with the whole picture. These were the things that each region did differently that management wished to align. What this site did was to provide a repository where these pieces of knowledge could be published and shared with other areas.

Selected staff in each section were requested to collate these types of documents in use in their area, and verify that they did not contravene any formal technical, HR, safety or environmental instructions. Once this was done, the documents were uploaded to the site, to be freely available to all staff nationally. Team leaders were encouraged to look at other regions' processes to gain ideas on improving their own processes. In the design area, this was taken another step further with the introduction of the Design Review Forums noted in section 6.5.

To date, the Queensland page has had by far the most work done on it, with the design area almost complete. One simple addition to the page, which has proven to be a valuable source of information, has been the "Staff List" at the head of each section. Unlike the traditional corporate directory, this allows the searcher to find whom to contact when they need to talk to a specific area. It provides a link to that person's reference in the corporate directory, and a short description of the work they do.

The Intranet Site Management Tool allows a site manager to assign individual pages to separate page managers and content managers. While collating all the documentation, it was preferable to keep one central point to load documents to the site. Once the pages are complete, and it is simply a matter of keeping them up to date with local processes, a person will be assigned from each region to do

this. Security on the site also means that only those allocated the responsibility can edit the pages, so unsolicited items can not be loaded.

6.3.2   Auditing & NCRs

The Audit/DBoRs page provides staff with the knowledge they require to correctly load DBoR information into the Telstra systems. At present, nearly all of the NCRs that Access LOB receives are DBoR related. For each NCR, an investigation is undertaken to find the reason for non-conformance. In many of these instances, it was found that the staff were unaware of the correct method of entering the information or of what information was required.

This page has two aims. It provides files, and links to instructions located in other areas of the Intranet, that guide staff in the correct entry of information into DBoRs. It also provides them with easy to use tools that can auto-load the information, and others that can quickly audit the DBoRs used. It was hoped this access to tools and information would see a decrease in the number of NCRs generated.

6.3.3   Technical Links

The Technical Documents page provides links to the existing sites on the Telstra Intranet that house the work instructions and CSDs. There are five different sites that contain these documents, so in the past staff have had difficulty finding the required documentation. The documents relating to Access's work are indexed in amongst all the other technical documents, so can be near impossible to find unless the document number is known. At present the links take you to the document sites, but an enhancement being contemplated by management is a search engine capable of locating wide-band and data related documents. This will greatly increase the performance of the sites.

6.3.4 Project Management

The Project Management Page provides links to the documentation of importance to the project management group. It provides links to contract documentation and Quality Management Plans, and will provide links to other non-technical documentation required by the Project Managers.

6.3.5 FAQs

This site contains the queries and responses raised throughout the Technical Support Process. It is envisaged that access to this information will greatly reduce the number of requests for support generated.

6.3.6 Technical Support Process

The Technical Support Process page contains the documentation outlining the process. It also contains the email template that the LTS is to use to request support.

6.3.7 Local Technical Support

This page contains a list of all LTSs, and their areas of support. Staff are to use this if unsure of who their LTS is.

6.3.8 Useful Links and Information

This page contains links to many of the section and system home-pages on the Telstra Intranet that staff can find information from. Some of these contain the database manuals for systems whilst others contain the data required to complete

the designer's work. Although previously accessible, there was no simple list of these sites for the Access LOB staff. It also contains downloadable files the design and construction operatives use for their work.

6.3.9   Special Projects

Access LOB is often involved in major projects. At the time of this project there was a major project involving the installation of fibre services to nearly all schools in NSW. Projects like this are often spread over diverse areas, and are dependent upon a large amount of project specific information. This part of the site allows for the set-up of a page devoted entirely to a major project. Project specific information, such as non-standard work practices can be loaded here for quick access by all staff involved. By holding the information here it will not be misinterpreted as a change to normal practices.

6.4   Knowledge Maps

As discussed earlier in the study, the knowledge map can be a useful tool in the management of knowledge in the organisation. The initial intent of the knowledge mapping in this project was to first find the areas that required work, either to enable knowledge to flow in, or to allow knowledge required in other areas of the organisation to flow out. Once this was done, the information was used to enhance the information flows, and to highlight to management where some of our opportunities lay for improvement. The information was also used to build a knowledge source map, to enable knowledge repositories and sources to be identified and used by all staff. A secondary map, a knowledge process map is also being developed to assist staff with locating knowledge that was required for their jobs.

6.4.1   Knowledge Audit

The first step in the process of developing a knowledge map is to determine what knowledge is required across the various parts of the organisation, where it currently resides, how staff currently access that information, and what hindrances to knowledge flow currently exist.

Due to the size and geographic dispersion of the organisation, a knowledge audit of the entire of Access LOB would not have been practical at this stage. The first audit was done on the Queensland wide-band design group. A second audit will then be done on the wide-band construction groups, both internal and external. It is intended that once the effectiveness of these audits is determined, an audit of all the various groups within the entire line of business will be conducted and an associated knowledge map constructed.

To audit the groups, interviews were held with key members of the design and construction groups. These included the work team leaders, experienced operatives and new staff. This enabled information to be gathered from staff who had a great deal of experience in the area, and also information from those new to the area. These newer staff had a better idea of what information was required for the job, and where it came from, as they were still looking for it.

6.4.2   Knowledge Source Map

It was decided early in the project that the knowledge source map would be a useful mapping tool for this organisation. It would show where knowledge was held, and once knowledge requirements were established, would enable the knowledge management practitioners to determine what enablers were required to ensure the knowledge flowed. Once established, the map will also provide a knowledge distribution means on the Intranet.

6.4.3   Knowledge Process Map

The knowledge process map, as described by Kim et al. (2003), is a useful tool for staff to use to find the knowledge they require to do their own part of a process. This tool pictorially represents a work process, and links required knowledge to the segments of the process.

To create this map, the process was investigated fully, to determine each part of the process. The individual parts were logically grouped to form up to a dozen domains. Knowledge audits, surveys and interviews were conducted to find every piece of knowledge required to complete each task in these domains.

Once all of this knowledge has been gathered, it will be linked to these domains, so that staff can access the information and knowledge in a simple to use, pictorially guided web interface. The progress of this process map is discussed in section 9.2.
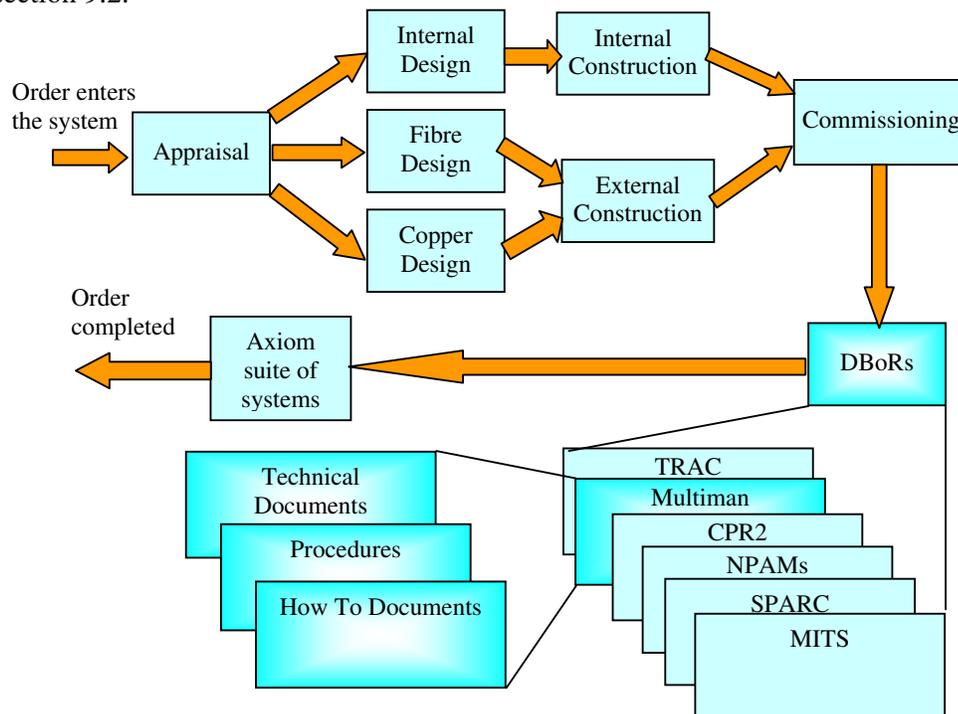
Figure 6.4: Knowledge Process Map. This map shows each of the process domains associated with the wide-band process. The DBoRs domain is opened to reveal individual tasks in the domain, which can then be further expanded to show the separate knowledge items that associated.

