Capturing Tacit Knowledge in Oil and Gas Project Using Storytelling

by

Mohd Syafiq bin Saifullah

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information Systems)
MAY 2012

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CERTIFICATION OF APPROVAL

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Approved by,

(Khairul Shafee Kalid)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
MAY 2012

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

MOHD SYAFIQ BIN SAIFULLAH

Abstract

Knowledge plays a vital role in managing project. Generally, knowledge is being categorized into two: explicit and tacit. Tacit knowledge is the "know – how" knowledge that lies in expert's head, while explicit knowledge is written and codified knowledge. Both are long term assets to every project and putting effort to nurture them is very critical. Though so, most projects are having difficulty in sharing tacit knowledge because of its nature that prevented the knowledge from being articulated and formalized. Therefore, integrating knowledge management into project enables tacit knowledge to be captured, codified, and then shared across the project. One of the best ways in sharing tacit knowledge is using storytelling. As part of knowledge management, storytelling offers sharing of a more structured and absorbable form of tacit knowledge. This paper shares a viewpoint of knowledge sharing in oil and gas project since the industry embraces lots of technical skills and experience based learning. Besides, this paper presents the research methodology which begins with planning until the development process.

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Chapter 1: Introduction

1.0 Chapter Overview

In this chapter, this paper will explain on the fundamental information about the study. The purpose is to provide basic understanding about the study before explaining deeper information in the next few chapters.

In short, this study concerns about practices of sharing tacit knowledge within oil and gas project. The study proposes the use of storytelling in order to share tacit knowledge. Since the study involves deeply into oil and gas industry, this section will present about the rational of choosing this scope, factors limiting the study, and feasibility study for this project.

1.1 Background

Sharing tacit knowledge has become one of the challenges in Knowledge Management (Nielsen and Madsen, 2006). Most organizations are struggling to capture and share the tacit knowledge related such as skills and working knowledge from the experts within the organizations (Imel, 2003). Many studies shows that most of large corporations including Schlumberger, Xerox, IBM, Ernst & Young and others are starting to build their competitive advantages by strengthening the strategy in knowledge management (Leavitt, 2002; Kidwell, Linde, & Johnson, 2000; Sole & Wilson, 2003; Smith, 2011). Knowledge sharing is part of knowledge management. As tacit knowledge is difficult to be articulated, sharing of this knowledge is a challenge to the project management. One of the ways to share the tacit knowledge in project management is through storytelling. Stories can be the linkages between the tacit and the explicit form of knowledge as stories conveys the speaker's moral attitude (Linde, 2001).

1.2 Storytelling

Stories have been used to pass knowledge for thousands of years (Brown & Deokar, 2009). Stories allow tacit knowledge to be shared easily (Brown & Gray, 1995).

Ever since human beings have communicated and socially interacted with each other, stories have played a vital role in exchanging and propagating complex ideas and disclosing knowledge (Wende & Parissa, 2009). This reflects the effectiveness of using storytelling to share tacit knowledge. Through storytelling, tacit knowledge can be embedded in narratives and shared (Bhardwaj & Monin, 2006). Organizational story is a narrative of past management actions, employee interactions or other events that are communicated informally within the organization. (Swap, Leonard, Shields, & Abrams, 2001). Sharing structured stories help the receiver to absorb the inputs efficiently. Through storytelling, the storytellers are able to create the flow of the stories. This will help the receiver to absorb the stories easily.

1.3 Problem Statement

Experts within project management possess deep knowledge in their specialized areas. The knowledge is mostly experience – based (tacit knowledge) which they acquired after many years of involvement. This knowledge flows from experts to another person within the project management through socialization process such as conversation, discussion, phone calls, and others. The knowledge is circulated within the project management but not being captured. Without systemic ways to capture and share the knowledge, the receiver might faces difficulty in capturing and absorbing the knowledge. This is because the tacit knowledge shared is unstructured and might ignoring important steps.

Therefore, structuring the tacit knowledge before transferring it to the receiver is very crucial in order to keep the knowledge flows within the project management. As part of knowledge sharing method, storytelling is suggested to bridge the experts and members in the project management. Story telling enables experts to arrange the tacit knowledge accordingly before sharing it with members in the project management.

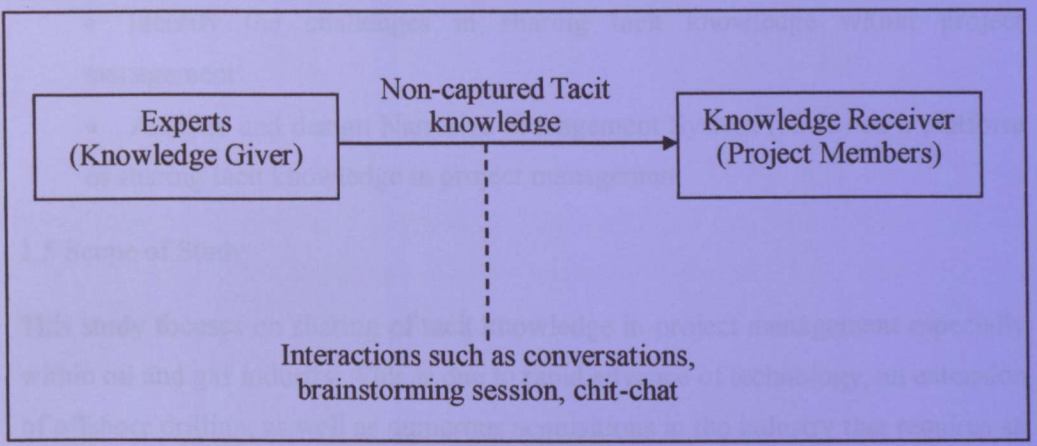

Figure 1.3: Flow sharing of tacit knowledge in project management

One of the ways in capturing and sharing tacit knowledge is using storytelling. Through storytelling, the experts share the tacit knowledge in a well – arranged structure. In order to share the stories, a Narrative Management System (NMS) is developed. Once captured, the stories are uploaded to the Narrative Management System (NMS). Team members across the project management are able to access the stories through the system. Narrative Management System (NMS) is also equipped with other features such as comments and tags to encourage interaction between members of the project management.

1.4 Objectives

The main objective of the research is to study the implementation of storytelling as a mechanism to allow knowledge sharing in a project management. The study aims at providing the project management with a platform for sharing tacit knowledge. Not only has it provided the experts with a structured method to share tacit knowledge, it as well as improving the ability for the receivers to capture the knowledge.

The specific aims of the research are to:

- Understand current practices in sharing tacit knowledge within project management. This includes the technological and social platforms being used to share tacit knowledge in project management.

- Identify the challenges in sharing tacit knowledge within project management
- Analyze and design Narrative Management System (NMS) as a platform of sharing tacit knowledge in project management

1.5 Scope of Study

This study focuses on sharing of tacit knowledge in project management especially within oil and gas industry. This is due to rapid advance of technology, an extension of offshore drilling, as well as numerous acquisitions in the industry that requires an efficient and effective method of sharing tacit knowledge between the experts and members of project management. In line with that, many oil and gas corporations are serious in implementing knowledge management in order to encourage the flow of tacit knowledge within the project management. Chevron, Texaco, Schlumberger and ExxonMobil are among oil and gas companies that benefited from knowledge-sharing culture implemented by them (Leavitt, 2002). The targeted participants are members of the project management team which coming from different roles. This provides the research with data from many angles of the project management.

1.6 Limitations of the study

There are a number of limitations affecting the research. For one, the research requires extensive study which subsequently needs a high time commitment. But since the research period is very short, it is limiting the study in term of time frame. Second, the research requires the involvement of specific participants who involve directly with the project management. Unfortunately, since these type of participants are very busy and hard to catch for an interview; the research might ends up with alternative participants which is not real target for participants.

1.7 Feasibility study

1.7.1 Scope Feasibility

As mentioned previously, this study is focusing on oil and gas industry. Choosing this industry is coherent as the industry is filled with lots tacit knowledge that is not captured. Besides, the study also involves respondents from the industry itself. This will provide sufficient and accurate input to help the study. Since the institution is closely related to oil and gas industry, it gives better opportunity to reach the resources.

1.7.2 Time Frame Feasibility

The study is structured within 8 (Eight) months in which including the development of the system as deliverables. This period is governed by detailed Gantt chart to track the progress of the study. The time frame is practical as it follows the allocated time by the institution.

Chapter 2: Literature Review

2.0 Chapter Overview

In this chapter, the paper will share about the study on literatures that has been conducted prior to research and development of this project. The purpose of studying the literatures is to extract information and knowledge that able to contribute input to the research and development.

At a glance, this chapter explains about the existence of tacit knowledge in oil and gas project. Not only it has that, the chapter also elucidates the literature study on knowledge sharing as well as storytelling.

2.1 Project

Project has been practiced since early civilization (Lock, 2007). It is considered as a discipline which comprises application of knowledge, skills, tools and techniques to meet project requirements (Choudhury, 2002). Differ from operation which is ongoing, project management is unique and temporary (Method 123 Limited, 2003). According to Anantatmula (2003), since processes in project management are iterative in nature it is vital to integrate project management together with knowledge management in order to achieve the target of the project. With knowledge management, it is possible to transform knowledge within a project management into a long term value (Kidwell, Linde, & Johnson, 2000). This absolutely explains the emergence of knowledge as primary resource and most valuable asset in a project management (Cline, Hinsch, Mertha, & Thompson, 2005).

2.2 Tacit Knowledge

As knowledge management is the process through which organizations create a long term value from their intellectual and knowledge based assets (Santosus & Surmacz, 2001, p. 1), the assets can generally be grouped into two categories: explicit knowledge and tacit knowledge. Explicit knowledge is codified and

documented, and its transfer can take place in impersonal ways such as written instructions and diagrams (Anand, Ward, & V.Tatikonda, 2010). By contrast, Polanyi (1966) described tacit knowledge as more context-specific as compared to explicit knowledge and is transferred mainly through social interactions like conversation and discussion. In project management, tacit knowledge can exist as the know-how knowledge contained in people's heads (Santosus & Sumacz, 2001). It can be derived from personal experience which means it is subjective and difficult to formalize (Nonaka, Totama, & Nagata, 2000).

