CHAPTER 2

2. LITERATURE REVIEW

In Chapter 1 of this document has briefly described what is document, document management and a simple definition of EDMS. EDMS enables document to be stored and managed electronically. Over the period of time, EDMS could save the organization cost in maintaining documents. Thus, contributes to the organization management effectiveness and efficiency.

This chapter contains information that will guide and lead towards the investigation that will be conducted. It will further support this study and guide the information gathering process.

As mentioned earlier in this document, knowledge and information are important to organisation. These are the important and basic needs that organisations required to operate and manage an organisation. Therefore, it is important that knowledge and information can be shared systematically, under controlled and secured environment. In order to achieve this, the document management procedure, methodology and mechanism needs to be in place.

2.1 Document Management

It is important to have a good document management procedure to ensure that the documents are maintained effectively. A good procedure includes filing data collected, storing it safely, indexing it properly, making it easily accessible and protecting it from outsiders is a major concern for many organizations.

A good procedure also will entails to users satisfaction. Therefore it is important to have a good document management procedure for users to have confident and trust that documents maintained by the organization are secured and reliable. Therefore, this study will also define characteristics of a document management procedure which will later be compared to the current document management procedure that RNZ adhered to. The result of the comparison will determine if RNZ document management procedure is one of the reasons that users are not satisfy with the EDMS.

Prior to the availability of the technology for the development of the EDMS, documents are being managed conventionally or manually. Users found that the conventional document management system are getting difficult and challenging as the number of document grew bigger.

2.2 Storing Document the Conventional Way

Conventionally, documents are stored manually. A manual filing procedure was created to assist in categorizing the document. The categorization would determine the indexing, security level and retention period of the document before it could be archived or disposed. Documents are stored in the filing room. There are organizations that have a dedicated filing clerk to manage the files. However, managing files manually gets troublesome as the number of files grew bigger. Not only it gets difficult to manage but also the space required to store them grew as the number of files grew.

Documents contain concepts, ideas or decisions. Activities of workers also can be obtained in documents. Documents play major role for exchanging information in the organization. Therefore, conventional way of document management would require high quantity of papers usage for the purpose of knowledge sharing. Another problem occurs when managing files manually is tracking the movement of the documents especially when there is staff turnover and the dedicated person or clerk that is in-charge of the filing is changed.

Keeping history of a document is also important especially to assist in decision making. Maintaining documents history is an issue as the documents grew older. The conventional ways, documents usually stored according to their areas. Hence, there are documents that are

kept separately. There is no single document repository. This creates difficulty if information is required from different areas.

Conventional document management allows limited security measure such as locked or fire proof document room.

Document management involves document management characteristic which are listed as below (Top Bits, 2010):

2.2.1 Storing Documents:

Storing documents becomes critical as the amount of document expand. The larger the organization, the bigger the number of document that need to be managed. Some large organization can create millions of documents each year, and on a regular basis.

Not only are these documents usually spread out over many offices throughout the country, they can be in different parts of the world as well. Document storage is an important piece to document management, due to the fact that in the near future, a document might need to be found for legal or other business purposes.

2.2.2 Retrieving Documents:

Retrieving documents is another huge problem that many people involved in document management must solve. How do you access one specific document in a pile of thousands or even millions of

documents? Retrieving documents requires a system of storing documents and accessing these documents in a timely manner, as well as a monetary affordable manner.

2.2.3 Filing:

Filing is extremely important, even if you have an organization system set up, who is to say that a file can't be easily misplaced. It is important to have a system that is not only easy to use, but is effective even if documents are misplaced. For example, some of today's documents have stickers that include transponders. These transponders allow filing assistants to easily locate a file via RF (radio frequency technology). For important files, more and more corporations are using this technology.

2.2.4 Security:

Security for most organizations is crucial when it comes to their document management. Many corporate industrial secrets, planning, salary data and other types of information are stored on documents. Whether the document is only a few weeks old or a few years old, if someone that is not authorized to look and copy these documents gets a hold of them, it can cause the organization possibly millions of dollars in damages.

Security is also a major concern for documents that are stored physically. If a document storage facility is not secured properly, a person can easily walk out with a whole filing cabinet of documents or worse. Most document storage facilities are guarded by security professionals.

2.2.5 Archival:

One of the interesting aspects of archiving documents is how people will be able to access documents in the future, for example 50 to 100 years from now.

2.3 Electronic Document Management System (EDMS)

EDMS is a computer system (or set of computer programs) used to track and store electronic documents and/or images of paper documents. It is the application of technology to save paper, speed up communications, and increase the productivity of business processes. From a broader perspective, EDM is a major expansion in the domain of information management (Spargue, 1995).

The system facilitates to coordinate and control of the flow (storage, retrieval, processing, printing, routing, and distribution) of electronic and paper documents in a secure and efficient manner, to ensure that they are accessible to authorized personnel as and when required.

A well-designed EDMS promotes finding and sharing information easily. It promotes knowledge management and information mining. It also helps the organization to meet its legal responsibilities. It provides information such as the document authoring, reviewing, publishing, auditing, and ultimately destroying or archiving.

2.3.1 Modules and Functions in EDMS

According to Sprague (1995), The Document Management Functions available in EDMS are what enables the documents to be managed as an information resource rather than as a collection of files.

The functions in EDMS include:

i. Create – who is the originator of the documents and when it was created
ii. Stored/organised – where to keep the document
iii. Retrieve – who can retrieve the document, how is the document retrieve
iv. Transmit/route – where an how can the document be transmitted
v. Display/print – what can be displayed and printed by who
vi. Access Control – who owns it, who can read it, who can change it
vii. Version Control – what is the current version of the document, what are the previous version that are still needed

viii. Status reporting – who has the document, what is its recent activity

ix. Retention management – what are the legal retention requirements, corporate policy requirements, how to destroy the paper and electronic versions

x. Disaster recovery – how and where are the backup copies kept, what are the recovery procedure

In another article, (Zantout & Marir, 1999) stated; the most important functions of current document management systems enable users to:

i. directly manipulate the documents,

ii. index and store to retrieve the documents,

iii. communicate through the exchange of documents,

iv. collaborate around documents,

v. model and automate the flow of documents.

2.3.2 Weakness of EDMS

According to Sprague (1995), EDMS has made an organization's major productivity and performance increases by applying new technology to document and documents processing. Even though EDMS managed to assist the organisation to increase its productivity and performance, the adoption of EDMS in an organization can also caused the following impact to the organization:

i. Increases the responsibility of the Information Technology Department,

ii. Required the technology applied to be constantly reviewed and updated to support the current requirement. This exercise would involve cost

iii. Radical organizational change is required to inculcate the culture of using EDMS

In the previous paragraphs explained the conventional and electronic means of managing documents in organisations. Thus, the followings are summarised comparisons between both methods.

2.4 Comparison between Conventional Document Management and EDMS

Comparison between the Conventional Document Management and the Electronic Document Management System can be summarized as in Table 1 below:

Table 1: Comparison between Conventional Document Management and Electronic Document Management System (EDMS)

Characteristics	Conventional Document Management	EDMS
Document Storage	Physical Store or Filing Room	Electronic storage media or Database
Document Retrieval	Limited search access. Search limited to knowing the date or approximate date, author or topic. Search for the document and retrieve it manually which can be Time consuming. To record manually the details of person who took the document	Required documents are retrieving according to the keywords assigned by the indexer. Searching can be done by combinations of descriptors which could produce a more accurate result. Thus maximising searching process where every

Characteristics	Conventional Document Management	EDMS
		possible search is available, Fast retrieval compared to manual
Filing	Time consuming as details of filing are recorded manually Extensive of paper usage as documents are stored according to specific areas. Hence, copies of same documents need to be made for filing is different areas.	Filing is easy by using technology such as bar code or transponder for document identification. Documents are electronically stored in a singe for all to access.
Security	Limited to manual and physical security	Usage of security such as authorization, authentication,

Characteristics	Conventional Document Management	EDMS
		encryption, filtering and access level

Table 1 which depict Comparison between Conventional Document Management and Electronic Document Management (EDMS) has shown that the latter provides better document management. Over the period of time, EDMS could save the organization cost in maintaining documents. Thus, contributes to the organization management effectiveness and efficiency.