6.5   Design Review Forums

To assist in the flow of information between groups around the country, and to establish knowledge sharing networks, A Design Review Forum was establish. The group was made up of design specialists and design team leaders representing design groups around the country. A monthly phone hook-up and net meeting allows issues to be discussed, and knowledge to be shared between the groups.

The first of these meetings was in September 2004, where the functions of the design tools being used were discussed. Out of this came more knowledge of the capabilities of the tool by some regions, and a desire to improve the processes nationally. Meetings are to be chaired by one of the technical specialist team, and conducted monthly, with the end goal of a standard national process, reached through mutual agreement between the regions through the identification of shared best practices.

6.6   The Knowledge Manager

McKeen and Staples (2003) discuss the position of the chief knowledge officer, or Knowledge Manager in organisations, where the role has been in existence for a number of years. They find it to have a strategic focus in many of these organisations. Through surveys and questionnaires put to a number of Knowledge Managers, it was found three quarters of these positions where created by director level executives or above. This would explain the strategic focus of the role.

Bennet and Neilson (2003) studied the roles of the chief knowledge officer in public sector organisations. Appendix E shows the results of their study. This project took these roles as the long-term aims of a knowledge management position, once the system has been implemented and the role established. Initially the role taken in this project was very different.

The position of Knowledge Manager of Access LOB is difficult to define. The role was initially that of a project manager, with a defined project, to develop and implement a working KM system throughout the Access LOB. Once this project is complete, it will take on a more process-oriented role, similar to that defined by Bennet and Neilson, with small projects arising from time to time.

The role of project manager is discussed in chapter 7, where the issues associated with the management of the project are detailed. Initially the role was a part time role, with a great deal of the work being done after normal hours, but with the early goals achieved, and some improvements seen by management, it was decided this role was important enough to warrant full time involvement. Once the major part of the project is complete and responsibility for specific areas of the Intranet site is divested, it is envisaged that the role will become process oriented.

Chapter 7

A Knowledge Management Project

Developing and implementing a Knowledge Management System in a large organisation such as the Access LOB, is not simply a matter of research, find a solution and do it. The development and implementation of a system such as this is a major project. As such, it requires many of the same project management skills, as the construction projects the organisation is familiar with. This chapter discusses the management of this project, from the initial conception, through development, to implementation. The measurement of results, although a part of the project management has been given its own chapter following.

There are many styles of project management used in today's industry. What was most appropriate in this case was to use the same project management techniques that are used by the project managers running the majority of projects in the organisation. NDCG use the Project Management Body of Knowledge (PMBoK) (ACMP 2003) as a basis of the project management framework. Using these methods, LOB management could better monitor the progress of the project, and if the project manager were to move to another area, it would be a simpler matter for another project manager to take over.

7.1   Project Conception

This project was originally conceived by the Project Director responsible for both Access Deployment Solutions, and the Access team in Queensland. Access Deployment Solutions was the group tasked with creating new knowledge in the organisation, and consisted primarily of technical specialists. As discussed earlier, a great deal of the technical specialists' time was spent answering questions that should never have reached them. NDCG were in a critical phase of reintegration into Telstra, and were keen to use these staff in the development of new knowledge to open new market opportunities.

7.2   Project Management Framework

Using the PMBoK framework, there are nine functions of project management. These are:

- The Scope of the project. This covers an outline of the work content, results that need to be achieved, the activities that need to be performed and the parameters of the project environment.

- The time frame the project is to be completed in. This would include timelines and scheduling.

- The costs associated with the project from conception to completion.

- The quality processes, systems and outcomes required for the project. This includes both quality assurance and quality control.

- The risks involved in the project, either in the outcomes or the processes involved in the project.

- The human resources required for the tasks required to complete the project.

- Procurement and contracting of goods and services.

- Communication processes that will be required to ensure all interested parties are fully informed.

- The integration of other functions both within and outside of the project.

These functions are of varying importance in most projects, and this was no different. As per most projects, the scope was extremely important. It lays down what the final objectives of the project are, and what is to be done to attempt to reach them. The time management of this project was also important, due to the critical restriction placed on completion of the stages associated with this dissertation. Cost management of this project is crucial, due to budgetary restraints placed upon operating expenses within the LOB, and the requirement to produce value for money.

The quality management of this project had to be closely monitored, as NDCG follows strict quality assurance standards, and any deviance from these could have jeopardised their accreditation. Risk management was an internal matter for this project. There were no external risks involved, as long as quality assurance guidelines were followed, but there was always the risk of not meeting objectives, or other constraints of the project plan.

Up to this point in the project, human resource management has been a minor consideration. Other than myself, the only other staff involvement has been through questionnaire and interview involvement. These were minimal for staff. Issues that did arise were the selection of staff for interview, and defining the culture of the organisation, and how to work with it.

There have been no contractual arrangements, or procurement of services to this point. It is not envisaged that there will be in the near future. Communications management plays a vital role in both this project, and the ongoing system development. Communications are an important part of any knowledge management system, and as such must be managed well.

Integration of the other eight functions involves the management of the scope, in conjunction with meeting time and cost budgets, while managing risk, quality and everything else. As such it is not dealt with individually like the other functions, but is a combination of them all.

7.3   Project Management Implementation Plan

The Project Management Implementation Plan (PIP) lays out how the project is to be carried out throughout the life of the project. In line with NDCG procedure, a PIP was written for this project. The PIP is attached as Appendix F. Due to the nature of this project, and to the fact that a majority of this project was to be completed outside of work time, the cost and revenue section of the PIP has been omitted. It is to be included once the full time position of Knowledge Manager is implemented.

There were two aspects to the implementation of this project. The first was to meet the requirements of the course pair ENG4111 and ENG4112. As such, some activities of this project, and the writing of this dissertation were completed outside of this main Project Implementation Plan. The schedule attached to the PIP in Appendix F has been modified to include these activities.

7.4   Development of the System

The project management of the early part of the project was straightforward. As the Project Manager was the only resource, and the work at that stage was mainly research, there were few problems. The only issue at the time was a major project in the wide-band design section that restricted the amount of time the Project Manager had available to work on the project. This problem occurred a number of times throughout the project.

7.5   Implementation Phase

The implementation phase required more careful planning, and was reliant upon a number of external factors. The initially the publication of the Knowledge Management Intranet site was scheduled to take place in May. Due to restrictions on access to the Telstra Intranet, and publishing rights, this was delayed till July. This did however allow more information to be gathered before initial publication.

One of the most difficult aspects of the implementation phase was the introduction of change to the workplace. This business unit had been through a great deal of change in the past five years. Without first enlisting the support of key players in each of the regions it would have been an all but impossible task. The best method found to enlist the support of these staff was to seek their input into the knowledge base that was being gathered. Most of these staff were experienced, and had a lot to offer, so this method served both this primary purpose, and assisted in the compilation of a large tacit knowledge base.

Risk management was taken into account on this project. Being a management project rather than a construction project there were a number of different risks to take into account. Access LOB works to very tight timeframes on the services it provides. As such, any commitment that took staff away from their usual duties risks disrupting other projects. Taking this into account, all survey and interview work had to be short and concise. Existing informal communication channels were also used to ensure minimal disruption to other priorities.

The other major risk involved was that staff could be supplied with incorrect or misleading information, which would in turn lead to non-acceptance of the system. To overcome this problem, a system of checks was implemented, whereby all documents submitted for publication or distribution would first be supplied through an LTS, and then verified by a technical specialist. This ensured that all documents were accurate, up to date, and relevant.