2.3 Knowledge Sharing

Due to the fact that tacit knowledge is hard to be articulated, it is difficult for the knowledge of it's type to be transferred from one person to another within the same project management (Endres, Endres, Chowdhury, & Alam, 2007). Lee (2000) suggested that knowledge sharing is the most effective way of transferring complex and tacit knowledge. Knowledge sharing enables tacit knowledge to be extracted from one person, coded, stored, and reused when needed (Smith, 2011). Besides that, knowledge sharing within or across projects through methods like conversations, phone calls, and voice mails can help in improving the efficiency and effectiveness of project management (Ramaprasad & Prakash, 2009). For example, an expert will involve in socialization process with other members within the project management. Through the process, the expert shares his experience in handling specific problem related to the project. The experience shared might be circulated among the project members but it is not being successfully absorbed. According to Sole & Wilson (2003), a study conducted by Institute of Knowledge Management suggested that the tacit or experience – based knowledge should be delivered in more manageable and absorbable fashion; in other word more structured. One of the ways in sharing a more structured tacit knowledge is through storytelling.

2.4 Storytelling

Academically, story can be divided into two categories; story features definition and structural affect definition. Story features definition emphasizes on the need to define the characteristics that determine story quality while structual affect definition is focusing on the structure of the story to affect the audience (Orton, 1995). Organizational story is defined as a detailed narrative of past management actions, employee interactions, or other intra- or extra-organisational events. Organizational story is generated internally and reflect the organizations values and culture (Nielsen & Madsen, 2006). Effective and memorable stories must have context and focus. The purpose of telling story might be vary either to teach, to share, or to create awareness (Meganathan, 2009). In order to create meaning and understanding, storytelling is best used as a mechanism to share the story (Snowden, 2005). Sole & Wilson (2003) found out that storytelling enables a more efficient exchange of the embedded and embodied knowledge. In project management, storytelling enables experts to share tacit knowledge in a structured way while the listener will be able to capture the knowledge shared as they can experience the flow of the knowledge easily. To illustrate, Shell developed The Subsurface Knowledge Sharing Global Network (SKS) to facilitate open discussions between subsurface people working in the different Shell locations (Shell Organizational Performance and Learning, 2001). It provides an open discussion area where questions and answers can be posted. The SKS facilitates the exchange of knowledge including geophysics, geology, petrophysics, reservoir engineering and integration.

Parallel with the needs, the present paper is suggesting storytelling as a mechanism to share a more structured tacit knowledge within a project management especially in oil and gas industry. The present paper includes explanation on involvement of tacit knowledge in project management, methods implemented to share the tacit knowledge and the details on suggested storytelling.

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Chapter 3: Methodology/Project Work

3.0 Chapter Overview

In this chapter, the paper will present about the methodology involves in conducting the research as well development of the output. The purpose of the methodology is to ensure that the research is aligned with the objectives of this study.

In short, the section explains about the beginning step that is planning and up until the development process. The chapter will also details about every step on how the research and development is going to be conducted.

3.1 Research design

The method for this research is constructive research. Selecting this method provides the research with a direction to analyze the knowledge sharing practices in project management. Extensive study on the literature related to the research is first conducted gain insights and information on the research. Since knowledge sharing is already being applied in most organizations including the oil and gas project management, the research is designed to get the inputs on the current practices implemented to share the tacit knowledge.

One of the methods in collecting the inputs is through interview. After analyzing the inputs collected from the project management, the research proceeds to study the suitability of implementing storytelling as an alternative solution in sharing tacit knowledge within the project management. Based on the research, a framework is expected to be developed on how storytelling can be developed to allow a better knowledge sharing in the project management.

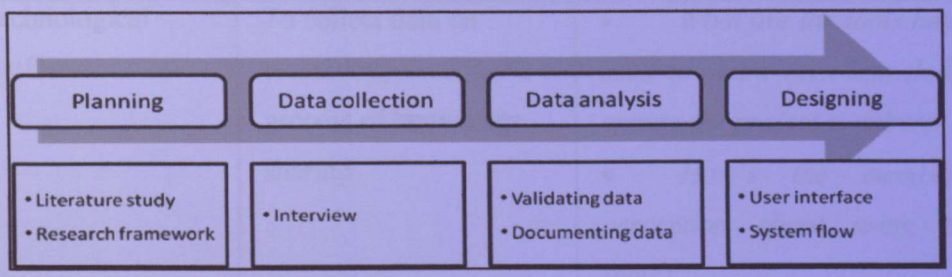

Figure 3.1 Research Methodology

3.2 Method for data collection

In order to collect the qualitative data for the research, one of the best ways is by conducting interview with selected participants. A set of interview questions is prepared to make sure that the interview will manage to collect needed data. Furthermore, the interview is set to be semi – structured. The reason of choosing this structure is to allow some of the questioning to be led by the responses of the participants. Since it is semi – structured interview, the session will be recorded using video tape to ensure that all the data given is collected.

3.2.1 Interview

Research questions are divided into five (5) important themes. By categorizing the research questions, it helps in building a flow for the process of collecting the data. Listed below are the themes and few examples of the research questions for the interview session with the participants:

Themes	Purpose	Examples
Tacit knowledge sharing practices	To get the idea on current knowledge sharing culture in the project management	• *How the team members interact or engage among each other?* • *How the tacit knowledge being transferred from one person to another?*

Technological platform	To collect data on technology used in the process of knowledge sharing	• *What are the tools being used to share tacit knowledge among the project members?* • *How's the member's perception about using the tools?*
Social platform	To collect data on involvement of any social platform in sharing the tacit knowledge	• *What are the social platforms involved in knowledge sharing?* • *How the platforms are being used to obtain tacit knowledge?*
Challenges in sharing knowledge	To address the challenges faced by the project management in knowledge sharing practices	• *What are the challenges in sharing tacit knowledge among the team members?* • *How to overcome the challenges?*
Proposing storytelling	To suggest storytelling as a mechanism of sharing tacit knowledge in the project management	• *What are your expectations on storytelling if it is used as a sharing mechanism?* • *What kind of stories that you like to hear?*

Figure 3.2: Sample of semi – structured interview questions

All the research questions are set to be open – ended since the interview is semi – structured. The interview is estimated to take place within 30 minutes – 45 minutes for each participant.

3.2.2 Selection of participants

The research mainly involves the collection of qualitative data. The qualitative data is based on interviews with participants from various roles within the project management. Two (2) oil and gas projects are selected to participate in this research. An estimation of five (5) project members is selected to represent each project.

3.3 Method for data analysis

The process of analyzing the qualitative data starts by transcribing the unformatted data from the interview. The raw unformatted data which is in text is well – organized accordingly. After completing the transcription process, the data analysis process is preceded with data coding. Through data coding, the key points from the interview are remarked at one side of the data. The purpose is to accelerate the next stages of analysis and writing.

3.4 Designing

After the completion of data analysis, the study will proceed with designing phase. At this phase, a structure of deliverables is developed based on the input from the previous phase. It involves designing the diagrams such as user case, sequence, system flow, context, and window navigation diagram. These diagrams help in giving basic insights about the proposed deliverables. These diagrams are explained further in Chapter 4.

3.5 Gantt Chart

Work breakdown structure	Tasks	October				November					December		
		30/9 - 6/10	7/10 - 13/10	14/10 - 20/10	21/10 - 27/10	28/10 - 3/11	4/11 - 10/11	11/11 - 17/11	18/11 - 24/11	25/11 - 1/12	2/12 - 8/12	9/12 - 15/12	16/12 - 22/12
Planning	Discussion with SV												
	Research												
	Pre - reading												
	Present literature to SV												
	Preparing research framework												
Data Collection	Drafting the questions												
	Setting up appointment for interview												
	Interview												
Data Analysis	Validating the data - contact participant to verify the data.												
	Documenting data - to make data more structured												
Designing	User Interface, Data repository, System architecture, system flow												
Important dates	Submission of proposal to research cluster												
	Proposal approved by research cluster												
	Announcement on list of approved topics												
	Research class												
	Submission of extended proposal												
	Proposal defense - Oral Presentation												
	Submission of Interim Report												
	Submission of Technical Report												

Figure 3.3: Gantt Chart

Chapter 4: Results and discussion

4.0 Chapter Overview

In this chapter, the paper will present the findings from the data collection activity. Not only it has that, this chapter will also share the designed prototype and explain about the output of this study.

In short, the results from the interview show that most oil and gas projects do have platforms to share tacit knowledge. Unfortunately these platforms are not fully utilized because of few challenges. Proposing storytelling is one of the ways to solve the problems.

4.1 Results and Discussion on the interviews

FOUR (4) participants from different oil and gas companies had been selected to join the study. All participants volunteered to take part in the study through phone interviews. Analysis of the qualitative data from the interview and the open-ended survey questions provided greater inputs for the study.

Current practices of knowledge sharing are using various ways such as email, meeting, discussion, chit-chat as well as web – based portal. During the sharing practices, team members interact with each other. All respondents gave different frequency of interaction between team members. One of the respondents stated that:

> *The frequency of interaction is different considering the roles and level of the team members.*

This shows that at different level of positions and roles affecting the knowledge sharing process between the team members. A field engineer is rarely can be seen in the office, therefore the interaction with the field engineer might be less if we compared to a sales engineer who is available in the office most of the time. On the other hand, the interactions between team members and high level managers or directors are also different. A junior engineer might have lesser opportunity to

participate in discussions or interactions which involve only high level team members.

