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Effective Knowledge Management System Implementation in Small Organisations.

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Effective Knowledge Management System Implementation in Small Organisations.

Orna Nicholl

A dissertation submitted in partial fulfilment of the requirements of
Dublin Institute of Technology for the degree of
M.Sc. in Computing (Knowledge Management)

July 2012

I certify that this dissertation which I now submit for examination for the award of MSc in Computing (Knowledge Management), is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

This dissertation was prepared according to the regulations for postgraduate study of the Dublin Institute of Technology and has not been submitted in whole or part for an award in any other Institute or University.

The work reported on in this dissertation conforms to the principles and requirements of the Institute's guidelines for ethics in research.

Signed: _____

Date: *16 July 2012*

1 ABSTRACT

Much of the key research in the field of Knowledge Management carries an inherent set of assumptions as to the nature of the organisations under investigation, such as the fact that the organisation is a large one. As a consequence of this, Knowledge Management papers tend to focus on the distinctions such as: management-led initiatives versus grassroots initiatives, and the importance of inter-departmental communications, but for smaller organisations these types of issues are minimised or completely absent.

This project will look at models and techniques from the existing body of Knowledge Management literature (with its focus on larger organisations) and look at how these approaches may need to be modified for smaller organisations and teams. A number of techniques will be investigated, and a smaller number will be fully developed specifically for the (small) target team based on their needs.

A preliminary survey will be undertaken of employees in organisations with already working Knowledge Management systems to investigate the validity of a range of approaches, and research in the area will be used to choose the specific technique(s) to be applied to the target smaller team. One potentially fruitful approach that will be investigated will be the new available range of visualisation techniques, in an effort to impart a sense of ownership of the Knowledge Management system to the employees in the organisation.

The usage of the developed system will be monitored and the visualisation techniques assessed through interviews with the employees who used them. Finally, the results of the implementation will be examined under a wide range of conditions, such as the scope of the system, accessibility, the emotional response of the employees and the continued usage over a sustained period of time.

Key words: *Knowledge Management, SME, Visualisation Technique, Knowledge Mapping, Implementation*

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1. INTRODUCTION

1.1 Introduction to Knowledge Management

Knowledge Management has many definitions, some of which are discussed in this study, although it is still a growing field. Essentially it is the study of how to effectively manage the knowledge (in an organisation). Knowledge itself can be an elusive idea, and so this too must be defined.

1.2 Background

Knowledge and Knowledge Management are areas of research concerned with the knowledge that *people* have. The studies are based around how people react to learning, sharing and creating ideas. It can also be concerned with the effects of implementing new changes in an organisation, in order to integrate a Knowledge Management System.

Visualisation is another field of study which is strongly connected to *people*. Visualisation is the study of how information or knowledge can be presented (visually) so that *it can be understood*. These two branches of research, interconnected, can in fact complement each other, when for instance visualisation techniques can help create new knowledge.

1.3 Research problem

Much of the research that has been carried out in the field of Knowledge Management to date is based on large organisations, with access to expansive resources. Smaller organisations often do not have the same opportunities to research, and make mistakes, in this emerging field. Smaller companies are in a position where it is more critical to complete the tasks correctly the first time.

To this end it is helpful to be able to examine the lessons learned from larger organisations and corporations, and identify those aspects which can translate to the small company.

Visualisation techniques could be used to further help this study, in order to speed up the process of learning a new system, or become familiar with new processes.

1.4 Intellectual challenge

The challenge of this research is to examine whether visualisation techniques have an effect on the people who are involved with the implementation of a new Knowledge Management System.

1.5 Research objectives

The objectives are to monitor the implementation of a new Knowledge Management System, and identify any effects that visualisation techniques may have on the implementation.

The following objectives have been achieved throughout the dissertation and contributed to the overall outcome:

1.6 Research methodology

The methodologies to be used are qualitative and quantitative; several case studies on previous implementations will be researched and a survey on the results of those case studies carried out.

1.7 Resources

Compufast Software Ltd is the test company, where employees will be asked to start using the new Knowledge Management System, some of whom will be using it through the visualisation techniques, and some will not. Full permission has been given for this testing.

1.8 Scope and limitations

The limitations of this research are that the company is particularly small, and so the results cannot be exhaustive. A control group and a test group of users will be used, so that comparisons can be drawn up, but the total number of users will be less than 10.

Due to the small number of users as well, the time periods in which the experimental research can be carried out are limited, since an absence of one employee makes up a substantial loss to the group.

1.9 Organisation of the dissertation

Chapter 2 will look at the basic tenets of Knowledge and Knowledge Management, specifically in industry today, what knowledge is and what it means to businesses. Knowledge Management was examined in light of three factors: People; Processes and Technology, where the ratio is shown to weigh heavily in favour of People involvement. A number of benefits that a Knowledge Management System can bring to a company were also examined.

The implementation of Knowledge Management Systems will be examined, specifically looking at possible reasons for unwillingness in employees, and methods to overcome this. Finally, implementation of Knowledge Management systems will be again examined, relating to private sector companies, large and small.

Chapter 3 will examine a small selection of Knowledge Management Systems that are available for use in organisations today. Several features of the systems are to be highlighted, as are the benefits and drawbacks. The contrasting requirements of companies of various sizes will be mentioned, with the note that any decision to buy in to a Knowledge Management System should be based on these requirements.

Communities of Practice will also be examined, as they are a process by which Knowledge Management is enabled, although not an example technological system. The motivation for joining Communities of Practice, as well as, again, the various benefits and drawbacks will be discussed.

Chapter 4 will focus on Change Management and Organisational Behaviour, with an effort to highlighting methods of easing the change structures in an organisation.

Chapter 5 looks at Visualisation and the various techniques which are available for use today. Knowledge Mapping will be highlighted specifically, but Knowledge Audits and Flows will also be mentioned.

In Chapter 6 various research methods are examined, including qualitative and quantitative research. Background information on the company in question, Compufast Software, and the system to be used, Drupal, will also be discussed. The basic requirements for Drupal will need to be identified for the system to be successful.

Chapter 7 will re-examine the company, Compufast Software, in terms of the knowledge that needs to translate to the knowledge management system. The system Drupal will be designed, the various modules set up and the user interface modified. Users will be assigned roles so that their usage can be monitored effectively.

This chapter will also contain the research side of the experiment; the quantitative research of the case studies. The results from this study will be compiled in tables, so that the most positive effects can be easily identified.

Chapter 8 will contain all the relevant data results. These will be discussed in terms of the quantitative research, and also the control group and test group, so that there will be two viewpoints of the outcome.

Finally, in Chapter 9, conclusions may be drawn up about the research, and any recommendations for further research can be made.

2 KNOWLEDGE MANAGEMENT IN ACTION

2.1 Introduction

Knowledge is a fluid mix of the key components of knowledge, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information (Davenport & Prusak)

It is generally accepted that there are many forms of knowledge, with the two main classifications being implicit and tacit. “Explicit knowledge can be expressed in formal and systematic language and can be shared in the form of data, scientific formulae, specifications, manuals, and so forth.” (Nonaka et al., 2001)

Tacit knowledge is a much more elusive form of knowledge, existing in the minds of people, and often very difficult to extract from those minds and articulate. Tacit knowledge could even be described as hidden knowledge, as sometimes people are not even aware they possess the knowledge. However everyone possesses some explicit and some tacit knowledge, with Nonaka producing the relationship between the two in the Knowledge Spiral in 1995. The spiral shows how a person’s knowledge evolves, as they move through the four quadrants: Socialisation; Externalisation; Combination; Internalisation. This represents the learning process, the creative and discovery process (when people essentially create knowledge by coming up with new ideas), and sharing knowledge. People the world over go through these processes constantly, but the field of Knowledge Management has arisen and evolved to maximise the impact of knowledge, and the value associated with it, for the use of an organization.

2.1.1 Knowledge Management

There are many definitions of what “Knowledge Management” is, depending on the source, and the audience. The phrase itself first came about in 1993 by Karl Wigg, at a conference based around knowledge, how it is created, and how it is disseminated throughout organisations. Several definitions are outlined below:

“Distinct but interdependent processes of knowledge creation, knowledge storage and retrieval, knowledge transfer and knowledge application.” (Alavi and Leidner 2001)

“Focuses on defining the knowledge employees or systems used to perform activities and saving it in some format so that others can access it.” (BPTrends 2008)

“KM is the process through which organizations generate value from their intellectual and knowledge-based assets. Most often, generating value from such assets involves codifying what employees, partners and customers know, and sharing that information among employees, departments and even with other companies in an effort to devise best practices.” (Levinson, M. 2007)

“The goal of KM is to encourage and control the knowledge sharing” (Menken 2009, p. 17).

Although so many definitions can cause the lines to be blurred in this discipline, it nevertheless plays a substantial role for organisations today. Managing the knowledge within an organization and exploiting it to its full and complete potential should show many benefits for the organization. According to Clark and Rollo (2001) 42% of corporate knowledge is held within the employees' minds. This is, relatively speaking, a rather high statistic, as up until quite recently the focus has been on tangible assets (property, hardware, production etc). As modern society's needs are changing, the focus is shifting and today's organizations are much more than the sum of their assets. However upon further reflection on the requirements of most organisations to function, and the effect or impact on an organisation should the knowledge be removed, this number is perhaps lower than could be expected.

Knowledge Management aims to transform the tacit knowledge in employees' minds into a tangible asset (albeit not as tangible as a building). By accessing that extra 42%, somehow keeping it in a location external to their minds, and possibly making it available to the entire organization, the organization should benefit hugely. And so Knowledge Management projects include methods of knowledge acquisition and elicitation, to extract the knowledge from the expert employees, as well as implementation of software to store and share the knowledge.

2.1.2 KM Perspectives

Knowledge Management should be assessed in terms of three separate sections- People, Processes, Technology- a common categorisation in many Management disciplines, as discussed by Chen and Popovich (2003). According to Bhatt (2001), the ratio of these three factors should be 70% People, 20% Process and only 10% Technology.

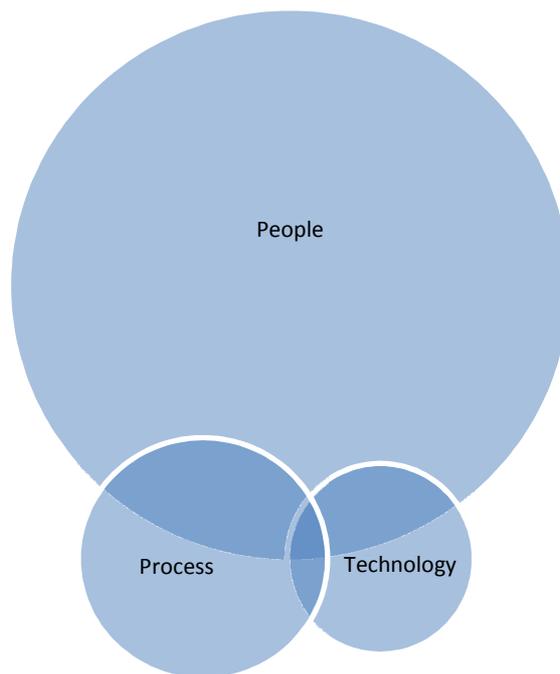


Figure 1. People Process Technology

1.1.1.1 Technology

The technology aspect of Knowledge Management is highly important and beneficial. Technology is the means with which organisations are able to store and disseminate all the information they have captured. Current technologies can provide secure, scalable, efficient systems, which can be integrated into many systems that organisations already operate. Examples of some of these systems are examined later.

1.1.1.2 Process

Processes describe the methods that are used at different stages in the Knowledge Management process. By organising knowledge correctly, it will be more easily stored as well as searchable. But more importantly, processes such as Knowledge Audits can identify gaps in the knowledge in an organisation, allowing time and effort to be spent in those areas to close those gaps.

1.1.1.3 People

If Technology makes up the “what”, and Process makes up the “how”, then People ties everything together. People are the single most important aspect to any Knowledge Management system, since knowledge inherently comes from people. A system requires all parts to exist, but the level to which people are included will have the largest impact on the eventual outcome. Where more people are consulted early on in a Knowledge Management project, more returns can be seen.

What this means in terms of the Research Question at hand, is that the people involved will have a larger impact than the choice of software, or the specific processes implemented.

2.1.3 KM Benefits

There are many benefits to implementing a Knowledge Management System in an organisation today, including higher workforce morale, greater corporate coherence, and richer knowledge stock (Davenport and Prusak 2000).

Other benefits include:

- Avoiding redundant effort
- Avoid repeating mistakes
- Take advantage of existing expertise & experience
- Making individuals more effective
- Making teams more effective

However there are drawbacks, such as high overhead and the lack of clear, measurable returns, which can prevent many businesses from investing in Knowledge Management Systems.

2.1.4 KM Implementation

Implementation of the Knowledge Management system is a difficult step for any company: introducing a new Knowledge Management System is a huge adjustment for any organisation, and change management must be handled accordingly. The implementation of a KM system has a greater effect on the day to day activities of many employees than most other system implementations; it is a greater than average change. The theory behind knowledge management systems shows that they do have many positive effects on organisations (Gray, 2000), but the discipline as a whole suffers when companies are not able to implement the change effectively. With successful implementation, a knowledge management system should be able to provide stability and innovation, as showcased in the compilation of Knowledge Management Case Studies, compiled by Davenport and Probst (2002).