Below are more advantages of EDMS (Sprague, 1995):

i. Reduce paper usage since documents are electronically kept. Thus, encourage paper saving within the organization.

ii. Faster document/information retrieval which could expedite communication

iii. Digitized document for easy maintenance which does not require large filing room. Documents can easily be stored and displayed.

iv. Documents could be transmitted/send electronically easily across the world via internet access with less cost as compared to the conventional way

v. The EDMS provide easy information sharing to facilitate the e-knowledge within the organisation which promotes education and training.

vi. Since documents also forms an important part of organization memory, thus EDMS provides means and access to analyse and leverage the organizational memory to improve the organization productivity and performance.

vii. Encourage the culture of filing and record management within the organization. This culture could promote into retaining the knowledge of the worker to avoid “brain drainage”

viii. Documents can be stored graphically, symbols, images, photographs, audio, video and animation. Documents which previously was stored on paper, can now be stored

ix. Digitized document can be “compound document” which contains graphical symbols, photographs, images, voice, video clips and animation in one document.

x. EDMS could improve the information management of the organization which could further facilitate management for better operations, management and control of the organization.

xi. EDMS could also facilitate management for better communication or sharing of ideas and concepts. Thus, assist management in forecasting and strategic planning of the organization.

Hence, comparing between the documents that is manually filed with the document that is filed with EDMS, basically the latter provides better document management. Over the period of time, EDMS could save the organization cost in maintaining documents. Thus, contributes to the organization management effectiveness and efficiency.

Having understanding of the importance of managing documents, documents management characteristics, conventional vs electronic document management methods, it is important to relate the above information to the business model of the company that is selected for this case study which is RNZ.

2.5 RNZ Business Model

RNZ Business Model information is important to give better understanding on application of EDMS in the organization. RNZ's business model was defined to set the business purpose and direction of the company. Those purpose and strategy is communicated through the vision and mission of the company.

2.5.1 Vision and Mission

Vision and Mission translate the direction of a business organisation which later translated in company objective. Vision is defines the desired or intended future state of an organization or enterprise in terms of its fundamental objective and/or strategic direction. Vision is a

long term view, sometimes describing how the organization would like the world in which it operates to be.

Mission defines the fundamental purpose of an organization or an enterprise, succinctly describing why it exists and what it does to achieve its Vision.

RNZ direction is set by its vision and mission which are as follows:

RNZ's Vision:

To Be A Highly Reputable, Global Integrated Solution Provider To The Oil & Gas Industry

Whereas RNZ mission is as follows:

We Are Committed To Consistently Deliver High Quality And Innovative Solutions In Conformance To HSE And Regulatory Requirements Which Exceeds Client Expectations

2.5.2 RNZ Organisation Structure

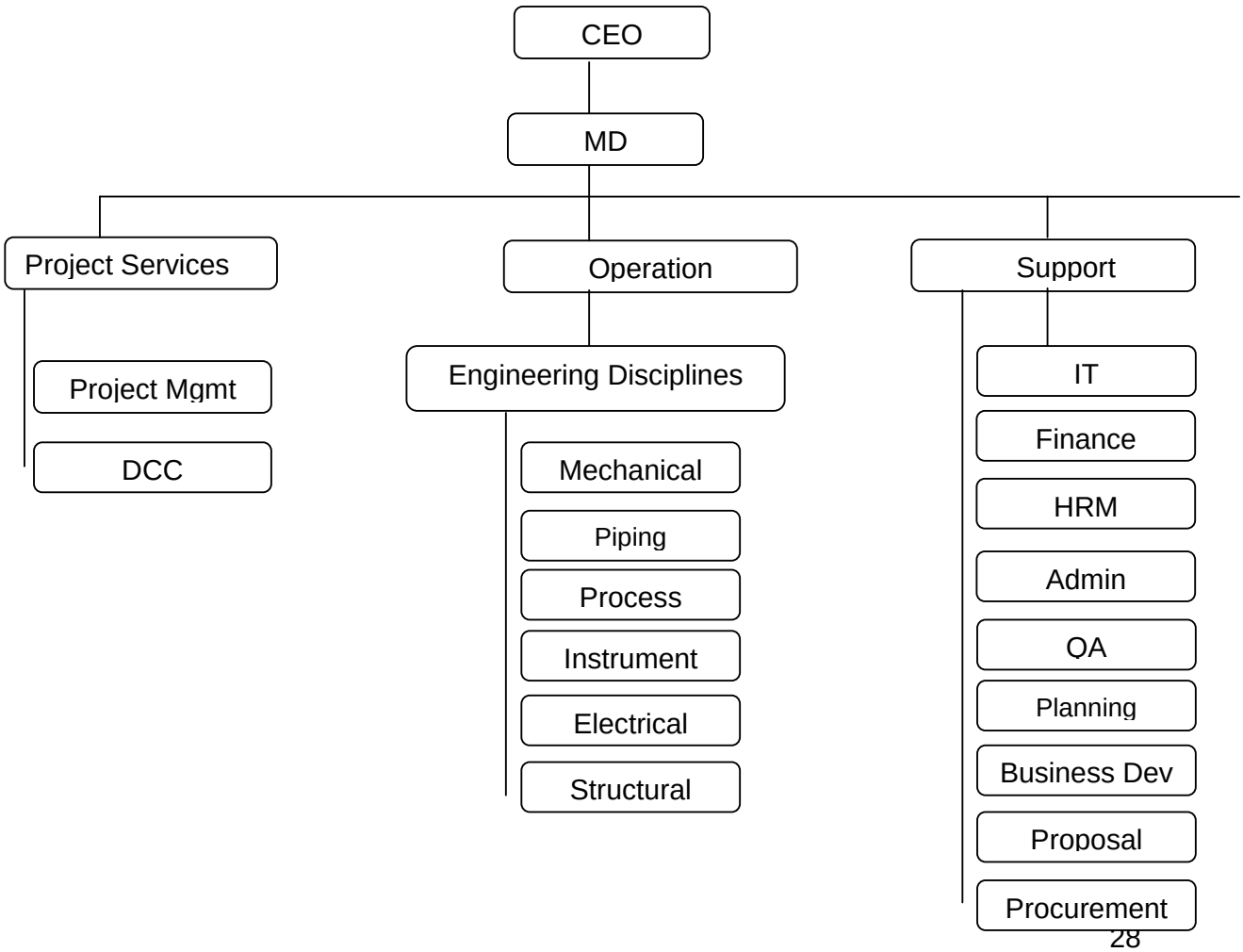
RNZ Integrated is spearheaded by a Chief Executive Officer (CEO) followed by his Managing Director (MD). RNZ Organisation structure is illustrated in Figure 1. Figure 1- describe the RNZ Organization Chart.

The Managing Director managing 3 main divisions namely Project Services, Operations and Support.

2.5.3 Project Services Division

Project Services Division (PSD) deals mainly with project management. It is a division where all project managers are located. Project Services Division is headed by a Director of Project Services (DPS). An important document management department called Document Control Centre (DCC) is located under PSD.

Figure 1: RNZ Organization Structure



2.5.4 Operation Division

Operation Division is lead by a Director of Operations (DOO). The DOO are the one who coordinates design development and Inter-Disciplinary Check (IDC) before, during and after each engineering design milestone is reached. Each engineering department under operations is called Engineering Disciplines. Engineering Disciplines are lead by Oil & Gas Engineering Design Experts which each of them is specialised in their own fields such as Piping Design, Mechanical, Electrical, Offshore and Onshore Structural, Process Engineering, Instrumentation and etc. Operation Division are the one who create engineering design for each design project awarded by clients.