Generally, there are various types of knowledge such as work – related, general issues, and lifestyles are shared among the team members. Informal interactions such as chit – chat and informal discussion are more inviting to include non – work related issues meanwhile the formal interactions such as meeting and brainstorming session are more focused and related to work. Besides, all respondents stated that the knowledge shared is normally considered as deep knowledge. They also mentioned that the knowledge shared is indeed very useful to their works. According to one of the respondent:

> *Normally team members do not actually share the basic knowledge because to their understanding, all team members are well-equipped with the basic knowledge.*

Basically, an interaction might involve more than two members and each member will contribute knowledge to the interaction. Therefore, the more team members involve in the interaction, this will add more value to the knowledge. Realizing the importance of sharing the knowledge, one of the respondents mentioned that:

> *Knowledge sharing expedite the learning process*

This shows that the team members are aware of the importance in sharing the knowledge among them in order to better serve the learning process.

Among the core components of knowledge sharing practices is technological platform. Indeed, all respondents mentioned that their organizations did provide technological platform to allow knowledge sharing practices to take place. These platform normally are web-based and being used internally. These platforms allow interaction between the team members virtually. For example, one respondent explained about the internal system which holds repositories on knowledge from various experts within the organization. Each employee can access the system and view the knowledge for their references. The respondent also said that:

> *This portal allows the sharing of best practices that already proven to be successful previously. Most employees will turn to the system to get knowledge and help them solving certain issues.*

This explains that the employees are benefiting from the platform as it allows them to share and extract knowledge for their usage. Not only that, as the knowledge is extracted from the experts, therefore there will be no issue with regard to the quality of the knowledge shared. This might add more trust to the employees to use the platform.

Besides the technological platform, there are also sociological platforms involve in knowledge sharing practices. All respondents mentioned this platform is one of the ways to share experience more lively. Sociological interactions are face to face interactions such as conversation, chit-chat and others. Unfortunately, the knowledge shared through this platform is rarely being picked up by the team members. This statement is supported by a feedback from one of the respondents:

> *Conversation and chit-chat is very informal. What you hear is what you get. But members normally prefer this way of sharing.*

This explains that the knowledge shared through conversation and chit-chat is not captured. Only the members who involve in the conversation will get the knowledge. Though so, team members normally prefer this way of sharing the knowledge. Perhaps since conversation and chit – chat is a very straight forward interaction in which members can ask question directly, observe the expressions, and listen to every single word being shared.

Most of the respondents preferred that writing down the knowledge during the conversation is the best way to capture the knowledge. Few also mentioned that by recording the conversion in video format, it helps in capturing the knowledge. Though so, few also mentioned that recording the conversion might cause the knowledge not to be natural. This might be because the members will try to not disclosing too much knowledge on the video as that might open up them to the risk of sharing the inaccurate knowledge.

While there are many mechanisms in sharing the knowledge, yet there are still challenges and limitations in sharing the knowledge. For one, there is low contribution of knowledge from the project members. Not only is that, the involvement and participation also quite low among the team members. One respondent said that:

> *They refuse to share because they normally don't have time and still lack of knowledge to share*

This situation might be a valid answer for the low participation and contribution from the team members. Based on the situation, we can say that members are very busy with their tasks and works and sharing knowledge require them to allocate huge amount of time. As sharing knowledge is not critical to them, then they decided to just neglect it. Moreover, team members also have the feeling of inferior in which they do not feel that they are the right person to share the knowledge. Every member believes that they still have lots to learn and they feel uncomfortable to share the knowledge since they afraid of others might criticize the knowledge shared.

The organizations are aware about the challenges. Few important strategies are taken to ensure that the knowledge sharing practices take place in the organization. Among the strategies are: giving incentives for those who contributing knowledge, make it compulsory as sharing knowledge will affect key performance indicator, provide training for employees.

In order to better serve the sharing of knowledge in the organization, storytelling is proposed. Most of the respondents are not familiar with storytelling and its implementation. Though so, all of them believe it can enhance the knowledge sharing practices. One respondent stated that:

> *Storytelling is something new. It sounds more systematic and efficient in sharing the knowledge*

Perhaps storytelling is more structured as compared to other mechanism of sharing knowledge, the respondent can see that this method is systematic and efficient. The knowledge will be arranged accordingly to ensure that the knowledge receiver can absorb the knowledge step by step.

On the other hand, other respondent responded that:

> *Storytelling seems interesting. Though, when actually doing, it may be way more complicated and worse - boring. So it depends on the practicality of it.*

The respondent believes that storytelling is bit difficult if compared to other mechanisms such as discussion, meeting and chit – chat. This is because storytelling involves the process of capturing the knowledge up until the knowledge being received by the end user. But, with an efficient structure of processes, storytelling is better than other mechanism.

All respondents gave different kind of stories they wanted to hear through storytelling. Among the stories are real incidents happened in the organization, health safety and environment, success stories, solution to specific problem and others. In short, the respondents would love to hear the knowledge that is related to their works and can serve as reference for them.

4.2 Design

4.2.1 Workflow for the designed output

The output is divided into THREE (3) important workflows; capturing tacit knowledge, codifying tacit knowledge, and sharing knowledge. These all parts are continuous processes to capture tacit knowledge from the knowledge giver and deliver it to knowledge receiver.

(a) Capturing Tacit Knowledge

This process is to capture the tacit knowledge possess by the experts. It involves TWO (2) important entities; expert and knowledge capturer. A face to face interview with the expert will be conducted by knowledge capturer in order to

capture the knowledge. This interview will be video – taped. During the interview, expert shares tacit knowledge in the form of storytelling. Though different experts share different stories, the structure of their stories are basically synchronized using storytelling.

The storytelling used in this study is based on the Three Acts Structure model which is widely used in writing and evaluating modern storytelling (Baxter, 2011). Instead of completely using the structure, the study proposes a revised model to better suit it purposes.

The revised model is developed to assist expert in delivering the tacit knowledge during interview session with knowledge capturer. Besides, this model is arranged accordingly to let knowledge receiver understand the flow of tacit knowledge shared by the expert.

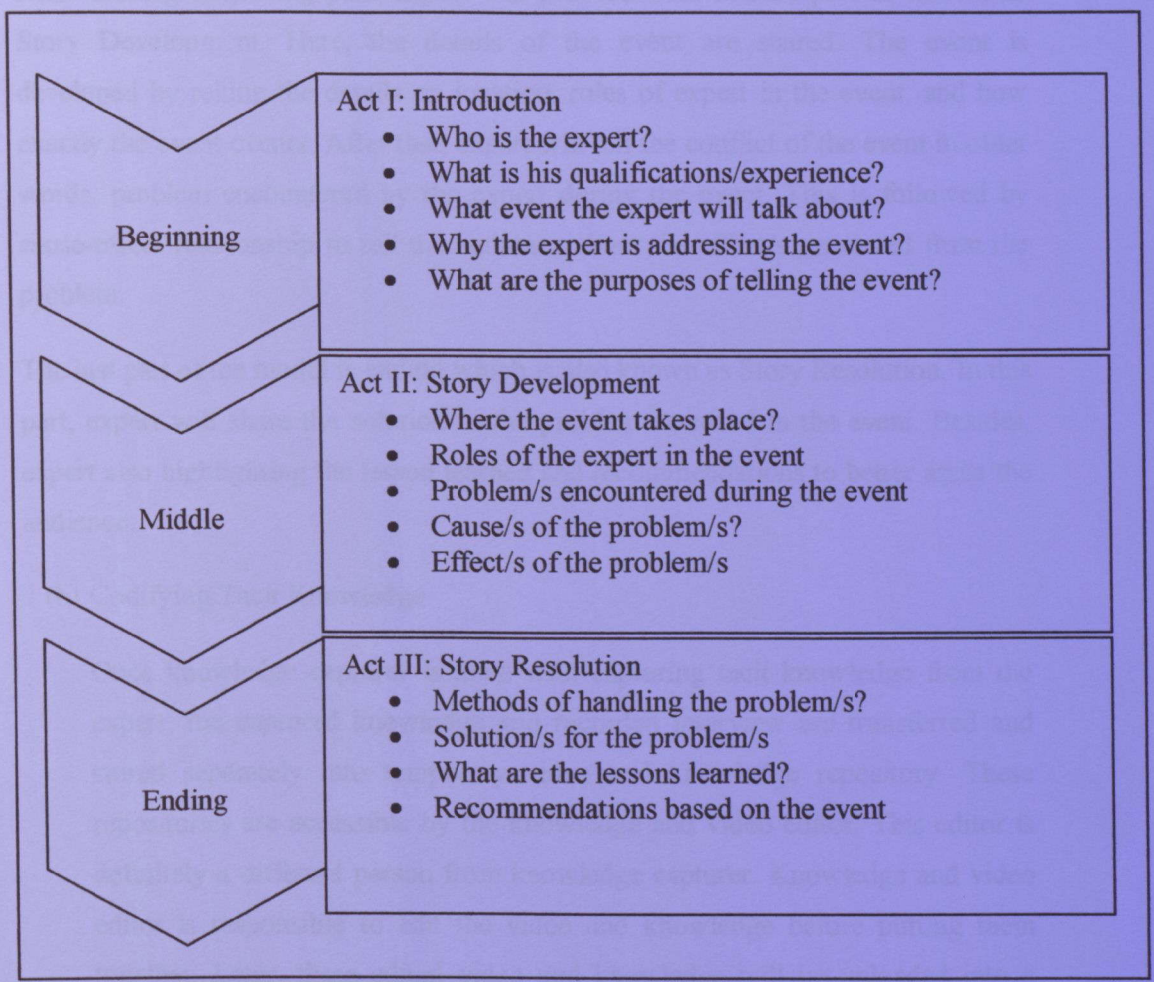

Figure 4.1: Expert's Storytelling Model (Baxter 2011)

During the interview with knowledge capturer, expert will be sharing tacit knowledge based on the Expert's Storytelling Model. This model is divided into 3 parts; Beginning, Middle, Ending. Each part is considered as act for the expert that answers the question, "What I need to do?"

