

# **Dealing with complexity: Elaboration of a suitable Information System Development at AUT Business School using Soft Systems Methodology**

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Primary Supervisor: Dr. Terry Nolan

To

Melanie, my parents and my grandmother

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## **Attestation of Authorship**

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicit defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution or higher learning.

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(Signature)

Hans-Jürgen Arz

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## **Confidential Material**

This research elicits and analyses information, such as operational processes and issues identified are classified as confidential and therefore should not be publicly disseminated to the Business School's students, customers, allied business organisations or competitors.

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## Key Terms

AACSB .....	1, 3, 4, 24, 48-52, 54, 110
CATWOE .....	1, 7, 59-61, 65, 67-72, 91-94, 102-105
Conceptual model .....	34, 61, 65, 97, 98
Decision support systems (DSS) .....	14
Dynamic Systems Development (DSDM) .....	7, 32, 33, 37
Enterprise Document Management System .....	82, 89-91, 95, 97, 100, 103, 105, 123
Enterprise resource planning systems (ERP) .....	10
Executive information systems (EIS).....	10, 14
File and knowledge sharing system .....	1, 3, 49, 50, 67, 68
Information architecture .....	62, 63, 71-76, 89-97, 102, 106, 121
Information Management .....	3, 17, 20, 21, 62, 65, 70, 81, 101, 123
Joint Applications Development (JAD) .....	7, 32, 33
Knowledge Management .....	2, 8, 15-17, 43-47, 55, 63, 81, 104, 108
Management information systems (MIS) .....	10, 14
Management Support Systems (MSS) .....	13-15
Object-Oriented Systems Development (OOSD) ...	7, 37
Operations Support Systems (OSS) .....	13, 14
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Rich Picture .....	67, 74-78, 91, 93, 102-105
Root Definition .....	1, 7, 59, 61, 65-69, 71-75, 91-93, 103-05
Soft Systems Methodology (SSM) .....	1, 7, 56, 57, 63, 102
Systems development life cycle (SDLC) .....	6, 27-32, 38
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## **Abstract**

*As a result of an initial assessment of Auckland University of Technology's (AUT) application for accreditation to AACSB International (The Association to Advance Collegiate Schools of Business), one of the single most important issues identified was the management and development of an 'Information System' (IS) to increase the productivity and efficiency of the daily business at AUT's Business School. Firstly, this study attempts to identify, through qualitative interviews with selected staff members of AUT's Business School, user requirements for a file sharing information system. Adopting Soft Systems Methodology, Checkland's (2006) proposed 'CATWOE' model, rich picture and root definitions are used to elicit and evaluate the users' system requirements. Secondly, by using Checkland's proposed tools, this study strives to evaluate the information systems currently used at AUT ("I-Drive", "Novell GroupWise", "Knowledge Base" and "Wiki-Software"). The systems are evaluated in terms of possibilities and restrictions of sharing information through expanding to a 'file and knowledge sharing' system that meets the identified user requirements. Thirdly a realisability analysis is performed to determine the implications of the user requirements (identified through interviews) upon an existing information system or a new system. Finally, to provide a solution for the identified issues and given recommendations, a 'conceptual model' (Checkland P, 2006) is developed.*

*Findings from this study indicate that information and file sharing at AUT Business School is at a sub-optimal level of performance. The prime reasons for this problem appear to lie with 'soft' organisational issues, including the organisation's culture, together with a lack of set operational standards and regulations, rather than with the information systems themselves.*

*Due to the confidential nature of this inquiry, the names and titles of interviewees have been disguised.*

## 1. Introduction

More than 50 years ago the first economist predicted a change from an 'Industrial and mechanized age' into an 'Information age', where the possibility of accessing new information and knowledge will become a key driver of social and economic growth. Although production and manufacturing of goods is still very important nowadays, the majority of workers are involved in the creation, maintenance, distribution, modification and application of information to generate and access new knowledge (G. Elliott, 2004). According to Back (2005) the two most important social and economic changes in the twenty-first century will probably be the transition to a "knowledge society" and a global "knowledge economy". The increase in demand for innovations resulting from these changes in the global knowledge economy will require the development of new management tools and methods to serve the demand for innovative and knowledge intensive products. Since innovation is reported to have become the primary key factor for successful and continuous growth, efficient knowledge management tools and methods have become essential for companies in every industry sector (Rollett, 2003). The increasing complexity of both the environment in which companies operate and the pressure of offering cheaper products or services by increasing their innovativeness in short operating times, make knowledge a central issue of business success nowadays. Managing knowledge has become a key issue in increasing the efficient use of land, labour and capital resources (Probst, 1998).

According to Dalkir (2005), Knowledge Management can be addressed from two different perspectives. The first is focused on the people, the organisations and the associated working and communication processes. In turn, the second perspective focuses on the management and development of the effective use of information technology to provide knowledge to anyone who needs to perform a specific task effectively and efficiently (Dalkir, 2005). To fulfil this requirement Jennex (2005) suggests in his case studies a well structured and smooth integration of knowledge management methods, tools and systems in the form of 'Information Systems' has to be implemented in companies.

### **1.1. Purpose and focus of the study**

As a result of an initial assessment of AUT's application for accreditation to AACSB International (The Association to Advance Collegiate Schools of Business), one of the single most important issues identified was the management and development of an 'information system' (IS) to increase the productivity and efficiency of the daily business at AUT's Business School. The cause of the problem was considered to be the lack of naming standards and version control of documents and data within the current IS causing difficulties for staff members to find and retrieve the appropriate and required version of a document or information. This problem is thought to reduce the quality of decision making and to reduce the levels of service both to students and internal clients (staff).

In order to improve decision making and services to students and internal clients, this dissertation reflects the role of information technology in Information Management. Furthermore it will evaluate AUT's current IS to determine the possibilities for expanding to a 'file and knowledge sharing' system ("I-drive", "Novell GroupWise", "Knowledge Base" and "Wiki-Software"). As a part of this evaluation it will attempt to define staff member requirements and to investigate models for developing an information system. Finally, it will attempt to highlight the processes the Business School will have to undergo before an information system can be purchased and implemented.

Accordingly, this dissertation will evaluate current information systems used within the Business School to determine the possibilities for expanding to a 'file and knowledge sharing' system through "I-drive", "Novell GroupWise", "Knowledge Base" or the "Wiki-Software".

**The Aims of this study have been defined as follow:**

1. To assess AACSB requirements in terms of increasing organisational performance, through an appropriate information system that ensures a consistent and secure file, information and knowledge sharing with staff members.
2. The study also strives to assess the needs of individual staff members, in order to share files and information on a daily basis.

3. To determine which of the current IS at AUT is most suitable and what modifications will need to be made to fulfil all user requirements.
4. To make recommendations for the modification of the existing IS system or to provide a list of systems requirements that can be used as a guideline for decisions regarding the purchase of a new IS. (Note: this study does not attempt to purchase, evaluate or implement a new software solution).

Following the above listed aims this research should

- ▶ have defined which information has to be shared
- ▶ define users' system requirements
- ▶ identify current technical restrictions of sharing information
- ▶ highlight possible modifications of current used Information Systems or identify whether a new Information System has to be purchased to meet the defined user requirements

## **1.2. Importance of the research**

The Auckland University of Technology (AUT) Business School needs to amass a very large information resource in order to manage application to become AACSB accredited. Current information systems are inadequate for the task and a new system needs to be designed and implemented as swiftly as possible in order to expedite the process. The information to be stored and accessed includes a unique mixture of types, including faculty academic publications and research activity, faculty teaching loads and assessments, student numbers, student learning experiences and course structures, administrative files, as well as the more typical financial performance materials.

## **1.3. Research Problem**

This study is not intended to be critical of how the shared electronic work environment at the Business School has been managed to date. The intention is to facilitate changes that are necessary for the development of a sustainable information system that is a determined business tool to meet the following current issues at AUT's Business faculty:



- ▶ it is not visible what files and information exist in order to share knowledge
- ▶ information stored on personal drives is not accessible to those who need it when the individual is ill or out of office
- ▶ creation of duplicated files have been stored in different locations and under different names
- ▶ loss of transparency because any staff member may create new directories and sub-directories in the “I-drive”
- ▶ information and knowledge is being isolated because it is saved in individual drives
- ▶ not all staff members have access to the same parts of the shared drive which hinders group work
- ▶ the need to protect personal and sensitive information

There are four main reasons why AUT should manage its data in an optimised Information System. Firstly, to ensure the data is available whenever it is required. Secondly, to make sure the requested data is current. Thirdly, enable the finding of accurate data. The final, and one of the most important reasons, is to make sure the data is secure (Nickerson, 1998). Thus establishing effective business rules around managing electronic workspace can increase efficiency and support collaboration. Specifically, clear business rules and standardised processes around managing electronic shared work environment can:

- ▶ reduce the duplication of files and outdated copies
- ▶ increase access to information and stored knowledge
- ▶ reduce the amount of “isolated” information
- ▶ secure confidential documents
- ▶ enable new staff to locate and procure information they need
- ▶ encourage staff to work as team members within the whole organisation
- ▶ and most important: secure and improve the maintenance of AUT’s intellectual knowledge by transferring individual knowledge when a staff member leaves AUT

#### **1.4. Brief explanation of methodology used to address the problem**

This MBus dissertation is primarily exploratory research and more based on inductive rather than on deductive research. Taking a social-constructivist epistemology it assumes that an information system is developed by actors based upon individual and shared understandings of its aim and purpose. The procedure for this study consists of several phases which have to be undertaken to examine the process of an Information System development life cycle.

This study will use semi-structured interviews with a selected group of staff members in order to examine individual staff members' needs and requirements of sharing files and information on a daily basis with a new information system or the current information systems used at AUT. The staff members for the interviews have been selected on the basis of their usage or management of the information system or for their technical expertise.

#### **1.5. Contributions and possible Implications**

The traditional approach of Information Systems Development processes is known as the "waterfall" or "systems development life cycle" (SDLC) approach (G. Elliott, and Starkings, S, 1998) (p. 61). This technique was based on structured and sequential development stages. Each stage of the life cycle had to be completed before the developers could move on to the next stage. The requirement of completing element by element in the development chain was time consuming, expensive and often resulted in missing specified development goals and users' requirements (Jessup, 1999). However, the traditional SDLC approach has evolved over the last 40 years through the development of applications software which has enabled the involvement of information systems users in the information systems development process. These alternative approaches consider a high involvement of human activities in most business systems which results in unpredictable systems. Thus, in the context of the alternative methods, information systems can not be seen and treated in isolation (J. A. O'Brien, Marakas, George M., 2007).

Nowadays there are seven best known alternative approaches to the traditional SDLC method which utilise and emphasise the importance of humans as systems users in the development process of information systems. These methods are known as: "Rapid Applications Development (RAD)", "Dynamic Systems Development (DSDM)", "Joint

Applications Development (JAD)", "Prototyping Systems Development", "Object Oriented Systems Development (OOSD)" and "Business Process Re-engineering" (G. Elliott, 2004) (p. 101).

Over the course of time the professional role and responsibilities of the traditional systems analyst and programmer have become merged and are these days carried out through the systems end user. Accordingly, this study aspires to add new cognitions to the body of knowledge in developing information systems at a tertiary education institution. This research applies Soft Systems Methodology (SSM) to examine the users' needs for a file sharing information system. This study includes end users in the development of information systems and evaluating their requirements by using Checkland's (1999) proposed CATWOE model, rich pictures and root definitions. Hence, this study strives to generate valuable findings about the usefulness of the SSM approach in the above mentioned alternative information systems development methods. Using a soft systems approach to examine organisational issues might also help to ensure a higher compliance of business organisation's requirements and, furthermore, increase potential wealth and growth generation for tertiary institutions as well as for corporate businesses.

Besides its contribution to extending the body of knowledge, this study also strives to improve, through the examination of user requirements and systems evaluation, the Business School's use of its information systems. In addition the Business School's current knowledge assets will be illustrated and linked with the identified possibilities of accessing information and knowledge. This collaboration of findings will identify gaps to be sealed by the 'new' information system. This improved information systems' use will in turn provide valuable information, promote innovation within the Business School and increase significantly its use for informed management and strategic decision making within the business environment.

### **1.6. Limitations of the study**

This research strives to increase the efficiency of the Business School through the assessment of an information system development process, hence assessing the possibilities of providing self-service facilities to access and share information amongst all Business School stakeholders. This study does not develop, maintain and equip institutional repositories of published research outputs, teaching materials,

administrative or managerial documentations in order to establish a database for sharing information and files.

It is also not the objective of this study to provide staff development sessions to keep staff members up to date in the use of Information Communication Technology (ICT) or provide support for storage, management and access to locally created data and files. Nor does this study aim to develop policies or good practices related to the accessibility of stored data through the current information systems. It also does not intend to implement a records management at the Business School to comply with the set objectives of AUT's knowledge management group or to meet the Public Records Act's requirements.