7.6   Roadblocks and Resistance to Change

It was initially thought that staff and management acceptance would be the determining factors for this project. What became the first major roadblock though was technical. The whole project revolved around a Knowledge Management Intranet site on the Telstra LAN. Whilst access was available to begin building this site in April, it was not until July that the site could be published. Due to this hold-up, much of the work planned for the first half of the year had to be put off till after July.

There were a number of roadblocks in the implementation of this project. Some came from expected sources, some from where it was least foreseen. Probably the largest was the resistance to change throughout the organisation. Access LOB, and NDCG as a whole had been experiencing a great deal of major change over the past five years (as described in section 3.2.1). Some of these changes saw the organisation grow; others hindered its development. Some staff saw this change as an opportunity to strive for improvement, whilst others tended to fight it.

In the early stages of planning, this was taken into account. To attempt to ease the burden of rapid change, parts of the project were restricted to specific areas of the organisation. These areas had previously been using some of the tools being introduced, so it was hoped that they would accept easily the minor changes involved. McDermott and O'Dell (2001) found that successful Knowledge Management approaches are developed to fit in with the company's culture, rather than changing a culture to suit a knowledge management approach.

The appraisal area of the Queensland region were already using a local Intranet site to source many of the local knowledge items that had previously been held as tacit knowledge. With the move to the Telstra LAN, this site would disappear, and the Knowledge Management Intranet site was the ideal site to develop them on. The support of this group, and the documentation that came with them, showed other areas what could be done. What was still required was the support of staff to share their tacit knowledge.

The other areas of difficulty involved the acceptance of and adherence to the Communication Flow Process. Originally it was assumed that the most difficult thing would be to stop the staff continuing to contact the technical specialists directly. It was decided that the best way forward was for the technical specialists not to accept queries from the staff, but to reinforce the process with them to go through their LTS. Although the process was originally developed to assist these technical specialists, they continued to respond to the queries. In the first month after the process began, only four queries proceeded through the correct channels. A harder line was taken, which began to improve adherence to the procedure.

The communication distribution component of the Communication Flow Process also began with resistance. Although agreed by all parties, the technical specialist controlling the acceptance of technical documentation from Telstra continued to follow previous procedures. This process is still in the implementation phase.

Chapter 8

Early Results

It is through the long-term results of the Knowledge Management initiatives, that the success or otherwise of the project will be seen, though we must also look at the present. Many of initiatives have looked at "quick wins", to gain support of the staff and the senior management. Medium term gains are also important to keep their interest.

8.1   Why Measure?

Areas of management, obsessed with the gathering of data often use the phrases such as "Anything worth doing, is worth measuring". As extreme as it may sound, it does make good business sense. Unless you can show that a new process is advantageous, what is the justification for change? Measurement makes it possible to control, evaluate, and improve processes (Ahmed et al. 1999) If a wide range of Knowledge Management initiatives is put into place, we need to be able to identify which are successful, and worth developing further, and which need an overhaul, or total replacement. What we must take into consideration though, when we look at this statement, is that the traditional measurement of financial gain, is no longer the only method being used by today's organisation.

8.2   How to Measure?

The traditional measure of procedural or management change has been the financial measure. What effect does it have on the bottom line? Whilst this is still important, there are now other measures that organisations can use to gauge success. Knowledge Management relies on these other measures, due to the difficulty in putting an exact monetary figure to any gains achieved.

8.2.1   Balanced Scorecard

The balanced scorecard gives a measure of business performance that combines financial measures with business strategies to give a fuller picture of how the business is performing. It looks at measures such as customer satisfaction, organisational learning, and internal processes. Figure 8.1 illustrates some balanced scorecard measures.
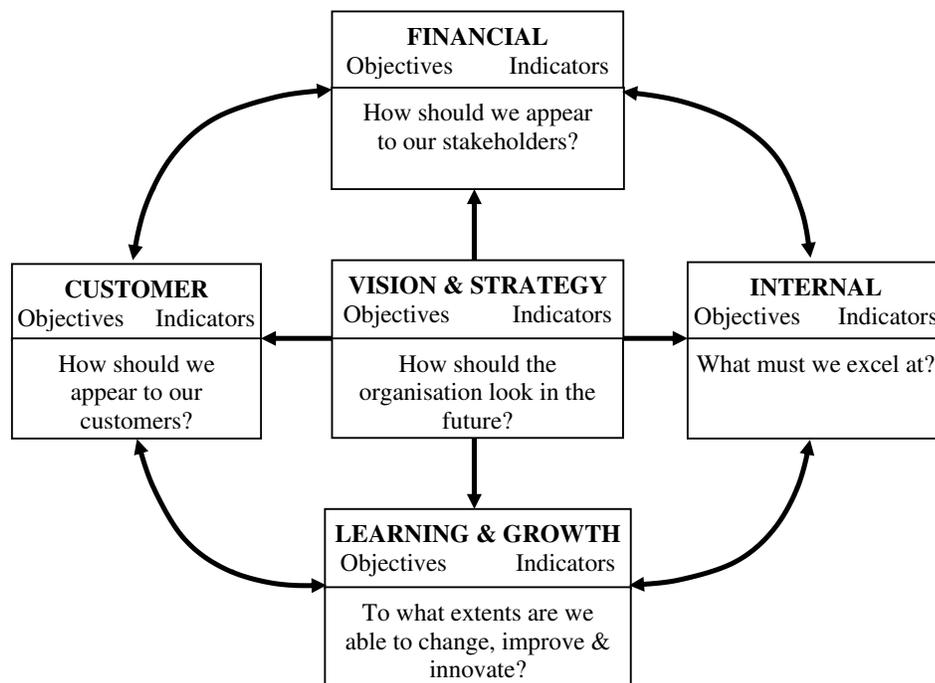
Figure 8.1: Balanced Scorecard Measures (Hanley & Malafsky 2003). This scorecard makes us look at the other things important to an organisation, not just the financial measures.

Using the balanced scorecard allows those factors that determine the success of an organisation, but do not have an easily definable financial measure, to be taken into account when measures are made.

8.2.2 Specific Measures

What specific measures can be taken? Due to the short timeframe, any measures taken for this project would not have represented any conclusive finding. There are a number of measures that will be introduced as the system is accepted. These will be the determining measure of the KM system's successful implementation.

Hanley and Malafsky (2003) highlight three types of specific measures, when studying the measurement of KM initiatives. The first is system metrics, which measure the usefulness of supporting technologies. The next is output measures. These are direct measures against the specific outputs that KM initiatives have worked at. The third is the outcome measure. This looks at the more long term outcomes, such as time and money saved due to specific initiatives, or best practices introduced. It can also look at changes in operating efficiencies and staff satisfaction levels or retention rates.

A system measure will be the number of visits to the Intranet pages. Very few hits could be a sign that the site is not known, or that it is known, but is not useful to staff in their search for knowledge. In either case, work must be done to improve the use of the site.

The major output measure on the sharing and access to knowledge and the success of the Technical Support Process, will be the number of queries that are escalated to the technical specialists. The catalyst behind the initial project was to take this load off the technical specialists, so this must be a important measure. What will also be measured in this same area will be the field operatives' impression of the response they gained from the new process. It will not be enough to have freed the technical specialists, only to have the staff requiring assistance unable to receive it. In the project to date, the technical specialists

reported a decrease in the number of queries reaching them, but it was too early to determine whether all queries were being answered quickly at the lower levels of the process.

The first outcome measure will be against the response of staff to survey questions regarding knowledge sharing. Telstra conduct six monthly employee opinion surveys. The responses to questions relating to knowledge sharing and access to information will guide future work in this area.

A key measure of the success of the KM initiatives will be the decrease in the number of NCRs generated against Access LOB. Many of these NCRs are due to the staff not having the knowledge required to accurately input data to the DBoRs. A decrease in the number of NCRs will signify an increase in the knowledge held by staff and an increase in the availability of information.

The final measure will be long-term outcome measures. These will look at specific Knowledge Management initiatives, and determine the savings and improvements these have brought.

8.3   Results so far

Using a survey distributed early in the project, data was collated to look at the existing knowledge management practices in the organisations. This allowed the project to concentrate on the areas that currently needed improvement. As the implementation of the project is still currently under-way, it is too early to achieve accurate measure on most initiatives.