The model starts with Beginning part or known as Introduction. Here, the expert is introduced by detailing the qualifications, experience, and job level. Then, expert will introduce the event that will be shared by giving the overview, the importance, and purposes of telling the event.

After closing Beginning part, expert will proceed with Middle part or known as Story Development. Here, the details of the event are shared. The event is developed by telling the details on location, roles of expert in the event, and how exactly the event occurs. After that, expert will tell the conflict of the event in other words, problem encountered by the expert during the event. This is followed by cause-effect relationship to tell the audience about the effect/s generated from the problem.

The last part of the model is ending which is also known as Story Resolution. In this part, expert will share the solution to the problem occurred in the event. Besides, expert also highlighting the lesson learned and recommendations to better assist the audience.

(b) Codifying Tacit Knowledge

Once knowledge capturer is done with capturing tacit knowledge from the expert, the captured knowledge and recorded interview are transferred and stored separately into temporary video and knowledge repository. These repositories are accessible by the knowledge and video editor. This editor is definitely a different person from knowledge capturer. Knowledge and video editor is responsible to edit the video and knowledge before putting them together. Later, these edited video and knowledge will be uploaded into a system called Narrative Management System (NMS).

(c) Sharing Tacit Knowledge

In order to deliver the knowledge, Narrative Management System (NMS) is developed as medium of deliverables. It is a web – based portal that helps facilitating knowledge sharing practices in oil and gas project management. This system is a bridge between knowledge receiver and knowledge giver. Knowledge receiver is able to search, watch, comment, and rate the knowledge.

NMS is equipped with Knowledge Management core functions. This includes the categorization and tagging of knowledge using Taxonomy approach. Besides, uploaded knowledge is fortified with Knowledge Attributes and Information Attributes. Moreover, the system allows user to rate the knowledge using Knowledge Rating. This rating is important to identify the reliability and quality of the knowledge shared. The system is explained further in the next parts.

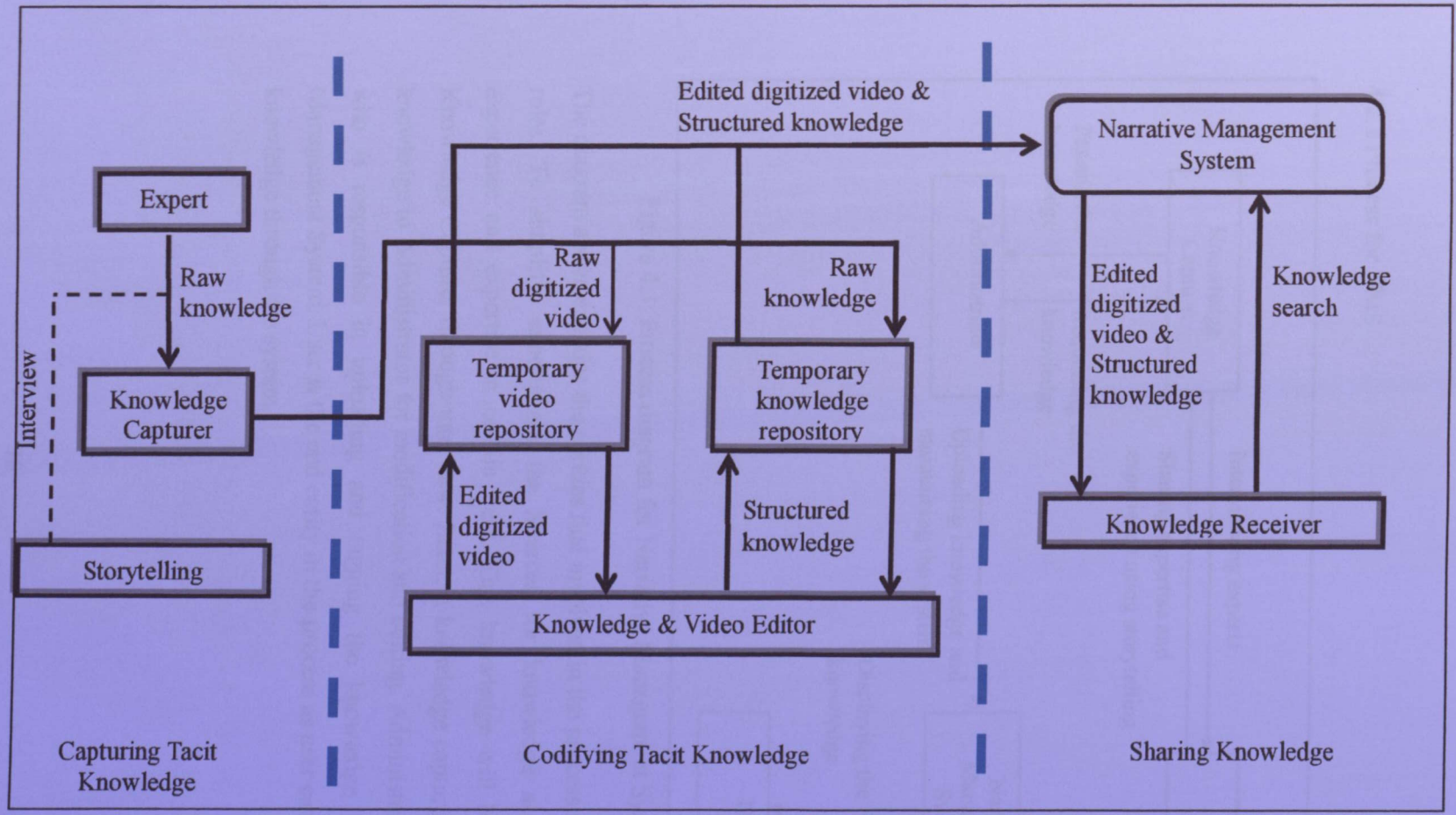

Figure 4.2: Workflow for the designed output

4.2.2 Process for NMS

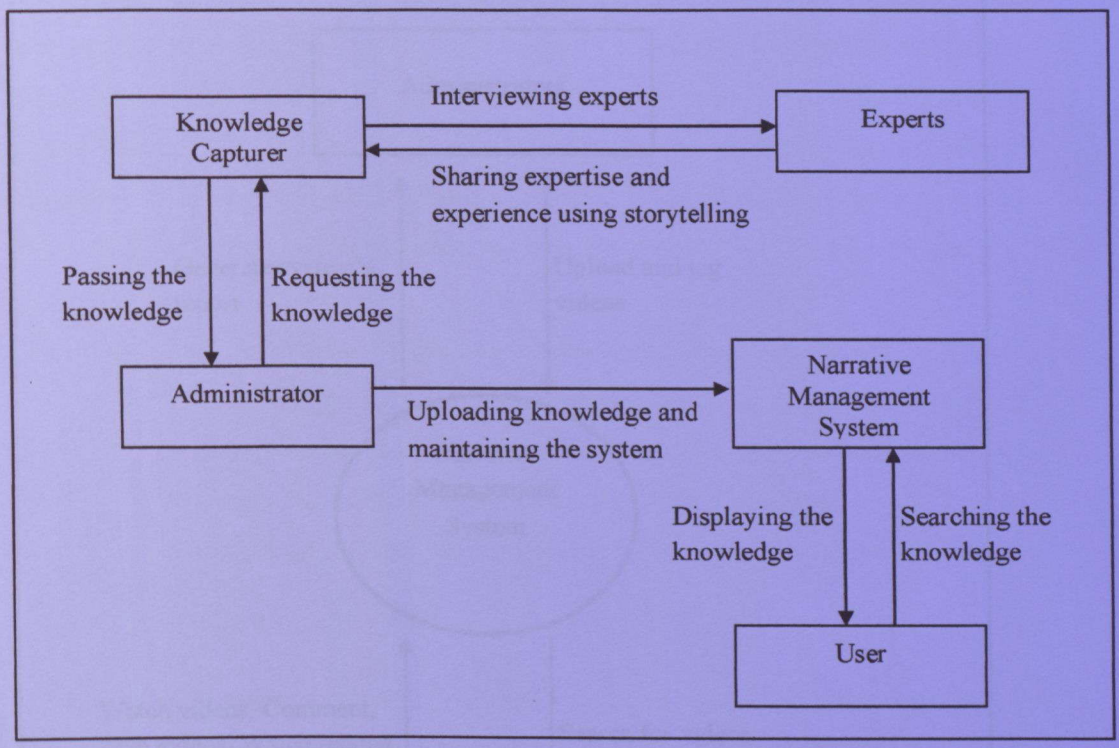

Figure 4.3: Process diagram for Narrative Management System

The diagram above explains the entities that involved in the process as well as their roles. To simplify, experts are the Sources for knowledge as they possess experience and expertise in certain field. This knowledge will be captured by Knowledge Capturer through interview. Later, a knowledge capturer will pass the knowledge to Administrator for modification and editing. Administrator is a person who is responsible in uploading and tagging the knowledge into Narrative Management System. User is the end entity in the process as user can search for the knowledge through the system.