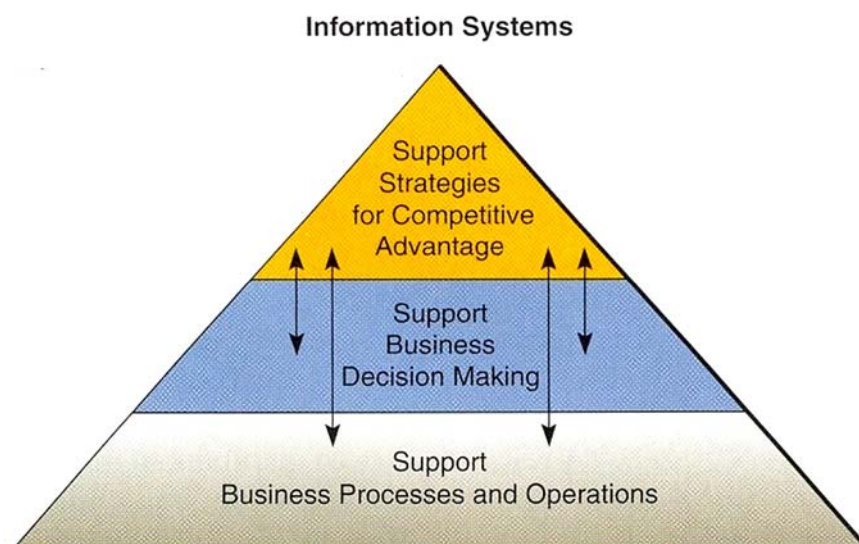
## **2. Literature Review**

### **2.1. Information System Fundamentals**

In order to understand information systems and their functions, we need to examine first the fundamental ideas and concept of an information system. Nickerson (2001) (p. 4) and Laudon (2002) (p. 11) define, in a wider scope, information systems as "a collection of components that work together to provide information to help in the operations and management of an organisation". Jessup and Valachich (1999) (p. 1:6) deepen this definition and define information systems as "...combinations of hardware, software and telecommunications networks, which people build and use to collect, create, and distribute useful data...". O'Brien and Marakas (2007) (p. 4) contribute with their definition of an information system "...as an organised combination of people, hardware, communications networks, data resources, policies and procedures that stores, retrieves, transforms, and disseminates information in an organisation". This is the most detailed definition of the information systems concept. Therefore this definition is used in this study to scope the fundamental ideas and concept of information systems.

O'Brien and Marakas (2007) argue that business professionals nowadays rely on modern and updated information systems more than on any other technology to provide the best possible communication, information and knowledge sharing

environment. The use of a variety of physical devices, software, networks as communication channels and stored data resources through the use of various information technologies (ITs) determines the most important components of the modern information systems.



**FIGURE 1** *The three fundamental roles of information systems*  
Source: (J. A. O'Brien, Marakas, George M., 2007) page 9.

Figure 1 (above) displays the three fundamental roles and the interactions that business applications information systems carry out in an organisation. The interactions within these roles allow information systems to support business processes and operations through providing employees and managers with timely, relevant and accurate information to enable business decision making to achieve a competitive advantage (J. A. O'Brien, Marakas, George M., 2007).

#### 2.1.1. Evolution of Information Systems

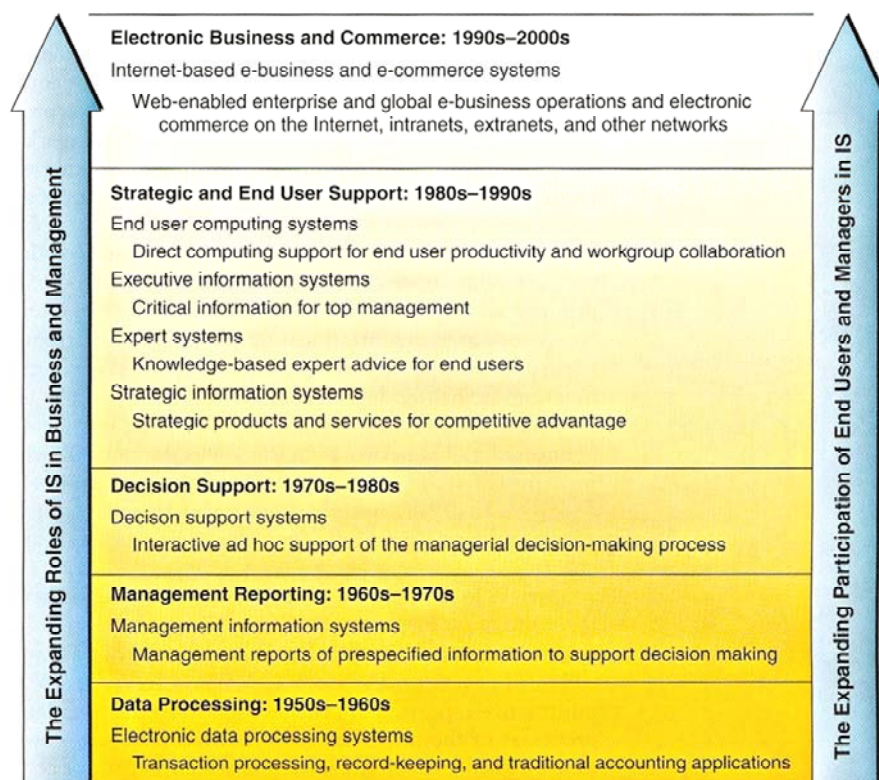
The significant evolution of information systems and their business applications over the past 50 years is shown in Figure 2 (below). At the beginning of this evolution in the 1960's, information systems could generally be seen as a simple record-keeping and data processing system. This concept was also the beginning of the development of the "management information systems (MIS)" (McNurlin, 1989) (p.220) , which had the focus of providing managers and end users pre-defined reports. Over the years the need for ad hoc information and interactive support of the decision making process for managers and end users grew significantly. Thus information systems developed in the

1970's to "decision support systems (DSS)" (G. Elliott, and Starkings, S, 1998) (p. 54). Over the following years the use of information systems was influenced by the rapid development of personal computers, application software packages and telecommunication networks in the 1980's. This dramatic technology change modified the role of information systems from an indirect support system through a centralised service department in the organisation to an end user computing environment. Thus this development had a significant influence on the use and effectiveness of information systems as data could be stored and accessed by each end user individually and ad hoc to support their job requirements (Hicks, 1990). Another significant change occurred also in the mid 1980's through the development of "executive information systems (EIS)" (Jessup, 1999) (p. 3:55). This change came about as a result of request from top executives as they did not directly use either the reports of the MIS or any analytical tools of the DSS. These executive information systems were specifically designed to enable corporate executives easy access to the critical information they want in the reporting format they prefer at any time they request the information. Through the development and application of artificial intelligence (AI) techniques in the late 1980's, information systems started to develop in a new direction. As a result, "expert systems (ES)" or "Knowledge-based Systems" (G. Elliott, and Starkings, S, 1998) (p. 58) were developed and could, for the first time, replace human interventions through the use of artificial intelligence, and there for serve as consultants by providing expert advice.

At the end of the 1980's and beginning of 1990's further development focused more on the strategic role of information systems. As a result of this review "strategic information systems (SIS)" (Jessup, 1999) (p. 3:67) were developed with the purpose to serve as an integrated component of business processes, products and services to help companies to gain competitive advantage. Through continuous improvement in the mid 1990's strategic information systems were then further developed to "enterprise resource planning systems" (ERP) (J. A. O'Brien, 2004) (p. 235). These ERP systems enabled, through their integration and use of a common interface for all computer based functions, data sharing for planning, manufacturing, sales, financial management, customer relations, human resources and inventory management (Oz, 2006). Through these systems, information could be easily accessed and collaborated for flexible decision making. Since the beginning of the 21<sup>st</sup> century the capabilities of information systems have again dramatically changed. More and more businesses took advantage of the use of the highly developed internet and intranet technologies which

enabled the development of fast growing global electronic businesses and commerce systems (J. A. O'Brien, Marakas, George M., 2007).

Although information systems are doing today still the same basic tasks as they did 50 years ago, Figure 2 (below) highlights the dramatic change of computer based information systems and their impact on end users and managers. Information systems nowadays still need to process data, keep records and provide management with accurate and useful information, but what has significantly changed is that businesses can now have the advantage of a much higher level of integration of system functions across the organisation, greater connectivity across system components and especially the ability to atomise data processing, storage and accessibility to take the maximum strategic opportunities for a maximum competitive advantage. O'Brien and Marakas (2007) argue that the new direction of information systems development in the 21<sup>st</sup> century will probably focus on increasing the speed and reach of other systems to provide a tighter systems integration combined with greater flexibility.



**FIGURE 2** *The evolution of Information Systems over the last 50 years*

Source: (J. A. O'Brien, Marakas, George M., 2007) page 11.

### 2.1.2. Levels of decision making

As shown in Figure 3 (below) companies in general can be composed of three levels with enormously different types of activities and informational needs. The following examination of the fundamental differences between the three levels and their required information will provide an understanding of why several types of information systems with different characteristics are needed to provide business organisations with information for decision making across organisational boundaries (Schultheis, 1995).



**FIGURE 3** *Levels of an organisation*

At the operational level, most enterprises have to deal interactively with customers and operate the day-to-day business. Information systems used at this level are designed to automate and increase the efficiency of repetitive activities and processes to increase customer service (Oz, 2006). Although decisions at the operational level are relatively straight forward 'if-then' decisions, these information systems support managers with information to make high structured and recurring day-to-day decisions (Jessup, 1999). Nevertheless, the high automatisisation at this level enables systems to carry decisions automatically out with little or no human intervention.

The second level of the framework shown in Figure 3 (above) determines the managerial level consisting of tactical systems. Tactical information systems are designed to summarise, aggregate and analyse stored data. Through the various generated summary reports, exception reports and ad hoc reports, tactical systems provide managers with required and necessary information to control processes and monitor the organisation's resources (Schultheis, 1995). Tactical information systems



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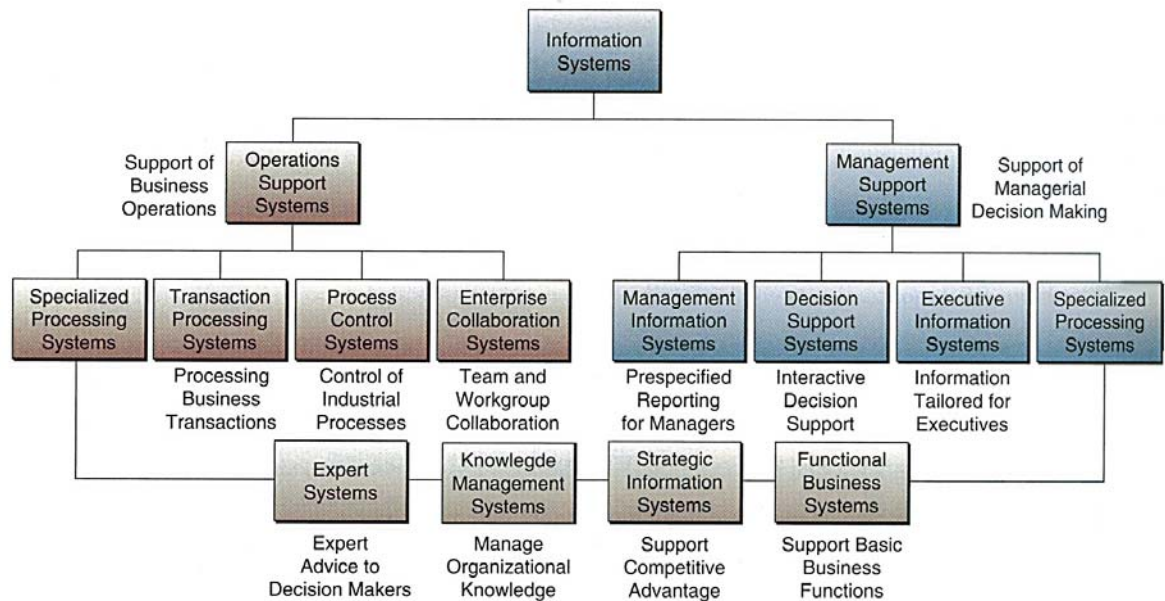
vary from operational systems in their nature and their basic purpose. Where operational systems have the purpose to support the execution of operational tasks, tactical systems help the managers to control the operations (J. A. O'Brien, 2004).

The third level in the framework serves the executive level for strategic planning and decision making. Information systems for this level are designed to provide executives with information to assist in setting long term goals and make long term decisions for the company (McNurlin, 1989). Schultheis (1995) argues that the distinction between tactical systems and strategic systems is not always easy to make as they refer to the same data. Schultheis (1995) states the systems can be differentiated by whom the system is used and for what purpose. Jessup (1999) argues that tactical information systems are typically used by managers to monitor and control the operations to meet the operational goals set by the organisation's executives.

In summary, most organisations consist of operational, managerial and executive levels with unique activities, special purposes, different data input and required information as data output. In the next section, different types of information systems are examined as to their nature and purpose and their support of each organisational level.

### 2.1.3. Overview /Types of Information Systems

Conceptually, today's implemented information systems can be classified in several ways. However, in the literature, information systems are in general classified in three major groups. As shown in Figure 4 (below) these conceptual categories are "Operations Support Systems", "Management Support Systems", and "Other Support Systems" (J. A. O'Brien, Marakas, George M., 2007) (p. 13, 15, 16).