The biggest issues that companies face when trying to implement a KMS is the attitude of the employees of the organisation. Many employees resist the new KMS for a number of reasons:

- Unwillingness to give up their information (a belief that knowledge is power)
- Unwilling to put time or effort into a separate project which does not reveal immediate results for the employee concerned
- Fear that by outlining exactly what knowledge a person has, it will only highlight what knowledge they do not have (which they believe they are already supposed to have)
- Typical issues of people's negative reaction to change.

Once, or indeed if, a KMS has been implemented successfully, it can often only remain effective for a short period of time; after the initial impetus and momentum of installing some new application has worn off, people can revert back to their old ways. In many of the large organisations this is dealt with by employing a full time

Knowledge Manager, who can oversee, or “champion” the KMS. Unfortunately this is a constant drain on resources, and is simply not feasible for many smaller organisations. Without a full time champion, the KM *procedures* themselves fade away, and companies may just be left with a dormant application.

2.2 KM in Companies Today; The Private Sector

Knowledge Management is still very much a growing field, with most successful Knowledge Management systems belonging to large, multi-national companies with extensive resources to put into the project. Although even for companies with huge resources, successfully implementing a KM system can be very difficult.

Implementing a Knowledge Management System can be a very difficult procedure, and many organisations can be unwilling due to the following reasons:

- Organisations “do not know what they know”; it is extremely difficult to keep track of the knowledge that many employee’s store on the personal PC’s, let alone what is stored in their minds (oftentimes, they themselves are unaware of what they know as well)
- Each employee is equally unaware as to what knowledge their colleagues have
- The loss of knowledge when employees leave an organisation- whether it is to a different company, department, or even office- can leave gaps of knowledge behind. It is left to the remaining employees to bridge this gap, but this results in a loss of efficiency while new people are trained in.
- In many workplaces, people are unwilling to share the knowledge that they have, for fear that it will make them less necessary to the job at hand. When employees believe that it is “what they know” that makes them crucial to the team, rather than their ability to carry out work, it means that knowledge sharing is to be avoided at all costs. This kind of atmosphere is, needless to say, detrimental to a knowledge management system.

Instead, people should be encouraged to share ideas and knowledge, leading all employees in to the “Knowledge Creation” side of the Knowledge Spiral.

1.1.2 Methods to Overcome this- Grass Roots

While many leading organisations worldwide are working to overcome these issues within their own organisations, smaller sized companies, with smaller budgets, will find it difficult. In his discussion of methods to integrate a KM system in the Public Sector, Sinclair (2006) speaks about “Stealth KM”. It must be positioned “*as just another part of good business management practices*”. Sinclair says there is “*no such thing as a supportable standalone KM strategy*” and that any system should “*keep it functioning the way it always has done, at a grass roots level*”. Indeed, this is no different to how IT in general should be viewed; at times many organisation can get carried away with implementing a new system which will “do wonders” for efficiency and productivity, but when the balance between “IT supporting the company’s needs” and “the company supporting IT” is tipped, IT projects fail, the company loses, and morale decreases. This is especially true when implementing a KM Project, where the results are harder to measure than in most IT projects.

However, when implemented correctly, KM projects can be seen to show high returns, as in the Siemens ShareNet case study, where engineers in South America used knowledge previously discovered by their colleagues in the Senegal, resulting in savings of up to \$1 million. (Davenport, Dous and Voelpel 2005 p12)

1.1.3 Encouraging Knowledge Sharing

According to Figallo & Rhine (2002), there are three essential aspects which contribute to a Knowledge Sharing Culture:

1. Trust

This is obviously needed so that employees feel able to share their knowledge in the first place, meaning that employees will not be criticized for any contributions, and that other employees will not “take” their knowledge.

2. Tolerance

Tolerance has to do with the organisation's response; in the event that sharing knowledge brings to light areas that employees are unhappy, or seek improvements from the organisation, then the organisation should be open to the idea of accommodating their staff.

3. Reward

Finally, any employees that participate in this culture should be rewarded. By overcoming any fears (above), or putting an extra effort in to their work, they are directly benefitting the company, and this should be recognised.

As time goes on, it is inevitable that Knowledge Management will become an integral part of any organization, as we move further into a society dominated by information (and knowledge). More and more companies are already taking heed of these observations, and following the above guidelines.

2.3 Successful Implementations

There are many companies around the world which have very effective Knowledge Management systems in place. Some of these are a result of a successful implementation, others may be a result of a rockier implementation, but all can highlight factors that should be adhered to for any future implementations undertaken by other companies.

The factors outlined below show that the majority of issues that can arise are to do with the people in the company, rather than technology or organisation, which is in line with the findings of Collison and Parcel (2001).

1.1.3.1 Technology

At the most basic level, technology needs to be easy to use. There is no point setting up an elaborate Knowledge Management system, if nobody knows how to use it. The system needs to be visually appealing, laid out in an intuitive manner, and robust.

1.1.3.2 Process

Perhaps one of the most important processes that needs to be set up in a KM project, is the assignment of Roles and Responsibilities. After a project has received approval, and the first steps are taken, people tend to forget and expect the project to continue to progress. This is especially true when the project in question is supposed to support business needs, and enable employees to carry out their duties more effectively. However, the fact of the matter is that projects cannot get off the ground without input from the employees, and they will typically need constant maintenance.

As well as this, certain processes which are already in place may need to be formalised for the project to be fully integrated. For instance communication; while it is common for members of staff to communicate on a regular basis, the need to communicate valuable and relevant information on a regular basis also, would need to be formalised.

1.1.3.3 People

As a continuation from the communication point mentioned above, keeping the levels of communication between employees high is extremely important, especially the face to face communication, since this makes up one quarter of the Knowledge Spiral (Nonaka); without socialisation, new knowledge cannot be created. In some cases it would be very difficult if not impossible to keep face to face communication, as with global corporations, but slight substitutes of video conferencing and online Communities of Practice can be adopted.

As mentioned above, creating a sharing environment, allowing people to freely share all their knowledge (or as much as possible) is paramount. This means encouraging trust and tolerance and rewarding all sharing that does take place.

Finally, perhaps one of the largest problems is the issue of ownership. All too often people feel too much or too little ownership of the system in their organisation. When employees do not feel any ownership for a system, they will have no desire to contribute to it, no desire to improve it, and it will not be utilized. On the other hand, if there is too much ownership, there is a similar problem to that in software development, and employees may feel that the system is *theirs* and theirs alone. Given the choice, though, of erring on the side of “too little” is higher than “too much”, it would be better to have a system which is overused and deal with the consequences as they arise, rather than deal with an unsuccessful implementation.

2.4 Large Company vs. SME KM

Most of what has been said above is in relation to large companies, usually multinational companies, with thousands of employees. These are typically the kinds of organisations which carry out research, not just in Knowledge Management, because they have sufficient budgets to do so. That does not mean, however, that they are the only companies that can reap the rewards of Knowledge Management Systems. Small and medium sized organisations can benefit hugely from Knowledge Management systems, albeit in slightly different ways to larger corporations. And similarly, there are numerous factors that SMEs should bear in mind when implementing a new Knowledge Management system, and they may differ to those that should be employed by larger organisations. In what follows we look at the points which have already been discussed above, and re-examine them in terms of their impact on SMEs.

1.1.4 Benefits

Large, global organisations often see the need to implement a Knowledge Management System in order to gain a competitive advantage. Increasing efficiency and encouraging innovation are of paramount importance. In terms of Nonaka’s Knowledge Spiral, this means focusing on Socialisation and Externalisation to create new knowledge, and ensuring to store the knowledge that the organisation already has to prevent “reinventing the wheel”. These aims are important to large organisations,

and can have a huge impact, but if they are never realised the organisation will at worst continue functioning as it has done. This may lose the competitive advantage, but business will carry on.

For SMEs, the draw to build a competitive advantage through innovative ideas is perhaps not as strong. Using valuable resources' time on a side project, which may only give a slight increase, is seen as a waste rather than a worthwhile contribution. However, Knowledge Management is even more critical to SMEs than to their larger counterparts, because knowledge of each individual employee is even more critical (to the company). As mentioned above, the loss of knowledge is a very real concern in many companies, and the consequent loss of profit. In very small companies, with 10-20 employees say, the loss of one employee could mean a loss of roughly 5-10% of the company's knowledge (without getting in to the relative amounts of knowledge each employee has. Clearly the managing director has a great deal more knowledge than a temporary employee). Comparing this to the loss of one employee in a global giant, which makes up a negligible percentage should give an idea of the relative importance.

While the employee of the global giant certainly has valuable knowledge, and benefits the global giant on a daily basis, should that employee leave suddenly, the global giant will carry on functioning in much the same manner as before. On the other hand, in an SME, should an employee leave suddenly, it could have huge implications, possibly taking the SME weeks or even months to get back on track. In fact, the size of the impact is indirectly proportional to the size of the company, and so for the very small companies, the impact could be monstrous, even fatally damaging.

1.1.5 Drawbacks

The obvious drawbacks of a Knowledge Management system, as mentioned briefly above, are the costs involved. A larger company can afford to spend on a new implementation, and can afford a few minor setbacks in integration. But any snags in implementing a similar system in a smaller company could mean the system is been rejected.

1.1.6 Implementations

In terms of implementing a new Knowledge Management system, several approaches have been outlined above, to make it as successful as possible. These include

- Knowledge Champion
- Trust

1.1.7 Requirements

The requirements, aside from budget, are much the same as in larger companies

- Customer buy-in
- knowledge Sharing atmosphere

Many cases of the implementation of Knowledge Management Systems were identified as possible research cases. The abstracts of all cases were read, and eventually five were examined in detail, each with a slightly different focus, although generally covering the same concepts. The cases were chosen for their similarities mainly, as this is a relatively small study, and would be difficult to provide a broad overview of the area. Instead, choosing five similar cases, we are better able to explore in depth the issues affecting Knowledge Management Implementation. However they do have crucial differences which helps showcase a number of separate approaches, as solutions to problems, which could be taken by other similar organisations.

2.5 Case Studies of Successful Knowledge Management System Implementations

1. The Knowledge Management Journey of Israel Aircraft Industry

This case shows the implementation of a knowledge management system in Israel Aircraft Industry. The company produced a full Change Program, highlighting four separate components: customer; people; innovation and technology; one company.

2. Sharing through Social Interaction: The Case of YIT Construction Ltd

This case identifies the inadequacies of a knowledge sharing system already in place, and looks at social processes and "intervention points" (the use of different social processes at different times) as a solution. This case was specifically chosen to examine the idea of a Knowledge Management system with and without the inclusion of people; i.e. purely IT based or not.

3. Applying Business Modeling to Knowledge Management

This case used a specially designed Business Model in order to provide a platform for understanding the business environment, which led to better decisions from the Knowledge Management managers and better communication with all staff. These factors then contributed to an overall better implemented system.

4. Enabling Cross-Project Knowledge Creation through "Knowledge Oriented Project Supervision"

This case follows the implementation of a KM system, with the focus on supervision.

5. Building KM @ Patni

This case documents the implementation of a Knowledge Management system across an organisation with over 10,000 people. There was already a facility to document and store information, but this was virtually inaccessible to most people.

Additional reasoning behind the choice of cases, which will of course have an impact on the results and analysis, was to choose those cases which resulted in an ongoing Knowledge Management System across a large organisation. It was thought that systems which had more longevity, especially in a large organisation, would be symptomatic of a more efficient implementation.

The Cases were read and examined, and two sets of criteria compiled for each case. First, the obstacles which were faced before (and sometimes during) the

implementation, and secondly the positive results of the implementation. From these compiled lists it was then apparent which obstacles are more common for KM implementation, and then based on what solutions are put in place, how positive outcomes can be produced.

2.6 Change Management

Change is something that people have to deal with every single day, and quite often people have difficulty dealing with change. Going back as far as Aesop's Fables, many of these stories appear to coach the listener in coming to terms with change. For example, in the story of the Crow and the Pitcher, the crow must find a way to retrieve the water from the pitcher in order to drink, and survive. This is the story of how the crow must adapt and change in order to survive.

In a current context, there are many coaches to guide people through changes brought about by necessity, just as in the fable. This can be witnessed by the sheer number of "Life-coaching seminars" available today.

Dealing with Organisational Change is perhaps an even bigger industry, since organisations all over the world must deal with change on a everyday basis

- Changeover of staff
- Upgrading systems
- Merging companies

In an effort to define Change Management, Burnes (1996) has said that organisational change cannot be described as "a distinct discipline with rigid and clearly defined boundaries" (p 173). He also highlights the three main schools to which most theories belong:

1. Individual Perspectives; Behaviourists "human actions are conditioned by their expected consequences" (p174) and Gestalt-field psychologists "learning is a process of gaining or changing insights, outlooks, expectations or thought

patterns” (p 174) believe this. Different views, but should perhaps be used simultaneously.

2. Group Dynamics (Bernstein, 1968) is of the belief that organisational change is brought about by groups and Lewin (1958) says individuals work in groups, individual behaviour based on group, so organisations should focus on groups
3. Open Systems; look at the whole organisation for change. This theory states that an organisation is not closed system, but rather it is open and interacts with environment, and subsystems within (p 177)

What can be taken from these ideas is that change, or organisational change, or even change management, affects the organisation as a whole, and an integrated view must be taken to approach all organisational change.

2.7 Conclusion- What this means in terms of the Research Question

This chapter has looked at what knowledge is and what it means to businesses today. Knowledge Management was examined in light of three factors: People; Processes and Technology, where the ratio was shown to weigh heavily in favour of People involvement. A number of benefits that a Knowledge Management System can bring to a company were also examined.

The implementation of Knowledge Management Systems was examined, specifically looking at possible reasons for unwillingness in employees, and methods to overcome this. Finally, implementation of Knowledge Management systems was again examined, relating to private sector companies, large and small.