2.5.5 Support Division

Support Division is a corporate centre for RNZ. Most of RNZ top management seats are located under Support Division such as Chief Financial Controller (CFO), Chief Information Officer (CIO), Head of Planning and Cost Control, Business Development Director and many more. Support Division are the department which provide the means for RNZ operations.

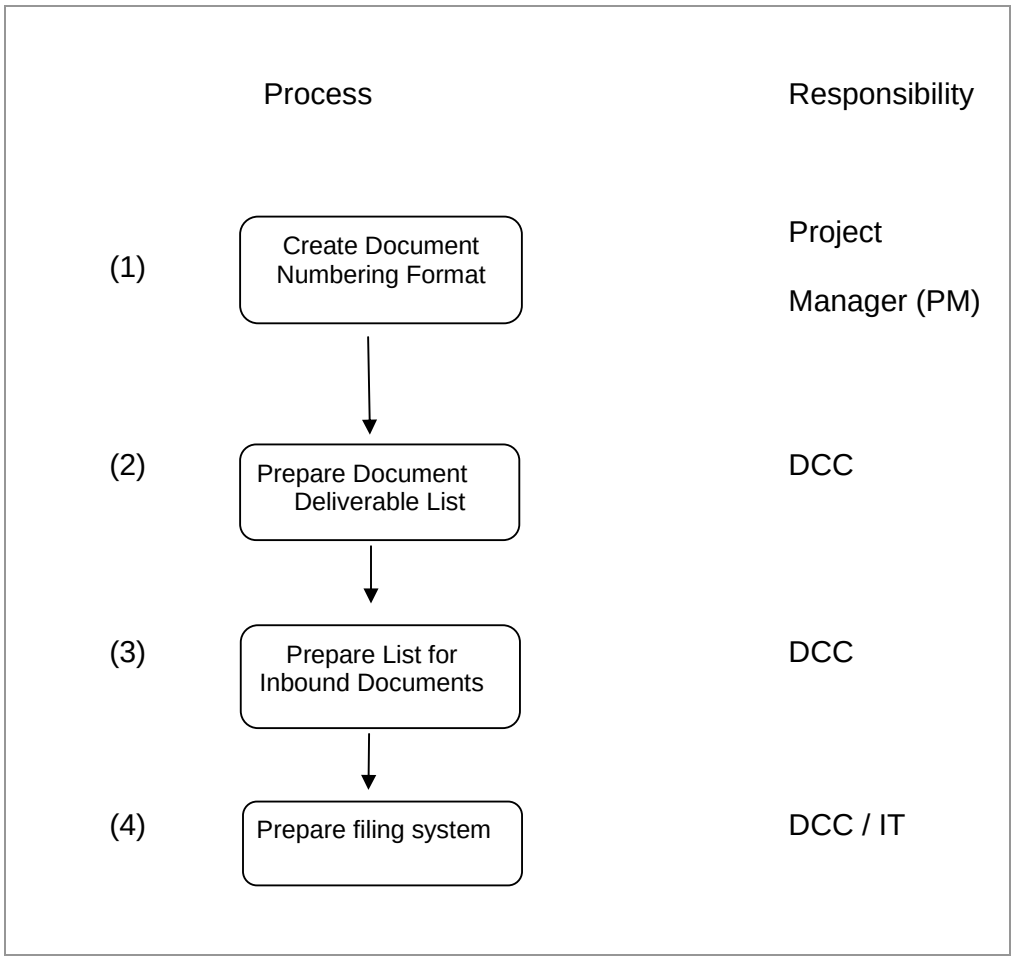
2.5.6 Document Control Centre

Document Control Centre (DCC) is one of the most important departments which will be discussed in this paper. DCC is a department in RNZ that manages all formal document movement

internal and external for the purpose of tracking document in related to project deliverables by RNZ to their clients. There are a few procedures owned by DCC and one of it that related to this paper is Document Control Procedures.

Document Control procedure provides guidelines and instruction in order to manage documents in RNZ. The procedures provide guidelines for DCC to manage document regardless of the existence of EDMS system in the company. The procedures are explained in detail below.

Figure 2: Initiation of Project Document Plan Procedures



. The procedure is extracted from a document named *RNZ3-PM-0104 Document Control Procedure*, provided by RNZ Quality Management System (QMS).

RNZ Document Control Procedures consists of two parts namely:

i. Initiating Project Document Plan

ii. Document Control for Internal and External Documents

The “Initiating Project Document Plan” starts after an awarded project been handed over to the Project Manager (PM) in RNZ. Upon project kick-off, PM establishes document numbering requirement referring to client tender documents for RNZ document deliverables.

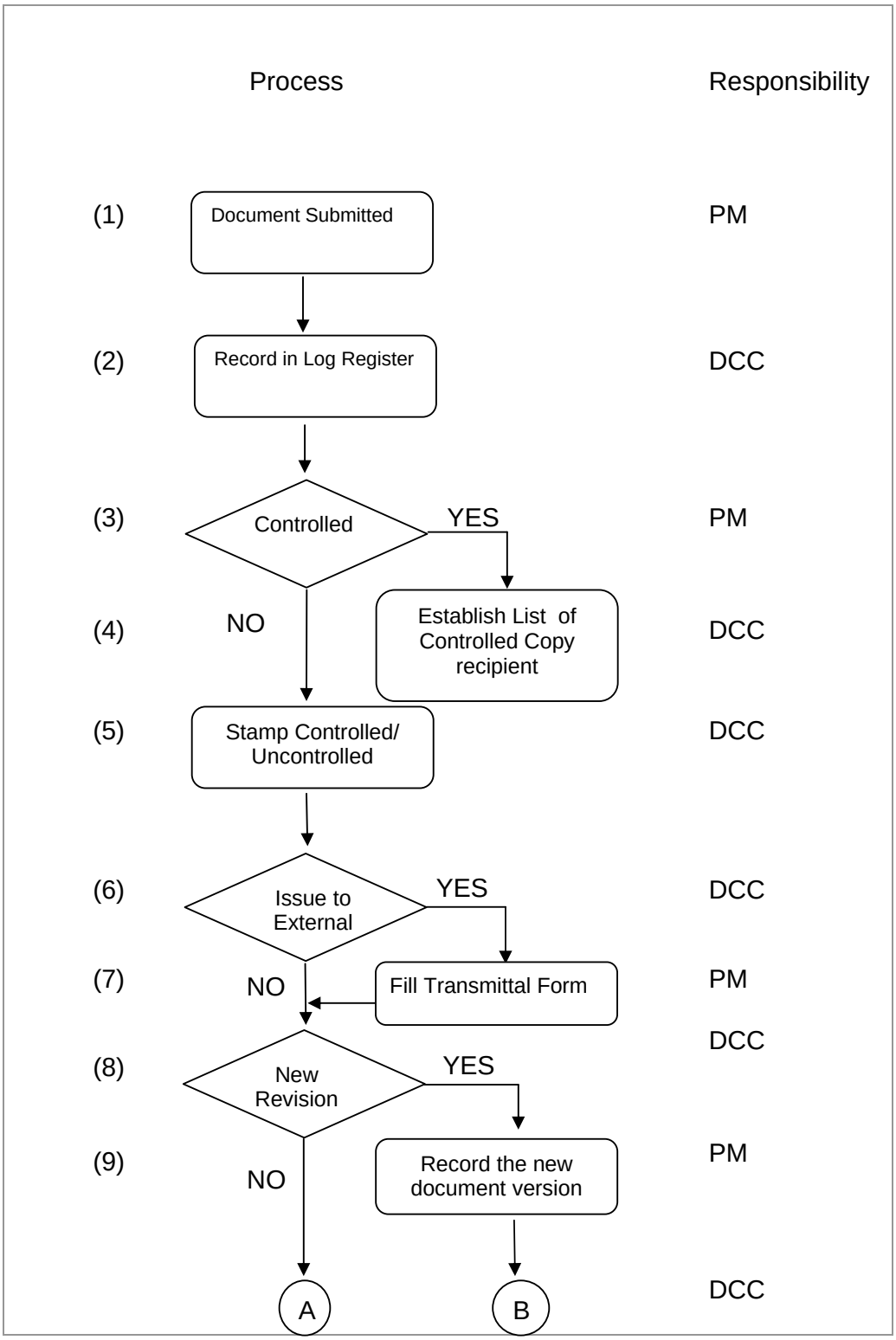
A Document Register shall be established for each Engineering Discipline and each type of deliverable. A Document Register should be established for Client and Vendor supplied document and as required for each type of document received, i.e. Drawings, specifications etc.