**FIGURE 4** *Types of Information Systems*

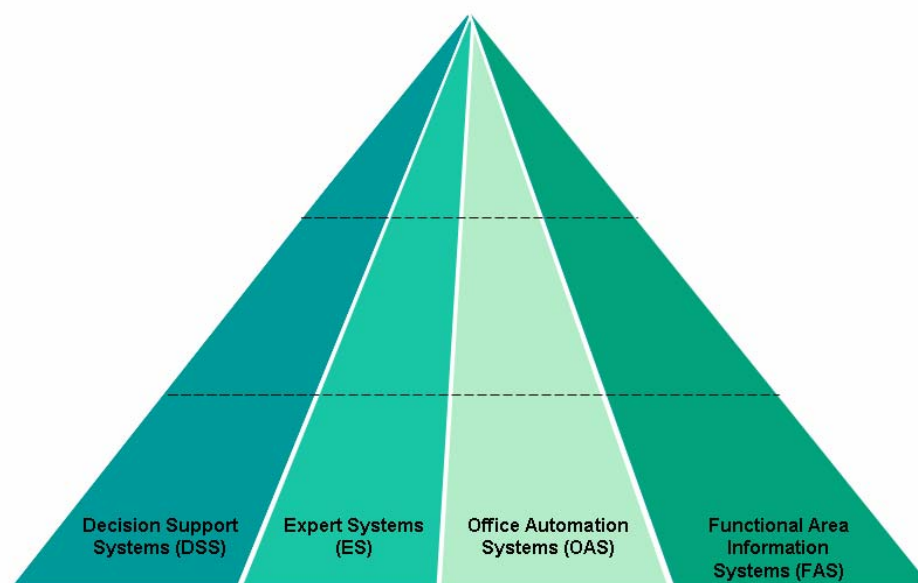
Source: (J. A. O'Brien, Marakas, George M., 2007) page 14.

The role of an operations support system is to update operational databases, produce business documents, effectively process business transactions, monitor industrial processes and enhance team and work group communication and collaboration (Deloitte & Touche, 1998). Although operations support systems process and produce a variety of internal and external information, these systems can not be used to support managers with specific required managerial information. In order to provide managers with adequate information for effective decision making, business organisations use management support systems. Providing support for managers' decision making process can be very complex and therefore requires different types of support systems (Gordon, 1999). As shown in Figure 4 (above) there are several decision support systems with different responsibilities: management information system (MIS), decision support system (DSS), executive information system (EIS) and specialized processing systems (SPS) (Jessup, 1999).

Whereas management information systems (MIS) provide managers with the requested information in the form of predefined report lay outs, decision support systems (DSS) have the role to enable managers direct computer support for interactive and ad hoc information queries during the decision making process (Gordon, 1999). For executive decision making, special "executive information systems (EIS)" have been developed (J. A. O'Brien, 2004) (p. 333). These systems extract the

information from MIS, DSS and other sources to streamline the information for executives to display and highlight organisational and competitive performance and economic developments to support strategic planning.

O'Brien (2004) argues that, besides the operations and management support systems, several other information systems exist which operate across all decision making levels. These organisational boundary spanning information systems are illustrated in Figure 5 (below). Several knowledge based systems such as "expert systems" and "knowledge management systems" support the creation, modification and distribution of business knowledge to employees, managers and executives (Schultheis, 1995). "Functional business systems", with their support of basic business functions such as accounting and marketing, also determine operational and managerial functions (Gordon, 1999). Finally, a business can make use of "strategic information systems" (Nickerson, 2001) (p. 394) to give the organisation a competitive advantage.



**FIGURE 5** *Organisational boundary spanning information systems*

In theory, conceptual classifications of information systems are only created to illustrate the different roles and responsibilities they carry out. In practice businesses usually apply an integrated combination of different roles and types of information systems. These cross-functional information systems are designed to carry out the basic business functions, such as record keeping and transaction processing, but also allow the transformation of information to support decision making on an operational, managerial and executive level (Schultheis, 1995).

Nair (1999) espouses that, over time, in most organisations information systems have often evolved in an informal manner such as in the use of shared computer drives. As a result, several issues emerge which impede business performance and reduce productivity. To tackle the challenge of increasing the organisation's efficiency in decision making on an operational, tactical and strategic level, several specific business information system have been developed (Nair, 1999). According to O'Brien (2007) (p. 13-15) the above described systems can again be broken down into five information system levels:

- 1) "individual information systems" - i.e. a personal computer
- 2) "group information systems" - i.e. e-mail systems
- 3) "organisational information system" – i.e. an organisational network
- 4) "inter-organisational information system" - functions among several organisations
- 5) "international information system" which allow data transfer within organisations world wide

#### 2.1.4. Link between Knowledge Management and Information Systems

Describing knowledge as 'identified, classified and valid information', Rollet (2003) (p. 7) defines Knowledge Management as a responsible management task which deals with "knowledge-friendly" environments in which knowledge can "develop and flourish to provide individuals, organisations or regions with context sensitive Knowledge and the ability of knowledge workers to apply the knowledge for action". Nickerson (1998) in turn divides knowledge into personal and organisational knowledge. Nickerson (1998) (p. 348) defines personal knowledge as "the understanding a person has gained through education, discovery, intuition and insight". Liebowitz (2000) (p. 23) summarises and defines the total of the personal knowledge of all people who work for the organisation as "organisational knowledge". Thus knowledge management is the process of managing organisational knowledge. Traditional Western epistemology has defined knowledge from the non-human perspective as an absolute and static entity (Nonaka, 2000). Nonaka et. al. present knowledge as a dynamic process in context, as a result of social interactions between "tacit" and "explicit" knowledge amongst individuals and organisations. "Explicit" knowledge can be expressed verbally, in the form of data, scientific formula, specifications or manuals and can be easily processed, transmitted and stored. "Tacit" knowledge, by contrast, is highly personal and hard to

formalise as this kind of knowledge is very subjective and rooted in intuitions, routines, ideals, values and emotions. In this way “tacit” and “explicit” knowledge are complementary, and thus both types of knowledge are essential to knowledge creation. Hence, knowledge is the interpretation and integration of information in a context by individuals. Based on this interpretation, Nonaka et. al. (p. 8) re-conceptualised knowledge as “a dynamic human process of justifying personal belief toward the ‘truth’”. As defined, information systems serve the purpose to process, transform, interpret and integrate information into knowledge. Thus, over the time several complex knowledge management systems have been developed as means of acquiring, organizing, storing, communicating and sharing organizational knowledge (J. A. O'Brien, 2004).

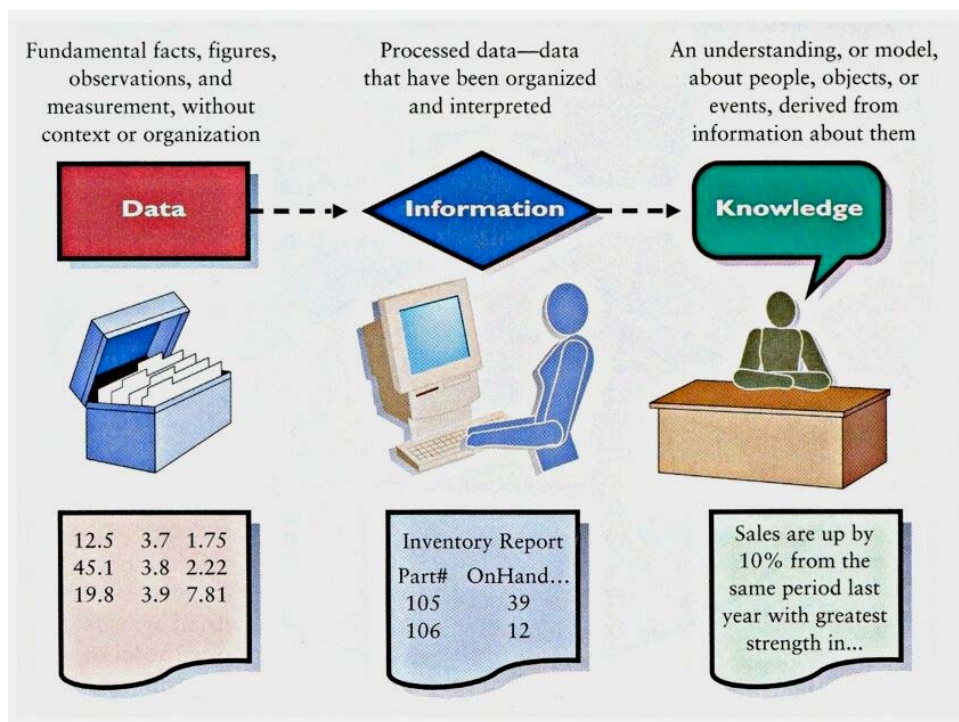
## **2.2. Information Management**

### **2.2.1. What is Information Management?**

Employees, managers and executives within an organisation, or across several businesses, deal with various types of information. A car manufacturer might use information to examine customer preferences in design, service and pricing. A hotel manager might use information about their guests' expectations in order to train staff, develop procedures and respond to customer requests. Lawyers use information to identify key issues to handle their cases and pending lawsuits.

Already this short introduction emphasises the variety of information, its purpose and interpretation. In order to understand information better, it is important to realise its relationship to data. McNurlin and Sprague (1989) (p. 188) define data as “fundamental facts, figures, observations and measurement, without context or organisation”. Based on this definition, Gordon (1999) (p. 7) defines information as “processed and interpreted data – data that has been organised, interpreted, and possibly formatted, filtered, analysed and summarised”. Based on these definitions, the following example might illustrate the relationship between data and information a bit better than by simple definition. A weather station, for example, might report the following data: 233, 1700, 35, 15 NW, 25. If the figures are not imbedded in a context, the figures can be interpreted in various ways or even remain meaningless to the user. Only through the placement of these figures in a context does the data result in useful information. Such a context could be: This is the report of weather station 233, at 17:00 (5 pm), the

temperature is 35 °C, a wind velocity of 15 mph from north west and a humidity of 25 percent. The creation of information is even more complex as, for the same data, different contexts can be used which then in return result in different meanings, thus different information. For example, the figure 100 as data will transform by adding the context “km” to another meaning than adding the context “bottles of wine”. Even the use of the same number and the same context can still have different value and meaning for users. The information of “35 km” has for a marathon athlete a different interpretation of distance as it has for a pilot. However, as shown in Figure 6 (below), the transformed data can then be used by employees, managers and executives to obtain knowledge from information. In the above described weather station example, information can be interpreted and transformed to knowledge through assimilating and explaining variations over time. In general, setting data in the right context is very important to enable knowledge creating and accurate decision making through all organisational levels.

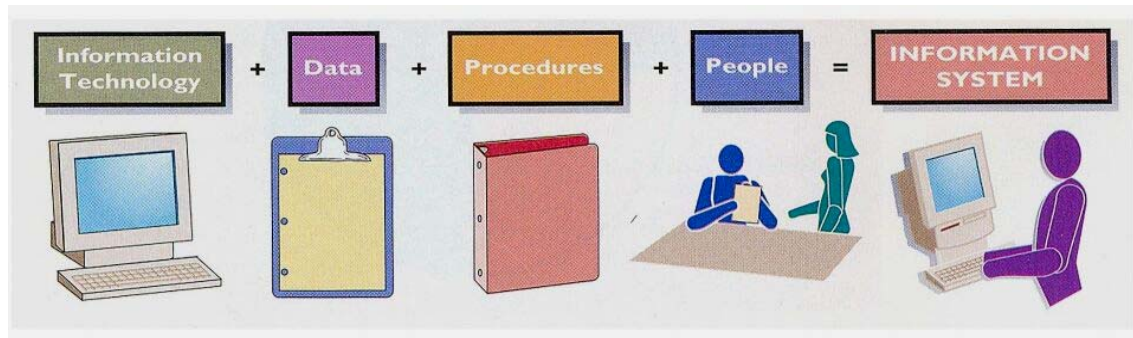


**FIGURE 6** Transformation of data into knowledge

Source: (Gordon, 1999) page 7.

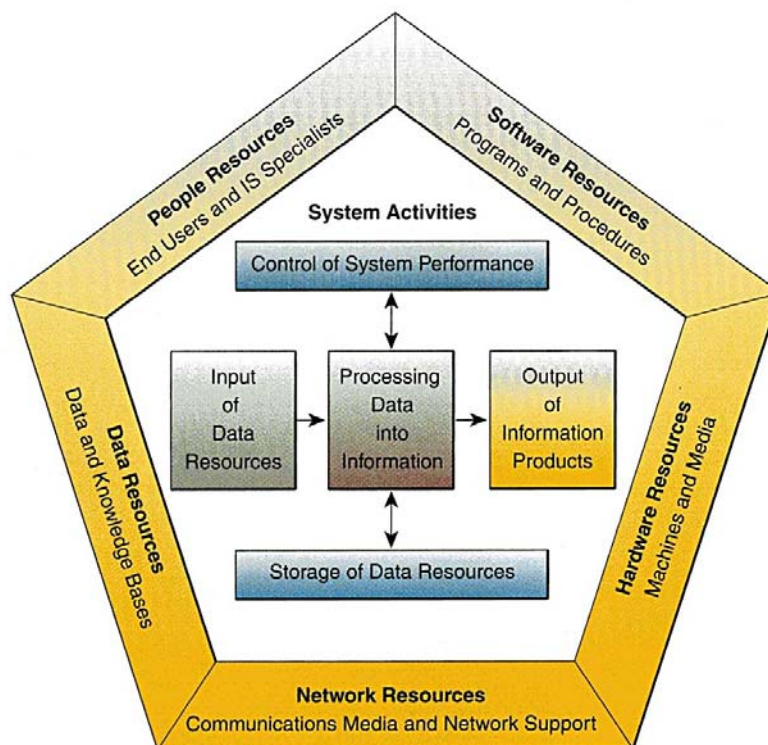
Managing information is not simply done through the transformation of data. As shown in Figure 7 (below), information systems consists of the following components: information technology, data transformation, procedures for processing data and people who access, modify and distribute data (Gordon, 1999).