There were two methods that have been used to measure the effectiveness of the initiatives to this date. The first, and at this point the most reliable, has been through interviewing staff who have visited or are now using the Knowledge Management site, and are using the Communication Flow process.

First impressions have been very favourable from staff toward the Knowledge Management Intranet site. Response from all levels have endorsed the principle, and approved of the format and the content. The most common remark to date has been "About time". After the initiatives have been in place for a period of six months, a similar survey to that conducted before the project will be distributed. A comparison of the two surveys in the areas of communications and access to information will provide data on the success of the initiatives in meeting the initial aims.

It was hoped that an early report of the usage of the Knowledge Management Intranet site would be available. Unfortunately similar problems to that encountered with the initial site publication prevent staff still on the NDCG LAN from registering on the reports on the Telstra Intranet. These reports will start to become available early in November.

Chapter 9

Conclusions and Further Work

The project specification in Appendix A gives an outline of what was originally the intention of the entire project. The success or failure of the project can in part be measured against these criteria. These though are not the sole measure of the project's success. There are many aspects to the field of knowledge management, and improvements throughout the organisation in just a few of these can highlight the gains possible using a Knowledge Management framework. This in turn will gain the support of higher levels of management, creating a momentum that can then promote further initiatives.

9.1   Conclusions

This dissertation looked at a great deal of the research that has so far gone into knowledge management. Chapter two defined knowledge and knowledge management, and looked at some of the literature on the subject. The importance that knowledge takes in this knowledge intensive world was highlighted, with economic success often determined by how well an organisation creates and uses knowledge. It looked at the importance of aligning the objectives of a KM framework with the strategic goals of the organisation. The role of the knowledge worker was explained, and how this role fits the Access staff.

Next, the turbulent history of NDCG was looked at, and it was revealed how issues in the past have combined to hinder the sharing of knowledge. It was also shown that what is likely to be occurring in the near future is likely to make a successful KM framework an even higher priority.

Chapter four uncovered the drivers behind the project, and looked at the importance of knowledge as an asset to Access LOB. It showed the numerous roles of the technical specialist, and the financial gains that the creation of new knowledge can bring. The consequences of a lack of knowledge management were also highlighted in the great loss of knowledge the company faced in the few years before this project.

Chapters five and six looked at the initiatives developed during this project to aid in the management of knowledge in the organisation. It was found that the initial aim of the project as defined in the project specification, to develop a system and culture of knowledge sharing, would best be implemented slowly with evidence in chapter seven highlighting the resistance found in some areas. To successfully integrate knowledge management into the organisation, small steps had to be taken. It was found that it was easier to design the processes to fit with workplace culture, and gradually work on that culture, than to try to change the culture from the outset. By generating the involvement of key staff in the process, such as their involvement in gathering the knowledge for the Intranet site, it was easier to elicit support for the initiatives.

The management of this project was dealt with in a similar manner to most other projects in the organisation. There were some difficulties with this. The first was that the project began with no allocated budget, and to very late in the project, there was no defined costing. Most of the work was done outside of normal hours, with very little company involvement. A project of this type would normally have incurred a much greater expense in the early stages.

The second difficulty was the lack of a true end date. There was a set time frame to complete a major portion, and complete this dissertation, but the entire project

has grown, and is likely to become a program of work continuing for a good length of time to come.

Chapter seven also looked at some of the problems encountered, and some areas resisting change. Most of the initial problems encountered were of a technical nature, access to the web-publishing tool being the major. The major area where resistance to change caused a problem was with the communication flow process. This was the major process change that staff would undergo in this project, so it was expected to be an area of resistance. What was surprising though, was that the major resistance came from the technical specialist group.

Although the project is too immature at this stage to measure results, there have been some promising signs. Early opportunities for knowledge sharing have yielded benefits to some of the design areas. The Intranet site has, after a slow start, begun to accumulate knowledge, and has had a very good response from those now aware of it.

Management is now taking knowledge management on board, and it is hoped the improvements gained to this stage are continued throughout the extended life of the project.

9.2   Further Work

Being such a major project, to such a large organisation, there is still a great deal of work to complete implementing all the KM initiatives that have been developed or put forward. Many of the initiatives have been implemented over a smaller region, due to the large amount of information and knowledge needed to be gathered. These will have to be expanded over the entire LOB during the next few months.

There are three areas of continuing work to complete. The first is to extend the existing initiatives over the entire LOB nationally. This will involve:

1. Extending the knowledge audit and knowledge source map nationally.

    Approvals need to be sought from regional managers to enlist the staff required to complete this work. At present due to budgetary restrictions, travel cannot be approved. For this reason, and due to the advantages of the local knowledge of staff, regional staff will gather some of the information, and it will be collated centrally to create the source map.

2. Completing the knowledge process map.

    The knowledge process map is underway for the wide-band process. This will be completed by early November. After an evaluation, similar mapping will be undertaken on other processes.

3. Gathering the information required to complete the local knowledge pages.

    The information is currently complete for the Qld Wide-band Design group. Twenty percent of other knowledge has been transferred to explicit knowledge to be loaded to the pages covering the other regions. This too will require the cooperation of regional management for the resources to gather and document this knowledge.

The second area of work to complete is the introduction of specific measures. Section 8.2.2 outlined the specific measures that are intended to be measured to gauge the value of the system. These measures will be important in engaging the support of management to continue the changes introduced and proposed.

Finally, the introduction of knowledge management is an important step for Access LOB. The beginnings of a KM framework and the position of Knowledge Manager have been created. There will be a continual change process over the coming years to be promoted by both this new position, and management as a whole.

The ground gained in this project will quickly be lost if Knowledge Management is not promoted further, and resourced adequately. To do this, the Knowledge Manager must become the champion of a movement to innovate, share, create, and accept new knowledge.

9.3   The Final Word

As technology improves the ability to share and transfer knowledge, it is expected that we keep up with it. What may have appeared an extraordinary range of knowledge to keep abreast of twenty years ago, is now a requirement of many of the simpler jobs in an organisation. Specialisation is no longer the key to success, and organisations need to be able to meet any new challenge that appears. To do this they must lever as much gain as possible from their knowledge resources.

A comprehensive knowledge management framework is not a luxury for a large organisation. It is now a need. Hopefully this project will be the start of a successful journey, towards a total commitment to knowledge management by NDCG Access Line of Business.

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Appendix A

Project Specification

University Of Southern Queensland

FACULTY OF ENGINEERING AND SURVEYING

ENG 4111/4112 Research Project
PROJECT SPECIFICATION

FOR: ANTHONY DELISSER

TOPIC: KNOWLEDGE MANAGEMENT DEVELOPMENT & IMPLEMENTATION IN NDCG

SUPERVISOR: Dr. Hong Zhou
ASSOCIATE SUPERVISOR: Rod Walke (NDCG / Telstra)

ENROLLMENT: ENG 4111 – S1, X, 2004
ENG 4112 – S2, X, 2004

PROJECT AIM: To develop a system and culture of knowledge sharing amongst NDCG Access staff to improve productivity and quality of work. The project will set in place the means for sharing of technical information throughout the geographically and technologically diverse areas of the company.

SPONSORSHIP: NDCG Access (A section of Telstra Infrastructure Services)

PROGRAMME: Issue A, 04/05/2004-05-04

1. Research information on Knowledge Management, knowledge cultures, business case studies and knowledge sharing techniques.

2. Evaluate current practices employed by NDCG and information availability. (This will include questionnaires to staff and Subject Matter Experts on their opinions of present practices)

3. Evaluate possible methods of information distribution and availability.

4. Develop a prototype web structure for the linking of technological and commercial information that will be readily accessible to staff throughout the section.

5. Source the information required for the Site.

6. Develop a method of distributing new information such as Superintendents Instructions and Technical Documents, ensuring only those who require the information are included, but no-one is left out.