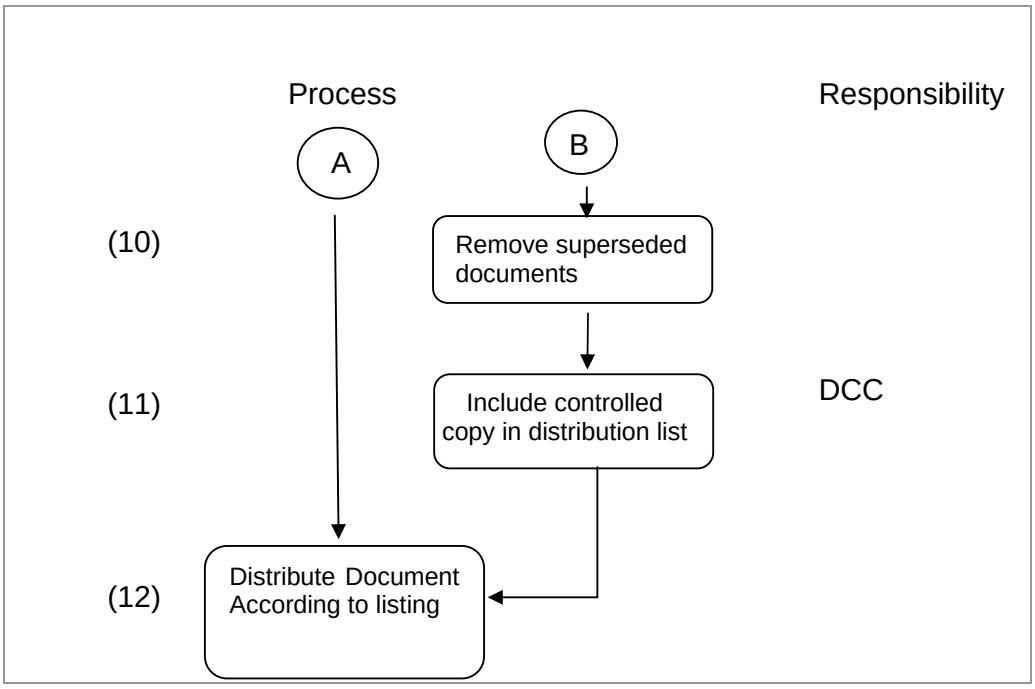
PM shall then instruct Document Control Centre (DCC) to prepare filing system, filing index and breakdown of documents storage for both hardcopy and softcopy. The hardcopy will be kept in the filing room and the softcopy will be kept in the servers.

Document control procedure does not focus on storing the document but discussed mainly on planning the document delivery for the purpose of RNZ project delivery.

After the document planning is established, the process of creating, reviewing and submitting document for approvals are described in the following procedure i.e. Document Control Procedure for external and internal documents.

Figure 3: Document Control Procedure for Internal and External Documents.





The document control procedure governs the whole process of developing documents, recording, distributing, categorising and controlling the documents in RNZ. The procedure was designed in line with the client requirement which later adapted to become a formal procedure inside the company. The document control flowchart does not explained any method for storing the documents but provide guidelines for the purpose of processing documents according to the required business process in developing engineering design in RNZ.

The procedure starts after Engineering Disciplines has completed the first stage of engineering design framework called Controlled Technical Resources (CTR). Project Deliverable list document will be submitted to DCC for submittal to client either for comments or for approvals.

Documents together with the deliverable list will be submitted by Engineering Disciplines to DCC through PM.

Upon receiving documents from PM, DCC will register the document number, title, revision status and date of issue in the Document Register. Documents are submitted in two types, i.e.: hardcopy, printed on paper and softcopy stored in EDMS folders.

DCC will identify the category of the submitted documents. If the document issued as a controlled document, DC shall establish a list of copyholders and stamp the issued copies with the “Controlled” stamp. Otherwise document will be stamped as “Uncontrolled Copies”. The softcopy of the controlled documents are marked by the Engineering Disciplines and does not require DCC intervention.

Where the document is issued to the Client/External, a Document Transmittal Form shall be used to record the transmission. Transmittal forms will contain addressee and addresser information, project or subject title, date and any related information for tracking of transmittal documents.

At any time there will be new revision of documents. New revisions are created after review from the Inter-Disciplinary Check (IDC) or after review or comments from clients have been incorporated into the

documents. Upon Issue of a revision, the Originator informs DCC and the new documents will be forwarded to DCC for distribution.

Originator shall indicate the revision status as per the Document Numbering and Revision Control Procedure.

DC enters new revision status and date of issue in the Document Register. The superseded document shall be removed from the original file and shall be stamped “Superseded” to avoid revision conflict.

DCC shall then refer the copy holder of controlled documents and inform them about the new revisions have been issued. Copy holder shall supersede the document in their hand with instruction from DCC.

The document control procedure has completed its process after all documents have been controlled according to the procedure.

The process flow described above was adopted as guideline to implement EDMS in RNZ.

2.6 EDMS in RNZ

Realising a need triggered by its client requirement, RNZ decided to improve the management of project documentation by capturing and controlling the project information into EDMS. EDMS in RNZ was purchased and customised back in year 2007 from AVEVA Asia Pacific Division due to rising requirement to automate the control of documents with regards to the documents submission procedure.

The EDMS is set to capture information starts from the design stage to production stage and up to the final output that deliver to the client. The originator and reviewer has the ability to communicate with each others on the comments and updating documents or drawings electronically. It supposed to reduce hardcopy distribution which are time consuming and costly.

EDMS in RNZ was implemented according to the following objectives:

i. Minimised delay in between document transmission

ii. Key function to having EDMS in RNZ is to assist on document storage, retrieval and transmittal of documents. Prior to EDMS, softcopy documents are often missing, misplaced and consume a lot of time to compile for transmission. Seldom, documents have caused delay in the transmissions and affect project management deliveries. RNZ has set the objective that EDMS shall eliminate the problem particularly delay in document transmission.

iii. Structured Document Storage

The EDMS in RNZ provides better and structured way of handling softcopies documents. Previously there is no central repository to store the documents' softcopies. There is no policy to govern a proper storage of the documents. Sometimes the softcopies were missing or most of the times were difficult to find. The EDMS is targeted to enable structured document handling which can be easily search and retrieve using some keywords and indexing.

iv. Improved Document Tracking

EDMS in RNZ shall enable proper tracking against the document deliverable plan. EDMS shall also enable automated tracking for date, time and progress of each document development for each project.

v. Assist project management in document submission to client

With online submission EDMS shall enable automated and up-to-date transmission timestamp. The module shall assist project managers and planners on better tracking of document submission.

vi. Minimised Design Discrepancies

As all design documents are made available online, each discipline can view and shall be alerted for any changes of any

design developed and submitted in RNZ EDMS. EDMS shall enable each discipline to observe any changes which related to each engineering discipline chain design.

vii. Storage and Capacity Planning

The EDMS shall provide better management of the documents including the capacity planning for storing the documents electronically. The system provides storage information which enable users to do its storage planning.

The system shall minimise document duplication and redundant documents being stored.

viii. Enable faster and easier document reviewing online

As documents are stored online, reviewer can access the document at any time and view the progress as the document being developed and updated online with real-time capabilities.

ix. Increased communication during document development

The EDMS in RNZ shall enable online communication. The communication shall be presented as online comments, alerts for any changes and notification for documents completion.

x. Target for late scalability into detail equipment ID.