**FIGURE 7** Chain of components in an information system  
Source: (Gordon, 1999) page 11.

As examined above, information systems process data resources as input into information products as output. Based on these findings, O'Brien (2004) proposed a fundamental framework of an information system model, shown in Figure 8 (below). This framework highlights the relationships among the activities and components of information systems. The model emphasises software, hardware, network, data and people as the five basic resources of information systems. Hence, these resources enable users to perform input, process data, store data and control activities to transform data resources into information products (J. A. O'Brien, Marakas, George M., 2007).



**FIGURE 8** Components of Information Systems  
Source: (J. A. O'Brien, Marakas, George M., 2007) page 29.

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### 2.2.2. Using information for a competitive advantage

In the literature it is argued that many companies still use information management as a backroom operation with the purpose to support the other functions of the business. Beside Gordon (1999), O'Brien and Marakas (2007) and Schultheis (1995) many other authors argue that information systems can also be used proactively and strategically to gain a competitive advantage. Gordon (1999) identifies five key areas of decision making which enhance and develop a competitive advantage:

- ▶ reacting to market conditions
- ▶ improving customer service
- ▶ controlling costs
- ▶ improving quality
- ▶ expanding globally

Increasing a company's possibilities of monitoring external developments and innovations through information systems and management will enhance in return the company's ability to respond quickly to market conditions, such as changes in demand, prices, product and service design and content as well as requests for innovative products and services (Ward, 2000). An example of this is Dell Computer's demand management system related to its supply chain. In order to improve customer service a company has to collect, store, share and monitor information about customers' expectations and the fulfilment of their needs to prevent failure from poor investments and the loss of customers (Teng, 1994). For example, good information management and establishment of appropriate information systems that classify and monitor spending, ease cost control and thus create a competitive advantage through price differentiation. Another possibility is that companies can gain advantage through the use of information systems and information management and therefore improve quality. The possibility of immediate processing of analysed summary and exception reports to production workers and managers enables quick interventions to improve processes and enhance quality assurance (Davenport, 1993). Companies pursuing the strategy of gaining high market shares through rapid growth in the global market need appropriate information systems to coordinate and monitor their globally spread subsidiaries and enhance information and communication flow across all language and cultural barriers (Neo, 1991).



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Creating a mature information management environment for local operating or multinational companies assures a high level of competitiveness in the international market by supporting foreign subsidiaries to better integrate in the company's worldwide operating activities and allows local operating companies a greater flexibility to respond immediately to changes in the domestic market (Schultheis, 1995). Overall, information systems, and their appropriate management, enable executives and managers a contentious control and navigation of all subsidiaries. This results in the gain of competitive advantage and enables the companies to serve their customers and clients with more innovative products and services.

## **2.3. Data / File Management**

### **2.3.1. Data Storage and Processing**

The quality, accuracy and pace of responding within an organisation to various kinds of queries, either from customers or colleagues, always reflects on the processes of managing information flow through collecting, organising, storing and retrieving captured information in files through an information system (Schultheis, 1995). Therefore storing and retrieving data is often considered in the literature as the essential study of information management. Using the word "data" in this context implicates the definition of data. Nickerson (1998) (p. 10) defines data as "information in form of a fact, number, word, image, picture or sound that is meaningful or useful to someone". In this context it should be highlighted that data for one person can, at the same time, be important information for another one or might not even constitute knowledge to either person.

With the introduction of computers in the 1980's, and especially the high tech boom followed by the rapid Internet development in the 1990's, the need for storing and accessing information captured in files has changed over the last decades (McNurlin, 1989). Thus, the development of more capable computer hardware and systems, which resulted in the growth of required storage possibilities and the vast amount of created files in most organisation's day-to-day business, required also the development of modern retrieval systems to enable easy and quick accessibility of stored files (Chowdhury, 1999).

Belkin (1980) (135) defines the purpose of a retrieval information system as a key tool to “serve as a bridge between the world of creators or generators of information and the users of that information.” The aim of retrieval information systems is defined by Chowdhury (1999) (p. 9) as “information collecting and organising system” across all departments in an organisation in order to provide the stored data to users as soon as asked for.

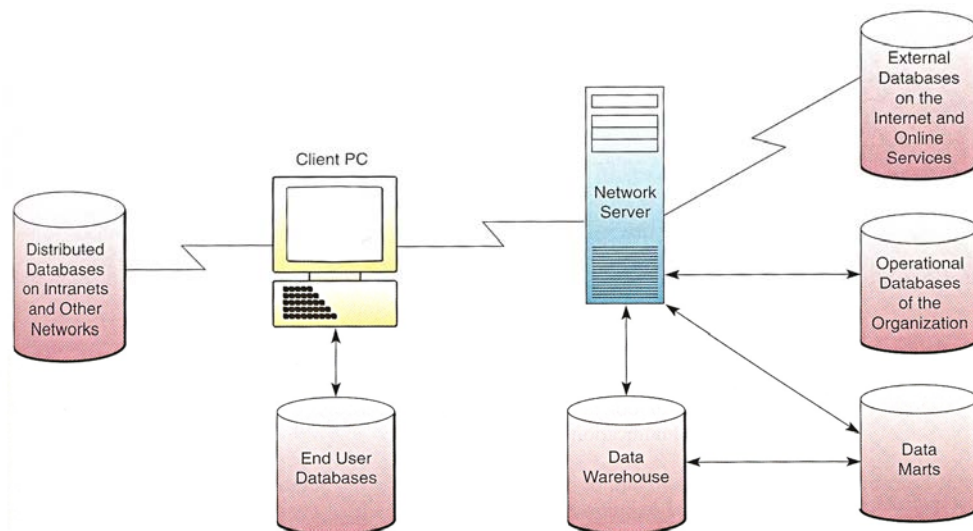
Taylor Chudnow (2003) argues that only 20% of the stored information in a company is classified as “structured information” and 80% is “semi structured” or “unstructured information”. Whereby structured information can be classified as data that can be automated, obtained, modified and stored in the organisation’s network, though the most common type of data is unstructured stored information such as word documents, spreadsheets, presentations and images (Belkin, 1980). These unstructured type of files do not allow any kind of automated processing. However, semi structured information such as e-mails and linked database with file systems can only be automatically accessed in limited ways. However, unstructured files take up a large amount of storage capacity in most businesses and, related to their size and type of nature, it can be difficult to manage these files. As Taylor Chudnow (2003) reports, even the largest companies invest in database management but have not yet invested the same amount in possibilities to manage their files and file systems. In order to meet the needs of managing unstructured data, a file-based storage management, also known as system resource management (SRM), has evolved over the past few years. All today’s available SRM solutions monitor file structures and have automation and control features such as automated reports of the oldest files, most and less frequent used files or even a report of the fastest growing files on the network and also enhance interactive communication streams. Laudon (2002) defines interactive communication streams in an organisation as all kind of information that flows between people within a work group or a department, and from one work group or department to another.

### 2.3.2. File transferring and sharing

While an operating system, hardware and networks create the platform for the information system, businesses need additional application software to provide the input, storage, processing and output functions (Taylor Chudnow, 2003). Several software programmes are in use, from a simple structured Access Database up to professional multiple databases (Alter, 1996). Sundaram (2006) states that the simplest

form of sharing data is to use a cheap and easily understandable information system based on file processing. However many disadvantages apply to this form. One major disadvantage is that data is duplicated in several files and it is difficult to ensure that changed data will be automatically updated in all files. A second main disadvantage is that a file can be accessed by only one user at a time (Sundaram, 2006).

Purba (2000) recommends a database as a solution for managing data instead of using file processing. He defines a database as a collection of data and relationships between data. Whilst in file processing all files are stored separately and isolated from the other data, in database processing all data is stored together in a database and utilised by a database management system which provides capabilities for creating, accessing and updating the database. Adelman (2003) describes another opportunity whereby big organisations can also implement an even more advanced information system with an establishment of a data warehouse. Data warehouses also contain historical data extracted over time from other databases and data from all other multiple databases within the organisation (Purba, 2000). Figure 9 (below) illustrates the major types of databases used by organisations.

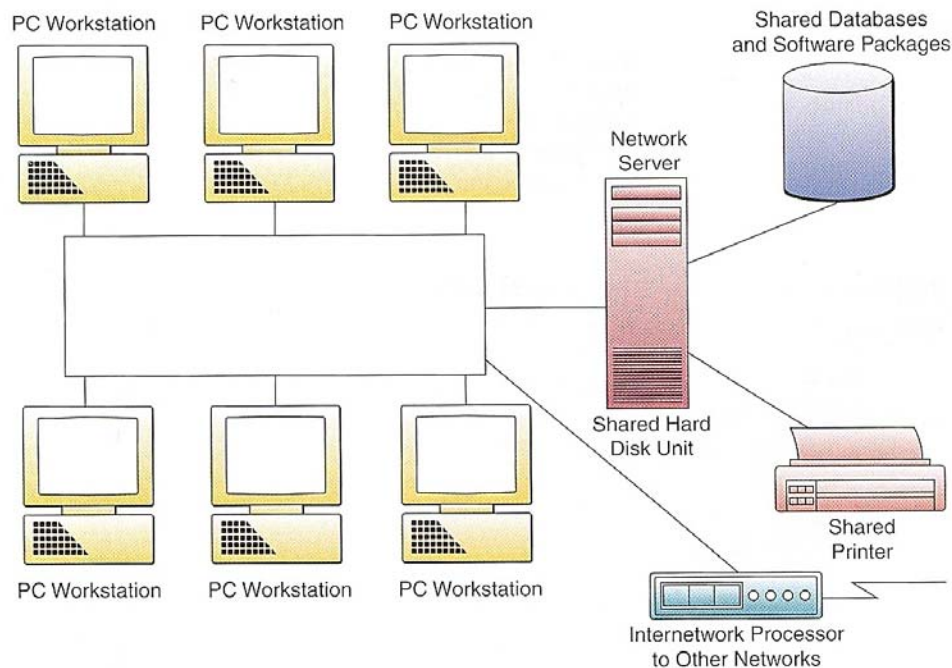


**FIGURE 9** *Major types of databases*

Source: (J. A. O'Brien, Marakas, George M., 2007) page 167.

In order to understand how databases and files can be distributed, stored and shared by various users within a company, the principal ideas of Local Area Networks (LAN) have to be explained. As shown in Figure 10 (below), local area networks connect all PCs within an organisation, to link end users through a network server in different

offices, work groups, departments or even buildings. The company's network server allows users the storage of data files, access to software packages and network peripherals such as printers. On the basis of the provided infrastructure by a local area network, information systems are used as an application software to access stored information captured in files or databases on the network server and are shared with other users (Nickerson, 2001).



**FIGURE 10** A typical Local Area Network (LAN)

Source: (J. A. O'Brien, Marakas, George M., 2007) page 205.

## 2.4. Information Systems Development

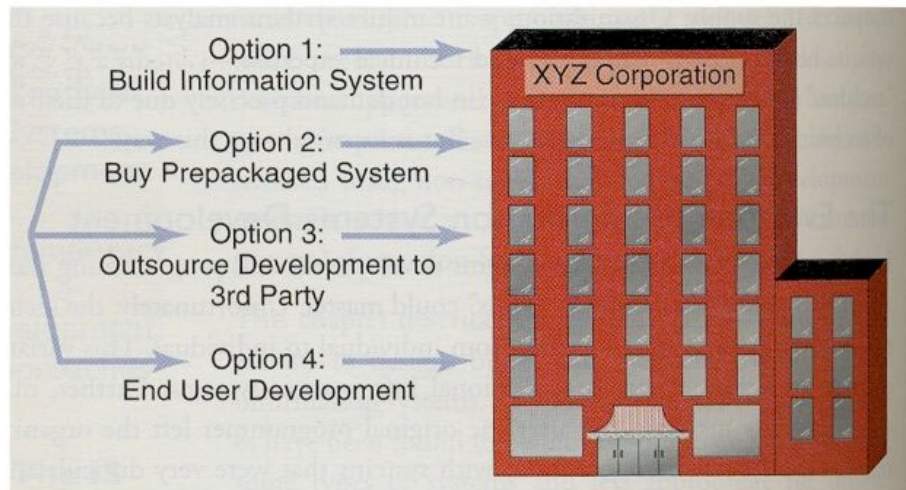
A complex question such as that arising through AACSB accreditation, whereby it is necessary to conduct an analysis of current usage of information systems within the AUT Business School has no easy solution. It is necessary therefore to adopt a structured approach called “information systems development or application development” (J. A. O'Brien, Marakas, George M., 2007) (p. 19). The following sections will illustrate what kind of systems development concepts and methods exist and how applications have to be developed to meet the requirements of the organisation, its employees and stakeholders. These findings are then linked to the current situation at the Business School and provide recommendations for an application of an asset method.