7. Develop a system of Databases to track information flow.

8. Publish Web Site.

If time permits:

9. Analyse Feedback from Website and Information Flow Procedures and modify designs to suit.
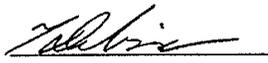
AGREED: _____ (Student) 7/5/04 (Date)
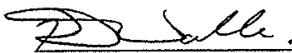
_____ (Associate Supervisor) 10/5/04 (Date)

_____ (Supervisor) __/__/____ (Date)

Appendix B

Communication Flow Process

COMMUNICATIONS FLOW PROCESS

TECHNICAL INFORMATION DISTRIBUTION and TECHNICAL SUPPORT for ACCESS STAFF

(For NDCG Access Staff)

SUMMARY

This document describes the process that has been put in place to control the flow of technical information between the Technical Specialists and the design and construction operatives. It is not a CSD.

AIMS

- Improve distribution of, and access to, existing and new technical documentation, thus ensuring all staff receive the information and knowledge they require to complete their jobs to the required standards.

- To use feedback from the staff to analyse where weaknesses in technical information are, and improve these areas.

- To provide solutions to technical problems as close as possible to the problem, utilising knowledge accumulated through experience and documentation.

ROLES

SME   Subject Matter Expert's (Technical Specialists)

- Review, update, and write technical documentation for use by our design and install staff.

- Develop new products that lead to new sources of revenue for the company.

- Provide high level technical support to other Access staff.

TSC   Technical Support Coordinator, (a new role).

- Link between SMEs and Access design and install staff.

- Distribute all technical information from a mailbox "! NDCG ACCESS TECHNICAL SUPPORT" so that it will be easily identifiable as technical information.

- Contact point for requests for technical support.

LTS   Local Technical Support (a new role).

- Each work area (may be per site or for large sites per technology in a site) will have someone allocated as the "LTS". Their role will be like a local tech specialist. It is envisaged that this person will be a WTL or Experienced Team leader. Project Manager is to allocate the staff.

- All new technical e-mails will be distributed through this person by TSC. LTS has to identify if it is relevant to their particular workgroup, and if so distribute locally.

- LTS will assist with level 1 escalations of technical problems.

- In many cases someone is already performing these tasks. This will formalise the role.

- This person will need to take some time from other current duties to perform this role. It is intended this will be compensated for by better and quicker technical support for the remaining operatives, and better productivity.

Access Design and Construction Operatives

- Design and install services for our customers in accordance with the current technical standards.

- Provide feedback to their LTS about problems encountered.

- Escalate technical issues when necessary.

PROCESS

Distribution of Technical Information

There is currently a large amount of technical information available. It is not always easy to find, and it is even harder to keep up to date. It is found in the form of CSDs, Bulletins, Work Package Instructions (formerly Superintendents Instructions), Access Technical News, Telstra documents. The diagram below shows the path of information flow is shorter and more reliable that in previous systems, where the project director and project manager were in the distribution chain, and information should be released to operatives faster.
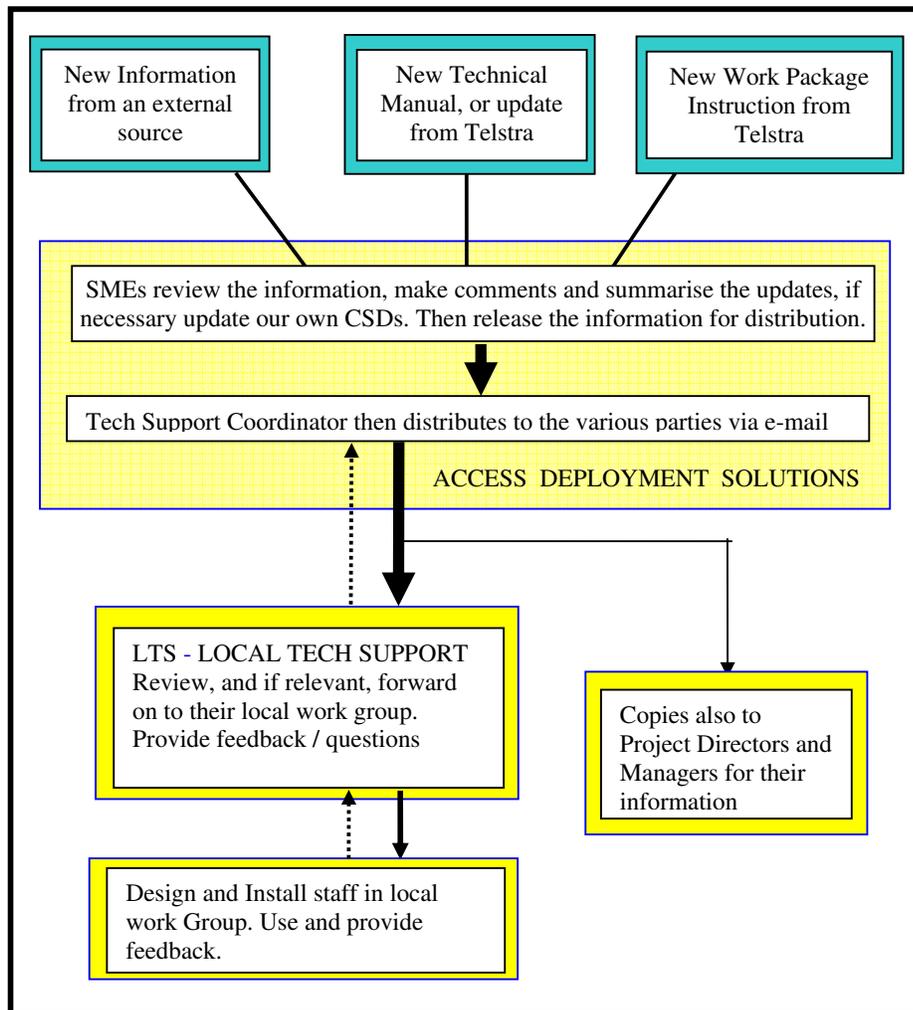
Figure B.1: Technical Documentation Flow

Who is my LTS?

An LTS is appointed to look after each local work group. There may be one in your office or depot, they may be remote, or they may be several in large offices or depots, who deal with different groups of people. A list is available via the Intranet at the following site.

http://www.in.telstra.com.au/ism/ndcgaccesstechinfo/localtechnicalsupport.asp.

If you find that you are not receiving the information that you require for your role, contact your LTS. If you do not know who your LTS is, and the table at the link above does not help, contact the Technical Support Coordinator found at the above site.

PROCESS

REQUEST FOR TECHNICAL SUPPORT

When the information in technical documents is not enough, or if faults or special circumstances exist then technical support is required.
The aim is to give all staff access to technical support to assist with their problems, but also to solve problems at the lowest level possible.
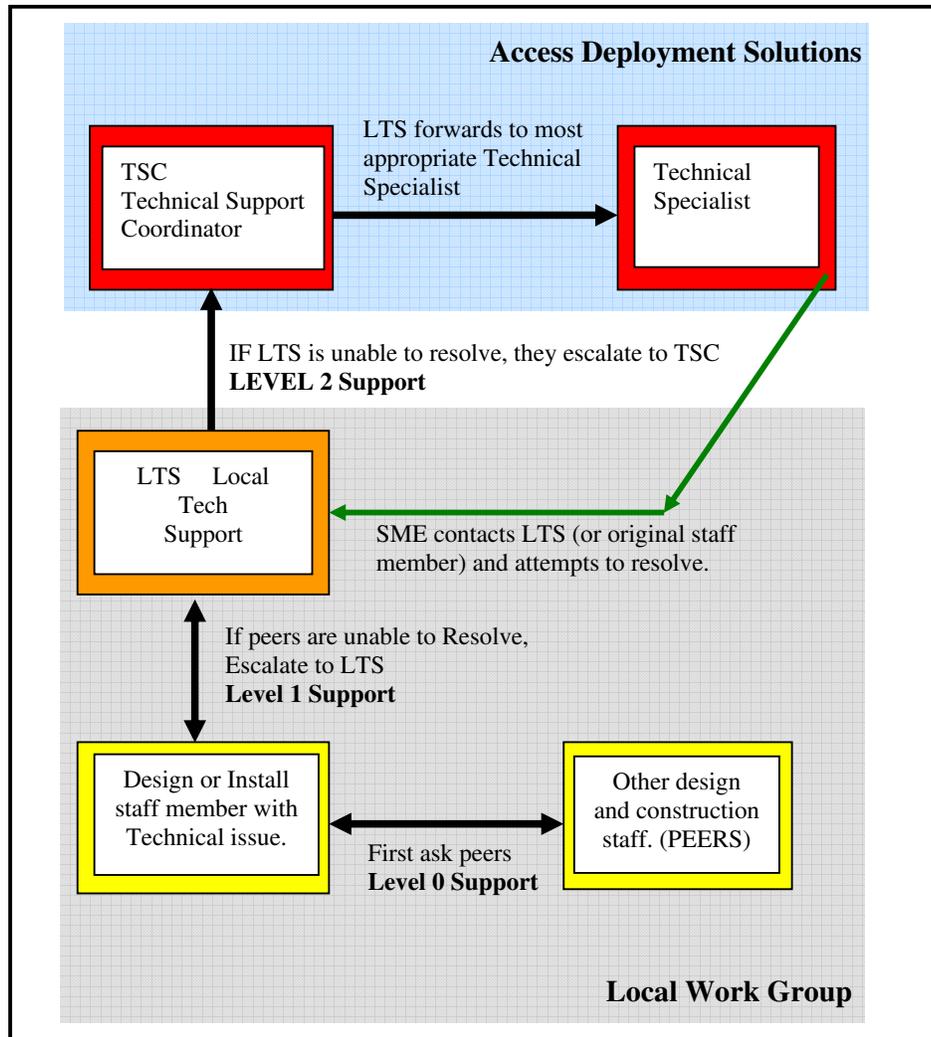
Figure B.2: Technical Support Process.