Each design drawing contains equipment or parts ID. EDMS in RNZ is targeted to later extend into online piping and

instrumentation diagram (P&ID) auto identification for easier equipment and parts tracking for engineering documents.

The above paragraphs are intended objectives in implementing EDMS in RNZ. The requirements will be used to evaluate and cross examined during interview and observation to evaluate successfulness of EDMS implementation in RNZ and how it relates to the benefit for the company.

Further on the study, we learned on available modules implemented in RNZ. Knowledge on the modules implemented will help interviewer to design appropriate questions and relate the question with the framework of the case study.

2.6.1 RNZ EDMS Modules

In order to meet the above requirement, EDMS were designed, customised and implemented in RNZ. The implementation has also taken into consideration the point of concern from the RNZ project department and document control centre.

EDMS in RNZ comes in three modules namely:

i. EDMS Portal (VNET)

Portal is used by Engineering Disciplines to review and comment on document and drawing. In this system they can do mark-ups and consolidate comment from each discipline. DCC

will upload completed document ready for Inter-Disciplinary Check (IDC) into portal and link the document with VPRM for review by Discipline Engineer.

ii. EDMS Project Resource Management (VPRM)

VPRM is used by document controller to log document and drawing created into system. DCC will manage document number, document stage and status, creating and receiving transmittal via this system. EDMS administrator will set up a project according to Project Execution Quality Planning (PEQP) and Deliverable Register (DR) and give access to nominated DCC personnel to manage documents within those projects.

iii. XMpLant (1 license)

XMpLant is used as a third party product to convert AutoCAD drawing files (DWG) to SVG and XML (intelligent files) files that can be supported by EDMS system.

2.6.2 RNZ EDMS Infrastructure

EDMS system consist of 4 servers:

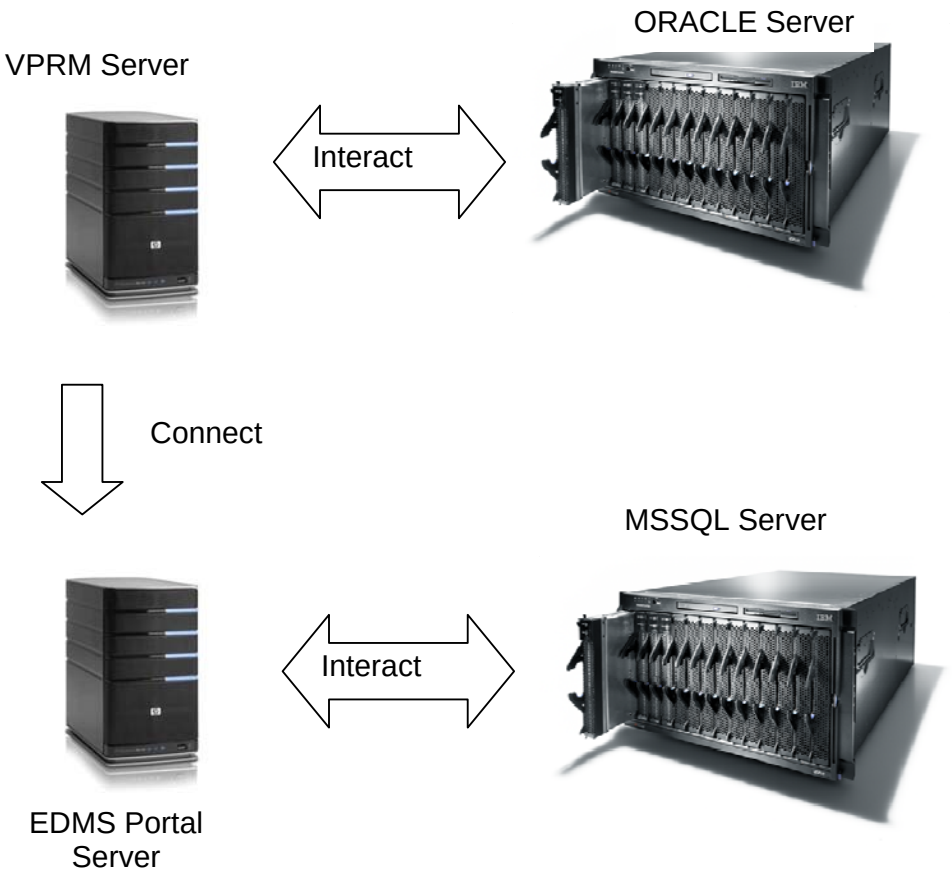
i. VPRM Server contains VPRM application server and Oracle Application server to handle VPRM platform

ii. EDMS Portal Server contains EDMS Portal application server, Microsoft SharePoint Portal Service and Microsoft Internet Information Services (IIS) to handle EDMS portal pages.

iii. ORACLE Server contains VPRM database

iv. MSSQL Server contains Portal Database (DDOC).

Figure 4: RNZ EDMS Infrastructure Set up



Each server was interconnected and serves different purpose. The system used the architecture of JAVA engines and Oracle and Microsoft SQL server the database platform.

Figure 5: EDMS Client Interface

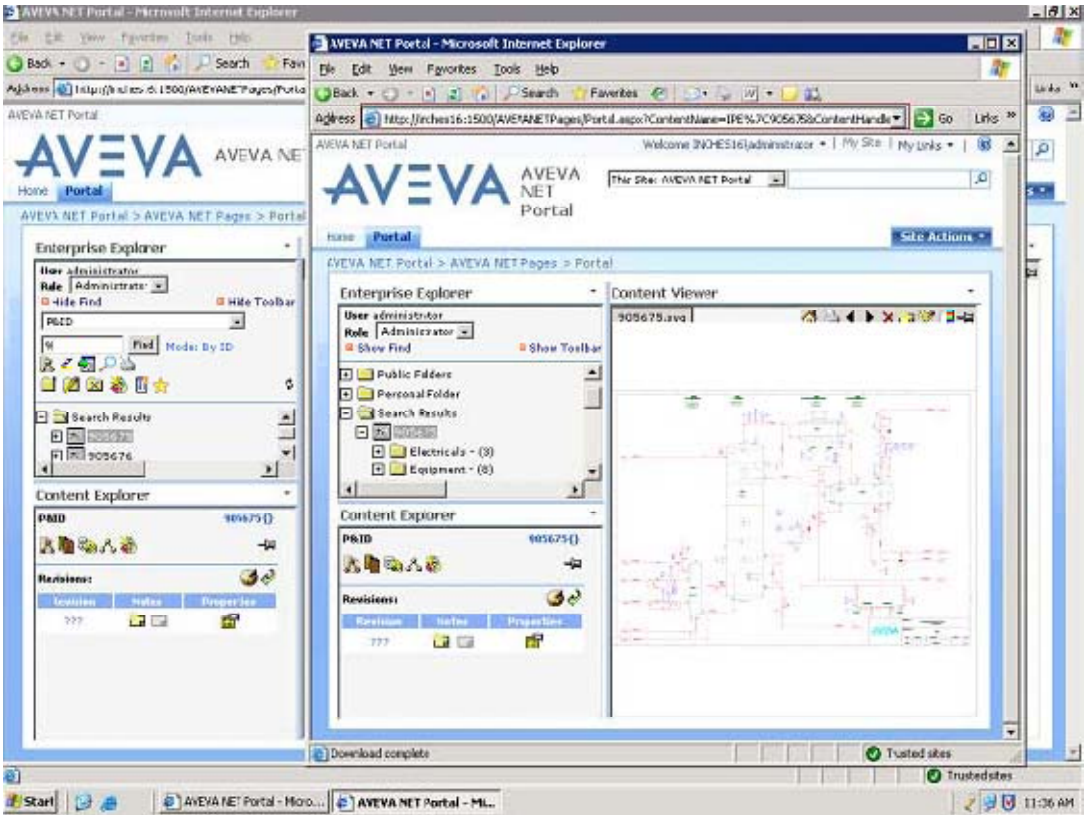
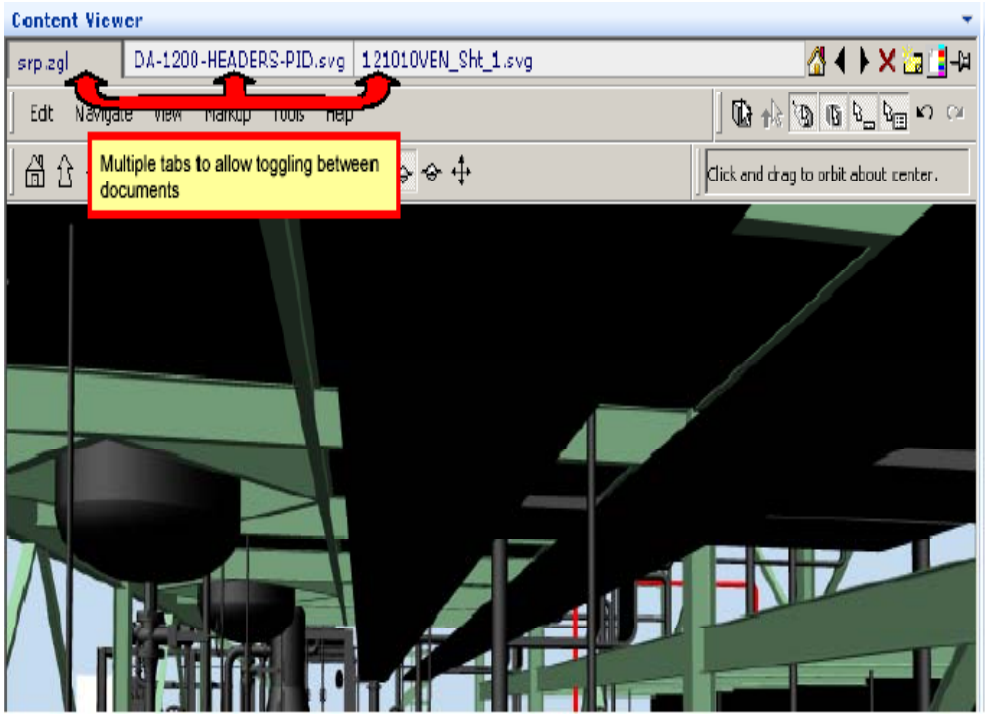