3 KNOWLEDGE MANAGEMENT SYSTEMS

3.1 Introduction

Knowledge Management Systems can range from anything as small as an interactive whiteboard in a social setting, such as a coffee space, to a huge integrated system incorporating wikis, Communities of Practice, full-time Knowledge Managers, on-going processes including AGILE methodologies... etc. The extent of the system depends on the size and requirements of the organisation. For instance, a small company with 20 employees may not require a full time manager; a wiki could suffice, however a company with a few thousand employees might not notice the full potential impact of a wiki without the added support of a team of personnel. Choosing the format of the knowledge management system to implement is a huge decision, as implementing the wrong kind of system would be more costly than no implementation at all, as in the case of Lale, Flemming and Jorgen (2006)

An advantageous factor in choosing a Knowledge Management System is that a large portion of systems available for use are Open Source; indeed, many of the open source communities for Knowledge Management Systems are excellent examples of the basic ideas in Knowledge Management itself. For example, the Drupal website, www.drupal.org.

“The world wide web has been instrumental in catalysing the knowledge management movement. Since knowledge and the value of harnessing it have always been with us, it must be the availability of these newer technologies that has stoked the knowledge fire.” (Davenport and Prusak p123)

3.2 Wikis

3.2.1 Introduction

A wiki is a system where users can add, edit and delete content which can be accessed by others. Wikis are almost always websites, such as the commonly known Wikipedia.

According to Leuf and Cunningham (2001), a wiki is a “freely *expandable collection of interlinked Web pages, a hypertext system for storing and modifying information*”.

A wiki leaves the control entirely in the hands of the users, it is a collaborative website with the ability to correct errors. In effect, it is an informal peer review process, but this lends itself to misinformation, unless constantly monitored. (Brännström & Mårtensson 2006)

3.2.2 Features

Benefits

Users are able to create, edit and even delete content, making wikis very much “for the people, by the people”. Users are encouraged to contribute as much as they can, so that the system grows with the knowledge of its contributors, and can be modified by the rest of this online community. If the wiki is a private wiki, it may be that there is a finite number of contributors/participants, but all members of that community would have access.

As with most websites, it is possible to categorise and link topics, so that similar issues are located nearby each other. For instance, an online wiki on animals might classify birds in one area, and dogs in another, while a wiki for a large organisation might classify all support issues in one area, and all development issues in another. This should make the logging of different issues easier, and help clarify topics for the users. When links and hyperlinks are used correctly, it makes for extremely easy navigation throughout the site.

Searching is another benefit of wikis, and is a direct result of the above categorisation. Depending on the particular features in any one wiki, users may be able to tag their articles, which would make them retrievable under those search criteria in the future. For instance, in a support log, the issue could be tagged with the client’s name, the particular piece of software, the employee who solved the issue... there are endless topics that could be used as tags, any of which should make searching the wiki easier.

Forums are another great feature of wikis; they are the online community discussions. In so many global organisations, it is impossible for employees to get together to chat about issues at hand, which is an integral part of the knowledge spiral (Nonaka). By making forums available, it goes some way to replicating the conditions of an informal “chat”. And taking it one step further, storing these online “chats” in an environment which is searchable, as above, makes that discussion available for anyone else in the organisation.

Drawbacks

A large issue with wikis, is that they are made up entirely of information (and knowledge) from its users; there is no monitoring body to regulate the contributions. While this is part of the allure of wikis, and is undoubtedly a huge benefit, it can cause issues when misinformation permeates through the system. Perhaps though, the thought of this misinformation sounds worse than it is. In a study carried out to compare the extent of misinformation in wikis, it was found that Wikipedia and Britannica had a comparable number of errors (Giles 2005). However, it is worth noting that the errors in a wiki can be modified much faster than those in a Britannica encyclopaedia.

3.2.3 Wiki as a KM Tool

From the above discussion it should be apparent that wikis are an excellent tool for Knowledge Management. Implementing a wiki in an organisation can promote the sharing of knowledge, especially since they automatically promote the atmosphere of trust, which is one of the most important factors in setting up a KM System, as mentioned in Chapter 2. This feeling of trust occurs because the wiki is a place that is essentially created by the users. The shape it takes and the content included are all decided by the users.

3.3 FileShare; Sharepoint

3.3.1 Introduction

FileShares- as the name suggests- are simply just shared file drives, to which many users have access. They can usually be accessed by users, possibly through a local system, in order to save and store different kinds of files; documents, images, workbooks etc.

Sharepoint is a Microsoft developed FileShare application, widely used by organisations to perform the above functionality of sharing documents and files across the organisation. While there are other file-sharing applications available, Sharepoint is examined here for its popularity in large organisations.

3.3.2 Features

Benefits

As a file-sharing application, one of the main benefits of Sharepoint is the capability to store large quantities of files and documents, which can be accessed by all users in an organisation. These files can be organised into categories, as with folders and sub folders, to make navigation easier for the users.

Sharepoint can greatly ease collaboration on projects, where multiple people are working from the same set of documents. It can be configured to restrict editing a document to one user at a time, so that any updates are saved appropriately. This can be done by allowing users to “check out” documents, where they will appear as read-only to any other users who open them before they are “checked in” again by the original user.

It is also a web based application, meaning that it is accessible to any users, with permission, once they have internet access. Again this eases collaboration on projects, as all employees do not have to be on the same site, and the only requirement to add more users is to grant permission, or share the log in credentials.

Drawbacks

While FileShares can be organised in terms of folders, they are not as easy to “organise” as wikis, since they are not searchable in the same way (a search would work in the same way as it does in Windows Explorer), and are dependent on accurately described folder headings. Similarly, while it is possible to add links between pages, the folder set up does not lend itself to the same intuitive linking as wikis or other web applications.

3.3.3 Sharepoint as a KM Tool

Sharepoint is a valuable tool to be used in Knowledge Management, due to the ease of which files can be shared. Sharepoint does not offer the same level of control to the user as a wiki does, Sharepoint sites are moderated in terms of the page creation and set up, which can remove the feeling of ownership over the site.

3.4 *Drupal*

3.4.1 Introduction

Drupal is a Content Management System, set up originally as a message board, and now accounts for at least 2.1% of all the backend website systems worldwide (Drupal). As a Content Management System, Drupal functions in a similar manner to a wiki; pages can be created by users, giving a lot of the control to the users. Pages can also be linked together, allowing movement between very separate categories if necessary. There is also the capability to upload documents to a Drupal site, allowing them to be shared out among all users. Another similarity to wikis is the use of tags, which facilitate searching through the site.

3.4.2 Features

Benefits

As Drupal sites are created and designed for the organisation (this would typically be carried out by one moderator, or a small team; it is not available to all users of the site), they can be customised to suit the organisations’ particular needs. This is done

through Modules, which can be downloaded separately as add-ons. Drupal has an extensive library of modules which are all developed by members of the global Drupal community. All modules are available for download from the drupal website, and the full list can be browsed or searched. There are also Themes (for the look and feel) which can be downloaded in the same way.

The Drupal community is substantially large, and consists of developers and users around the world who act as a knowledge base, and can provide support for most issues. The Modules as mentioned above are all developed by members of the community, as well as Themes, and even the latest versions of the core site. This online community can provide constant support and advice for all other users.

Drawbacks

Modules, Themes and other updates may not always be available in the version that is necessary for the core Drupal site; it may just be a beta version. This is due to the fact that Drupal is Open Source and development only occurs where members of the community have chosen to work. While the online community can still offer support and possible work-arounds, this is not an ideal solution.

3.4.3 Drupal as a KM Tool

Drupal is an easy to use system, which is very beneficial for multiple users. It has much of the same functionality as wikis, and is Open Source which makes it a very attractive option for many organisations. While Sharepoint is standard in many industries, it is the pricier option and may not be feasible for all companies.

3.5 Communities of Practice (CoP)

3.5.1 Introduction

Wenger (2006) defines a Community of Practice as follows: “Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.” Walsham (2001, p. 601) continues by

saying that it encourages a “shared understanding of what it does, of how to do it, and how it is related to other communities and their practices – in all, a ‘world-view’ ... (CoP’s) are a sensible focus for Knowledge Management initiatives (sharing) some common language, purpose and ways of acting”

In practice, CoPs are effective ways of allowing people across an organisation to come together to discuss ideas on a certain topic. They are a perfect example of the various stages of the Knowledge Spiral, encouraging the discovery of new ideas, sharing knowledge between co-workers.

3.5.2 Motivation

Numerous studies have been carried out to determine both what motivates people and what deters people to participate in Communities of Practice. For example: Ardichvili, et al, 2003 and McLure Wasko and Faraj, 2002.

It is important to note that when people become involved in CoPs, they are fully aware that it is a business venture, not purely sociable, McLure Wasko and Faraj (2000, p. 162) say that “*work units behaving as focused communities are more innovative*”, and so it is of high importance to understand the motivation behind this; it is every employer’s goal to find out what encourages the staff to become more involved and work harder.

It is perhaps easier to understand why an employee might join a Community of Practice if it is in a Knowledge Area that they wish to expand. A CoP will consist of numerous experts on the subject matter, and are an ideal place for someone to learn a new skill. To complement this, many organisations operate with certifications alongside the CoP, so that any employee who wishes to take their learning further can do so.

For the experts involved, it might seem a little less clear as to why they wish to participate. According to (McLure Wasko and Faraj (2000, pp. 163-167)), there are two possible reasons. The first is that answers to specific questions can be received quickly. In a conversation between two experts, it is much more likely that a solution

can be reached faster than with just one expert. Being involved in a CoP is the ready access to such discussions.

The second reason is that experts receive validation and respect for their knowledge. This may seem quite selfish at first, but it is for the benefit of the company, and indeed, rewarding participation is clearly outlined as a basic requirement of any Knowledge Management System, and so why should it not be in the form of praise and respect from coworkers? In fact, by introducing more tangible rewards, such as financial rewards, the community atmosphere is diminished and the CoP no longer acts as a forum for free and open discussion. Walsham (2001, p. 603) says that, *“in a context where individuals see little in the way of financial reward for knowledge-sharing activities, it is not surprising that knowledge hoarding may take place”*

This can also be linked to the sense of enjoyment that employees get when “working” in a more social sense, but as discussed above, all employees are fully aware that this is a work effort, and not pure socialisation.

3.5.3 Features

Benefits

As mentioned above, a CoP can help with both sharing knowledge, discovering new ideas, providing a forum for discussion. Both experts and employees seeking to learn can gain rewards equally, and through the Socialisation process new Knowledge could be created which could benefit the organisation.

Drawbacks

One of the largest issues affecting CoPs is scheduling. It can be tricky to find a time that will suit most participants, and finding a time that will suit all is very difficult, unless the number of participants is sufficiently low. However the benefits of meeting face-to-face are undeniable, even with less than full attendance.

Although people often feel motivated to join CoPs, they still face the same issues that many of the above KMS Tools face, and quite often this is because users are asked to use another KMS Tool to complement the CoP. For instance, a content management

system such as Drupal could be used to share documents and provide an area for discussion when people need to communicate across long distances.

A further issue that can affect CoPs is the lack of rewards for the experts. While experts might feel validated and worthwhile, as mentioned above, that could evolve into a feeling of being used by other members of staff who are gaining everything from the experience and not giving anything in return. A similar, but slightly different issue is the idea that an expert would become too involved in a CoP, and begin to neglect their own work, as McLure Wasko and Faraj (2000, 160) point out- : *“instead of experts focusing their time and attention on creating new innovations, their role shifts from that of knowledge creators to knowledge disseminators”*. However, this is the kind of problem that could arise from any work outside of the very basic assigned project tasks, and would likely need to be monitored for specific people, rather than a process in the CoP.

3.6 Comparison of KM Systems

3.6.1 Knowledge Transfer Capabilities

Wikis and Content Management Systems such as Drupal have the ability to link items, which provides users with ease of access which a Fileshare does not have. Fileshares are dependent on appropriate naming of folders, and keeping all folders up to date. By using tags and links, users can keep content up to date organically.

Wikis and Content Management Systems also have the advantage that they are very similar in appearance to many other web based products, and most customers will be familiar with web based products, so there is less of a learning curve, and knowledge can be transferred faster.

3.6.2 Storage

Storage in all systems will depend on the type of system in use. For instance, in a Drupal CMS, the size of the storage will depend on the domain which is in use, whereas with a Fileshare such as Sharepoint the size is limited to the license agreement

3.6.3 Security

Security will depend on the basic web settings, whether or not the site is stored locally or not. Again, this is something which will depend on the specific system settings chosen, for instance a local CMS maybe be more secure than a publicly stored Sharepoint, but they are adjustable settings.

3.7 KM Systems for Large and Small Companies

The requirements facing large companies, when searching for an appropriate Knowledge Management System, can be quite different to those of a smaller company. A large company may need to take multiple departments, spanning several companies into account, whereas an SME may only need a few pages on a website. On the other hand, an SME may need more access privileges for more people, which could prove to be time consuming and difficult to administer.

When embarking on a Knowledge Management Implementation, as with embarking on any project, it will be extremely important to examine all requirements fully before making a decision on any system used.

3.8 Conclusion

This chapter has examined a small selection of Knowledge Management Systems that are available for use in organisations today. Several features of the systems were highlighted, as were the benefits and drawbacks. The contrasting requirements of companies of various sizes were also mentioned, with the note that any decision to buy in to a Knowledge Management System should be based on these requirements.