When to escalate?

Sometimes the first person to experience technical difficulty will spend too long trying to solve the problem before seeking assistance. The following table is a *GUIDELINE* only, as to when to escalate.

Don't spend too long on something that may be able to be resolved quickly by escalating.

Table B.1: Escalation Table

WH0	DOES WHAT	ESCALATE TO	WHEN
Design or Construction Operative encounters an issue. (Originator)	The operative should try to resolve the issue on their own using technical documents and their own knowledge.	Peers Level 0 Support	If you can't resolve the issue by yourself within 1 hour
Peers and Originator	Try to solve together using technical documents and knowledge.	LTS – Local Tech Support Level 1 Support	Within the next hour
Originator and LTS	Try to solve together using technical documents and knowledge.	TSC – Technical Support Coordinator Level 2 Support	When LTS feel that he needs to, or after 4 more hours
Technical Specialist / SME and Originator or LTS	Work together to resolve the issue, under the lead of the technical specialist	Escalate to Telstra, Vendor or the author of the responsible document if it is a documentation problem.	At the point where it is known it cannot be dealt with in-house.

How to escalate?

Level 0 - Phone or speak to your peers face to face.

Level 1 - Phone, E-mail or speak face to face with your LTS

Level 2 – The LTS is to use the Intranet E-mail template. If no access to the Intranet or E-mail is available, then phone a peer who has access to E-mail, or phone the TSC using the details given on the LTS Intranet page mentioned earlier. The TSC can input the form. Do not call Technical Specialists directly unless it is for an update on an already open case.

What happens next?

1. The "Request for Technical Support" is received by the TSC, who reads and inputs it to the database. They then allocate it to the technical specialist most appropriate to assist, taking into account technology type, location and who is available. A case number is generated and is supplied to the sender.

2. The technical specialist then phones the contact number from the request and works with them to try to resolve the problem.

3. The case remains open until it is resolved.

4. The technical specialist updates the database with information about the progress and resolution of this case.

5. When resolved, the technical specialist closes the case. The data forms part of the records of cases resolved and can be used to help identify common issues so their source can be examined and addressed.

Why make it this complicated?

The overall aim is to improve the technical knowledge of our work force. We need to formalise the technical support system to be able to use it to gather data to assist in this overall aim. Other problems were that staff were calling particular technical specialist who may be on leave, or busy with some other project and therefore cannot assist as quickly as we'd like to. This system will allocate to someone who **IS** available to assist now.

Appendix C

Request for Technical Support Template

Request for technical support - Message

File Edit View Insert Tools Compose Help

Reply Reply to All Forward

Message | Options

From: Morrissy, Thomas A
To: ! NDCG ACCESS TECHNICAL SUPPORT
Cc: Damiani, Zeno; Ducaine, Jeffrey V
Subject: Request for technical support

Sent: Thu 26/08/2004 09:41 A

Request for tech support

Brief Description:

New Invensys Power Supply IMPS4D5 (274/00648) alarm wiring not described in document TM00123 A04 issue 3

REQUEST TYPE: assistance needed

SENDER - Surname: Morrissy   SENDER - first name: Tom   SENDER - postcode: 5037   SENDER - contact no.: 0417 662 704

Received: 26/08/2004 09:41 AM   CASE number:

Detailed description:

A question has been asked about the new Invensys Power Supply subrack that is used in Sitelight applications.The alarm wiring diagram on page 7 of the manual is vastly different to the Rectifier alarm (274/442) wiring which is covered on page 89 of TM00123 A04.
The input in numerical order are different as well as :Load volts out of limits instead of high/low volts commoned together;Battery volts abnormal instead of high/low float commoned together;Battery and Load CB fuse fail instead of Fuse Fail and an alarm called Monitor Fail.
  Is there an update that describes these changes particularly what to do with the new Monitor Fail input?
This was brought to my attention by Zeno Damiani who installed Sitelight at ZXWD,his phone is 0408 831 502.

Progress / resolution:

Figure C.1: Technical Support Request email template. This template shows the information field staff enter to provide the technical specialist with the information required to provide assistance.

Appendix D

Knowledge Management Intranet Website

Site Map

Home
Information on the Site

Local Knowledge Pages
Local Knowledge Documentation

      Qld Local Knowledge Page
      Local Knowledge documents from NDCG Access LOB - Qld
      NSW Local Knowledge Page
      Local Knowledge documents from NDCG Access LOB - NSW
      Vic/Tas Local Knowledge Page
      Local Knowledge documents from NDCG Access LOB - Vic/Tas
      Western Region Local Knowledge Page
      Local Knowledge documents from NDCG Access LOB - Western Region
      Audit/DBoRs Group
      Information regarding Auditing and DBoRs

Technical Documents
NDCG Access Technical Documents

Project Management
Project Management Information Page

Frequently Asked Questions
Frequently Asked Questions

Technical Support Process
NDCG Access LOB Technical Support Process

Local Technical Support
List of Local Technical Support Staff

Useful Links and Information
Links to Telstra Intranet Site with useful content

Special Projects
Information relating to special projects within NDCG Access LOB
      NSW DET Schools Project
      Information relating to the NSW DET Project