### 2.4.1. Systems analysis and design

In the early days, skills and techniques of computing information systems were considered as an art work which only a few IT experts could master. As a result the maintenance and further development in businesses was very difficult and expensive (Jessup, 1999). To address this issue, professionals started to design different methods and techniques of developing information systems which could be constructed and applied in different industries, organisations and institutions (Nunamaker, 1992). This evolution resulted also in the benefits of an easier and in particular similar training of programmers and systems analysts. This ensured organisations the independence of developers but furthermore the development of systems based on commonly used techniques became easier and cheaper to maintain (Alter, 1999).

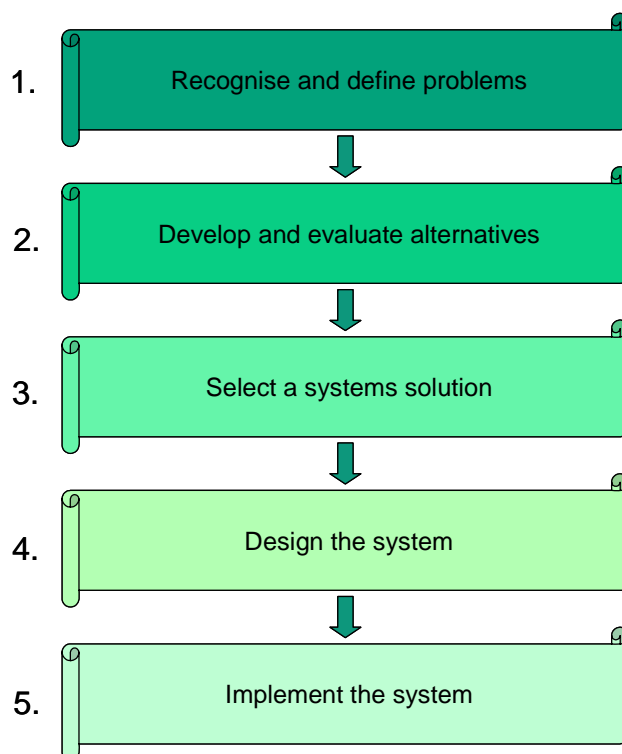
As shown in Figure 11 (below), Jessup (1999) outlines four options which organisations can choose for developing information systems. One option allows organisations to develop their own information system. Option two highlights an easier, probably faster and especially cheaper way of implementing a new information system in an organisation through the purchase of a pre-packaged system. However, purchasing developed software might not meet all required needs of the organisation and has therefore be to assessed on an individual basis whether it is still worth choosing this option. A third option is the outsourcing of the development process to another organisation or consultant. Most enterprises choose this option when they have not got the resources and expertise to develop their own customised information system. The fourth and final option is known as the end-user development. This method allows users and departments to be an active part of the requirement examination and development process. Applying this technique also results, not only to the organisation's benefit, but also in the creation of systems which support users' individual needs (Gordon, 1999). However, systems based on complex databases or which span organisational boundaries are in general not suitable for this method.

The set purpose of this study with its evaluation of the development of a suitable information system for the AUT Business School, emphasises option one and three of the in Figure 11 (below) displayed options as not applicable. However, a desired goal of this study is to examine whether option four or option two would be the best alternative to develop a suitable information system for the Business School.



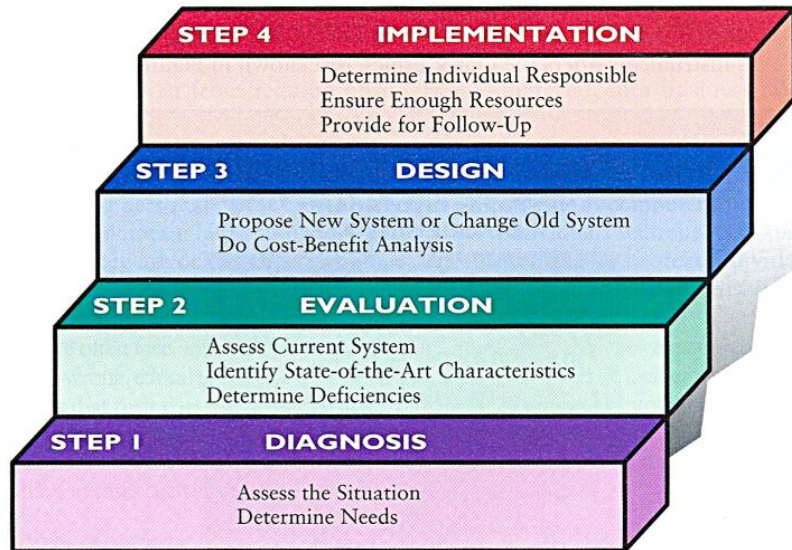
**FIGURE 11** *Options for obtaining information systems*  
Source: (Jessup, 1999) page 4:8.

O'Brien and Marakas (2007) illustrate the systems development process of analysing and defining problems and restrictions of the currently used information system by using a five step model of the so called 'systems approach', shown in Figure 12 (below). The authors argue that by following these steps an appropriate solution can then be developed in response to the initial assessed requirements.



**FIGURE 12** *The five step systems approach*

A similar approach of the systems development process illustrated by Jessup (1999) is a four step model, shown in Figure 13 (below).



**FIGURE 13** *The four step development approach of information systems*  
Source: (Gordon, 1999) page 30.

#### 2.4.2. Key systems development concepts

The oldest form of developing information systems evolved in the 1960's and is known as the "systems development life cycle (SDLC)" (Gordon, 1999) (p. 153). This methodology is known as a very well-considered, structured, but also very inflexible, way of developing information systems, as each stage of the development life cycle had to be carried out and be completed before moving on to the next stage of the development life cycle (Hicks, 1990).

Today the SDLC approach is mainly in use for large scale developments especially in the telecommunication sector where it is necessary to periodically change telephone numbers and area codes (Alter, 1999).

Since the mid 1980's the traditional systems development life cycle approach has been mainly replaced through alternative development methods (G. Elliott, and Starkings, S, 1998). However, in order to be able to evaluate the strengths and weaknesses of traditional development concepts as compared to the new evolved alternative approaches, the four basic stages of the life cycle have to be examined first. As shown in Figure 14 (below) the systems development life cycle consists of four sequences of



stages. In the first stage, "System Identification, Selection and Planning" takes place (Gordon, 1999). In this phase of the development process it is most important to gather as much data as possible about the users' needs and their perceptions of a well functioning information system.

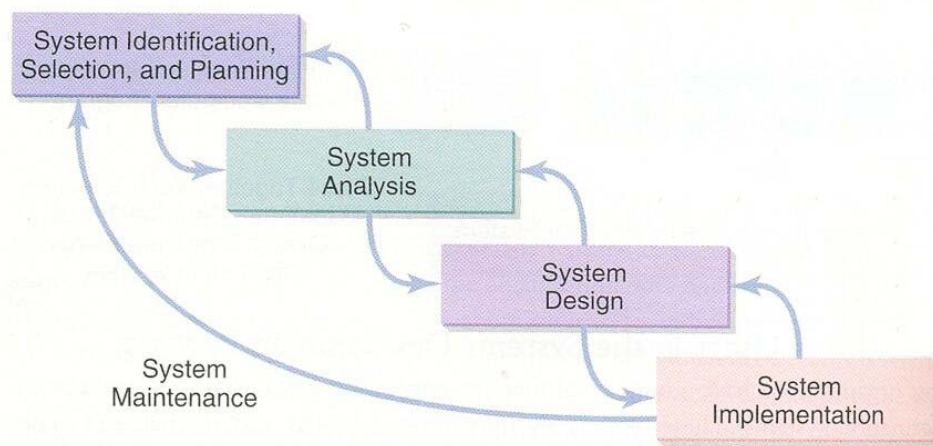
The second stage of the life cycle is determined by the "Systems Analysis" which involves systems investigations, with the aim to understand the systems problem and evaluate whether the issue raised can be solved (Schultheis, 1995). This can be achieved by interviews with employees, questionnaires, observations and data acquisition through the evaluation and analysis of systems documentations (Alter, 1999). After data collection and analysis of the systems environment this stage also performs a feasibility analysis. Elliot (2004) identifies the five main factors the feasibility analysis contains as: "Technical feasibility" to determine technical possibilities of developing a system. "Economic feasibility" to assess the financial constraints. "Legal feasibility" to indicate existing legal requirements and restrictions. "Operational feasibility" to determine whether the proposed system is suitable for operational activities and procedures. And finally "schedule feasibility" to prove the practicality of the proposed systems development process.

The third stage of the development life cycle is the "Systems Design" which can be divided into a logical and a physical part (Gordon, 1999). Just as a constructor would not start building a house without a plan and measurements, the physical design of the information system requires, in the first instance, a theoretical design of the proposed information system (Schultheis, 1995). The logical design also conceptualises how the proposed system should solve the identified issues in stages one and two. The physical design of the information system typically involves the following elements: hardware, software, storage media, telecommunications technology, people and organisation (Oz, 2006).

The fourth and last stage is the "Systems Implementation" and "Systems Maintenance" (Jessup, 1999) (p. 4:20). In the traditional systems development life cycle this is also known as the "Evaluation Stage" (G. Elliott, 2004) (p. 88). This stage is concerned with uninstalling the old system, hence the installation of the new information system. This might include the training of end users in how to use the new system and also might include a pilot testing of the new system. This stage of the development life cycle is primarily concerned with the implementation of hardware and software components in the organisation's IT-environment (Schultheis, 1995). This phase also includes the



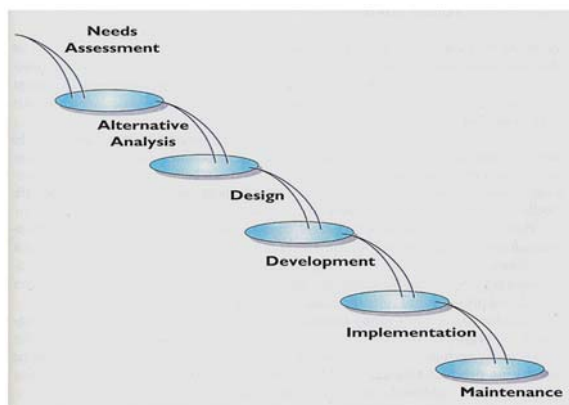
evaluation of the system's integration, performance and how it covers the addressed issues (Jessup, 1999). Discovered variances and errors have then to be fixed either through a readjustment or a modification in the maintenance stage. Typically the readjustments and modifications start from the first stage again, which would also complete the circle. As shown in Figure 14 (below) the big circle also consists of small inner circles between the several stages which require the completion of one stage before moving on the next stage. In the worst case scenario of completing a stage, the developers might have to move a step back to the previous stage to do a review or make adjustments. However, in practice it is hardly possible to develop an information system by following this strict and sequential fulfilment of stages.



**FIGURE 14** *Systems Development life cycle*  
Source: (Jessup, 1999) page 4:10.

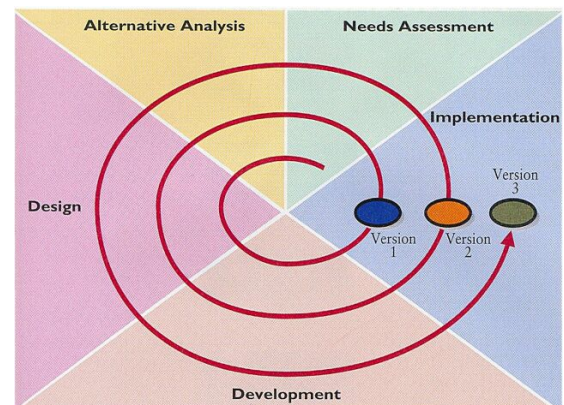
Based on the principles of the systems development life cycle, several models and techniques such as the “waterfall model”, “the spiral model” and “prototyping” evolved over the years (Gordon, 1999) (p. 487, 489, 490). The waterfall model, shown in Figure 15 (below) illustrates clearly the principles of the step by step or stage development. Where the SDLC allows the rotation in inner circles between the several steps to make readjustments, the waterfall model does not allow these backward steps. Like water flowing in a river or in a waterfall only one way, the approach for a systems development is based on the same ‘one-way’ principle (G. Elliott, and Starkings, S, 1998). This linear approach makes this model relatively easy to manage but at the same time very inflexible as it allows no errors or control loops to make readjustments to a previous stage. This can lead to major failures of set user requirements and organisational needs.

Gordon proposes a different approach of modelling and developing systems with the “spiral model” (Jessup, 1999). As illustrated in Figure 16 (below) the development follows the same stages of the SDLC and the waterfall model. The difference, however, is that the spiral approach develops systems through several versions of which each version follows through the same SDLC stages except maintenance which only applies to the final version. The spiral approach is also driven by the “80/20 rule” (Gordon, 1999). This rule emphasises that by the realisation of 20 percent of the users’ demanded functions, 80 percent of the users’ needs can be met already in version one of the systems development process. The following versions two and three are most likely only in place to terminate errors, add features but also add “bells and whistles” to the system. The difference however is that the spiral approach enables the users to see first results of the systems development so that if applicable the end result can be revised through interactive collaboration with the developers. Although the spiral approach means a consistent rework on existing versions, the model allows users to see the progress and judge how long it will take till completion and removal of the existing system (Jessup, 1999).