Communities of Practice were also examined, as they are a process by which Knowledge Management is enabled, although not an example technological system. The motivation for joining Communities of Practice, as well as, again, the various benefits and drawbacks were discussed.

4 KNOWLEGDE MAPPING, VISUALISATION

4.1 Introduction

The focus of this chapter will be to examine Knowledge Mapping as a tool in the implementation process for a Knowledge Management System. According to kmwiki, Knowledge Mapping is “*An on-going joint quest to help discover the constraints, assumptions, location, ownership, value and use of knowledge assets, artefacts, people and their expertise, uncover blocks to knowledge creation, and find opportunities to leverage existing knowledge*”.

Knowledge Mapping is often considered a visualisation tool, and so in this chapter visualisation techniques and tools will first be examined, and then discussed with specific reference to Knowledge Mapping.

4.2 Visualisation

It is difficult to define Visualisation with just one definition, and indeed the discipline is littered with varying, and sometimes contrasting, definitions, all from highly reputable sources. One person’s definition may be completely different to another’s, but neither are strictly correct or incorrect. In what follows, we explore the varying definitions, from the very origins of graphical representation, right up to the most recent, purely artistic forms of visualisation.

4.2.1 Early Definitions

The earliest forms of visualisation consisted mostly of graphs, or charts, and maps. William Playfair (1759 – 1823) is considered to be the founder of these kinds of graphics [1] with graphs such as the following, from *Commercial and Political Atlas* of 1786.

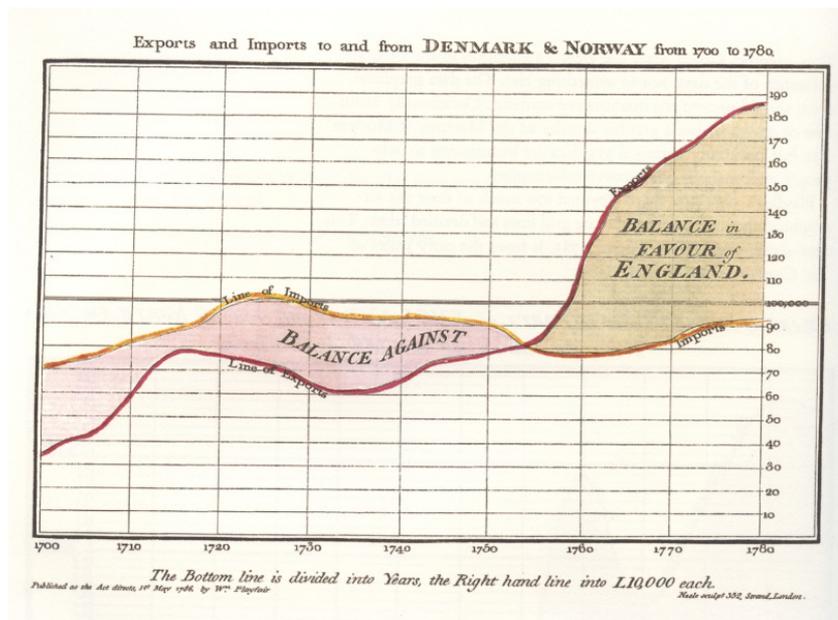


Figure 2 Early Graph, William Playfair

Playfair's graphs were the first to display information in graphical representation, allowing the reader to easily understand the meaning of the data, arguably the point of data visualisation as it is today. That graphs of this form, as well as pie charts which are also attributed to Playfair, are still so widespread today is testament to the insight of Playfair. Florence Nightingale used Playfair's notion of pie charts roughly 70 years later to show that the greatest cause of death during the Crimean War was not due to battle, but poor hygiene in the hospitals. This in turn was able to persuade members of the public to support reforms.

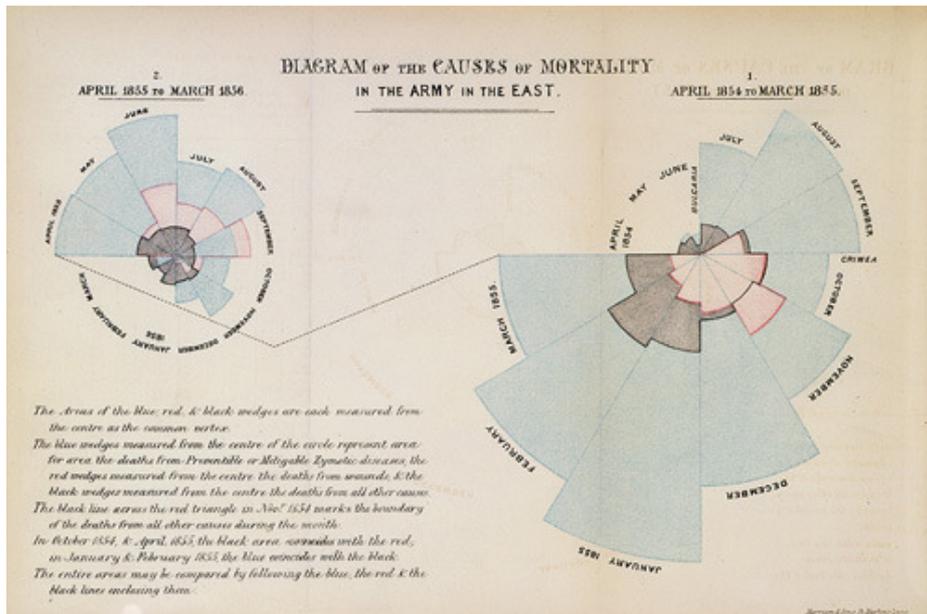


Figure 3 Florence Nightingale Graph

Graphs and pie charts may seem outdated, or sometimes regarded as the least innovative form of current visualisation, but when applied correctly can convey a powerful message. One could argue that this is a justified definition for Visualisation?

4.2.2 Recent Definitions

More recent forms of visualisation include infographics, animations, or even just pictures. The boundaries have been extended and blurred. Nathan Yau, author of *Visualize This: The FlowingData Guide to Design, Visualization, and Statistics*, defines it in this way: “to me, visualisation is a medium. It’s not just an analysis tool not just a way to prove a point more clearly through data”. (ColumnFiveMedia)

Ben Fry in his PhD thesis defended a new label called “Computational Information Design”, able to properly integrate information visualization, data mining and graphic design, while Robert Kosara is a promoter of “Visual Analytics”, with a stronger emphasis on analytical reasoning. (VisualComplexity)

Several people have also tried to categorize different kinds of visualisation in an effort to ‘tidy up’ or simplify definitions. For instance, Robert Kosara has divided the wider realm of “visualisation” into Pragmatic and Artistic Visualisation [2]. Pragmatic Visualisation is concerned with communicating data, presenting information in a form

that is easily understood, whereas Artistic Visualisation is concerned with communicating a feeling or evoking an emotion in the audience, most likely to inspire change.

Equally, both Frits H. Post (2002) and Friedman (2008) have divided visualisation into sub-categories based on their respective backgrounds, computer science and graphic design.

4.2.3 Knowledge Visualisation

Although both Artistic and Pragmatic Visualisation have been discussed above, they both still belong to the realm of Data visualisation. Knowledge Visualisation is a separate branch again, and could be considered as far from data Visualisation as Knowledge is far from Data itself. Knowledge visualisation is a branch of visualisation which requires thought to bring actual ideas to life. Burkhard and Meier, (2005) believe it to be the process of converting tacit knowledge in to explicit knowledge, a process which Nonaka had thought to be impossible.

4.3 Knowledge Mapping

Knowledge Maps are designed to work in much the same way as geographical maps; where they may not contain an absolute repository of information (Davenport and Prusak, 2000, p. 72), but they can point the direction in which to search for that information. Maps, both knowledge and geographical, are very effective mechanisms for transferring knowledge from one party to another. Indeed, as are most visualisation tools.

4.3.1 Benefits

The benefits of Knowledge Mapping include

- Roadmap for all knowledge in the organisation
- Identify gaps in Knowledge
- Employee Insight

- Encourage re-use of existing knowledge

By building a knowledge map of an organisation it is possible to retain those guidelines for future employees. What may begin as an exercise in identifying gaps (see below), could also be stored and used as an induction document for new joining employees. The knowledge map would serve in the same way as a geographical map.

As mentioned above, Knowledge Maps are also very convenient for identifying gaps in an organisation's knowledge. But physically drawing out the location of all the knowledge in an organisation, along with people involved, departments aligned to, skilled resources available etc. It is possible to identify the gaps as gaps on a map much more conveniently than to find gaps through lists.

Since the employees are necessary to carry out the Knowledge Maps, this provides a wonderful opportunity to gain an insight into the viewpoint of the employees. By viewing the employee's version of the knowledge of the organisation, an employer can learn more about the inter-departmental communication, say.

Reusing Knowledge which already exists within the organisation is one of the major draws for companies when considering Knowledge Management strategies and systems, since it is so easy to cut down on costs and improve efficiency. As such, Knowledge Maps are a vital part of the process, since they can identify Knowledge which already exists and present it in a visually appealing manner, so that it is more readily available to other users.

4.3.2 Drawbacks

Knowledge Mapping is not as extensive a practice as say, Knowledge Auditing, which is a much more formal process undertaken by organisations to ensure that all the knowledge has been captured correctly, and can be accessed by all employees in the organisation. (Kelleher and Levene, 2001) As such, Knowledge Maps will not contain as much detail, and may not be sufficiently informative for some practices.

Equally, Knowledge Maps cannot replace Knowledge Flows, which the connections between people, and can be used in social networking (Baird and Cross 2000) Knowledge Flows are beneficial when people in an organisation do not know where to look for knowledge; they do not know who to ask. Knowledge Flows can therefore serve as a directory of sorts.

4.3.3 Processes

One of the most important aspects of Knowledge Mapping is that it is designed to be the user's map, created by the user, for other users, and so there are relatively few constraints.

One suggested set of steps, from USAID, to complete a Knowledge Mapping Session is as follows:

1. Review Critical Processes
2. Identify individual process steps within each process
3. Identify the knowledge required to fulfil the purpose of each process step
4. Identify the knowledge generated for each process step
5. Create measurement criteria for each critical process step
6. Analyse the process maps (knowledge quality, knowledge sharing, ease of access, etc.)

These set of steps are effectively just a walkthrough a functional work process, which could be repeated in any organisation. A walkthrough enables employees to visually step through the steps, recounting the necessary knowledge at each step, where they are able to record this knowledge.

As is the case with all Knowledge Elicitation, experts often don't know what they know, and so it is best to repeat these steps numerous times to catch any pieces of information previously forgotten.

4.4 Conclusion

This chapter looked at the study of visualisation, in terms of artistic and pragmatic relevance, and the influences visualisation has on current culture. This was specialised to look only at the technique of Knowledge Mapping, which can be used to highlight areas of knowledge within an organisation.

With reference to the Research Question, Knowledge Mapping could be used as a tool to facilitate the implementation of a Knowledge Management System in an organisation, as it engages with the user, while also providing a useful view of the knowledge which should be included in the system.

5 RESEARCH METHODS AND DESIGN

5.1 Introduction

This Chapter gives an overview of some of the different research methods that will be employed in the investigation of this Research Question. The paradigm of postpositivism is briefly discussed to give an overview of the ideals, according to which this research will be carried out.

Some background information on the company in question- Compufast Software- is given, including the Company product- software and hardware, size and organisational structure. A number of business processes are also highlighted in order to gain further insight into the daily workings in the company. The addition of a Knowledge Management System is also discussed.

The content management system Drupal is identified as a possible Knowledge Management System for Compufast Software. The beneficial features that Drupal has to offer, along with some of the requirements, are also discussed.

5.2 Research Methods

There are many different methods of carrying out research, but a few methods are considered briefly in what follows:

5.2.1 Paradigms: Postpositivism

While there are many paradigms of research, the principles by which research is carried out and the results examined, many of these paradigms are outdated in current science. The paradigm which most accurately describes the way research should be carried out is Postpositivism, from Karl Popper (1902-1994). This method of research involves the examination of results in light of the conditions under which the experiment was carried out. This is especially important when we consider that bias affects every part of our lives, and has even been shown in physics experiments; when

testing to see if light behaves as a particle, the results show that light is made up of particles, and when testing to see if light behaves as a wave, the results show that light is made up waves. Indeed it has been shown that all matter behaves as both waves and particles. (a series of experiments around the early 20th century) The point of all this, is that no result, or outcome, can be considered independent of the tester.

With this in mind, we continue the with the Research Question at hand, accepting that simply by monitoring the outcome of certain situations, we have altered the result slightly.

5.2.2 Quantitative Research

Any research that involves datasets or large amounts of information, and can be quantified, is classified as quantitative research. Quantitative research provides the audience with a very representative overall view of the situation at hand, a statistical understanding. This kind of research, and the results that are produced, are especially useful when there is an interest in the outcome, for example the results of a medical study. Statistical results are needed to give exact answers, which can predict future outcomes. However this kind of research does not give an accurate picture of the impact of certain outcomes.

5.2.3 Qualitative Research

Qualitative Research, on the other hand, provides a much more in-depth study with fewer results. A very good example of qualitative results would be a story from a person involved. While this does not provide a full overview of the entire situation, it does provide much more detail of the specifics. For instance, as in the medical study mentioned above, the statistics may show the study to be successful in 90% of the cases, but will not highlight the extent of the impact in the remaining 10%.

Both Qualitative and Quantitative research offer very different results, each giving a different slant and viewpoint. Of course, the use of both methods in one study will be

more informative than the use of only one, and this approach should be taken whenever possible.