Site Map
Site Map

Contact Us
Contact & Feedback page
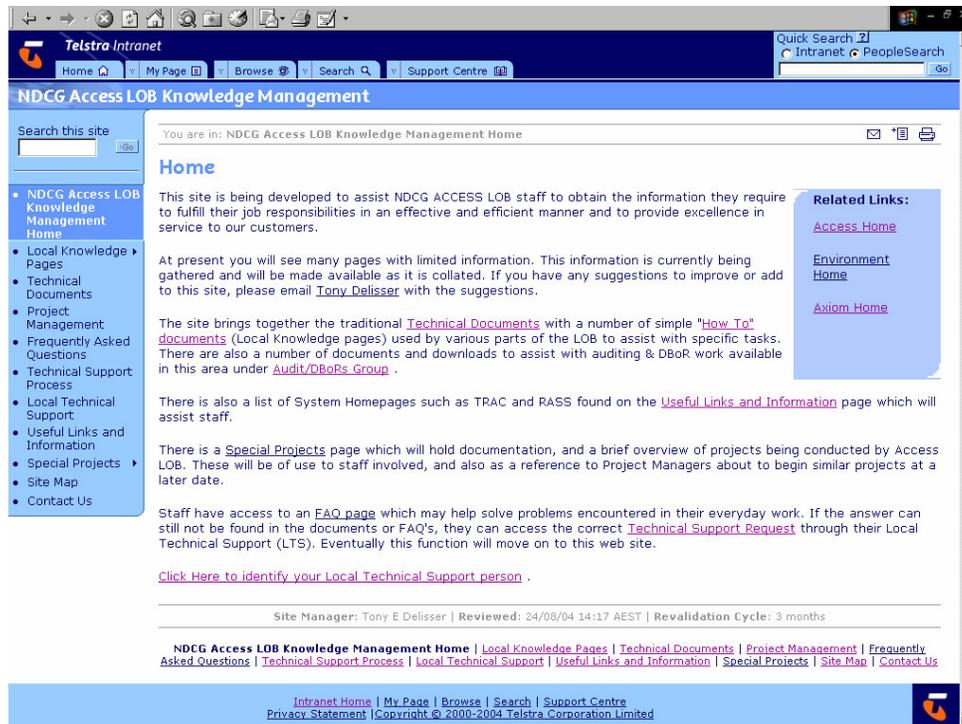
Figure D.1: Knowledge Management Intranet Site Home Page. Links are from here to each of the pages on the site in logical sequence in the left margin field.
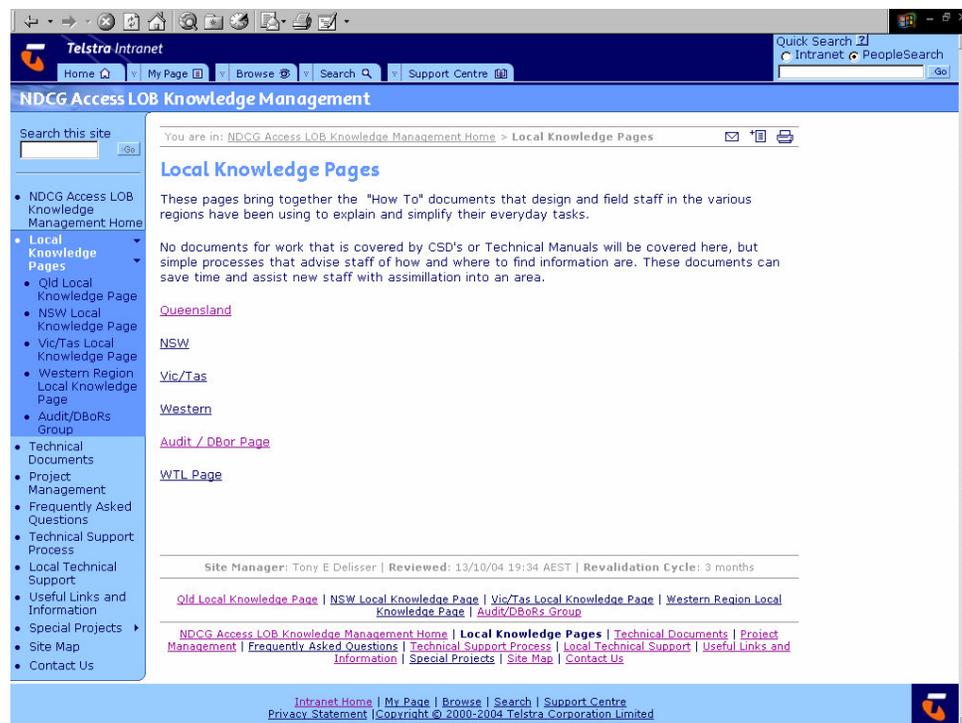
Figure D.2: Local Knowledge Page. This page links to the local knowledge pages for each state.

Figure D.3: Qld Local Knowledge Page. This page contains links to sites needed by Qld staff, and informal work documents staff use to make their work easier.

Figure D.4: DBor/Auditing page. This page provides the information staff use to correctly enter data into DBoRs, and to self audit. It also provides up to date quality reports from the auditing group.

Figure D.5: The WTL Page provides links to the sites the WTLs require in their daily duties leading teams. These include Safety, HR, Environment and contact lists.

Figure D.6: Technical Documents Page. This page gives users links to the five sites that contain technical documents relating to Access LOBs work.

Figure D.7: Technical Support Page. This page provides staff with details on the technical support process, the roles of the LTS & TSC, and a copy of the Request for Technical Support email template, and a list of all LTSs.

Figure D.8: The Useful Links & Information Page links staff to the various home pages of the systems they use, the databases used, and some downloads available to assist their work. It also provides information on the services that staff are providing. This information has previously been unavailable to staff in this short form, and is invaluable in presenting a competent appearance to the customer.

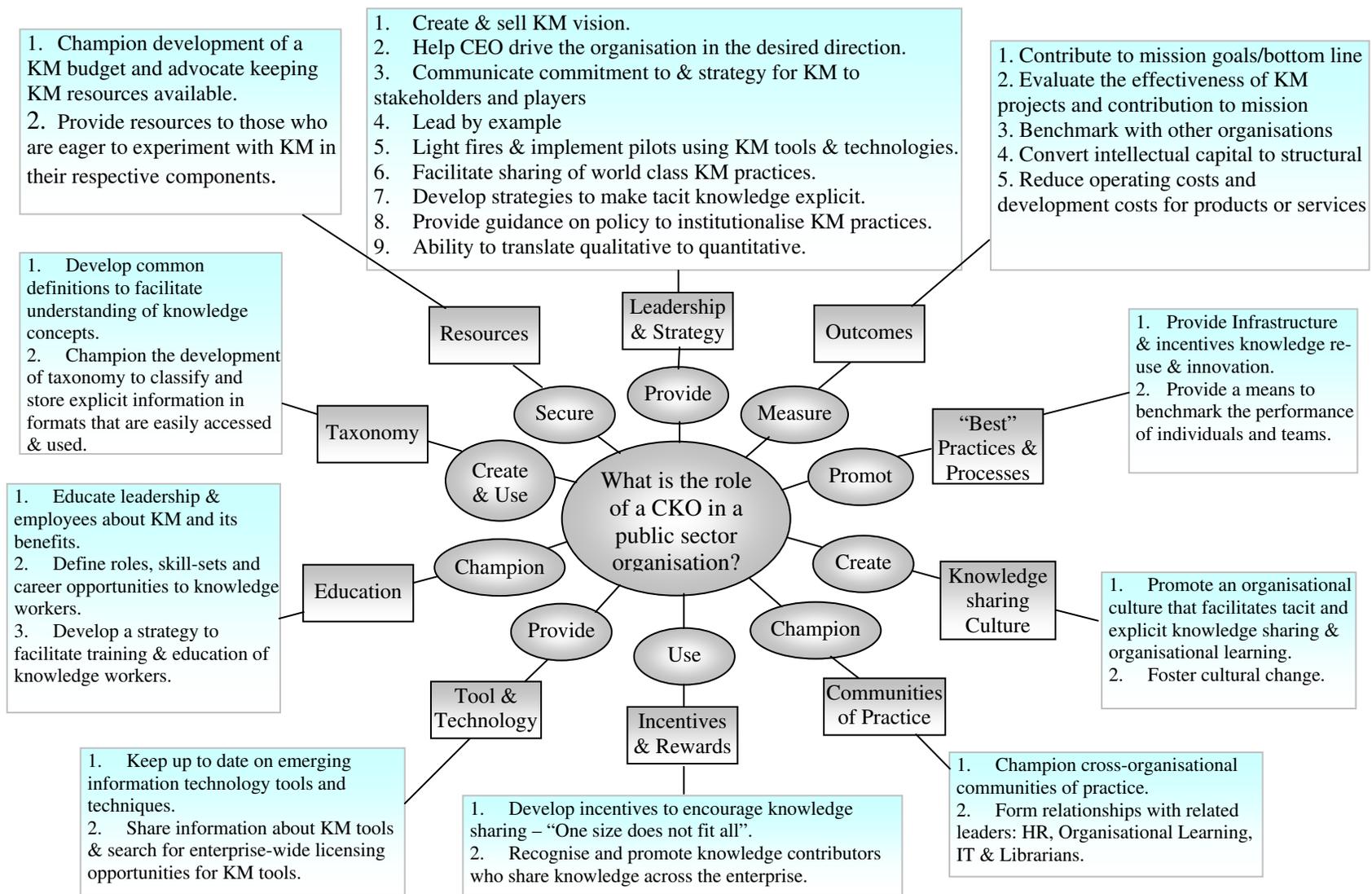**Figure D.9:** The Special Projects pages give staff the project specific information they require for large projects. This allows non-standard processes to be published in an area that won't see them used for other projects.