**FIGURE 15** *Waterfall method of systems development*

Source: (Gordon, 1999) page 487.



**FIGURE 16** *The spiral systems development model*

Source: (Gordon, 1999) page 489.

#### 2.4.2.1. Strengths and Weaknesses of traditional Development concepts

In order to understand ISD in relation to current knowledge and perception of information technology and the strengths and weaknesses of the traditional concepts and methods, we first have to describe the environment in which these models have been developed and used. At the time of the systems development life cycle in the 1960's the need for information systems developments was only raised in a few large

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companies (Deloitte & Touche, 1998). Furthermore the use was mainly in the company's electronic data processing (EDP) department (Alter, 1999). Compared to nowadays, the use and focus group was completely different from what it is today. Information Technology and its applications are nowadays essential to every organisation, its departments and employees. Today there is an essential requirement on every user as an employee to know and use information systems in an effective and efficient way. But also the enterprises have nowadays become more dynamic in dealing with business changes and challenges, so that requirements for information systems have evolved to a completely different level. Nevertheless, the traditional SDLC has some strengths upon which the new approaches have been developed.

The SDLC is a developed and tested approach of developing systems. The SDLC also relies on the documentation of the development processes which are a very important element for systems maintenance and user trainings (Oz, 2006). The concept of a stage development enables the breakdown of complex system development problems and enables the use of formalized analysis and design tools.

However, whilst the SDLC's usage was appropriate in the business and IT environment in the 1960's and 1970's, it cannot be adopted in modern businesses with their requirements on information transformation and processing. The main disadvantage and weakness of the SDLC is its conception in which the end-users are not included in the development process (Deloitte & Touche, 1998). This results quite often in a confrontation between end-users and user unfriendly information systems often leading to end-users refusing to use the new system. Furthermore, the need to complete stage by stage makes the model very inflexible for changes and at the same time increases the development costs (Gordon, 1999). A parallel development of sequences could result in significant time and cost savings. The development of a system through the SDLC approach is also a slow and labour intensive process which might be inappropriate for most organisations which need a quick response to marked changes and challenges (Schultheis, 1995). The proposed step by step development approach ignores the possibility of testing the developed system as a pilot to reduce the risk of failure through not meeting the users' requirements.

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#### 2.4.2.2. *Alternative Development methods*

The failings of the traditional models and the significant changes of the business environment, led to the evolution in the 1990's of new and alternative approaches of developing information systems (Schultheis, 1995). Some of the alternative approaches are ajar on the concepts of the SDLC and some focused on a completely different approach. The new models were also developed with the focus on reducing the development time and costs and ensuring the satisfaction of user needs (Deloitte & Touche, 1998). Another outstanding difference from the traditional SDLC approach is the acknowledgement that most information systems in organisations involve human activity as an unpredictable factor. Furthermore, this acknowledgement highlights the basic concept, that all alternative approaches have to be seen in totality and not in isolation.

Today there are six most commonly know alternative development approaches in the literature with the emphasis on involving the end-users in the development process (G. Elliott, 2004):

- ▶ Rapid applications Development (RAD)
- ▶ Joint Applications Development (JAD)
- ▶ Prototyping Systems Development (PSD)
- ▶ Object Oriented Systems Development (OOSD)
- ▶ Dynamic Systems Development Method (DSDM)
- ▶ Business Process Re-Engineering (BPR)

#### Rapid applications Development (RAD)

The term “rapid applications development (RAD)” is an umbrella conception to bundle various new methods, tools and techniques to enable end-user participation and to accelerate the development process of information systems (G. Elliott, and Starkings, S, 1998). The needs for rapid systems development concepts and models have risen significantly in the past few years. A reason here fore is the high competitiveness organisations have to face on the global market. The basic concept of rapid development is of the creation of a synergy through the development of the various tools and the combined actions of one or two activities which lead to a greater outcome than treating the activities in isolation (Jessup, 1999).

The concept of rapid applications development is based on the four phases shown in Table 1 (below). These phases incorporate the assumption and premise of using only fast, effective and efficient tools and methods combined with appropriate and suitable software applications. Rapid applications development also emphasises a concentrated and permanent end-user involvement through the development process via interviews, meetings and workshops to ensure the fulfilment of the users' needs (Schultheis, 1995). The proposed tools and techniques which fall under the RAD umbrella are quite often also related to the "dynamic systems development method (DSDM)" (G. Elliott, and Starkings, S, 1998). Hence, there is a methodical and logical way of using the RAD approach. However, the success of RAD applications in an organisation is often measured by how well the developed system fits into the organisation's business specifications and how well the system delivers benefits to that specification.

<b>Phase 1 Requirements planning</b>	
Technique:	joint requirements planning (JRP)
Technique:	joint applications development (JAD)
<b>Phase 2 User design</b>	
Technique:	joint applications development (JAD)
Tool:	prototyping
Tool:	computer-aided software engineering (CASE)
<b>Phase 3 Construction</b>	
Tool:	prototyping
Tool:	computer-aided software engineering (CASE)
<b>Phase 4 Cutover</b>	
Tool:	testing and evaluation
Tool:	user training

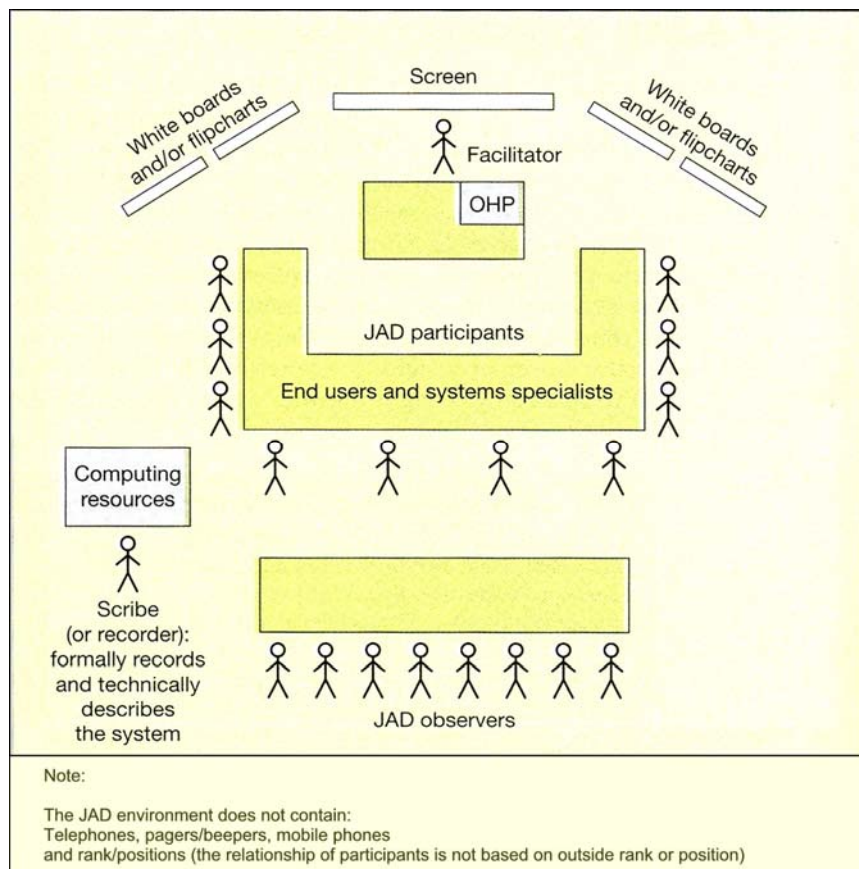
**TABLE 1** *The four Phases of rapid applications development*  
Source: (G. Elliott, 2004) page 131.

### Joint Applications Development (JAD)

Since the late 1970's, joint application development (JAD) has been proven to be one of the most successful techniques of identifying user requirements and developing, through active user participation in the development process, end user oriented and committed information systems (McNurlin, 1989). Therefore most enterprises use the

JAD approach instead of traditional data collection methods and requirement analysis. In order to bring the right people in the most suitable working environment, the JAD concept is based on structured workshops and group meetings between several end users, managers, technical specialists and other systems stakeholders who work collaboratively together to identify user requirements, analyse the existing system and identify and propose solutions for improvement (G. Elliott, and Starkings, S, 1998). The emphasis of this method is clearly on “joint ownership” which highlights the importance of collaborative and interactive work amongst all stakeholders in the organisation.

Elliott (2004) (p. 135) highlights the essential purpose of the JAD approach “to design a conceptual model of the proposed information system” that exactly matches the designed and desired models of the managers as business experts and the technical specialists. Only a continuous iteration of meetings and workshops enhances the consolidation of the two designed models to one conceptual model. Figure 17 (below) shows a model of a typical JAD workshop or group meeting. The JAD participative framework consists basically of brainstorming meetings in structured meeting rooms with a neutral facilitator who guides the participants through the discussion (Oz, 2006).



**FIGURE 17 JAD environment**  
Source: (G. Elliott, 2004) page 136.



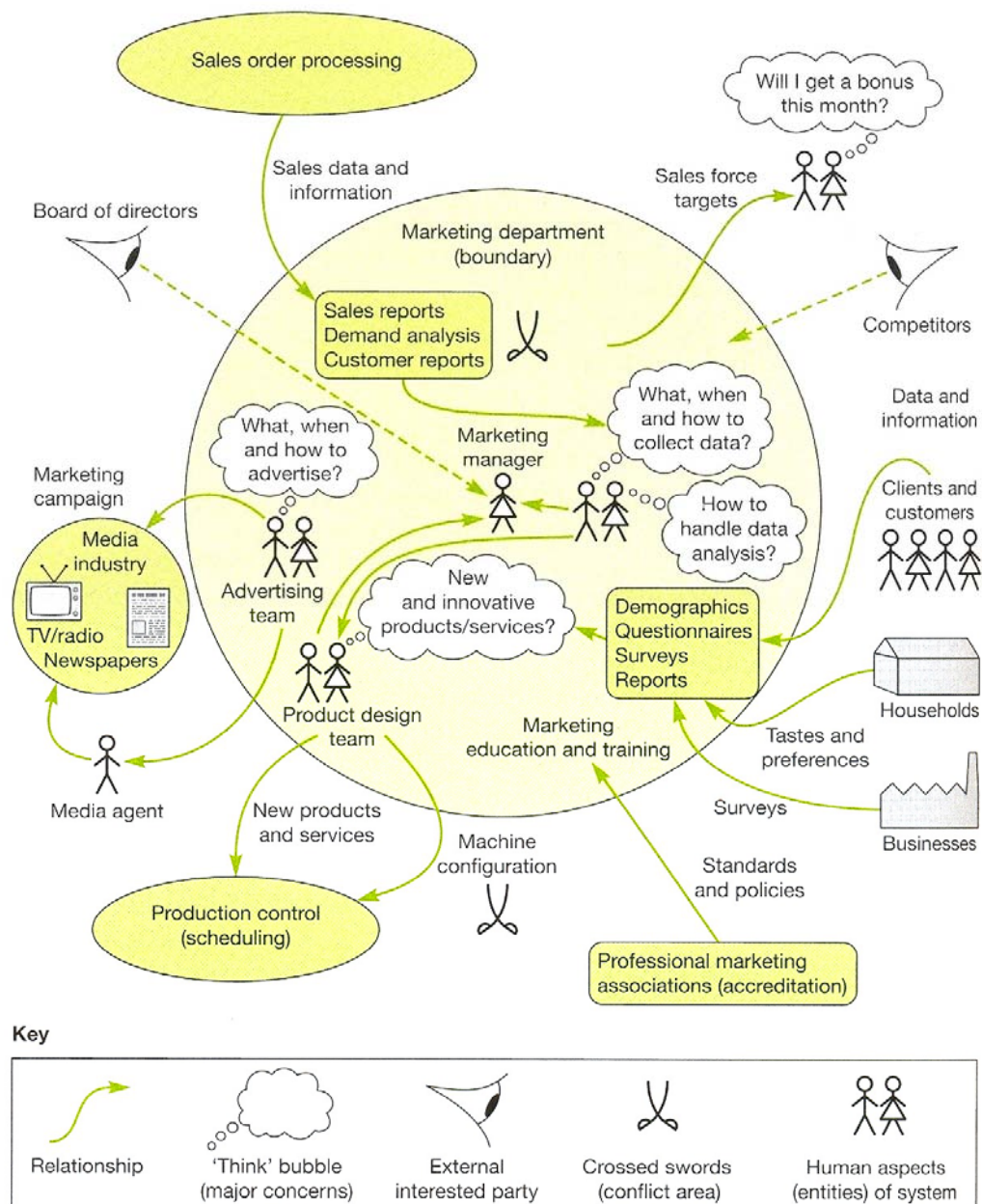
There are a number of advantages in using the JAD approach. Firstly, users, managers and IT specialists are encouraged to focus on systems requirements and issues. Secondly, the participation of all stakeholders in one room also results in the benefit of quick decision making and ensures, through their enfranchise in the decision making process, a high commitment towards the achievement of set goals and reduces the risk of resistance to the proposed system. And finally, the integration of a neutral facilitator helps to conciliate and overcome internal organisational politics to ensure efficient group work but also the development of the most suitable and appropriate information system.