4.2.3 Context diagram for NMS

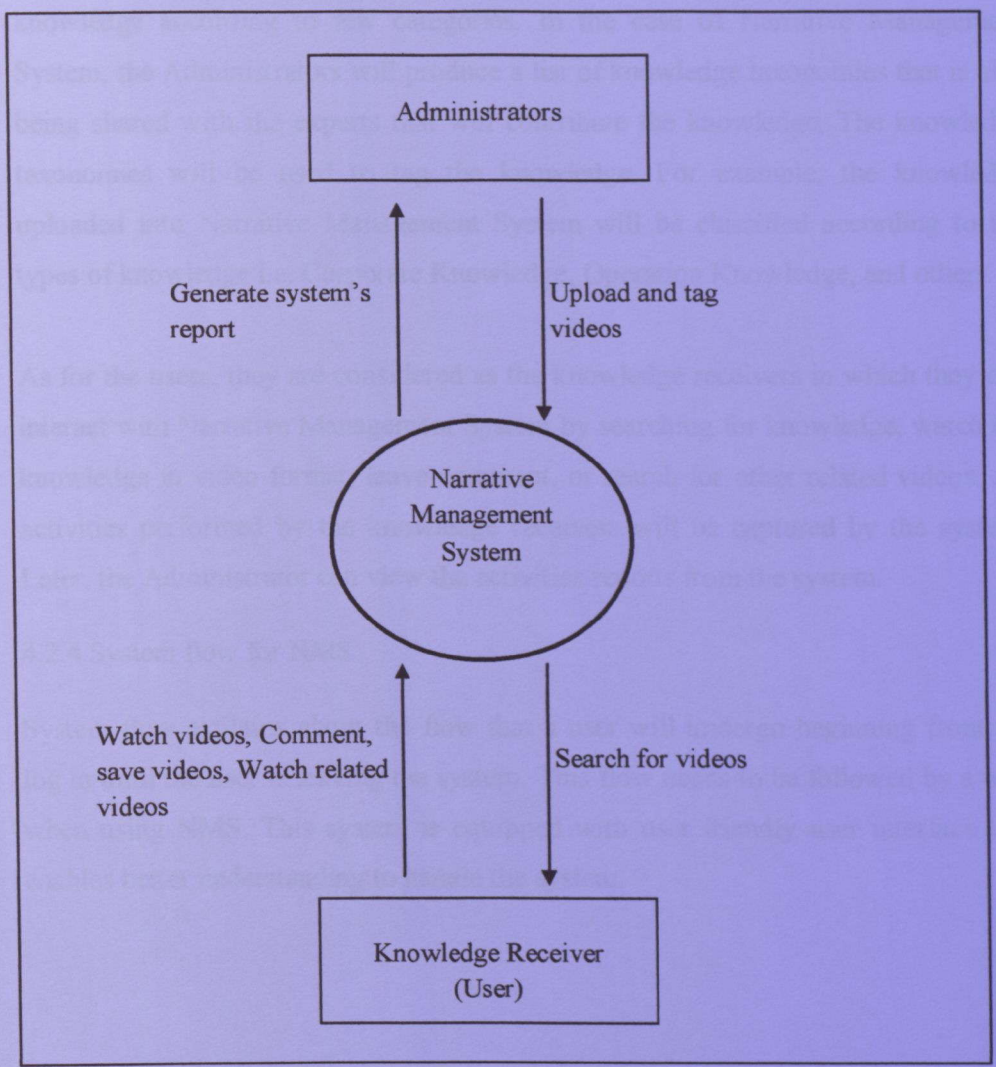

Figure 4.4: Context Diagram for Narrative Management System

The figure above shows TWO (2) entities that will directly interacting with Narrative Management System. The first entity is the Administrator that is responsible in uploading the knowledge which is basically in video format. While uploading the knowledge, administrator is as well creating knowledge taxonomies in order to tag the videos.

Knowledge taxonomy is an approach to organize knowledge by classifying the knowledge according to few categories. In the case of Narrative Management System, the Administrators will produce a list of knowledge taxonomies that is also being shared with the experts that will contribute the knowledge. The knowledge taxonomies will be used to tag the knowledge. For example, the knowledge uploaded into Narrative Management System will be classified according to the types of knowledge i.e. Corporate Knowledge, Operation Knowledge, and others.

As for the users, they are considered as the knowledge receivers in which they can interact with Narrative Management System by searching for knowledge, watch the knowledge in video format, leave comment, or search for other related videos. All activities performed by the knowledge receivers will be captured by the system. Later, the Administrator can view the activities reports from the system.

4.2.4 System flow for NMS

System flow explains about the flow that a user will undergo beginning from the log in until the user is leaving the system. This flow needs to be followed by a user when using NMS. This system is equipped with user friendly user interface that enables better understanding to handle the system.

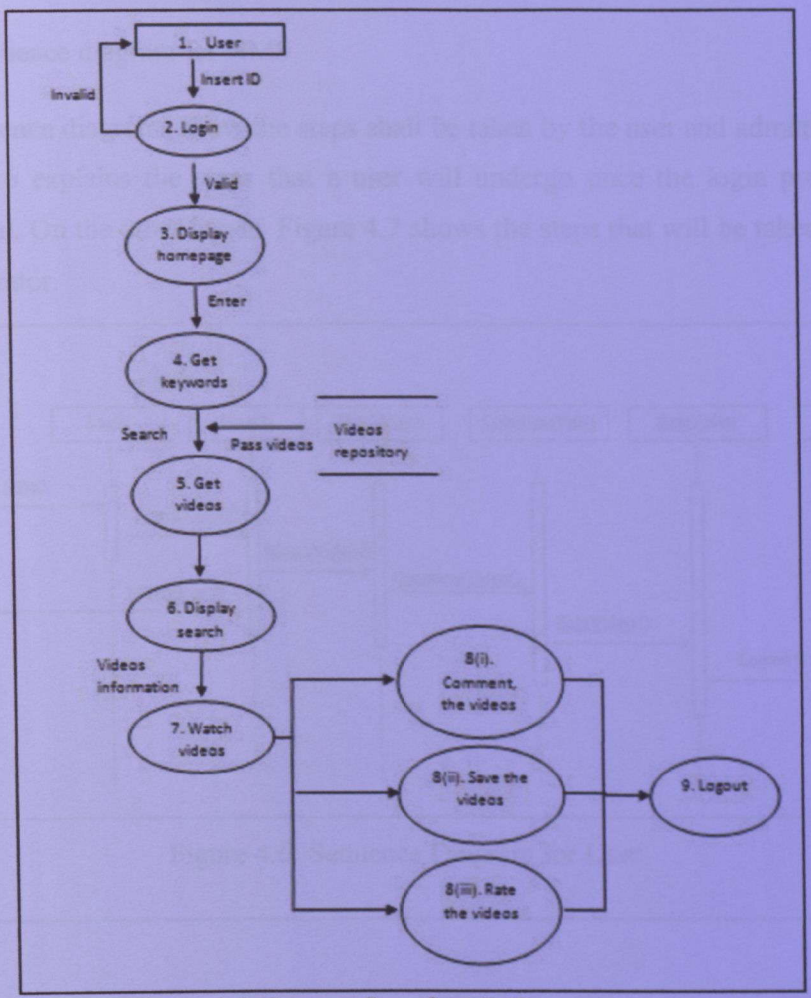

Figure 4.5: System flow for NMS

4.2.5 Sequence diagram for NMS

The sequence diagrams show the steps shall be taken by the user and administrator. Figure 4.6 explains the steps that a user will undergo once the login process is successful. On the other hands, Figure 4.7 shows the steps that will be taken by the administrator.