5.3 Background Information

5.3.1 Compufast Software

The company in question in this study is a software company that develops Workforce Management solutions. It is a private sector SME based in Dublin which has been in business for over 20 years, and has built up very strong relationships with many of its customers, as well as a wealth of experience in the industry.

The software packages can include Payroll, HR, Time & Attendance modules, as well as a web-based front end. They are accompanied by biometric clock-in devices, Suprema “Bio Station” clocks, although these are not in use by all customers. Future development includes new reporting modules, which are to incorporate Business Intelligence to optimise attendance and skills-usage. The use of PDA devices is another possible route, sought after by several customers.

The customers consist mostly of production-line manufacturing factories, and are based all over Ireland. This type of customer has the need for logging all employee hours, through the clock-in devices, and allowing employees to access their internal files from a PC on site, using the web-based front end over intranet. Another branch of customer is medical institutions, which oftentimes have employees with very complicated working hours, for example Junior Doctors, where an automated pay-calculation service has been estimated to save the customer up to 10% in HR expenditure.

Company Processes

Compufast has several processes which occur continually. For example a development process would begin with research into new technologies/ industry practices and research into clients’ needs. From there a design for a new product/module or new

function as an enhancement to an existing product/module is created. Then a typical development life-cycle follows, through to implementation. If this new product is for general release then Sales and Marketing must be informed of the key aspects of the new development, and a marketing campaign must be created and deployed in tandem with development. After implementation staff in Support must be fully trained. Once the new product is in place, quarterly updates are carried out to maintain the functionality of the product. Other departments will have their own processes, such as Accounts with monthly salaries, yearly reports etc.

Company Structure

Compufast Software is a very small company, made up of only 6 full-time employees in Dublin. The basic structure looks somewhat like that shown below:

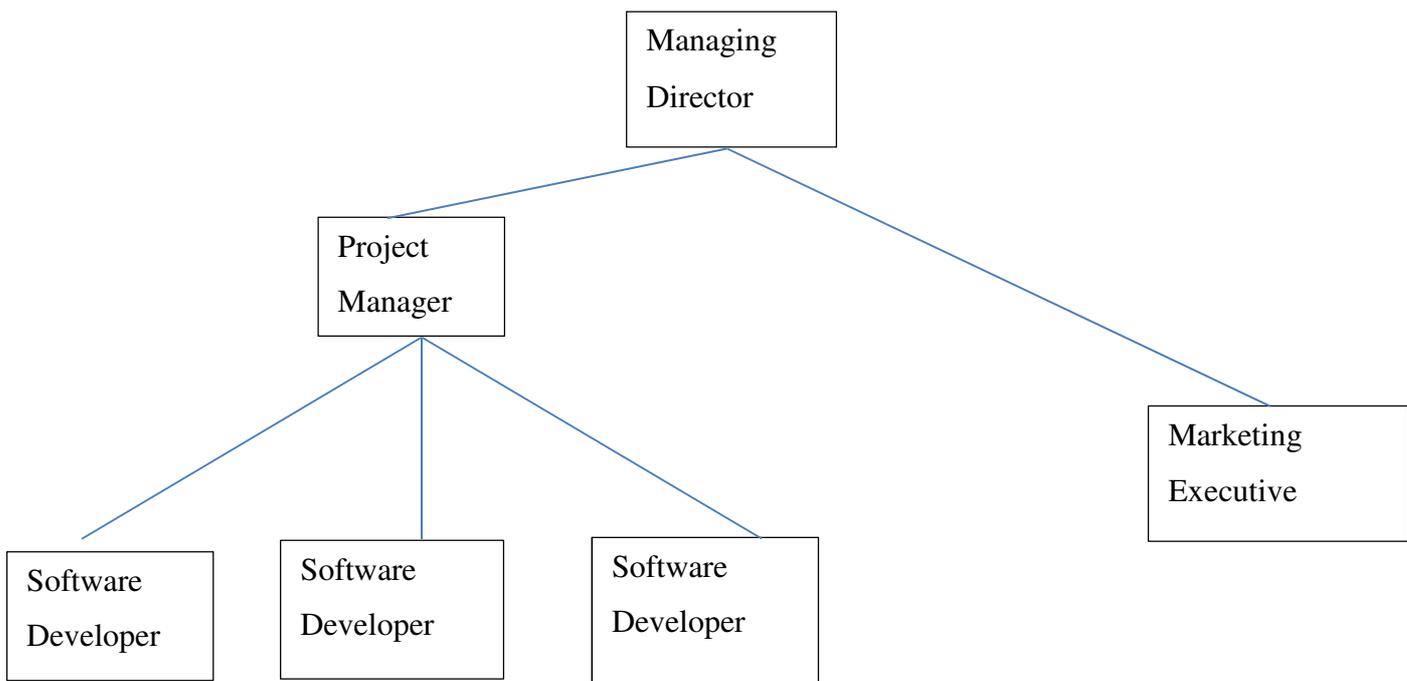


Figure 4 Compufast Software, Company Structure

The Software Development team all work on different projects, with one Project Manager overseeing all development work, and the Marketing Executive works quite separately to the development team. The Managing Director oversees the development work, but at a higher level, while also overseeing marketing and sales. The MD also

manages much of the client relationships, along with the PM, and the remainder of the software development team have limited client exposure.

How Knowledge Management would benefit Compufast

Currently Compufast has very poor knowledge preservation. Solutions to various Support calls are only kept as very vague one/two-line explanations in a dated Support system. At times, more detailed explanations can be found in email histories, but this is an extremely ineffective way of preserving knowledge.

Knowledge is created with new development, but sharing newly created knowledge is almost non-existent and there is very little existing documentation. Knowledge should be re-used in all cases, especially given the need for communication between such modules as Payroll and Time & Attendance (the hours worked are passed from T&A to Payroll). As there are no knowledge management policies currently in place, knowledge is never transformed into an accessible form, such as a model, or used by other staff members.

With any new Knowledge Management processes in place this organisation should see an improvement in efficiency and effectiveness. Appropriate documentation would be compiled as development happens, and a comprehensive Knowledge Model of the new software would be created. The Knowledge Model could also be used by marketing staff as a means to help with marketing campaigns

5.3.2 Drupal

There is a very high standard of technologies available for Knowledge Management Systems today, as mentioned in Chapter 3. For this study the Content Management System (CMS), Drupal, has been chosen. Drupal is a leading global open source CMS, with 587,980 users worldwide. Drupal can be used for anything from building a website for blogging, to comprehensive knowledge management systems in large organisations.

First of all, Drupal is free. The initial software package and all enhancements are open source, available for the use of anyone. The only investment into the technology aspect of this project is then the time taken to set up the system and maintain it, there are no capital investments necessary.

“Drupal is open source software maintained and developed by a community of hundreds of thousands of users and developers” (Drupal, 2011). This vast community of developers keeps the drupal package current and meets customer’s development demands. There is also an online support forum which has archives of all previous threads, including those of old versions of Drupal if needed. The most recent release of Drupal was Drupal 7.0, which has been used in this study.

Drupal is a user-friendly system, very easy to modify the look, feel, and layout should users request. It is also highly scalable, which provides for expansion into the KM realm. It is as secure as the user requires it to be: there is the facility to have some pages open to anyone (forums etc), and other pages only visible to users who have provided a password relating to a role which has the correct permissions. Staff and customers of all levels can use the same system and receive very different results.

The requirements necessary for a Drupal installation are an active database server (open source versions such as MySQL are the default setting), web server, PHP and the necessary storage. There are multiple web hosts that can provide for all of these requirements as well as providing domain name, but these are not open source like Drupal.

5.4 Conclusion

This Chapter has given some insight in to different research paradigms and methods, particularly those that will be employed in the investigation of this Research. Background information on Compufast Software was given, in particular the Workforce Management Software, including web applications and Biometric devices for clocking in and out. The organisational structure was also discussed, and the company was revealed to consist of 6 employees, which is quite small, even for a

Small to Medium sized Enterprise. Business processes such as Development and Marketing procedures were also

The content management system Drupal was identified as a possible Knowledge Management System for Compufast Software. The beneficial features that Drupal has to offer, along with some of the requirements, were also discussed. Drupal has the functionality to add new modules and build custom sites, in order to cater to the needs of the system, in this case a Knowledge Management system. However, although Drupal itself is Open Source, the web hosting is not. This is a cost the company will have to bear for this particular system, the details of which are disclosed in the following chapter.

6 EXPERIMENTATION

6.1 Introduction

The first part of this experiment is to conduct quantitative research into previous implementations, to highlight aspects of those implementations which brought about the success.

6.2 *Compufast Software*

The method of testing the Knowledge Mapping Technique, as a means to create a sense of ownership among employees for the new Knowledge Management System, will involve implementing the system, and splitting the test subjects into two groups: a control group, and a test group who will carry out the Knowledge Mapping exercise. In this way, the relative success of the implementation can be compared to well-documented implementations, but can also be compared internally; the response of the control group will be used as a benchmark for that of those employees who have used Knowledge Mapping Techniques.

As the company is very small, with only 6 employees in Dublin, and the Marketing Executive and one of member of the software development team will be unavailable for this testing, the sample will consist of two groups of two. This leaves the Managing Director, Project Manager, and two members of the development team. In order to try to maintain an even spread of responsibilities and interests among the two groups, they will be split into:

Group A	Group B
Managing Director	Project Manager
Software Developer	Software Developer

Figure 5 Control Group, Test Group

Group A and B will both be interviewed in the same way, with the same set of questions, and after the interviews Group A will be guided through a knowledge mapping session, prior to using the system. In fact, the Knowledge Mapping exercise can then be repeated with one member of Group A, after a set amount of time, to further monitor any impact of the visualisation technique.

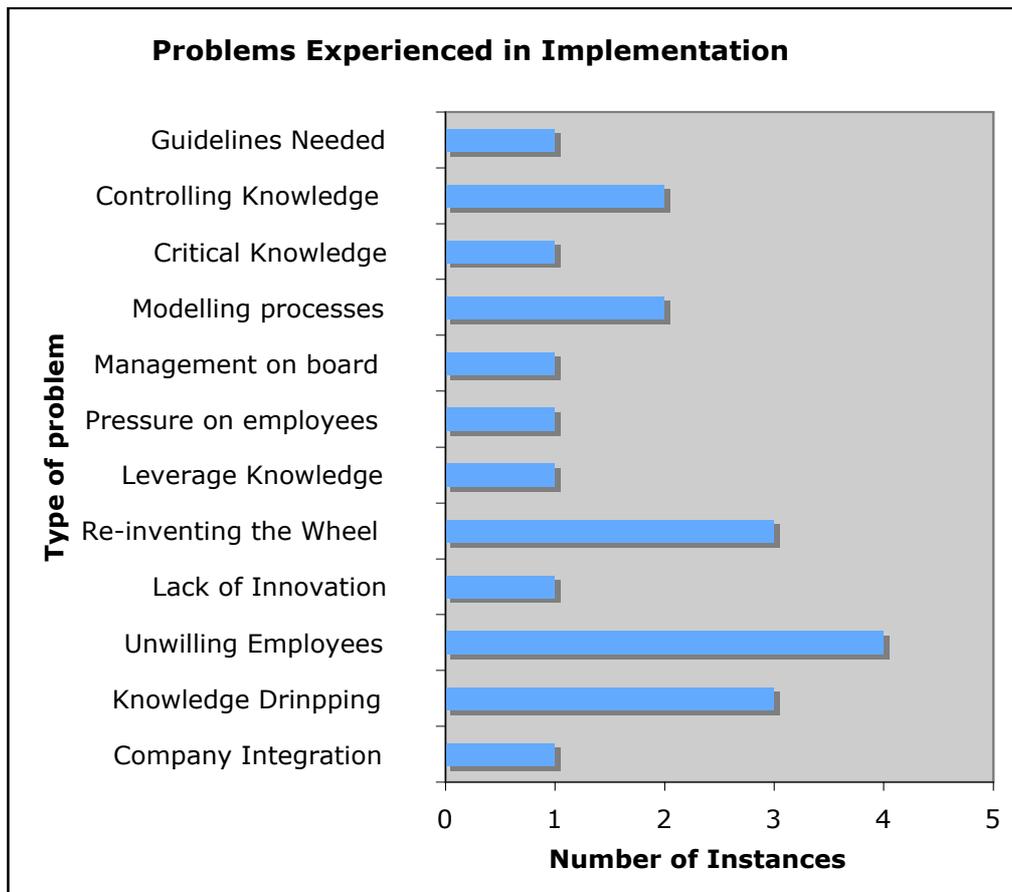
The limitations of the company and test subjects are immediately apparent; there are so few people that any results are open to multiple interpretations, bias will be an enormous factor, and risk is high. But these are also factors which make this research and these results even more important, as these small companies are almost completely without research in this area because they are “too” small, and the only way to test these techniques for companies of this size is in this environment. The control group, and even “double” control group is a method of limiting bias, and introducing some measure of “metric”.

On the other hand, the benefits of such a small test group are also very important, although perhaps less apparent; the familiarity of the test subjects with each other and the interviewer should allow for more in depth interviews. The answers may still be biased, but the interviewees may be more inclined to answer in more detail.

6.3 Background Information; Case Studies of Successful Knowledge Management System Implementations

The following table has been compiled from the Case Studies, mentioned above, which looked at successful implementations in large companies.