### Prototyping Systems Development (PSD)

A third approach of systems development is known as the “prototyping model” (Gordon, 1999). This approach has the fulfilment of the users’ needs as a priority. In order to achieve this goal, the prototyping model focuses through the design and development stages on the user interface and modifies the versions until the user is satisfied (Schultheis, 1995). During these phases of the development process, developers often change the design of the system as the need for new features arises. As most end users have only limited knowledge and training of traditional tools to analyse and design systems, the prototyping approach offers users the possibility of transcribing the systems environment and requirements through symbols and pictures (Hicks, 1990). This technique is part of the soft system development methodology and known as “story board” or “rich picture” (G. Elliott, 2004) (p. 145). Rich pictures can be developed individually, in groups or in workshops to express and communicate non-technical users’ own views of the systems environment and propose ideas for improvement to the technical specialists. Figure 18 (below) illustrates an example of a rich picture visualising a typical marketing systems environment.

The prototyping model offers several advantages over the waterfall method. The most important is certainly the satisfaction of the users’ needs once through the extreme focus on the users but also caused through the longer time developers have to spend between the analysis and implementation. The prototyping model also highlights, through user involvement, the benefits of the new system before the development costs become excessive. The prototyping approach enhances the chances to overcome the problem of inadequate communication between technical and non-technical users but also involves managers as business specialists throughout the whole development process which was not possible with traditional approaches (G.

Elliott, 2004). However, the concept of this model has also some disadvantages. Gordon (1999) points out the fact that a high user involvement in the development processes will significantly increase the risk of the rise of users' expectations to level developers cannot achieve with their resources and budget. Users' requests for changes might also only include the adding of "bells and whistles" which are not necessary to satisfy the core functions of the system (Schultheis, 1995). The tendency to get sidetracked in the development can significantly increase the costs of the system's development.



**FIGURE 18** An example of a rich picture to describe the environment of marketing functions  
Source: (G. Elliott, and Starkings, S, 1998) page 102.



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### Object oriented Systems Development (OOSD)

Elliott and Starkings (1998) (p. 104) describe the object oriented systems development (OOSD) as a method which “combines data and the associated instructions for that data into one object or entity” to enable a transposable use and integration into other software applications. This interconnectivity approach allows developers to obtain object codes and data from an object library and build them like blocks into any systems application (G. Elliott, 2004). Jessup (1999) argues the use of an object oriented systems design results in the benefits of saving costs and time through a multiple usability of the processed data in the object library. However, it requires high skills to analyse, compromise and code business functions correctly into objects, which makes this method less likely to be used.

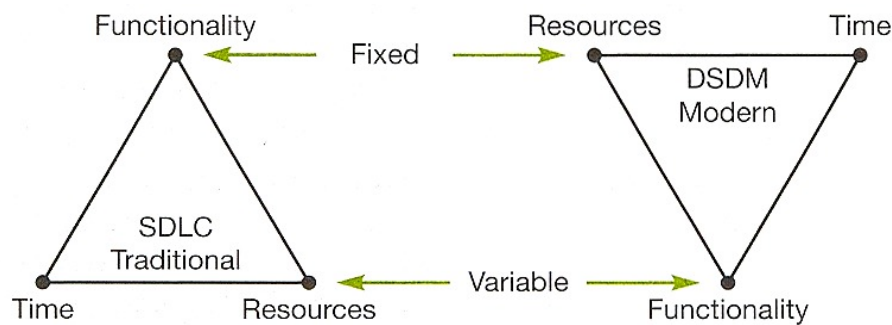
### Dynamic Systems Development Method (DSDM)

In the form of framing the rapid application development (RAD) approach, the concept of the dynamic systems development method evolved in the late 1990's into the development of modern information systems in fast changing business environments. The establishment of an International DSDM Consortium in 2000-2001 resulted in a world wide use of the DSDM (DSDM Consortium, 2007). After several years of being an integrated and set framework for systems developments in the UK and Europe, the USA started to adopt the DSDM approach in the twenty first century. The main purpose of this method is to enable a quick business solution in the global network and “dot com” age (DSDM Consortium, 2007).

To ensure the achievement of rapid and right systems development by reducing uncertainty in quick turn around environments, the DSDM approach uses, like the JAD approach, facilitated workshops but furthermore the reuse of objects and time-boxing through the whole development process (J. A. O'Brien, 2004). As time and resources often vary during the development process, the DSDM approach, time and resources are fixed as far as possible through the whole process which ensures the aim of aligning the IS development with the users' changing needs and requirements (Nair, 1999). However, the primary aim of the DSDM is to shorten the implementation time of developed information systems.

There are a number of benefits of using DSDM. An outstanding characteristic is the high level of involvement of end-users throughout the whole development phase.

Through the continuous focus on the users' real business requirements, this intensive user involvement reduces the risk of misunderstandings between the developers and users to avoid building an incorrect system (Schultheis, 1995). The concept of DSDM is based on a simple three factor systems development: functionality focus, working in a set time frame and resource utilisation (G. Elliott, and Starkings, S, 1998). Whereas in the traditional development approaches developers had to construct systems for a fixed functionality but with variable time constraints and resources, the DSDM approach operates in the development of systems in a fixed resource and time frame but with a high flexibility for changing user requirements and systems functionality. Figure 19 (below) illustrates these different approaches.



**FIGURE 19** *Difference between DSDM and SDLC approach*  
Source: (G. Elliott, 2004) page 153.

### Business Process Re-Engineering (BPR)

The business process re-engineering approach is a method that addresses the organisation's strategic orientation and direction in the development of information systems (G. Elliott, 2004). Therefore the BPR does not develop systems based on functionality of existing systems but looks at the purpose and objectives of the organisation's information communication technology to justify whether existing information systems are appropriate and satisfying to support the company's overall strategic direction (Jessup, 1999). The BPR approach also is more likely attempt to change underperforming business processes rather than developing an entire new system as a way of ensuring the achievement of the organisation's set goals. Although there is a major benefit in adopting the BPR approach, this method also emphasises some challenges, as the method requires a highly skilled management to examine the processes for fundamental organisational changes (G. Elliott, and Starkings, S, 1998).

Furthermore, this approach of improvement and performance measurement involves a difficult establishment of performance criteria to judge and evaluate BPR activities.

#### 2.4.3. Success and Failure of IS-D

Jones argues that 65 percent of the very large information systems developments with a budget of more than US\$ one million are cancelled before completion (Jones, 1993). Nykamp and Magalitta (1991) in turn argue that smaller systems development projects with less complexity have only a cancellation rate of 10 percent or less. However, Lybrand (1996) and several other authors highlight a high number of failures of successful information system developments (ISD) (Lybrand, 1996). Beynon-Davis provides evidence showing the profound consequences of organisations' failure to perform thorough first, or continuous, information system development (ISD) evaluations (Beynon-Davis, 2004). Brynjolfson (1993) reports that the failure to evaluate ISD across its lifecycle has resulted in limited organisational learning of IT and information systems (Brynjolfson, 1993). To avoid such failures, Beynon-Davies et. al. (2004) proposed an enhanced model linking findings from incorporating continuous feedback loops as aids to organisational learning. Nonaka et. al. (2000) proposed a model consisting of three elements to understand how organisations can create, maintain and manage knowledge dynamically. The first element is the SECI (socialisation, externalisation, combination and internalisation) process which focuses on knowledge creation through the continuous dialogue between tacit and explicit knowledge. The second element, named as 'ba', displays the shared context for knowledge creation. The third and final element is defined by the knowledge assets which consist of the inputs, outputs and moderators of the knowledge-creating process. The main findings of Nonaka, Toyama and Konno in this study were that these three elements form a spiral in the knowledge creation process so that existing knowledge assets can be used by an organisation to create new knowledge through the SECI process. Once new knowledge is created it becomes, in turn, the basis for a new spiral of knowledge creation. Based on these findings, Nonaka et. al. (2000) argue that knowledge can also be created by interactions between a company and its customers or even between a group of companies.

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#### 2.4.4. Information Systems Development at the Business School

Before choosing a systems development method, AUT's Business School has to consider three stages:

1. Identify and understand knowledge assets and existing organisational information.
2. Establish the ability to manage these assets through appropriate information systems which enable the transforming, sharing and storing of data and information.
3. Scope the purpose of the information systems development to ensure maximised development effectiveness within time and cost constraints.

In regards to a systems development method, it is important for sustainable success that the chosen development approach is realistically achievable within existing Business School frameworks but is also aligned with accepted standards and best practice to be capable of a resource sensitive and progressive implementation. However, in particular the chosen systems development approach has to align with the School's strategic goals to be responsive to strategic directions and priorities. If a systems development method can enhance these requirements and develop a system under these permissions, it is most likely that the developed system will strengthen the Business School's ability and capability of better file, information and knowledge sharing for better management of the organisation's day-to-day business, teaching, learning and research.

The author believes that, out of the above examined alternative development approaches, a mixture of the joint application approach and prototyping approach will be the most appropriate method to develop an information system at the Business School. The approach of joint meetings and workshops with all stakeholders will be the best collaborative and interactive approach of communicating different perceptions and requirements amongst users of different organisational levels within the Business School. Using the prototyping approach to map requirements and express environmental issues to technical and non-technical users in the form of rich pictures seems to be a valuable technique which emphasises the adoption of the joint application approach (JAD) in the Business School.

Conducting this study in the given severe time constraint of 3 months, emphasises limitations in terms of using the joint application and prototyping approaches for the evaluation of the four currently used information systems in order to identify user requirements. The given time frame allows only the application of the first two rapid development approach phases shown in Table 1 (above). This study is conducting in these first two phases “requirements planning” and “user design”, one-on-one interviews in which the interviewees have to draw a rich picture, a tool from the prototyping approach, to express the users’ and system’s environment. These elicited data will identify the users’ systems requirements. An expected outcome of this study is ongoing collaboration in the systems development process between technical and non-technical users in the idea of the joint application approach.

### **3. Introduction to AUT’s Environment**

#### **3.1. Auckland University of Technology**

The Auckland University of Technology (AUT) is New Zealand’s newest and fastest growing university. It was founded in 1895 and was for over 100 years New Zealand’s leading Institute of Technology. The school was given University status by the Government in 2000 (Auckland University of Technology, 2007a), in recognition of its national and international stature in creativity, research, innovation and excellence in teaching. As such, the University has the express statutory power to award degrees and other qualifications that are recognised nationally and internationally.

Comprising of five schools: Applied Humanities, Business, Design and Creative Technologies, Health & Environmental Sciences and Te Ara Poutama (Maori Development) and a student population of 15,741 Equivalent Full Time Students (EFTS), total number of 22,822 students and 1,769 Full-time Equivalent (FTE) academic and administration staff, Auckland University of Technology offers one of the largest and most diverse university environments in New Zealand (Auckland University of Technology, 2006). Informed by businesses and industry professionals in the university’s programmes, in 2006 AUT awarded 9 Doctorates, 279 Masters, 227 Honours, Postgraduate Degrees, 2,309 Bachelor Degrees and 3693 Pre Degree qualifications (Auckland University of Technology, 2006).

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### **3.2. Relationship between the Business School and Information Systems**

The Business School was established in 1988 and has grown to become one of New Zealand's major business schools. The School has both a national and international focus, with academic school members drawn from some of the best universities around the world, connection with leading global business and educational institutions, and a significant international student body drawn from over 60 countries. In order to offer the 4,280 Equivalent Full-time Students (EFTS) a range of qualifications from tailored short-course certificates and diplomas through to PhD's, the Business School currently employs 168 Full-Time Equivalent (FTE) academic staff and 51 Full-Time Equivalent (FTE) administrative and managerial staff (Auckland University of Technology, 2006).

In order to examine the importance of information systems at the Business School the relationship between the School's mission statement, intellectual contributions of academic staff and supporting contributions through administrative and managerial staff must be illustrated first.

The Business School defines its mission "To develop business graduates who are highly capable, valued and sought after by employers, and to undertake research which supports our programs and contributes to professional practice in business. Our graduates and research will contribute to business, industry and the community and to the economic and social development of Auckland and New Zealand within a global context" ('Internal Planning Document' AUT 2007). This recently reviewed mission statement has progressively been reflected in all of its programs and activities. In regards to this mission, the school maintains two distinctive and long-standing commitments. The first commitment is to provide excellence through generating highly employable graduates. The second commitment is to provide its students with an education that is practice-relevant and research-led to develop their ability to think independently and work collaboratively.

The university operates a highly devolved style of management which affords the Deans considerable discretion in both administrative and academic affairs of the schools. The Business School's Dean exercises the school's discretion within the context of broad university-wide corporate policies and prescribed academic processes designed to ensure program quality. The Dean of the Business School is accountable for the performance of the school through clearly defined performance objectives underpinned by performance-based individual employment agreements.

This environment highlights the importance of accurate, easily accessible and timely information in order to support work groups, managers and executives of the Business School in their reporting and decision making. The school's mission statement explicitly guides the intellectual contributions of academic staff members and highlights the necessity of an efficient information system in assisting academic staff to be research active and in return ensure students are exposed to fresh ideas, current developments and innovations. Therefore the Business School needs to provide an extensive range of information based services through easily accessible information repositories, 'state of the art' computer facilities with effective and efficient information systems to support the learning and wider social needs of its students.