Figure D.10: Contact/Feedback Page. This allows users to give feedback on problems or possible improvements to the site.

Appendix E

**The Role of the Chief Knowledge Officer
(Knowledge Manager)**

1. Champion development of a KM budget and advocate keeping KM resources available.
2. Provide resources to those who are eager to experiment with KM in their respective components.

1. Create & sell KM vision.
2. Help CEO drive the organisation in the desired direction.
3. Communicate commitment to & strategy for KM to stakeholders and players
4. Lead by example
5. Light fires & implement pilots using KM tools & technologies.
6. Facilitate sharing of world class KM practices.
7. Develop strategies to make tacit knowledge explicit.
8. Provide guidance on policy to institutionalise KM practices.
9. Ability to translate qualitative to quantitative.

1. Contribute to mission goals/bottom line
2. Evaluate the effectiveness of KM projects and contribution to mission
3. Benchmark with other organisations
4. Convert intellectual capital to structural
5. Reduce operating costs and development costs for products or services

1. Develop common definitions to facilitate understanding of knowledge concepts.
2. Champion the development of taxonomy to classify and store explicit information in formats that are easily accessed & used.

1. Provide Infrastructure & incentives knowledge re-use & innovation.
2. Provide a means to benchmark the performance of individuals and teams.

1. Educate leadership & employees about KM and its benefits.
2. Define roles, skill-sets and career opportunities to knowledge workers.
3. Develop a strategy to facilitate training & education of knowledge workers.

1. Promote an organisational culture that facilitates tacit and explicit knowledge sharing & organisational learning.
2. Foster cultural change.

1. Keep up to date on emerging information technology tools and techniques.
2. Share information about KM tools & search for enterprise-wide licensing opportunities for KM tools.

1. Develop incentives to encourage knowledge sharing – "One size does not fit all".
2. Recognise and promote knowledge contributors who share knowledge across the enterprise.

1. Champion cross-organisational communities of practice.
2. Form relationships with related leaders: HR, Organisational Learning, IT & Librarians.

Figure E.1: The role of the Chief Knowledge Officer in a Public Sector Organisation. (Bennet & Neilson 2003)

Appendix F

Project Implementation Plan

Network Design & Construction Group

Project Management

Project Implementation Plan.
Access Line of Business
Knowledge Management Development and
Implementation

Prepared By:-   Approved By:

— Original Document Signed   — _____

Name: Anthony Delisser   Name: Norman Payn

Project Manager   Project Manager

Implementation Date: 17/05/2004

Table of Revisions
Completed PIPs to be issued from Issue 1.0.

All issue numbers to be retained for document control purposes]

Issue No.	Issue Date.	Comments	Issue Author
0	10/10/2001	Document Created	
0.1	12/12/2001	Minor amendments	Matrix Administrator
0.2	07/06/2002	Modifications due to D. Price feedback	Anthony Felice
0.3	26/08/2002	Response to CAR #499 & #524: Modifications to Annex List table & Document Approval table	Anthony Felice
1	17/05/2004	Issue	Anthony Delisser
2	08/09/2004	WPI Database removed from project	Anthony Delisser

TABLE OF CONTENTS

1. INTRODUCTION

This is the Project Implementation Plan (PIP) for the development and implementation of a Knowledge Management system throughout the Access LOB.

2. STAKEHOLDER MANAGEMENT

STAKEHOLDER	NEED	MANAGEMENT PLAN
WTL / Staff	Information & Knowledge to do their jobs.	Intranet Site Information Distribution Process Technical Support Process
Technical Specialists	Responsibility more low-level queries removed.	Technical Support Process
PM	Staff have the information they need to do their jobs	Intranet Site Communication Flow Process Knowledge Management
PD	Staff have the information they need to do their jobs	Intranet Site Communication Flow Process Knowledge Management
LTS / TSC	Documented Processes	Communication Flow Process

3. OBJECTIVES

3.1 Project Implementation Plan Objectives

This Project Implementation Plan (PIP) outlines how the project is intended to be managed to its completion.

This PIP is the mechanism to disseminate project information from the Project Officer to the Project Team.

3.2 Project Objectives

This Project focuses on 3 main objectives.

- To set in place a process that relieves the technical specialists of the responsibility of solving the minor technical queries in the section, yet continues to provide an efficient process for the resolution of all queries.

- To provide staff with a means of finding information easily, and sharing with others the knowledge they have acquired through years of experience.

- To assist Roadmap and other initiatives in the establishment of national "best practice".

4. SCOPE

4.1 Project Objectives

To complete this Project on time and on Budget, and to also meet all of managments requirements.

4.2 Scope of Works

A Knowledge Management system is to be developed and implemented throughout the Access LOB. The various parts of the system are broadly scoped as follows.

- The development and introduction of the Information Distribution Process.

- Formulation of the process.

- Approval of the process.

- Introduction and acceptance of the process.

- The development and introduction of the Technical Support Process.

- Formulation of the process.

- Approval of the process.

- Introduction and acceptance of the process.

- The creation of a Knowledge Management Intranet site, to provide information and knowledge to the Access LOB staff.

- Completion of Telstra Intranet Accreditation.

- Design of the site.

- Gathering information for the site.

- Building the site.

- Advertising and promoting the site.

- The integration of this Intranet site into the everyday use of Access LOB staff.

- Developing a long-term plan for the upkeep and continual improvement of the site.

- WPI database construction.

5. PROJECT TEAM STRUCTURE

The Project Team consists of those staff delegated responsibility to assist the Contract Implementation Manager in achieving the objectives of this project (ie delivering the completed project to the Customer).

Project Management	Design	Construction & Integration
Project Manger **Anthony Delisser**	Designer Team Leader **Anthony Delisser**	Work Team Leader **Anthony Delisser**

6. RESPONSIBILITY ASSIGNMENT MATRIX (RAM)

The RAM assigns responsibilities to staff for managing and delivering each activity within a Work Package.

Project Management	Design	Construction & Integration
Project Manager **Anthony Delisser**	Designer Team Leader **Anthony Delisser**	Work Team Leader **Anthony Delisser**

7. DOCUMENTATION MATRIX

The Documentation Matrix identifies the output documentation that will be produced for each activity associated with each product.

Project Management	Design	Construction & Integration
PIP Dissertation	Communication Flow Process Intranet Web Site Dissertation	Intranet Web Site Dissertation

8. HANDOVER DOCUMENTATION

8.1 Completion Advice (NDC Internal use only).

The Project Manager shall advise the Project Director at each milestone of the project. Project completion reports will be provided if required.

9. SCHEDULE AND KEY MILESTONES SUMMARY

The project schedule will be detailed in Appendix A and maintained by the Project Manager.

Key Milestones

Task	Timing
Introduction and acceptance of the Communication Flow Process	As per Appendix A
Publication of the KM Intranet Site	As per Appendix A
Completion of Qld Local Knowledge Pages	As per Appendix A
Completion of National Local Knowledge Pages	As per Appendix A
Completion of the WPI database.	Removed from Project
Knowledge Source Map	As per Appendix A
Knowledge Process Map	As per Appendix A

Annex A.   Schedule

Milestones

Completion of LTS list	Jun 2004
Publication of Intranet Site	Jul 2004
Technical Documents Page	Jul 2004
Useful Links & Information Page	Aug 2004
Qld Design Local Knowledge Page	Sep 2004
DBoR/Audit Page	Sep 2004
All Qld Local Knowledge Page	Oct 2004
National Local Knowledge Page	Dec 2004
WTLs Page	Oct 2004
Knowledge Networks (Design Review Forum)	Sep 2004
Acceptance & use of the Comm. Flow Process	Oct 2004
Knowledge Source Map	Oct 2004
Knowledge Process Map	Nov 2004

Milestones associated with ENG4111/ENG4112

Project Specification	*22 Mar 2004*
Project Appreciation	*17 May 2004*
Extended Abstract	*25 Aug 2004*
Project Conference	*20 Aug 2004*
Project Completion	*28 Oct 2004*