Table 1 Issues in KMS Implementation



The table above shows that there were a wide variety of obstacles encountered by each organisation, but that a few are more prevalent:

"Knowledge Drinpping", as coined by Case Study 1, is what happens when knowledge is effectively lost. Each employee in an organisation is in possession of a store of personal knowledge. (This can be as simple as the fastest way to fix the printer). If, and when, these employees leave, that knowledge will go with them, unless it has been adequately captured somewhere. Similarly, on every new project, the project team will be forced to create new solutions to problems; all members involved in this will then have created knowledge (as in the Knowledge Spiral). But then if this is not captured correctly (or at all, as in most cases), when the team separates and members join different teams, the knowledge is gone. It is possible that each member may remember parts, but if it was a collective team knowledge, then individuals will most likely be missing crucial parts.

This leads on to another highly recognised obstacle for Knowledge Management: "Reinventing the Wheel". If knowledge has been created for a specific solution, very often this same knowledge can be used to solve a very similar problem. In other words,

if a project team in Europe has solved a distribution problem, it makes sense that if a distribution problem arises in any other location, similar policies could be adopted. However, the problem is that quite often one team may not be aware that a similar problem has been solved, and they must create this knowledge for themselves for the first time- re-invent the wheel. Or, as mentioned above, it is possible that individual members of the original team may have some memories of the solution, but if they are specialised experts, they may not have knowledge of the entire solution.

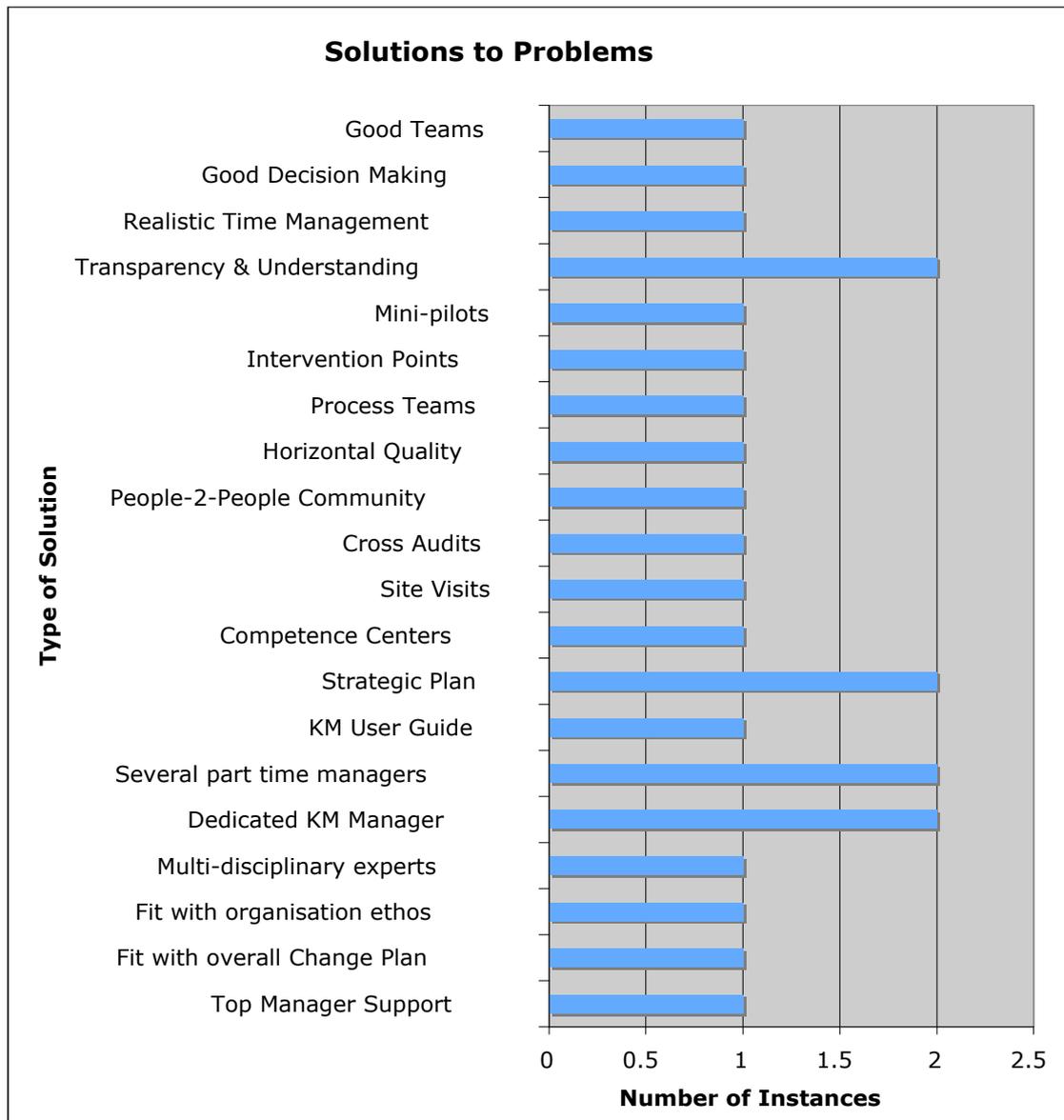
An interesting point to note here is that these problems are experienced by all companies, regardless of whether they are trying to implement a KMS or not. What is important is that the issues were the most highly recognised by the organisations in this case study, and so the approaches learned here cater toward solving these issues. Therefore the solutions here should be of interest to any company wishing to implement a KMS.

Those two issues were the most common, with the next highest problems including willingness of the employees to participate (either due to lack of enthusiasm or suspicion and politics), problems "controlling the knowledge", and problems with the system itself as it is being set up. Controlling knowledge may seem like quite a foreign concept, since knowledge in essence is something that happens quite naturally and organically when people acquire information. Information is certainly controllable, but controlling knowledge is an abstract concept. However it may be very beneficial to do so to focus the direction in which employees are learning; to steer development and innovation toward areas that need it most within the organisation.

Finally, there were many other points mentioned which organisation came across, such as integration, innovation, pressure on employees and knowing what knowledge is important in the first place. While examining these ideas it may seem that indeed they are minor compared to the above issues, it would be inconclusive to say for sure, because the scope of the study is so small.

If we look now at the solutions and positive outcomes of the implementations:

Table 2 Solutions to Common Problems Implementing KMS



There was a much wider spread of possible solutions to the various issues; each organisation chose a slightly different approach to solving similar obstacles. It is possible to group the different solutions though:

Planning

Any project's success is dependent on the level of planning involved [Shenhar, A. J., Dvir, D., Levy, O., Maltz, A. C., 2001. "Project Success: A Multidimensional Strategic Concept". Long Range Planning, Vol 34, Issue 6.], and Knowledge Management Projects are no different. Some of the points raised in the case studies relate directly to planning, and many could simply be described as helpful hints- but these hints also

require planning to be properly executed. In either case, the planning is directly or indirectly necessary. Some of the points mentioned were: fitting in with the macro change plan, strategic planning, identifying which areas need KM, mini-pilots, realistic time management; all of which relate to effective Project Management.

People

Involving the right people is another strong grouping that was mentioned under many different names. Again this could be true of any project, but it is especially relevant to Knowledge Management Projects because they require such an integral change, and because many people have the view that is not a worthwhile investment, or it is a threat, as mentioned above. The most important person is the Knowledge Manager, since he/she will influence the entire team, and as such the users of the system. The phrase used in Case 1 was a "fanatical" manager, and while many other cases did not use the same language, it was implied that this was the level of enthusiasm needed. It is also important to have allocated the appropriate number of people (resources) to the project (which would fit under adequate project planning, above), with some organisations obviously needing more than others. Of course it is equally as important that all team members are enthusiastic about the project, and this was mentioned in the case studies.

An important point to note is that while the dedication of staff is important to the success of the project, it is still dependent on the support from upper management. Without the support (financial, allowing time to the project, etc.) of upper management, KM teams will effectively have their hands tied, and it is absolutely useless for an organisation to commission a project, and then restrict the support so much as to let the project fail. While top level support was only mentioned as a necessary part of success explicitly in the first case, it was an integral part of all cases.

6.3.1 Reflection & Conclusions

It is clear that the importance of a committed Knowledge Manager is paramount, along with several enthusiastic part time workers (and having all employees on board to a certain extent), so for any future project, the people involved are key. Beyond that there are several steps that an organisation may take to ensure a smooth implementation, including good planning and regular checks to ensure that the project is still on track, both of which are key points in any project, not just a Knowledge Management System implementation.

However in order to provide a full roadmap for an organisation, detailing the optimal approaches to take based on specific criteria (such as size, location, culture...), a much more detailed report would need to be carried out. In such an instance it would be advisable to make contact with the organisations to acquire more information.

Finally, it is again worth mentioning, that these organisations did notice the benefits of a Knowledge Management System, only the implementation techniques are in need of improvement.

6.4 Interviews

The method of qualitative research used in this study will be semi-structured interviews with all staff members involved in the implementation. The interviews will be semi structured, that is, following a set list of questions which will be asked, but with allowances to vary from the set list in order to ask follow up questions on any topic which may arise. This should cover the same basic topics with all test subjects, and leave opportunity for deeper discussion where possible.

Interviews will be carried out both before and after the scheduled time period, to gain insight into the thoughts and opinions that the staff members have about the KM System. At the beginning the questions will centre on whether or not the employees have any understanding or experience with “Knowledge Management” as a concept, and if so what their opinions of it are. (Many employees in large companies are not in favour of Knowledge Management Systems, as mentioned earlier). These preliminary questions on Knowledge and Knowledge Management will also serve as a means to highlight the exposure that the employees have already had to the idea of implementing a Knowledge Management System (since they are of course aware of the imminent changes).

Following on from that they will be asked about whether or not there is a KM System in place, or whether they are aware of any kind of system in place at all. Then any methods of informal knowledge sharing will be discovered, as it will be important to preserve and enhance these channels of communication. Finally, any suggestions they have will be taken into consideration, which will give an idea of their level of ownership of the system.

At the end of the test period, the employees will again be asked their thoughts opinions on Knowledge and Knowledge Management as concepts, and any changes in their ideas will be noted. They will be asked about their experience with the Knowledge management system which was set up, and those employees in Group A will be asked for their opinions on the Knowledge Mapping Session. Again, they will be asked for any suggestions, to show any change in the level of ownership from the beginning.

Bias and leading questions will be avoided in all cases, although it should be accepted that there will always be some level of interference, simply by the interview taking place.

These interviews will all be taped and transcribed, and the answers can then be analysed.

6.5 Knowledge Mapping

The Knowledge Mapping sessions will mostly be informal. As discussed above, Mapping sessions can be carried out in great detail, and can provide system architects with very valuable information, but as the desired effect is not (at this point in time, although could later be incorporated into a full time project) to accurately describe all the knowledge in the organisation, but instead to create a sense of ownership for the employees who participate, it will not be rigorous.

The Mapping Session will consist of a brief overview of what Knowledge Mapping is, followed by what specifically is required by the people involved. The employees will be encouraged to speak, write, draw, or use any other means they feel comfortable with, and they will also be encouraged to map any knowledge they feel appropriate. As

suggestions, mapping the entire knowledge of the organisation, or mapping the knowledge to be stored in the KM System will be given, but these are by no means the only possibilities. The length of time spent at the mapping session will be up to the staff member involved. The explanation and introduction to mapping will be the same for each employee, but the length of time given to the exercise is completely up to the individual, although it will be noted for analysis later.

One of the test subjects will be selected for a second mapping session, and their use of the system after this second session will be monitored. This second session will follow much the same path as the first, but will be a Knowledge Mapping Revision, where the subject will be encouraged to revise the map they had already created. However, since it is once again an exercise in taking ownership, if the subject chooses to create a completely new map, this will also be accepted.

6.5.1 Knowledge Management System

Basic Layout

The Drupal Knowledge Management System will be set up as a very basic system, allowing the users to add to it as they please. As the first Knowledge Management System that these users will have come across, on an internal company level at least, the simpler it is, and easier to navigate and learn, the better. Three main areas/menus will be created: Development; How-To/Documentation; Support, with each of Documentation and Support handling the main saleable software modules- Payroll, Personnel, Time and Attendance, Employee Self Service (ESS), and the Development area will handle the main development environments: VB.NET, BuildProfessional, Implementation and Other.