Figure 5, above illustrate the folder structure inside EDMS in RNZ. The systems are also capable of viewing AutoCAD drawings online. Users may login into the system and search for the document. Search module manipulates keyword and metadata which stored against each documents.

Several types of documents are made available in EDMS to enable online document viewing, reviews and approvals. Some engineering documents such as Hysis line list and PDMS 3D design simulation were converted into PDF formats as they are not viewable if native files were uploaded into EDMS.

Figure 6: Sample Content Viewer



The system offers a lot of functionality and sub-modules. In order to understand details of system operations, we will explain the process flow, which were adapted from the RNZ business process in previous paragraphs.

By Understanding the process flow the study hope to gain better understanding on the benefit and problem from EDMS implemented in RNZ.

Figure 7: RNZ Functional EDMS Flowchart

	Flowchart Process	Responsibility	Documents
(1)	Start Project Awarded		
(2)	Data Compilation	Planner	Deliverables Register
(3)	Deliverables Register	Planner, PM, Lead Discipline	Deliverable Register
(4)	Documentation Creation	Originator	Documents
(5)	Ready for submission?	Originator, DCC	Documents, Transmittal, Master Transmittal Log
(6)	Generate		
(7)	Master Transmittal Log	Planner, DCC	Deliverable Register, Master Transmittal Log
(8)	Update deliverable register		
(9)	End of Project Stage?		
(10)	End		

2.6.3 RNZ EDMS Process Flow

After detail designed study for RNZ EDMS, the EDMS consultant has come out with the above procedure, as in Figure 7. The paper will then describe the procedure in the following paragraphs.

Similar to the RNZ Document Control Procedure, RNZ EDMS starts after the planner will get CTR Number and data on man-hours from proposal and or PM. CTR number and data on ma-hours will become the basic for project progress scheduling which later will be tracked for Project Progress Report in RNZ EDMS.

Based on Kick Off Meeting, planner will discuss and update documents planned date with guidance from Project Manager (PM) and Lead Discipline (LD). Planner will then prepare the Deliverable Register List for client approvals.

After client approval, each Engineering Disciplines will start to create documents templates for development of documents. Design document will then submitted to EDMS for DCC to distribute for Inter-Disciplinary Check (IDC). In level 5 in the above procedure, IDC will acknowledge that documents are ready for submission. PM will then counter check that document submitted are completed for transmission.

When document ready to be transmitted, DCC will generate transmittal form and start creating document details into Master Transmittal Log.

Transmittal can be internally for IDC or externally for client comments or approvals.

Upon successful of transmission EDMS shall update the deliverable register as a report for document development progress thus indicates project progress.

Planner will then notify on the transmittal at which planner will referring to Master Transmittal Log to update Deliverable Register progressively. Data from the progress Deliverable Register update will be kept for every stage for project deliverable analysis. Planner will produce several S-Curve analyses to PM using the data captured during each progress or milestones stated.

The EDMS process will continue its flow until project completion.

In order to have better knowledge in EDMS in Oil and Gas industry, the study capture some essence of information on RNZ's client on how their client handle document using EDMS.

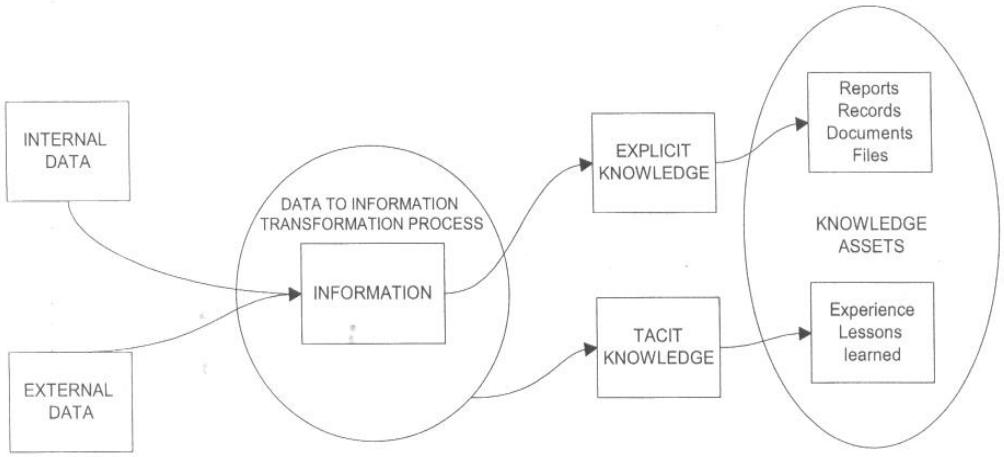
2.7 EDMS in RNZ Client – PETRONAS

The paper also studies some functions that were adopted by one of the company's major clients who are using EDMS to manage its documents. The client is Petroliam Nasional Berhad, or better known as PETRONAS. The purpose of this study is to compare the EDMS functionality that is required in the industry.

PETRONAS identified its document as Knowledge Assets. The source may come from external data as well as internal data. In PETRONAS EDMS, data were then processed and categorised either as explicit knowledge or tacit knowledge. Explicit knowledge are such as reports, records and document files. While tacit knowledge are such as experience and lesson learned.

The common elements that all departments required became a basis for the Meta data. This Meta data was also used to create easy drop down functions in the system. The more users friendly and easy to use the more successful will be the implementation (Petroliam Nasional Berhad, 2008).