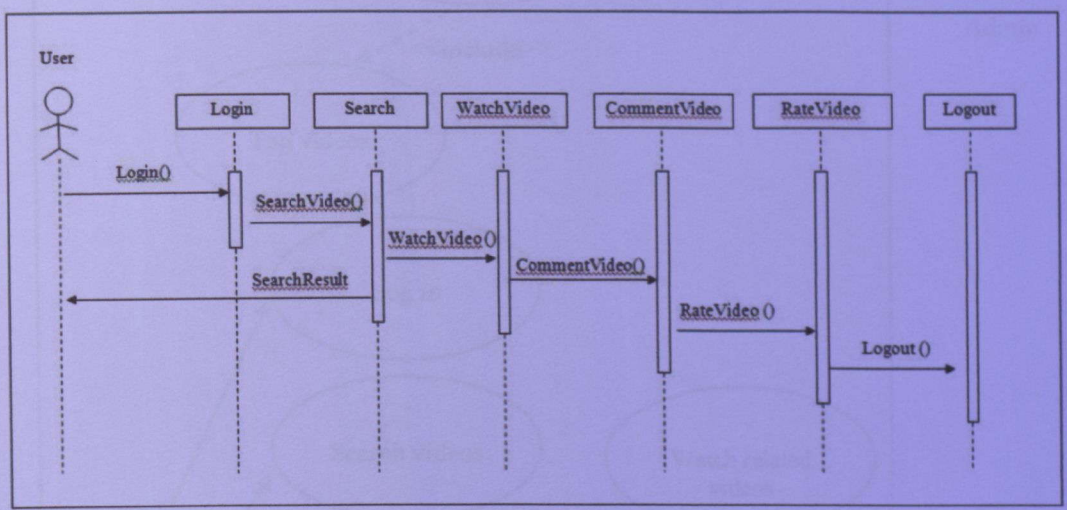

Figure 4.6: Sequence Diagram for User

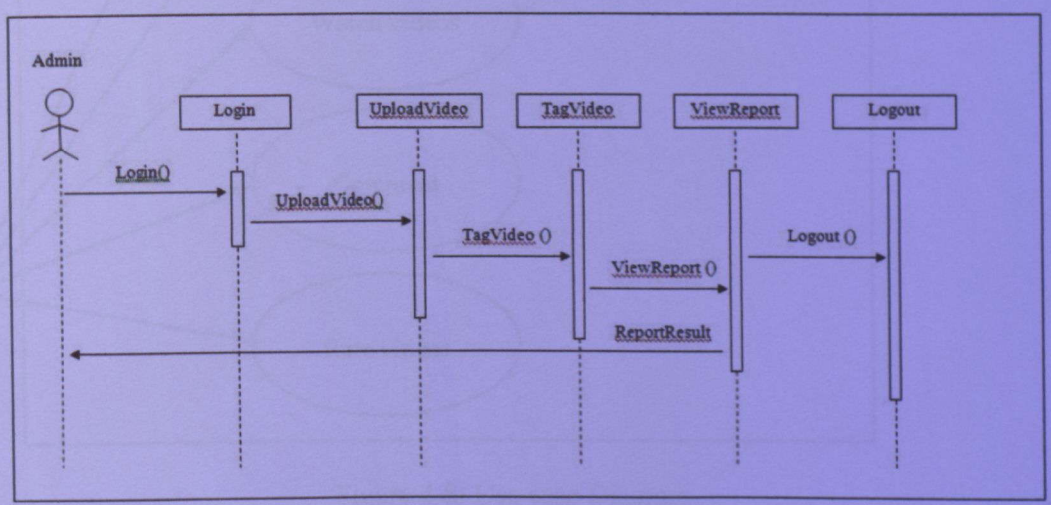

Figure 4.7: Sequence Diagram for Administrator

4.2.6 Use case diagram for NMS

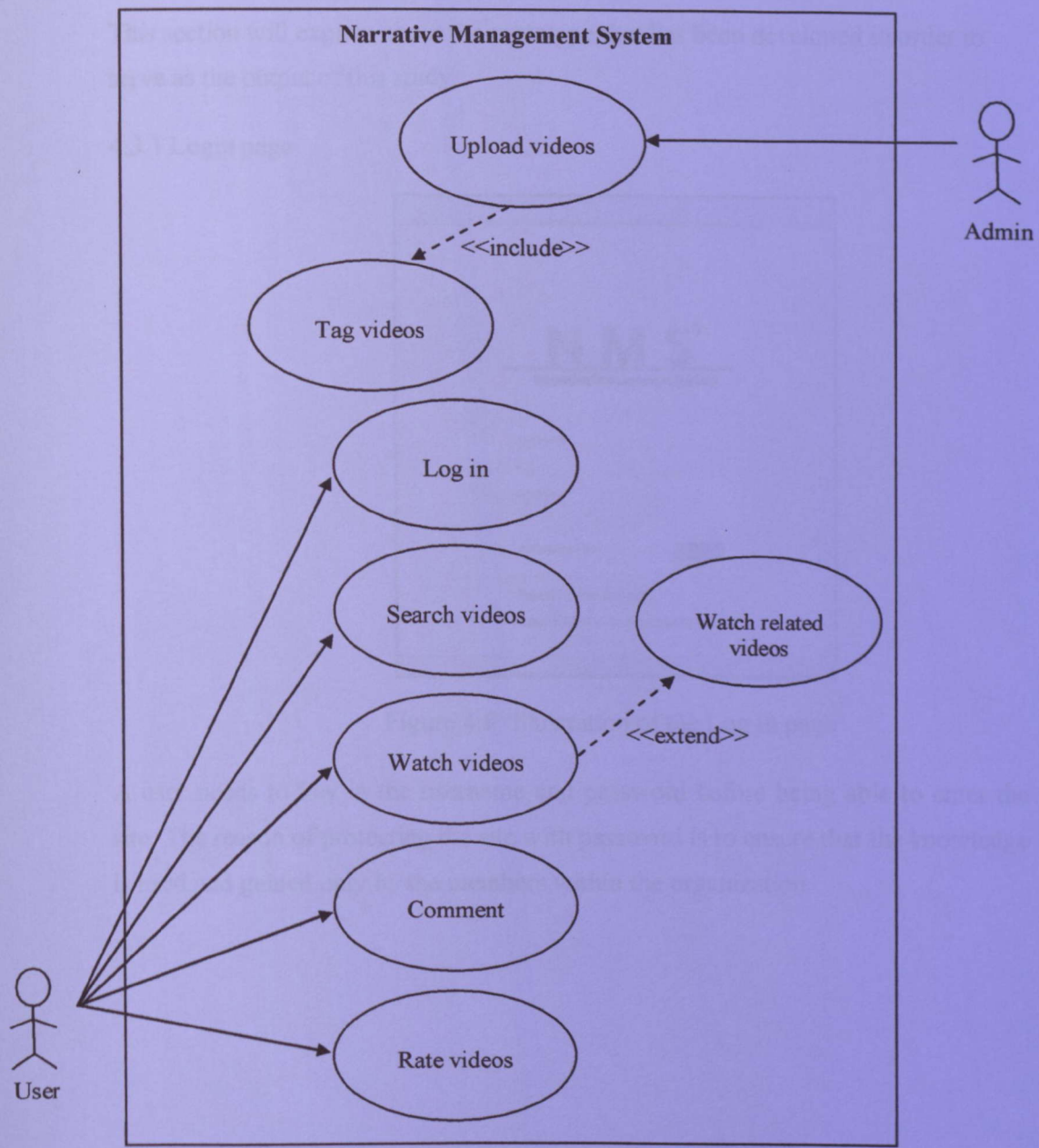

Figure 4.8: Use case Diagram

4.3 Prototyping

This section will explain about the prototype that has been developed in order to serve as the output of this study.

4.3.1 Login page

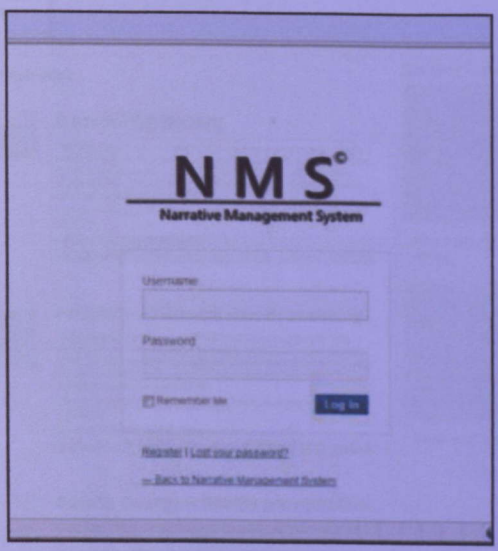

Figure 4.9: Illustration of the Log in page

A user needs to key in the username and password before being able to enter the site. The reason of protecting the site with password is to ensure that the knowledge is used and gained only by the members within the organization.

4.3.2 Homepage for NMS

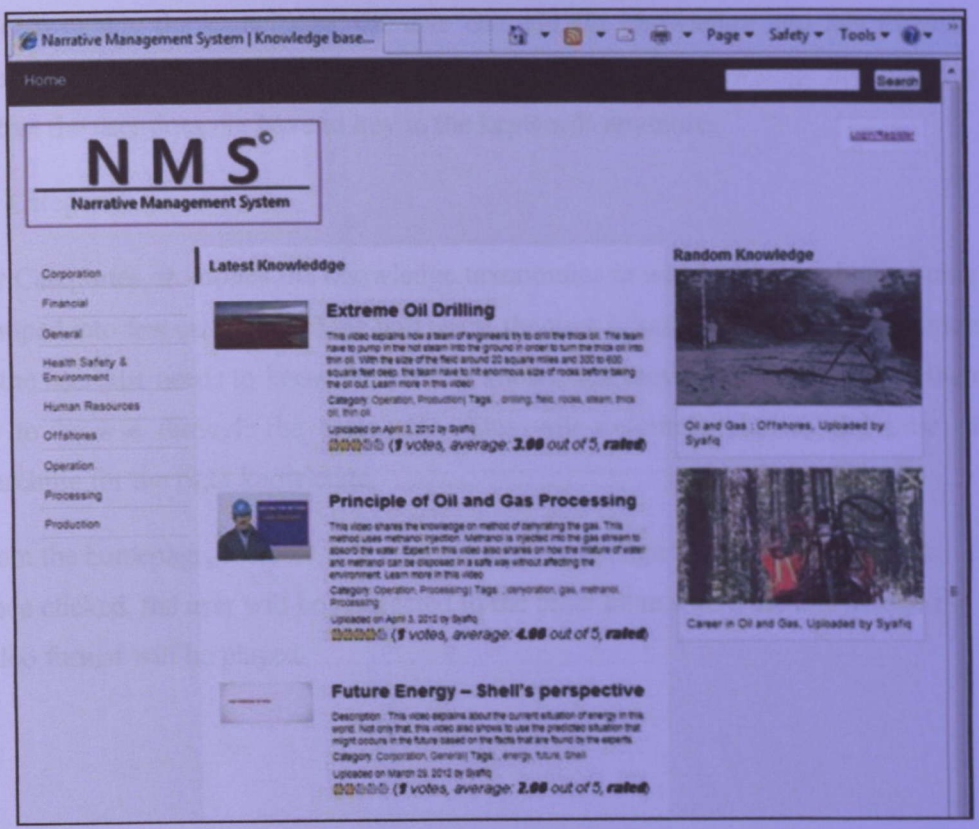

Figure 4.10: Illustration of the homepage

The area is divided into THREE (3) parts; Categories, Latest Knowledge, and Random Knowledge. Not only has that, a homepage is developed together with those functions:

(a) Search Box

The homepage is equipped with Search box which allows the user to key in the keywords for the knowledge that they are looking for. It is developed using KM concept that is knowledge taxonomy. Every knowledge will be tagged accordingly and if the search matches the tags, then the knowledge will be displayed.

(b) My Playlist

After watching the knowledge, the user can add the knowledge into My Playlist. The purpose is to ensure that a user can easily look for the knowledge in the future so that the user does not have to key in the keywords anymore.

(c) Categories

For Categories, it implies the knowledge taxonomies in which the knowledge being grouped into few categories. This will assist the user in searching for the knowledge as the user just needs to know the kind of knowledge they are looking for and then try to browse through the categories. This will definitely shorten the time of searching for the right knowledge.

From the homepage, the user will click on any knowledge that they wish to view. Once clicked, the user will be redirected to the other page where the knowledge in video format will be played.