The online system will also be created with the look and feel of the company in mind, to further promote a feeling of familiarity. The following image shows the “blank canvas” system:

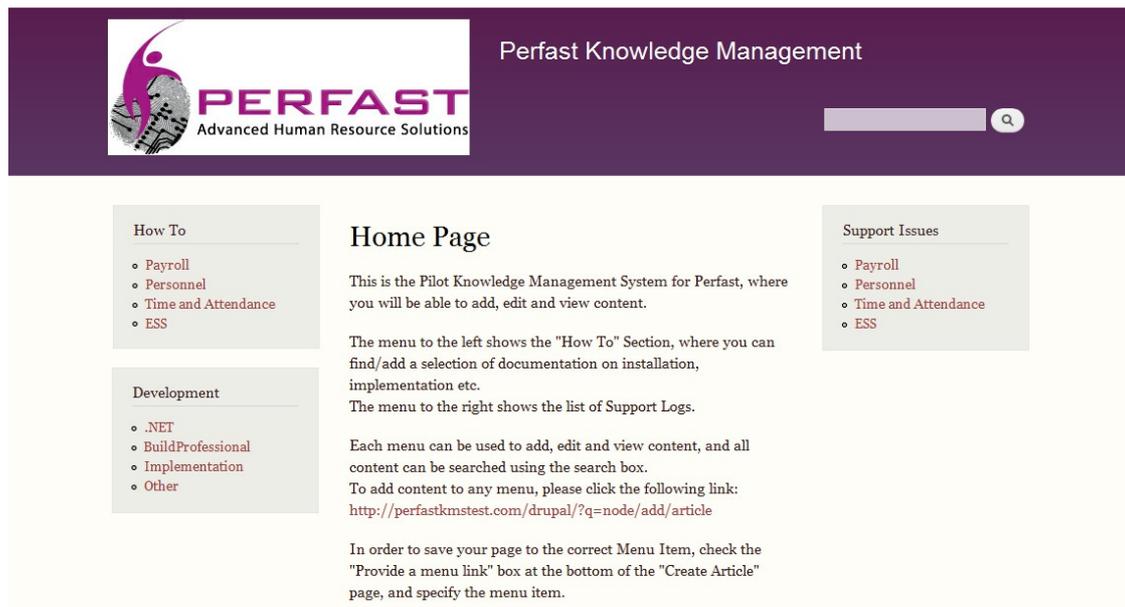


Figure 6 Screenshot of Drupal KMS to be implemented

By following the link on the home Page, users will be able to create new pages, assign a url of their choosing, and place the page in the relevant menu item. All pages that users create can be commented on, and tags can be added, so that the pages are searchable. (*In a future, more rigorous implementation, taxonomies could be set up, by the user but facilitated by the “Knowledge Manager”, and these taxonomies could be discussed in depth at the Knowledge Mapping Stage)

User Set-Up

A feature of Drupal is the ability to set up new users and assign them Roles. This allows different groups of users to have different permissions, and even view the site differently. This would be applicable to site administrators, different roles between the development team, management, and marketing, or possibly allowing customers to have a restricted access to the support issues, as a “FAQ” area. For the purposes of this study, different roles have been assigned to Group A and Group B, although their permissions are the same. The different roles will instead be useful for monitoring the usage, as below.

Monitoring usage

Drupal sites keep a log of all site activity, which includes user log-ins, creating content, editing content, and various other events. From this information, reports can

be generated to show the site traffic, or as in the case of this study, the comparative usage of the site, between different user roles.

The site usage, and events relating to users, can be filtered out of the entire site log (which also includes administrative tasks, automatic updates etc), and then these reports can be represented graphically. Indeed, there are many add-ons to the site which would enhance the way these reports can be generated.

While “User-Usage” may not be an elegant metric for Knowledge Management, and certainly not with only 4 users, there are very few metrics which can be considered concrete, as discussed earlier. Coupled with the interviews of the test subjects, the user usage here should at least be able to verify any results from the second interviews, to show that the users are in fact using/not using and warming/not warming to the use of the system.

6.6 Conclusion

This chapter has shown that there are several aspects of an implementation which could be used in a smaller organisation. The next chapter will look at applying these aspects, with the use of visualisation techniques.

7 EVALUATION

7.1 Introduction

This chapter will look at the results of the experiment; the users reactions to the new Knowledge Management system, both through interviews with the users themselves and by looking at the usage of the system. The interviews will give a direct view of how the users felt about the system, and they will have an opportunity to discuss any issues or misgivings. However, due to the nature of the interviews, a more objective approach must also be taken.

The second part of the experiment will look at monitoring the usage of a Knowledge Management System by the four separate users, with a view to distinguishing the users who have used it more and taken ownership over the system more. Their log in times and site activity (page creation, comments, length of time spent on the site) can be viewed in order to compare their usage. While this may be crude, it is the only way of actually measuring how the users have reacted to the new system in an objective manner.

Finally, these results- which users became more acquainted with the system – will be examined in light of which users were exposed to the Knowledge Mapping, to see if this had had an impact on their opinions of the system.

7.2 Interviews

Interviews were carried out with members of both groups; both the control group and the test group, before and after the implementation of the Drupal Knowledge Management System. Both groups were asked the same set of questions, with the only difference between the two groups being the Knowledge Mapping Sessions, which took place after the interviews.

The questions, which are listed in Appendix A, followed 3 distinct categories:

7.2.1 General Questions

The General Questions were in place to establish context, and to begin the interview with a few minutes of easy answers, in order to set the pace for the rest of the interview. All interviewees found the general questions easy to answer, and all were able to give a similar description of the company, and describe their roles. Some interviewees had multiple definitions of their role, due to the small size of the company, but in general these caused no difficulty.

7.2.2 Knowledge and Knowledge Management

This section of the interview was in place to gain an insight into the understanding that the employees of this company had of Knowledge and Knowledge Management. This insight is important in order to manage the expectations for system usage; if the employees approach the project with absolutely no prior knowledge of “what Knowledge is” or “What Knowledge Management is”, one could assume that they will be less likely to use the system than an employee with a prior understanding of the importance of Knowledge Management.

There was also a need to establish the basic awareness of each of the subjects of the experiment; each person in the organisation was aware that the experiment was taking place and each had a prior understanding of Knowledge Management. Once this was established the following questions in the interview aimed to discover the opinions of each of the employees around Knowledge Management Systems, and their enthusiasm toward them.

Employee JC:

He described knowledge as “accessible information”, and while there was no definition for knowledge in the company, he agreed that it is important. He values his and the company’s knowledge highly, in order to perform duties at work, which shows an understanding of the importance of setting up a fully functioning system, but there is no formal way of managing his/the company’s knowledge at present.

Informal measures to store knowledge include notes, files stored on individual people's PCs, and each person's own memories, but he commented that "Retrieval is a problem.". According to this employee, acquiring knowledge only occurs through discovery, with no creation of knowledge through socialisation.

Possible improvements suggested by this employee included a dedicated database which would be searchable.

Employee SV:

This employee's idea of knowledge was based around learning, but was unable to describe how he valued his knowledge. Again, the idea that knowledge is shared at a personal level, in informal discussions was raised.

Employee PG:

This employee found it quite difficult to define knowledge, but eventually did highlight the human aspect of knowledge. He did not have a company definition for knowledge. He values his knowledge "very highly". Later, he described knowledge as using past experiences to solve new problems. There is a simple database in place for recording support issues and solutions, but there is no formal management system in place, although this system is not really used by other employees to view previous solutions. Equally, any documentation which may be needed for implementations are not always kept up to date; they need to be modified before going to a new site. There is no way of capturing new knowledge as it happens on a project (this would be until the next implementation)

There are no routine processes in place, just informal structures such as phone calls (for instance while out on site). This system breaks down when people are absent, re-inventing the wheel. He often uses online, standard documentation, specific to the "development environment" when dealing with issues. People do know who to contact though when they need to find out knowledge, dependent on all employees being present.

Employee LN:

This employee categorised knowledge as “factual information” and business and practical experience. It was established that knowledge is necessary in order to be able to carry out daily functions and duties, and this knowledge would be difficult to replace should he have to leave the company. Many of the processes in place are based purely on people’s ability to remember past events.

New Knowledge is only acquired individually, usually following a customer request. Employee LN seemed fully aware of the implications of losing Knowledge, and mentioned the effects of losing a staff member several times. The lack of any real storage facility was also of concern.

As can be seen from the above, the responses to Knowledge and Knowledge Management as areas of research were similar, and although they may not fit in to any established definition (there were multiple answers that knowledge was the same as information), some of the basic ideas were discussed, demonstrating that each employee was fully aware of the project.

7.2.3 Knowledge Management as an Organisational Change

This section of the interview was in place to assess the opinions of the employees in terms of the organisational change that is needed to implement a Knowledge Management System effectively. As discussed earlier, implementing a Knowledge Management System, indeed any system, into an established organisation requires planning and preparation to ensure the system continues to be embraced after the initial impetus has gone.

Employee JC:

This employee again stressed how people work individually, although there is face-to-face communication “as needed”, and that all employees know where to look to find knowledge they may be lacking and need. He did not appear to have any issues with sharing knowledge; he was very willing to start the project and recommends a Knowledge Management System. He understands the need to have processes in place to encourage people to use the system.

Employee SV:

Knowledge is shared through discussions, and this employee is in favour of more formal channels for communication and knowledge sharing.

Employee PG:

This employee echoed the response of Employee JC; communication channels are face to face, or in the case of being off site or when necessary, phone and email. Knowledge is shared when necessary, but there is no formal socialisation processes. He also did not appear to be against knowledge sharing, but this time he differed from employee JC in that he was not actively advocating knowledge sharing. However he conceded that he would be in favour of the system, since that's "the only way it works".

Employee LN:

Employee LN briefly discussed the various processes that have been in place in the company for many years, such as customer relations. The informal nature of communication was mentioned, and recommended, such as social outings to the pub, or even chatting by the coffee machine. The necessity of formal meetings was also mentioned however, and a suggestion of using formal meetings to achieve specific tasks, with supportive informal discussions, was proposed.

7.2.4 Follow Up Interviews

The follow up interviews were used to monitor any changes in opinion that employees may have encountered both in terms of Knowledge and Knowledge Management and in terms of the system and the necessary changes. The structure follows a similar line to the earlier interviews, but with fewer questions, and the general questions were omitted entirely. As a result these interviews were considerably shorter than the first set of interviews.

The employees which were part of the Knowledge Mapping Test Group were also asked about their responses to the sessions. Employee PG, who participated in one session, did not in fact remember the session taking place until prompting. While the

sessions were supposed to be integrated seamlessly with many other implementation processes, and the session was in fact more of a ‘crutch’ to encourage ownership, the sessions were hoped to be memorable. However, after prompting Employee PG was in favour of continuing the sessions, but involving all members of staff. Employee LN, who participated in two Mapping Sessions, responded more favourably to the questions, and was also in favour of opening up these sessions to the entire staff.

All employees gave similar definitions of Knowledge and Knowledge Management, although it was mentioned by employee JC and LN that their thoughts and efforts were more focused after beginning this project. The system appears to have been well received by all employees, although it was acknowledged that usage was not high. This will be verified with the Site Statistics in a later section.

7.2.5 Conclusions

All employees were in favour of implementing a new Knowledge Management System, and appeared to be in favour of adopting an organisational change in favour of Knowledge Sharing. Many of the issues raised in Chapters 2 and 4 were not in question, during the interviews at least. It was mentioned by most employees that they did not use the system as much as they would have liked. Employees SV and PG cited lack of time as a reason, whereas Employee JC seemed to be of the opinion that this KMS would be taken down after the project. This was explained not to be the case after the interview.

After examining the interviews and responses to the system, no definitive conclusions can be drawn relating to the use of the Knowledge Maps. The employees in the Test Group seemed to be in favour of using the maps, but until their usage is compared to the usage of the Control Group we cannot see if it had a measurable impact.

It is important to acknowledge that all employees responded very favourably to the introduction of a new system, and even in the follow up interviews they were enthusiastic about a KMS implementation, regardless of how much they used this pilot

system. This is due to the desire of each person respond favourably in interviews, adding to the bias of the results.

7.3 Comparison to large companies (Case Studies)

From the study of successful implementations carried out in large companies detailed above, there were several techniques that were highlighted as possibilities for small organisations, and in what follows the idea of the “Knowledge Champion” is examined in detail. While it may be possible for large organisations to dedicate a full resource to act as Knowledge Champion, the effort here was to see if each employee in a small organisation (or team) could act as a partial Knowledge Champion, given that a full resource could not be dedicated here. The visualisation technique, Knowledge Mapping, was used as a means to encourage employees to become partial Knowledge Champions. Knowledge Mapping was chosen for its simplicity, but any visualisation technique could have been used, indeed any technique to encourage usage at all.

From the interviews of all employees it would appear that they all feel that it would be a worthwhile project, however in the more in-depth view of their individual system usage (below) it should be apparent whether the employee’s positive feelings extended as far as actually taking ownership of the system, even to a small degree.

7.4 KMS- Site Statistics

The Knowledge Management System was opened up to the users for 2 weeks, and their usage was logged for each of those 10 days. The complete list of log messages was then extracted to an Excel file for examination, and the following results were achieved: (the complete Excel Workbook is stored on the accompanying CD)

Table 3 Site Statistics per User

	PG	LN	JC	SV
Number of Days User Logged in	3	6	2	1

Number of sessions opened	4	10	3	1
Average Time per session (min)	10.75	9.4	8.33	2
Number of pages created	1	5	1	0

This shows that employee LN clearly used the system the most of all the users, followed by both employees PG and JC. Employee SV does not appear to have used the system at all, having logged in for a total of 2minutes over the total test period. However this table does not show the whole story. If we look at this data in relation to the actual dates of each activity we have:

Table 4 Actual System usage (content creation) per user

	1	2	3	4	5	6	7	8	9	10
SV	x									
JC	xx	x								
LN		x	x	xxx	xx	x	xx			
PG	xx	x								x

It can be seen from this table also that Employee LN clearly used the system the most. Employees PG and JC have very similar system usage; logged in for almost the same days and each created one page, but Employee PG has a higher Average Time spent logged in. In reality, this is a result of one long first session, followed by very brief log-ins. On the first morning, after the implementation had been set up, Employee PG was shown to be active on the system for 38minutes, and Employee JC was shown to be active for 21minutes.

7.5 Evaluation

7.5.1 What does the experiment say about KM

What these results show, is that the system was used quite well by all users in the first day of implementation, and this carried over well enough in to the second day.

However, but the third day, interest had dropped so much that only one employee was still using the system. This ties in with the research carried out in large companies, where the idea of a “Knowledge Champion” is strong- the system was only used well when the knowledge champion was actively taking and discussing the system, in this case it would be about the system set up.

There is also a small spike on the very last day, when the system was once again brought to the attention of all users, as the follow up interviews were to be scheduled. Unfortunately, when the system was not a regular topic of discussion, it is apparent that the system was all but forgotten by all users and they did not “embrace” or “take ownership” of it.