Figure 8: PETRONAS Knowledge Continuum Model



PETRONAS EDMS is aimed to provide fast and easy access to refinery documents and records. The objectives of the EDMS are listed as following:

i. Ease of access to information

ii. Security of Information

iii. Audit trail

iv. Elimination of Duplication

v. Ownership of documents

vi. Currency of documents

vii. Cost saving due to information error reduction

viii. Knowledge by retention to intellectual property

ix. Scalable system which support business strategy with respect to SAP EH&S and enterprise DMS.

Figure 9: EDMS Implementation Maps in PETRONAS – ENGEN Refinery

TEAM CHARTER

Department: Refinery
Team Sponsor: Linton Reid
Facilitator: Myra Boyes

Team: Document Management Implementation Team
Team Members: Myra Boyes, George McClure, Avinesh Pillai, Shaun Laing, Vishnu Reddy, Tiiu Excell

Vision/Destination

To provide, fast, easy access to Refinery documents and records.

Objectives

- Establish Records Management Policy
- Implement SharePoint portal server DMS
- Central document repository
- Document ownership established
- Workflows for documents
- Faste ffective Search facility
- Enforce metadata captured

Benefits / KPI's

- Ease of access to information
- Security of information
- Audit trail
- Elimination of duplication
- Ownership of documents
- Currency of documents
- Cost saving due to error reduction
- Knowledge management by retention of intellectual property
- Scalable system which supports businessstrategy wrt SAPEH&S and enterprise DMS

Deliverables / Milestones	Date
•Refinery records management policy	June 06
•Awareness road show to get Level 4 buy in	June 06
•Finalise high level document architecture including directory structure	July 06
•System technical implementation	Aug 06
•Core Document migration	Sept 06
•Training and awareness in the use of the system	Sept 06
•System go live to coincide with SAP EH&S	Oct 06
•Remainder of document migration	Dec 06

In Scope

- All refinery documents as defined in the policy
- Drawing office
- Contracts
- Referencing to hard copy documents
- Projects documents in IMS.
- Project documents on g: drive as agreed.
- Project handover documentation in agreed format.

Key Dependencies & Interfaces

All refinery departments
SAP EH&S and core modules
Enterprise DMS
Site Safe
RIMS
GRS
PSM
CTIS
Business information Steercom

Out of Scope

- Workflow for business processes, e.g. RCA tracking, risk assessments, MOC
- Transactional data
- Email archiving
- Scanning of hard copy documents

Revision 1 25 May 2006

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The PETRONAS EDMS are used to store all documents defined in refinery Policy such as Engineering Drawings, contracts, reference documents, project documents and as built documents.

The PETRONAS EDMS host for easy document storage, archival and retrievals. The PETRONAS EDMS does support workflow against their business process, transactional data, email correspondence and scanning of hardcopy documents.

Subsequent to the studies conducted on the EDMS for both RNZ and PETRONAS, further evaluation can be conducted to suit this paper.

Based on characteristic and comparison in the above study, evaluation need to be done for the EDMS system implemented in RNZ in order to address the case study question and come out with recommendation for improvement of EDMS for organization.

2.8 IS evaluation methods

IT evaluation has been a widely explored issue in order to resolve the above issues and in search of reliable measurement drivers. Most of the theoretical literature in IT evaluation; such as Bradford and Florin (2003) ; Gunasekaran et al. (2001) ; Lin and Pervan (2003) ; Liu et al. (2003) ; Remenyi et al. (2000) and Irani and Love (2002) tend to depart from the traditional accounting-based evaluation methods by appreciating the intangible aspects of IT benefits as well as the tangible ones.

Traditional project appraisal techniques such as Return on Investment (RoI), Internal Rate of Return (IRR), Net Present Value (NPV) and Payback approaches are often used to assess capital investments (Willcocks 1994). These methodologies are based on conventional accountancy frameworks and often facilitated under the auspices of the finance director. Specifically, they are designed to assess the bottom-line financial impact of an investment, by often setting project costs against quantifiable benefits and savings predicted to be achievable (Farbey et al. 1993; Hochstrasser 1992).

However, the vast array of traditional and non-traditional appraisal techniques leaves many organisations with the quandary of deciding which approach to use, if any. Consequently, debates about the types of techniques that constitute meaningful justification have been ubiquitous (Small and Chen 1995).

Authors are more inclined to view evaluation as part of the planning activity only or, in some cases, as part of the development process. There are also a number of empirical studies – such as those reviewed by Ballantine et al. (1996) – which examined ex ante evaluation, yet only a few (e.g. Kumar (1990) and to some extent Beynon-Davies et al. (2004)) that have explored the ex post evaluation.

Walsham (1998), contends that formal mechanistic methods are the usual methods that are employed by organisations and this has been empirically confirmed by many authors (Lefley, 1997), (Ballatine & Stray, 1998). These methods are derived from a positivist philosophical perspective and are based upon economic factors.

The problem with this approach is that even when formal methods are applied rigorously, their relevance in the public sector domain is questionable. This is because economic measures, such as added value, productivity and financial return employed are very difficult to define in the public sector (Bannister, 2001) contends that this is particularly true with regard to ICT projects, such as e-Government, due to the complexity of defining value (Serafeimidis & Smithson, 2000) note the position with evaluation in organisations in general and argue that:

"Evaluation is an important and complex organisational process. The traditional approach to ICT evaluation, based on narrow technical and accounting terms, has limited relevance to the role of ICT in today's organisations.", (Serafeimidis & Smithson, 2000).

According to (Anandarjan & Wen, 1999) the traditional investment justification only concentrated on the affected direct project costs and benefits. Hence, creates confusion among organizations in terms of evaluation process especially for the IT/IS investment. Previously the IT/IS investment are having difficulty to be quantified in monetary terms because of its intangible nature of many of the derived benefits. The information and analysis done using the technology advancement could assist an organisation in various activities such as decision making, forecasting/estimation, and customer service. However, there are also other factors to be considered for an IT/IS initiative to be beneficial and reliable to the organisation such as clean data, users competency and participation; and correct processes (Irani & Love, 2001)

As reported by (Ballatine & Stray, Financial Appraisal and the IS/IT investment decision making process , 1998) the traditional appraisal techniques for the evaluation of IT/IS have become obsolete and inappropriate since it discourage strategically important IT/IS investments that offer intangible and non-financial benefits.

2.9 Proposed evaluation method

The rationale behind this research was to investigate and highlight those technological and organisational aspects of implementing an extended enterprise, by carrying out a case study analysis on an organization embarking upon such a project in implementing EDMS and further study the implication of EDMS implementation the benefit of the organisation.

The authors now define the research approach employed in terms of the background, data and focal theory relating to the topic. The author proposed to conduct a case study method with qualitative research through interview.

Hochstrasser and Griffiths (1991) and Farbey et al. (1993) suggest that the major problems associated with the application of traditional appraisal techniques is their inability to take into account qualitative project implications. As a result, the authors propose the de-coupling of the relative dimensions of the EDMS implementation, and the taxonomy into strategic, tactical and operational dimensions, for further analysis.