4.3.3 'Now playing' page

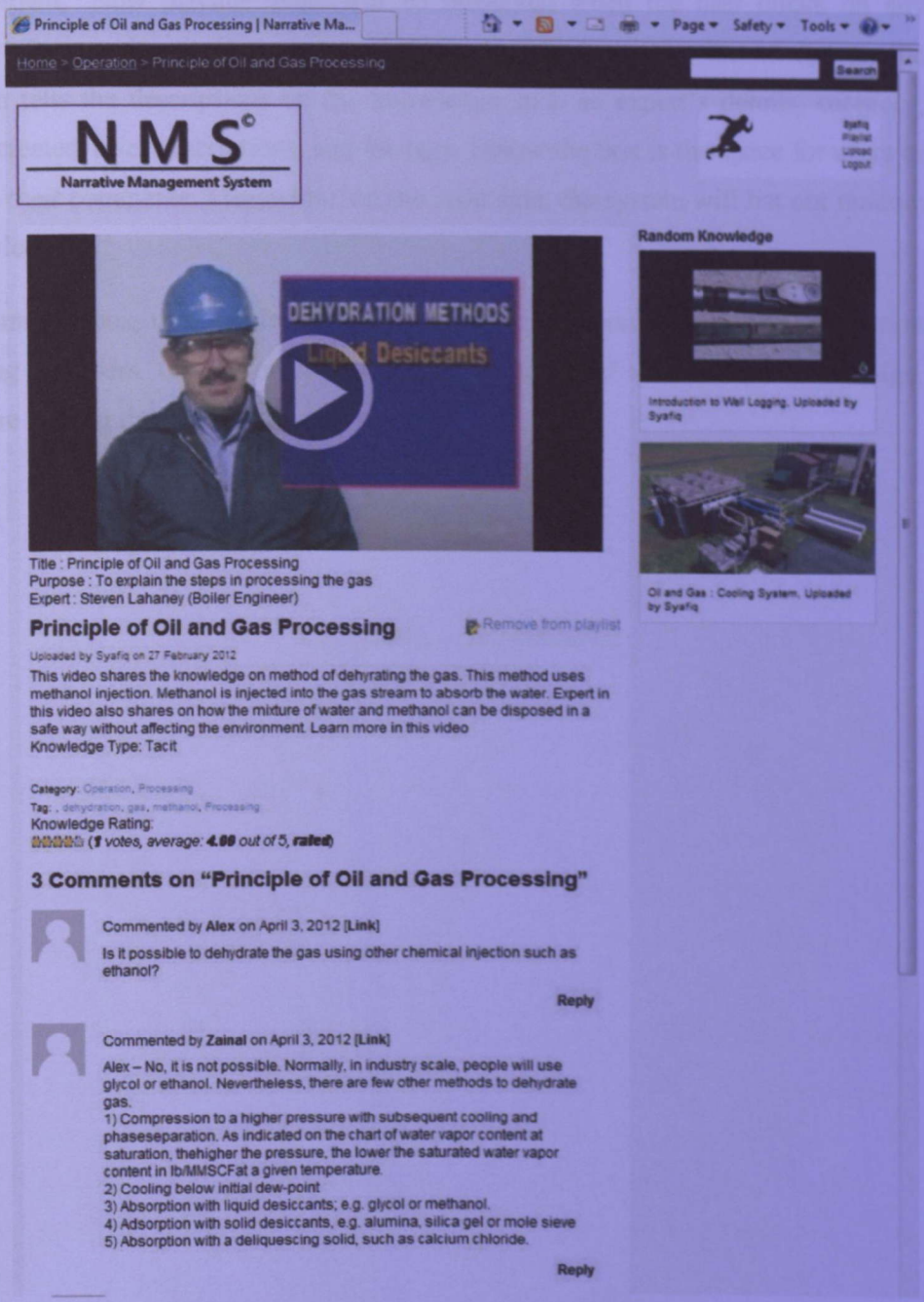

Figure 4.11: 'Now playing' page

As shown, 'Now playing' page will be displayed when the user clicks on any knowledge to view it. The page included a box that contains knowledge profile which tells the descriptions on the knowledge such as expert's details, category, date created, brief descriptions, and the tags. Below the box is the space for users to leave their comments. Meanwhile, on the right side, the system will list out random knowledge.

In comment box, user can leave any comment or question. This allows interaction among the users. On the other box, user can click and view related knowledge. Before leaving the system, the user will log out.

Chapter 5: Conclusion & recommendations

5.0 Conclusion & recommendations

Finally, storytelling is a structured mechanism to capture and share tacit knowledge in a project management. Since the nature of tacit knowledge that is difficult to be articulated, one of the best ways in sharing the knowledge is using storytelling. With the development of Narrative Management System (NMS) to support storytelling, project management is able to encourage knowledge sharing culture among the project members.

This project concerns with the main objective of the research that is to study the implementation of storytelling as a mechanism to allow sharing of tacit knowledge in a project management. Overall, the research is equipped with the study on knowledge sharing practices in oil and gas project management, and the implementation of storytelling to share the tacit knowledge.

There are a number of limitations affecting the scope of these findings. For one, the research requires extensive study which subsequently needs a high time commitment. But since the research period is very short, it is limiting the study in term of time frame. Future research would benefit from long and ample period of research which involves intensive reading on literatures and other research papers.

Secondly, the research requires the involvement of specific participants who involve directly with the project management. Unfortunately, since these type of participants are very busy and hard to catch for an interview; the research ends up with alternative participants which is not real target for participants. It is advisable for future research to prepare a larger sample size that would add more significant inputs to the results.

References

Anand, G., Ward, P. T., & V.Tatikonda, M. (2010). Role of explicit and tacit knowledge in Six Sigma projects:An empirical examination of differential project success. *Journal of operations management , 28*, 303-315.

Anantatmula, V. S. (2003). *Improving the performance of project management through knowledge management.* Washington DC: The George Washington University.

Baxter, K. (2011). *Three Acts Structure.* Story Lab Partners.

Bhardwaj, M. & Monin, J. (2006). "Tacit to explicit: an interplay shaping organization knowledge," *Journal of Knowledge Management*, vol. 10, p.72.

Brown, E. D., & Deokar, A. (2009). Applications of storytelling in knowledge management. *INFS 838.*

Brown, J.S., & Gray, E.S. (1995) "The people are the company" in Fast Company

Choudhuri, N. M. *Project Management Fundamentals.* India: ITC Infotech India Ltd.

Cline, S., Hinsch, C., Mertha, I., & Thompson, M. (2005). Knowledge Management. *Information Systems: Tehory and Practice .*

Endres, M. L., Endres, S. P., Chowdhury, S. K., & Alam, I. (2007). Tacit knowledge sharing, self - efficacy theory, and application to the Open Source community. *Journal of knowledge management , 11* (3), 92-103.

Kidwell, J. J., Linde, K. M., & Johnson, S. L. (2000, October). Applying corporate knowledge management practices in higher education. *Educause quarterly* , pp. 28-33.

Leavitt, P. (2002). *Applying Knowledge Management to Oil and Gas Industry Challenges.* Houston: American Productivity & Quality Center.

Lee, L.L. (2000), ''Knowledge sharing metrics for large organizations'', in Morey, D., Maybury, M. and Thuraisingham, B. (Eds), Knowledge Management: Classic and Contemporary Works, MIT Press, Cambridge, MA.

Linde, C., (2001). "Narrative and Social Tacit Knowledge",Journal of Knowledge Management, Special Issue on Tacit Knowledge Exchange and Active Learning, vol. 5, no.2,pp. 160-171

Lock, D. (2007). *Project Management* (9th Edition ed.). Gower Publishing Limited.

Meganathan, R. (2009, October 31). *Teaching English: British Council* . Retrieved 10 28, 2011, from British Council Website: http://www.teachingenglish.org.uk/blogs/rama-meganathan/telling-a-story-0

Method 123 Limited. (2003). *Project Management Guidebook.* India: Method 123 Limited.

Nielsen, L., Madsen, S., Storytelling as Method for Sharing Knowledge across IT Projects. In Proceedings of HICSS'2006.

Nonaka, I., Totama, R., & Nagata, A. (2000). A firm as a knowledge-creating entity: a new perspective. *Industrial and Corporate Change , 9* (1), pp. 1-20.

Orton, P.Z. Effects of story strength elements and interactivity on audience interest in and liking of story dissertation, Department of communication, Standford University, 1995

Polanyi, M., 1966. The Tacit Dimension. Doubleday, Garden City, NY.

Ramaprasad, A., & Prakash, A. (2009). Fostering Knowledge Sharing in Project Management. 42nd Hawaii International Conference on System Sciences, (pp. 1-10). Hawaii.

Santosus, M., Surmacz, J. (2001). The ABC's of Knowledge Management. Retrieved February 22, 2004 from Knowledge Management Research Center Web site: http://www.cio.com/research/knowledge/edit/kmabcs.html.

Shell Organizational Performance and Learning. (2001). *Story-telling in Shell: Managing Knowledge through new ways of working.* Shell International Exploration and Production.

Snowden, D. (2005). Story telling: an old skill in a new context. *Business Information Review , 16* (1), 30-37.

Sole, D., & Wilson, D. G. (2003). *Storytelling in Organizations: The power and traps of using.* Harvard: Learning Innovation Laboratories, Harvard University.

Swap, W., Leonard, D., Shields, M., & Abrams, L.,(2001). "Using mentoring and storytelling to transfer knowledge in the workplace," Journal of Management Information Systems, vol. 18, p. 95.