7.5.2 KM Mapping Tools

Employee PG was one of the employees who participated in a Mapping Session, and his usage was visibly quite high in the first two days. In fact, it was higher than his counterpart (in terms of overall usage, viewed retrospectively), Employee JC, who did not participate in the Mapping Sessions.

However, Employee PG did not participate in the second Mapping session, and his usage dropped off again after the second day. In fact it picked up again on the 9th day of the experiment, but this was soon after the follow up interview times had been decided, and so this was interference from the Knowledge Champion.

Employee LN showed the highest participation in the System, and this is the employee who participated in both Mapping sessions. It would appear that this shows that continued interest in the system has a direct result in keeping employees interested in updating the system, however this employee had also shown the most enthusiasm in the lead up to this project, which could have had a substantial effect on the results. This employee also gave the most in depth interview, and so again was perhaps more interested in the system to begin with.

Finally, Employee SV only used the system once, and for a very small period of time. This employee could be said to have missed the implementation techniques, and has not contributed to the implementation.

7.6 Reflect on Aims and Objectives

It was shown that the Knowledge Mapping had an effect on the results, however, it is unclear whether it was the Mapping itself or simply the renewed interest. Based on the results of the Case Study Survey, and the importance placed on the Knowledge Champion by those users, it would appear that in this case it was also the Knowledge Champion who produced results, rather than the Mapping.

Without further research to investigate the exact causes for LN's higher usage of the system, we can only draw the conclusion that the employee who participated in the Mapping sessions did in fact show the highest usage, but that could also be the result of a number of other factors.

7.7 Conclusion

This chapter has shown that a successful implementation can be achieved, but it required the constant interest, applied from a Knowledge Champion. In this case the Knowledge Champion was an external employee, not part of either Test Group or Control Group, and the influence of the Knowledge Champion was directly visible in the usage of the system by the other employees.

The remaining employees were shown not to take on partial responsibilities of the Knowledge Champion, however it is possible that with the introduction of scheduled techniques, such as Knowledge Mapping, that employees are further encouraged to take ownership of the system. For instance, with the absence of a full time Knowledge

Champion, all other employees could be scheduled to participate in group sessions together, such as SCRUM, or similar styled group meetings

8 CONCLUSION

8.1 Introduction

In this final chapter, the previous chapters are reviewed and the results of the experiment are examined in light of the research question. Questions that were raised in the Review of previous research, and how it relates to this current research, are revisited in an effort to reach a conclusion. Recommendations for future work are given, which may lead to conclusions on any unanswered questions.

8.2 Research Definition & Research Overview

The Research in question was whether or not visualisation tools such as Visualisation Mapping can be used to help integrate a Knowledge Management System into an organisation.

8.3 Contributions to the Body of Knowledge

Chapter 2 looked at the basic tenets of Knowledge and Knowledge Management, specifically in industry today, what knowledge is and what it means to businesses. Knowledge Management was examined in light of three factors: People; Processes and Technology, where the ratio was shown to weigh heavily in favour of People involvement. A number of benefits that a Knowledge Management System can bring to a company were also examined.

The implementation of Knowledge Management Systems was examined, specifically looking at possible reasons for unwillingness in employees, and methods to overcome this. Finally, implementation of Knowledge Management systems was again examined, relating to private sector companies, large and small.

A small selection of Knowledge Management Systems that are available for use in organisations today were then examined. Several features of the systems were highlighted, as were the benefits and drawbacks. The contrasting requirements of

companies of various sizes were also mentioned, with the note that any decision to buy in to a Knowledge Management System should be based on these requirements.

Communities of Practice were also examined, as they are a process by which Knowledge Management is enabled, although not an example technological system. The motivation for joining Communities of Practice, as well as, again, the various benefits and drawbacks were discussed.

Change Management was briefly discussed which provided a base to understand the mindset of the employees as the new Knowledge Management System is implemented in their company. Various factors were highlighted which can ease the process of organisational change in any company.

Knowledge Visualisation was discussed under artistic and pragmatic themes, which both relate to the visualisation of data. The visualisation of knowledge specifically was researched, and Visualisation Mapping tools were examined. An example of a set of steps were given, which could be used as a guideline in the following research.

8.4 Experimentation, Evaluation and Limitation

The basics of the experiment were to conduct research into previous successful implementations, specifically in large companies .Several Case Studies were identified for their common size, but varying requirements and specific details. These case studies were examined to a list of common aspects, in order to give an idea of the necessary steps to complete a successful implementation.

8.5 Future Work & Research

There is huge potential to continue researching in this area. The experiment could be expanded to include a more extensive quantitative study of the case studies and previous implementations. This would give more options and available steps, as examples of tasks to be completed for a successful implementation, as well a highlight any factors with negative impact.

The system itself could be monitored for a longer period of time, giving more robust results. The effect of the Knowledge Mapping could also be tested further, by testing on an employee for longer, or even by testing on different employees in sequence. For instance, Employee A could be part of the control group, and Employee B part of the Test group. After one set of results have been obtained, and a rest period observed, Employee A could be exposed to the mapping while Employee B remains in the control group. It is to be expected that the first Mapping exposure will have an impact on the employees' usage, but the comparison should still be valid.

There are a number of other Visualisation techniques, aside from mapping, which could be used as the technique in this experiment. Should multiple techniques be used, their effects could also be compared to show which technique yields the best result.

Finally, the test company was very small, and while it is necessary to carry out research in small companies as well as large organisations, to validate these results, similar experiments should be carried out in several other companies of similar size.

8.6 Conclusion

The Research Question

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APPENDIX A – INTERVIEW QUESTIONS

1. Describe the organisation
2. What is your position within the organisation
3. What kind of work does this involve
4. What kind of work have you been involved with most recently
5. What is your idea of knowledge, how would you define it?
6. What is the company's view on knowledge
7. Is knowledge important to the company
8. Is knowledge important to you/your work
9. How do you value your own knowledge
10. How do you manage your knowledge
11. Are there any processes in place for knowledge management
12. How is knowledge stored in the company
13. Describe how knowledge is acquired in the company
14. Are there any processes in place to re-use old solutions to problems/issues (support, development, implementation... anything)
15. Can you give any examples of when processes have been changed due to newly learned knowledge
16. Are these processes maintained?
17. Does the company have a knowledge database
18. Do you possess knowledge of where/who to ask to find knowledge
19. How could knowledge management be improved
20. How do employees communicate during work
21. Are there any communication channels/forums to discuss knowledge
22. How is knowledge spread throughout the organisation
23. How do you feel about sharing your knowledge through the organisation
24. What resources are available for knowledge management
25. How do you feel about knowledge sharing?
26. What could be done to promote the spreading of knowledge throughout the company?

APPENDIX B – SITE STATISTICS

User	Page Title	Day
SV	Access denied	1
SV	ESS Documentation	1
SV	ESS Documentation	1
SV	Home Page	1
SV	Payroll Documentation	1
SV	Payroll Support	1
SV	Payroll Support	1
SV	Personnel Documentation	1
SV	Personnel Support	1
SV	Time And Attendance Documentation	1
SV	Time And Attendance Support	1

User	Page Title	Day
LN	Access denied	2
LN	Home Page	2
LN	BuildProfessional	2
LN	Implementation	2
LN	Payroll Support	2
LN	Personnel Support	2
LN	Time And Attendance Support	2
LN	ESS Support	2
LN	Payroll Documentation	2
LN	Home Page	2
LN	Create Article	2
LN	ESS Documentation	2
LN	Create Article	2
LN	Autocomplete taxonomy	2
LN	Create Article	2
LN	Activity Reporting	2
LN	Payroll Documentation	2
LN	Payroll Support	2
LN	Access denied	3
LN	Home Page	3
LN	Other	3
LN	Home Page	3
LN	Home Page	3
LN	Home Page	3
LN	Access denied	4
LN	Home Page	4
LN	Activity Reporting	4
LN	ESS Documentation	4
LN	Activity Reporting	4
LN	.NET	4
LN	Home Page	4
LN	Create Article	4
LN	How to get IUSR password	4

LN	Access denied	5
LN	Home Page	5
LN	Create Article	5
LN	Autocomplete taxonomy	5
LN	Create Article	5
LN	BI Dashboards	5
LN	Home Page	5
LN	Home Page	5
LN	ESS Documentation	6
LN	Activity Reporting	6
LN	Add new comment	6
LN	Activity Reporting	6
LN	Payroll Documentation	6
LN	Payroll Documentation	6
LN	Payroll Support	6
LN	.NET	6
LN	Payroll Support	6
LN	Payroll Support	6
LN	Home Page	6
LN	Create Article	6
LN	Payroll Support	6
LN	Create Article	6
LN	Autocomplete taxonomy	6
LN	Create Article	6
LN	Payroll	6
LN	Edit Article Payroll	6
LN	Edit Article Payroll	6
LN	Payroll	6
LN	Access denied	7
LN	Home Page	7

JC	Create Article	1
JC	Create Article	1
JC	Test	1
JC	Edit Article Test	1
JC	Edit Article Test	1
JC	Test	1
JC	Home Page	1
JC	Home Page	1
JC	Search	1
JC	ESS Documentation	1
JC	Time And Attendance Documentation	1
JC	Personnel Documentation	1
JC	Payroll Documentation	1
JC	Payroll Support	1
JC	Personnel Support	1
JC	Time And Attendance Support	1
JC	ESS Support	1
JC	ESS Documentation	1
JC	Time And Attendance Documentation	1
JC	Time And Attendance Documentation	1
JC	Payroll Documentation	1
JC	Payroll Support	1
JC	Personnel Support	1
JC	Time And Attendance Support	1
JC	ESS Support	1
JC	ESS Support	1
JC	Search	1
JC	Home Page	1
JC	Home Page	1
JC	Page not found	1
JC	Home Page	1
JC	ESS Documentation	1
JC	Time And Attendance Documentation	1
JC	Page not found	1
JC	Time And Attendance Documentation	1
JC	Payroll Support	1
JC	Personnel Support	1
JC	Payroll Documentation	1
JC	Personnel Documentation	1

JC	Time And Attendance Documentation	1
JC	Access denied	2
JC	Home Page	2
JC	How to get IUSR password	2
JC	Payroll Documentation	2
JC	Payroll Documentation	2
JC	Search	2
JC	BuildProfessional	2
JC	Implementation	2
JC	Other	2
JC	.NET	2
JC	Time And Attendance Documentation	2
JC	Personnel Documentation	2
JC	Payroll Documentation	2
JC	ESS Support	2
JC	Time And Attendance Support	2
JC	Personnel Support	2
JC	Payroll Support	2

User	Page Title	Day
PG	Access denied	1
PG	Home Page	1
PG	Personnel Documentation	1
PG	ESS Documentation	1
PG	ESS Documentation	1
PG	Home Page	1
PG	Create Article	1
PG	Autocomplete taxonomy	1
PG	Create Article	1
PG	How to get IUSR password	1
PG	Edit Article How to get IUSR password	1
PG	ESS Documentation	1
PG	ESS Documentation	1
PG	Search	1
PG	Home Page	1
PG	ESS Documentation	1
PG	ESS Support	1

PG	ESS Documentation	1
PG	Payroll Documentation	1
PG	Payroll Documentation	1
PG	Personnel Documentation	1
PG	ESS Documentation	1
PG	Home Page	1
PG	Create Article	1
PG	Create Article	1
PG	Search	1
PG	Search	1
PG	Search	1
PG	Home Page	1
PG	Create Article	1
PG	ESS Documentation	1
PG	Payroll Documentation	1
PG	Time And Attendance Documentation	1
PG	ESS Documentation	1
PG	ESS Documentation	1
PG	Payroll Documentation	1
PG	Personnel Documentation	1
PG	Personnel Documentation	1
PG	Home Page	1
PG	Home Page	1
PG	Search	1
PG	Search	1
PG	Search	1
PG	ESS Support	1
PG	Home Page	1
PG	Create Article	1
PG	Create Article	1
PG	Create Article	1
PG	Search	1
PG	Home Page	1
PG	ESS Documentation	1
PG	Payroll Documentation	1
PG	Home Page	1
PG	Create Article	1
PG	Autocomplete taxonomy	1
PG	Create Article	1
PG	Test page	1
PG	Test	1
PG	Test page	1
PG	Edit Article Test page	1
PG	Home Page	1
PG	Home Page	1

PG	Search	1
PG	Home Page	1
PG	Create Article	1
PG	Add content	1
PG	Create Article	1
PG	Personnel Documentation	1
PG	Payroll Documentation	1
PG	Time And Attendance Documentation	1
PG	ESS Documentation	1
PG	Payroll Documentation	1
PG	Time And Attendance Documentation	1
PG	ESS Support	1
PG	Time And Attendance Support	1
PG	Payroll Support	1
PG	Home Page	1
PG	Page not found	1
PG	Home Page	1
PG	Payroll Documentation	1
PG	ESS Documentation	1
PG	Page not found	1
PG	Page not found	1
PG	Search	1
PG	How to get IUSR password	1
PG	Page not found	1
PG	Page not found	1
PG	Search	1
PG	How to get IUSR password	1
PG	Edit Article How to get IUSR password	1
PG	Home Page	1
PG	Page not found	1
PG	Access denied	2
PG	Home Page	2
PG	Page not found	2
PG	Page not found	2
PG	Search	2
PG	How to get IUSR password	2
PG	Edit Article How to get IUSR password	2
PG	Access denied	9
PG	Home Page	9
PG	Activity Reporting	9
PG	How to get IUSR password	9
PG	Home Page	9
PG	Create Article	9