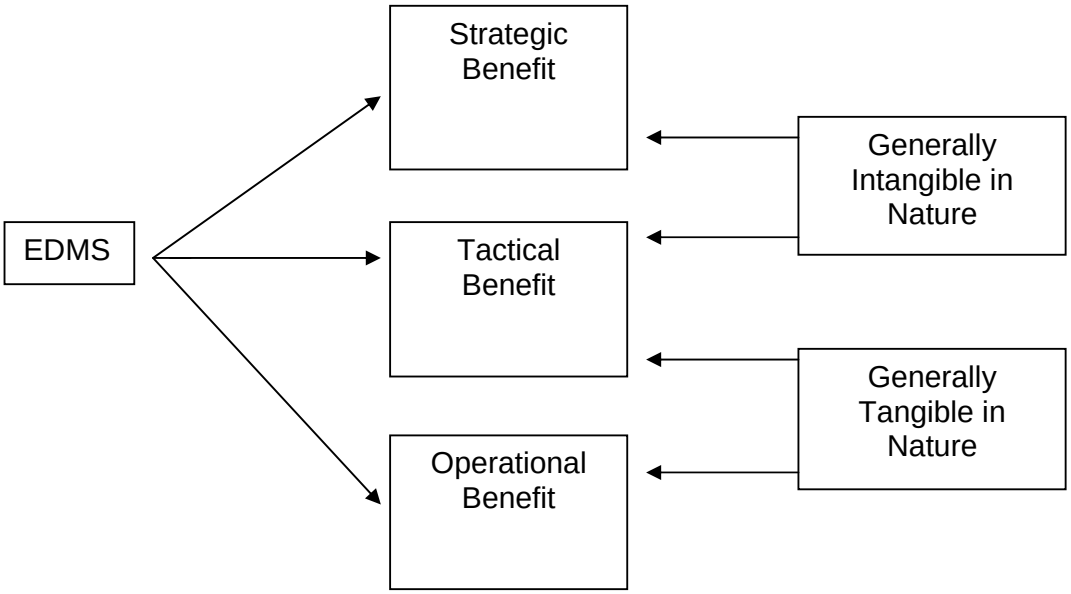
This methodology originally proposed by Irani et al.,(1999), as with Naik and Chakravarty (1992), proposes the analysis of each project on individual merits, unlike Garrett (1986) who begins with the analysis of

a number of different proposals, resulting in the selection of the 'best' perceived option. The proposed conceptual model is detailed in Figure 10, in the following paragraphs.

2.10 Theoretical Framework

Figure 10 provides a pictorial description of the various levels of performance measures. Furthermore, it is essential to develop appropriate mechanisms for their quantification (performance enablers).

Figure 10: Strategic, Tactical, and Operational Benefits Theoretical Framework



This model is divided into 3 hierarchical levels of evaluation; strategic, tactical and operational. At the level of *strategic* evaluation, the

emphasis is placed on the relative impact of the project in relation to the delivery of a competitive advantage. The framework begins with a consideration of the corporate philosophy, core values and beliefs, which translate into a mission statement. This provides a vivid description of what the organisation will be like when 'success' has been achieved. Furthermore, these issues are reflected in the organisations strategic business plan, which broadly identifies where the company is relative to its' market place; where it is going in its' market place; and how it is going to get there, with all these issues being broken down into long/medium term objectives. Once the strategic 'game plan' has been 'mapped-out' and resources identified, there is then a need to identify *tactical* project critical success factors (CSF's). These are project requirements that must be fulfilled at a tactical level, by isolating detailed tasks, processes and resources, to ensure short-term project success.

Figure 10 depicted a framework which is adopted from (Irani & Love, 2001) framework. According to them, there were research conducted previously that suggested an organizational failure with any IT/IS is mainly because it does not meet the users. The users represented the organizational. Therefore, failure of meeting users expectations means failure to resolve the organizational issues. This failure also indicated the lack of consideration of human and organizational benefits during the evaluation process (Ryan & Harrison, 2000)

Both Irani & Love included the financial and non-financial benefits aspect in their research. However, these were excluded in this study due to complexity, subjectivity and time-consuming factor.

According to (Ryan & Harrison, 2000) the tangible benefits have direct dollar impact on the cash flow. Therefore, the taxonomies of benefits categorized as tangible benefits can easily be measured in dollars and with reasonable certainty such as volume of paper usage. Nevertheless, the taxonomies of intangible benefits have indirectly measurable values such as better decision making.

In spite of that, the decision-makers would appreciate more the IT/IS investment if the social subsystem benefits were incorporated. The social subsystem composed of employees and the knowledge, skills, interrelationships, attitudes and the needs they bring to the work environment such as the improved decision making ability, improvement of productivity and quality and better communication and teamwork. Another definition of social subsystem is by (Pasmore, Francis, & Haldeman, 1982) who has defined that social subsystem as “all that is human that members of an organization brings with them to work”.

According to (Harris, 1996) in considering the taxonomies of benefits, the investment in IT/IS are decided upon looking into three categories that were brought about by a new IT/IS initiative. The three categories

are namely the strategic, tactical and operational benefits. The taxonomies in each category also include the social subsystem benefits.

Basically the three categories represent the benefits of the entire organization. The strategic, tactical and operational benefits identified for RNZ Integrated are as follows:

i. Taxonomy of Strategic Benefits:

The taxonomies in the Strategic Benefits represent the benefits which were classified to suit this category of individual who are responsible for the significant decisions with a long-term strategic outlook (Irani & Love, 2001). The taxonomies are as follows:

a. Improved Growth and Success
b. Leader in New Technology
c. Improved Market Share
d. Market Leadership
e. Enhanced Competitive Advantage

ii. Taxonomy of Tactical Benefits:

The taxonomies in the Tactical Benefits were for the executives at the lower level who carry out tactical decisions (Irani & Love, 2001). The taxonomies are as follows:

a. Improved Flexibility

b. Improved Response to Changes

c. Improved Productivity Quality

d. Improved Teamwork

e. Promotes Open Culture

f. Improved Integration with other Business Functions

g. Increased Development Efficiency

h. Reduced Delivery Lead-times

i. Reduced Lead-times

j. Improved Capacity Planning

k. Improved Data Management

l. Improved Product Development Control

m. Improved Accuracy of Decisions

iii. Taxonomy of Operational Benefits:

The taxonomies in the Operational Benefits involve the executives who are involves or concentrate with the day-to-day operational affair (Irani & Love, 2001). The taxonomies are as follows:

a. Reduced Material / Paper Inventory

b. Reduced Levels of WIP

c. Reduced Labour Costs / Man-hour spent

d. Reduced Design activity Costs

e. Increased Throughput

2.11 Proposition

According to (Remenyi, Sherwood-Smith, & Irani, 2000) the technology management that is viewed from an evaluation perspective may not be deployed in an effective manner in many businesses. Therefore, initiators of the new technology often become distanced from the development process. Furthermore, developers may lose sight of the business focus which could resulted the IT/IS initiative was not delivered as what was originally proposed and justified.

On the same basis, according to (Irani, Love, & Hides, 2000) it is often that organizations has either overlooked or ignored the human and organizational implications associated when adopting new technology. Nevertheless, these factors play significant and crucial impact to the success of failure of an IT/IS investment. In the earlier discussion, these factors are also described as social subsystem.

Forwarding from the discussions, the following propositions were derived taking into consideration whether the EDMS implemented has benefited the organizational and also taking into consideration the human and organizational implications; and both tangible or intangible benefits. Thus, further classifying them into three categories which are strategic, tactical and operational benefits (Irani & Love, 2001).

The data which is gathered from the three level of management mentioned above is sufficient to represent the different levels of management.

Proposition 1:

"There is a need to know whether the EDMS provides tangible and intangible strategic benefits."

Due to the importance of the strategic level of management in an organisation whereby members of the strategic management are responsible for the strategic planning which will drive the organisation, hence, the study would like to know whether the current EDMS provides tangible and intangible strategic benefits to this group of management.

Proposition 2:

"There is a need to know whether the EDMS provides tangible and intangible tactical benefits."

Recognizing the importance of the tactical level of management who defines "how" to implement the strategy that was decided by the strategic level, the study also would like to know whether the EDMS provides tangible and intangible tactical benefits to them.

Proposition 3:

"There is a need to know whether the EDMS provides tangible and intangible operational benefits."

This study also takes into consideration the operational level of management. Being in the operational level, they are the people on the ground who knows best what happen on the ground. Hence, the study also would like to know whether the EDMS provides tangible and intangible operational benefits to them.

The company learnt from their experiences and mistakes as the result concluded from the findings which could assist the company for further business opportunity and improved business management and operations. The management could decide whether to retain its strategic focus after analyzing the roles and effects of the EDMS. They could foresee the relevance of this investment and how to position the investments for the success and growth of the organization.