Wende, E., & Parissa, D. H. (2009). Storytelling as a tool for knowledge transfer in the IT industry. *17th European Conference on Information System* (pp. 1-12). Verona: Manuscript Central

APPENDIX 4-1

Results and discussion

Theme 1: Tacit knowledge sharing practices

Question 1: How the team members interact or engage among each other?	
Response	Initial Coding
Mostly the team members will communicate through email, weekly update meeting, and community of practice (COP).	Mechanisms for interaction
Question 2: How the team members communicating through COP?	
Response	Initial Coding
COP is a web – based platform that enables the project members to search for information on specified project. Each staff enrolls into community they should and will interact with other members within the COP through forum, or online discussion. Besides, the network for COP is quite wide because it is connected to the COP at the HQ in KLCC. Therefore lots of documents can be found within the system. The contributions into COP will affect the Individual Performance Contract (IPC) of the project members. The more they contribute, the better the IPC can be. Once in a year, this COP will gather according to their COP group and organize a sharing session	COP and how it works Incentives for involvement
Question 3: What kinds of information being shared in the document?	
Response	Initial Coding
The knowledge shared might be varies depending on the roles and positions of the contributors. For example, operations department is sharing information on the structure of the boiler, functions of certain equipments, and others. But, it is very rare to see the departments inside the company are sharing technical knowledge with other departments.	Types of knowledge shared

Question 4: Why the departments rarely share the technical knowledge?	
Response	Initial Coding
For one, of course other departments have nothing to do with the technical knowledge from others. For example, technical knowledge from operations department has nothing to do with Human Resources (HR). Besides, technical knowledge is hard to be shared through a document because it involves details procedures and information. Project members refuse to share because it might take time to write the technical knowledge. Not to mention that project members do not really have time to read every single document on the technical knowledge.	Challenges in sharing technical knowledge
Question 5: Referring to what you mentioned earlier, how frequent are the project members communicating through email, weekly update meeting and COP?	
Response	Initial Coding
That depends. For email, might be on daily basis since the accessibility to email is quite easy. Weekly update meeting is sometimes once in a week. But if there is issues, then the update meeting might be very frequent. For COP might be different for every project members. Some might be using it daily; others might use it once in a week, or even not using it in a month.	Frequency of interaction between project members
Question 6: How is the involvement of the project members in weekly update meeting and COP?	
Response	Initial Coding
Project members will get involved if they have time. For operations department for example, most of the members are working on shift so we don't really have the time to join update meeting.	Participation in interaction mechanisms
Question 7: Since there is limitation in term of time, what are other ways for operations department in order to share knowledge?	

Response	Initial Coding
For operations department specifically, we do have discussions almost daily. Basically the project members are discussing on few issues regarding the operations, equipments, and even sharing reports.	Alternative way in sharing knowledge

Theme 2: Technological Platform

Question 1: Instead of email and COP, what are technological tools being used in sharing the knowledge?	
Response	Initial Coding
Internally, the company has web based portal known as AXIS (Knowledge Management) Database. It contains many repositories such as procedures, management, and internal procedures. Each time there is update on the procedures, related repositories will change automatically. All project members have the accessibilities to look for the databases and give feedback on the changes. The portal helps in capturing any changes and modification made in the plants' equipments. The system helps in centralizing the changed procedures. AXIS helps in knowledge sharing within the company.	About AXIS Benefits of using AXIS
Through AXIS, each project member is required to submit at least one document a year. The document needs to be submitted to the Knowledge Management (KM) staff before being shared through AXIS.	Implementation of AXIS
Unlike AXIS, COP is a bit different. COP is department and function based portal. It is forum like platform. For operation engineers, they will enroll in COP under the department. The COP is also equipped with expert finder whereby the project members can find for experts using the COP. Each year, the COP	Differences between COP and AXIS

members for the department will meet during the sharing session at least once.	
Question 2: Why did you say AXIS database helps in knowledge sharing?	
Response	Initial Coding
Because it is more accessible whereby the project members can even access the database though they are working from home. For another, it is more structured management in which the project members need not to worry for data loss.	Advantages of using AXIS to share knowledge
Question 3: What do you mean by more structured management?	
Response	Initial Coding
Unlike COP, AXIS is more specialized towards technical knowledge in which the system is not being overloaded with unnecessary knowledge and information. The knowledge is also being grouped accordingly. For example, knowledge related to heating, production of steam, and compressing the gas will be placed under the process database. Therefore, the project members have no problem in finding information related to those processes.	Features of AXIS system
Question 4: How are the project members responding towards the system?	
Response	Initial Coding
Positive. Since new knowledge can be learnt through the system, the numbers of voluntarily participants are quite good. The numbers can be improved if it is made compulsory to all project members.	Level of acceptance by project members on the system

Theme 3: Sociological Platform

Question 1: What are social platform involved in knowledge sharing between the project members?	
Response	Initial Coding
Commonly the project members engage in conversation and discussion during break time. There is no specific place like lounge or others. Normally the discussions can take place at the pantry, manager's room, or even workplace.	Socialization mechanisms
Question 2: How frequent the social platforms being used to share knowledge?	
Response	Initial Coding
If it is discussion between team members, perhaps three time in a week. Normally the discussion being initiated by the team leader in order to discuss on several matters. But conversation between project members takes place almost every day. This conversation is informal and sometimes involves members from other departments as well.	Frequency in socializing between project members
Question 3: How the social platforms being used to obtain the knowledge?	
Response	Initial Coding
Normally the discussion involves few members of the project. The project members will capture the important knowledge in discussion by taking the notes before taking the next action. Sometimes when the project members are not sure with the knowledge then they will consult with the right persons to clarify more. I must say that later they are also using email to communicate the knowledge they obtained from the discussion and conversation.	Implementation of sociological platforms
Question 4: What are among the knowledge shared through the social platforms?	

Response	Initial Coding
I must say there are lots of knowledge and information being shared through conversation and discussion. From the general subject until the technical parts. Perhaps because the project members are comfortable to share knowledge through social platforms. But most commonly, they are sharing experience and stories that they encountered previously because some project members are coming from other companies and even working in other departments. So they normally share their experience working at previous companies.	Types of knowledge shared through sociological platforms
One thing that is not good about conversation is the rumor. Sometimes it is hard to split between the fact and rumor. For example, during the tsunami in Japan most of the project members were talking about minimizing the operations since Japan is one of our biggest customers for LNG though the management issued nothing about the situation.	Disadvantages of sociological platforms

Question 5: What do you mean by "project members are more comfortable to share knowledge using social platform"?

Response	Initial Coding
Both discussion and conversation are more close to the project members. They can have face to face interaction. Besides, both are not complicated and can take place during free times.	Advantages of sociological platforms
If compared to web – based portal, many refuse to share knowledge because it is complicated and time consuming. By discussing with the right person, project members can get quick responses and provide more spaces to discuss.	Advantages of sociological platforms

Theme 4: Challenges in sharing knowledge

Question 1: What are the challenges in sharing tacit knowledge among the team members?	
Response	Initial Coding
There are many actually. The obvious one definitely low contribution from the project members. Not many project members really wanting to contribute towards sharing of the knowledge within the organization.	Low contribution
Sometimes, there are too many files/documents shared which causes too many unrelated knowledge appears when you key in the search. So the project members would rather go to the right person and talk to them in order to get information or knowledge.	Overloaded documents
I must say that the awareness on knowledge sharing is also quite low since the project members cannot really see the purpose of sharing the knowledge as each person had been assign to specific task.	Low awareness on knowledge sharing
Question 2: Why the project members hardly participate in knowledge sharing?	
Response	Initial Coding
Project members are too busy with their overload works and sharing is done if they have time or they are force to do the sharing it. Like in our case, contribution towards the COP will affect their IPC.	Time constraint
Sometimes technical stuffs are very difficult to be explained, so the project members would rather discover the technical knowledge on their own.	Technicalities are hard to explain
Question 3: How does the management overcome the challenges??	
Response	Initial Coding
As I mentioned earlier, the more the project members contribute	Strengthening the implementation

towards the system, the more positive their IPC's can be. This IPC will be evaluated by end of the year by the managers. Besides that, each project members are required to contribute at least one document each year to the system. Besides, in order to encourage project members to participate in discussion or training, the management prepares meals/refreshments.	

Theme 5: Proposing storytelling

Question 1: What are your expectations on storytelling if it is used as a sharing mechanism?	
Response	Initial Coding
Storytelling is good to narrate the process flow of some project management, on how they manage the work, on how they tell their success or failure stories. However, to explain technical knowledge is quite difficult if relying on storytelling method alone, as visual aid is required to help people to understand the concept of the technical stuffs.	Using visual aid to support storytelling
But, if the storyteller can relate the technicalities with his real life stories, the audience will keen to pay attention as they can see its application in the real world. Sometimes it is hard to understand technical theory alone without knowing its application the real world.	Clear relationship between stories and real life applications
Storytelling via video can enhance knowledge sharing as people are lazy to read. Most importantly, the storyteller is an expert in the knowledge so that people are keener to know more about the knowledge.	Storytellers must have expertise
Question 2: Stories will be uploaded and shared through a web – based system known as	

"Narrative management system". What are your expectations on this system?	
Response	Initial Coding
I am not so sure what it's supposed to look like but all I know is that the system must be very user – friendly. Because these project members do not really have much time to figure out every single button within the system.	User – friendly system
For me, as the system can help to deliver the knowledge in an attractive and interesting way, then each project members will enjoy using the system.	
Of course it is better if the system can allow the project members to interact and communicate to each other. Not only that, the video and the knowledge to deliver must be very clear and interesting.	Interactive system Clear video and knowledge
I believe that if the system can work similarly like AXIS, then it will be very good or even better since there is going to be video inside the system.	
Question 3: Can you explain more on "video and knowledge to deliver must be very clear and interesting"?	
Response	Initial Coding
Definitely the important thing when using video is how you want to make sure the person will watch the video until the end of it. The quality of the video must be very good, the voice must be very loud and clear and as I mentioned earlier, the visual aid is very importance so that the project members can relate the knowledge to the real life situation.	High quality audio and visual
Question 4: If the system being deployed to share knowledge, are the project members willing to contribute?	

Response	Initial Coding
For me, it is hard to predict the participation of project members especially if it is voluntarily. But if the system is really helpful then the project members will definitely use it.	Helpful system will encourage participation
When we talk about participation of project members, one of the major concerns is of course the cost of time. Normally project members won't be spending too much time on reading materials, watching videos and others.	Less time consumed
They would prefer something that is informal and more real like conversation or chit – chat. Perhaps because they can expect faster responses with face to face interactions.	Faster and informal responses

Question 5: What kind of stories that you like to hear??

Response	Initial Coding
1. Rationale of making decision. For example, if previous years the company made significant changes in the operations, then there might be a video telling on last years' operations and why it changed. 2. General information like revenues generated by the company, or perhaps key message from the top level management, the new developments, and others. 3. Success and failure stories. Operations mainly related to safety, processes, and others. So it might be good if the system can supply the project members with stories like real incidents happened during operations and how to handle the incidents.	Types of stories suggested