### **3.3. Knowledge Management at AUT**

AUT defines itself as "a knowledge organisation, be it for research or teaching or learning or for administrative and management functions" (Auckland University of Technology, 2007). As AUT is not a process driven institution and can be mainly seen as a network or relationship organisation where knowledge is managed informally between individuals, knowledge functions more as pervasive 'glue' between the research, teaching and management functions at AUT.

Although the application of knowledge management in many business organisations has become very common nowadays, it is still not well integrated or developed at universities. Inspired by Muthukumar's (2005) (p. 379) statement "for a research intensive organization, knowledge is its most profound asset and so it is imperative that efficient knowledge management be one of its priority strategic concerns" and the various universities world wide which have successfully established and integrated a version of knowledge management for their university, such as the University of Edinburgh or King's College London's University, the Auckland University of Technology (AUT) established in 2004 a knowledge management group. This innovative progress will also help AUT to demonstrate, nationally and internationally, leadership in the development of a knowledge management in the tertiary education sector. The knowledge management group defines its purpose as:

*"To create and maintain a framework in which all members of the University are encouraged to share and use knowledge for the benefit of teaching, learning, research and business goals and which allows them to seamlessly and easily*

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*connect to the information they need, whenever they need it and wherever it is located” (Auckland University of Technology, 2007).*

The responsibilities and initiatives of AUT’s knowledge management group in managing knowledge at the university’s functions have been involved so far in AUT’s Library, IT department, academic research, e-learning and in marketing activities.

To ensure effective guidance in the management of the university’s resources and capabilities by the knowledge management group, a knowledge management framework within AUT’s strategic plan had to be developed. Within this framework the knowledge management group identified the following challenges which have to be addressed to manage knowledge effectively across the university:

- a. Avoid data duplications
- b. Eliminate silos of information
- c. Avoid the distribution of incomplete or averaged information
- d. Avoid loss of opportunity
- e. Improve information literacy skills of researchers, managers and administrators
- f. Increase accessibility of recorded internal knowledge
- g. Increase the transmission of external knowledge
- h. Assess when integration of knowledge sources is appropriate

### **3.4. File Record Management at AUT**

The Auckland University is currently engaged to work with the assistance of an external consultant towards the above mentioned issue of avoiding data duplications. Through this project the knowledge management group strives to frame and implement records management (RM) across the university.

Based on the assessment of current applied records management practices across the university in regards to existing documents and involved processes of file creation, storage and distribution, a records classification based on functions and sub-functions at AUT had been developed and illustrated in a gap analysis across AUT (Auckland University of Technology, 2007). Through several pilot projects based in communities of practice, the entire range of activity levels had been examined to identify the



classifications and record standards which assist in the examination of a cultural strategy aligned with, and supporting, the knowledge management framework. The established record management at AUT strives to achieve (Auckland University of Technology, 2007):

- ▶ reduced overheads
- ▶ appropriate archiving
- ▶ retention & disposal of stored files
- ▶ security of vital records
- ▶ competitive advantage through access of accurate and appropriate information
- ▶ standardization in naming files

Using the terms “records” in this context necessitates its definition for a better understanding. The ISO standards define records as "information created, received, and maintained as evidence and information by an organization or person, in pursuance of legal obligations or in the transaction of business" (Healy, 2001) (p. 135). Gill (1988) identifies two types of records: public records and vital records. In a business context, a record can be identified as an output that records each and every business administrative transaction in a form of a file. Clark (2005) identifies public records as a format of neutral information which is designed and created for public or external diffusion. Public records are therefore required to be kept only to a minimum standard for a specified time (Clark, 2005). In turn Vital Records are crucial records to the conduct of the business (Gill, 1988). Thus, Vital Records protect AUT's assets and interests of its clients and employees so that these records determine essential records in terms of a continuous operation and existence of AUT University.

The knowledge management group identified the following basic components of the records management framework:

- A. Classification Scheme – Information Profile
- B. Retention and Disposal Schedule
- C. Policy and Procedures
- D. Training

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### A. Classification Scheme

Classification is defined in the ISO 15489: 2001 standard as the "field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposition of records, including the processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records" (Healy, 2001) (p. 137). Human nature naturally tends towards the classification of similar records. To ensure AUT a long term flexible and robust structure the record management framework works in its classification of files and records on the basis of their functionality and involved activities towards the ISO 15489: 2001 best practice standard.

### B. Retention and Disposal Schedule

Based on the classification scheme, a retention and disposal (R&D) schedule represents the legislative, compliance and business requirements for the retention of records in any business. The easiest way to create a retention and disposal (R&D) schedule is to map processes and activities back to the classification structure which should be based on business activities.

### C. Policy and Procedures

The record management framework is led by policies and procedures to assist with initial and ongoing training and the creation of compliance to best practice standards and the Public Records Act. A further aim of the set policies and procedures is to evolve them into an ongoing application as a standard for all employees with the additional benefit of modelling the basis of key performance indicators (KPIs) in respect of records.

### D. Training

Once the system is introduced and approved, training opportunities will be provided by the knowledge management group through so-called "records champions" in each Faculty. A record champion can either be an academic, managerial or administrative staff member. The specified task of the record champions is to ensure that once the standards have been approved, released and distributed in training sessions, the employees in their departments follow the standards of recording information in files

within the retention and disposal cycle. As of today twelve records champions have been defined for the Business School.

The record management's framework can basically be summarised as "PROGRAMME"

- ▶ **P** – people, processes, policies, procedures
- ▶ **R** – records classification
- ▶ **O** – organisations
- ▶ **G** – good practice
- ▶ **R** – retention
- ▶ **A** – archive
- ▶ **M** – management of information
- ▶ **M** – minimising risk
- ▶ **E** – effective control

### 3.5. Link between AUT's Knowledge Management and Information Systems

The benefits of the implementation of a records management programme can best be illustrated in a calculation:

Based on the assumptions of:

- ▶ every employee spends 15 minutes per day, every year, looking for information
- ▶ average salary of \$23.00 per hour
- ▶ 220 employees at the Business School
- ▶ 2000 employees at AUT

a)  $15 \text{ minutes} * 5 \text{ days} * 4 \text{ weeks} * 12 \text{ months} / 60 \text{ minutes} * 23 \text{ $/h} = \text{NZ \$ } 1,380$

b)  $\text{NZ \$ } 1,380 * 219 \text{ employees} = \text{NZ \$ } 302,220$

c)  $\text{NZ \$ } 1,380 * 1769 \text{ employees} = \text{NZ \$ } 2,441,220$

Based on these assumptions it is costing the Business School NZ \$ 1,380 per year per employee. This totals to NZ \$ 483,000 per year for all employees. In the whole context

of AUT the costs amount to 2.7 million NZ dollars per year. These costs are only based on the time the staff members lose through searching for information. The loss of time through the creation of duplications or opportunity lost through the use of outdated information are not taken into consideration. The loss would be significantly higher.

A well set up records management combined with an effective information system will significantly increase the accessibility of information captured in files, thus enabling the management to make better decisions. A well set up information system will also enable users to file in a smart, quick and easy way. Clear retention and disposal “rules” will clarify how long a file/document has to be kept in the organization, where it has to be stored and when it has to be destroyed which will increase again the availability of information within Business School. The set uniformity through records management and its identified retrieval and disposal standards for naming and storing files, enables information systems to find and access the files across the university. Hence, records management and a well functioning information system work complementary to each other in an organisation. If files are not saved and stored in a standard way they can not be found and retrieved even by the best information system. In turn, without a comprehensive information system, data, files and information can not be shared and distributed even though the files are, without exception, named and stored in a standard way.

### **3.6. AACSB requirements for Information Systems**

“AACSB International - The Association to Advance Collegiate Schools of Business is a not-for-profit corporation of educational institutions, corporations and other organizations devoted to the promotion and improvement of higher education in business administration and management” (AACSB International, 2007a).

Founded by various universities of the United States in 1916, AACSB International is today known with its first set standards in 1919, as the premier accrediting agency for bachelor, master and doctoral degrees in accounting and business administration (AACSB International, 2007a). As of July, 2007, AACSB accredited 551 business institutions world wide (AACSB International, 2007a). With this world wide spread of networks and responsibilities in top class universities, AACSB became over the years for many universities a source of information, training and networking for management

educators. In addition to its accreditation function, AACSB International engages in research and survey projects and also interacts with the corporate community to link the 'academic world' with the 'business world'.

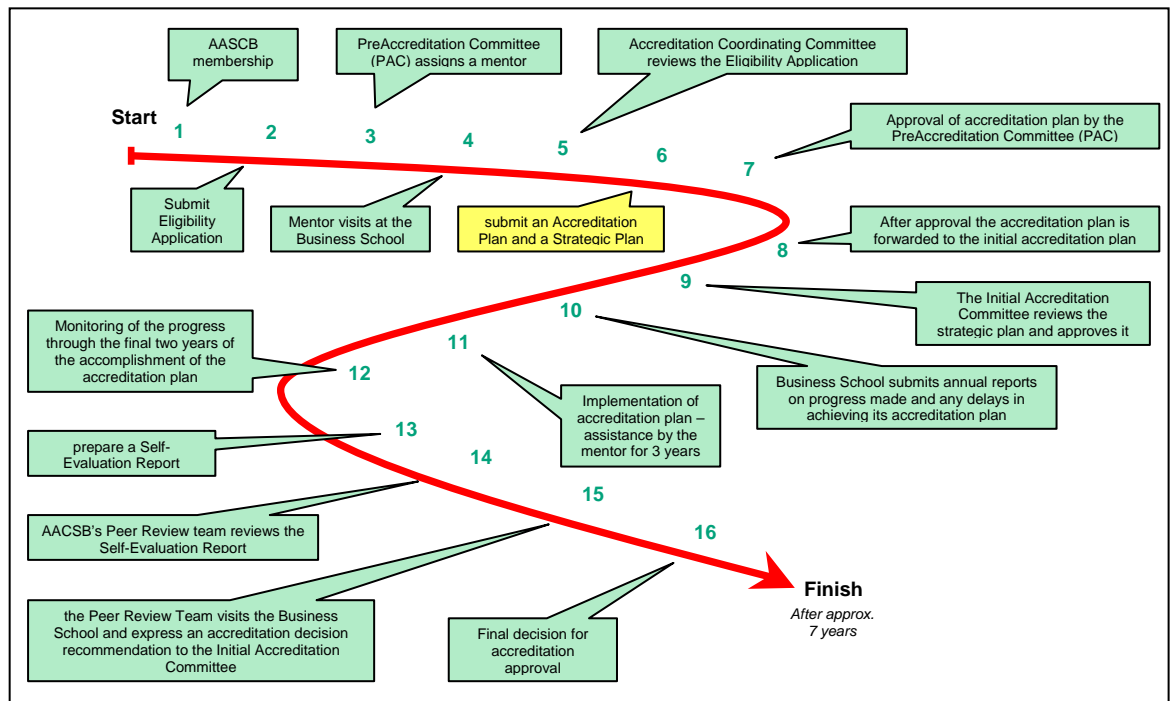
AACSB defines its core business of accrediting colleges and universities as a "process of voluntary, non-governmental review of educational institutions and programs" (AACSB International, 2007a). As an approved agency, AACSB is entitled to award accreditation to tertiary educational institutions for outstanding performance of academic units or professional programs for undergraduate and graduate accounting and business administration programs. Universities which have been accredited by AACSB International are, with their outstanding achievements teaching, research and organisational performance, among the top business schools worldwide. These institutions passed the initial assessment of quality and performance and are committed to a rigorous and comprehensive yearly peer review of quality assurance and continuous improvement. The initial '16 step' assessment of quality and performance each Business School has to undergo during the seven year application process, is illustrated in Figure 20 (below).

In order to understand AACSB's requirements for an appropriate information system which is adequate as a 'file and knowledge sharing' system, the AACSB accreditation process needs be illustrated first. AUT's Business School started the AACSB accreditation process in December 2006 with its submission of the eligibility application. Although the review of the school's eligibility application by the Pre-Accreditation Committee (PAC) raised a number of concerns, the school was accepted as being eligible for accreditation and is currently working as highlighted in Figure 20 (below) on step six. The Business School's mentor, which has been allocated to AUT's Business School by AACSB, subsequently visited the school in July 2007 for the dual purpose of assisting the School to respond to the concerns raised by PAC and to review how the School satisfies each standard in preparing the analysis that underpins the Accreditation Plan. With this assistance the Business School is currently framing the Accreditation Plan and Strategic Plan to meet the submission deadline of January 2008.

In regards to information systems, the Business School had to identify in the Accreditation Plan the issues of ensuring effective and accurate information sharing in the organisation and make suggestions as to what actions have to be taken to countervail these issues. As shown in steps ten and eleven, the Business school has to

then, after the approval of the Accreditation Plan, show in annual reports the progression of the forward brought ideas. At latest in step eleven the School has then to implement a modified or new file and knowledge sharing information system. A review of this implementation then takes place in step thirteen, with the Business School's submission of a Self-Evaluation Report to AACSB's Peer Review team.

The accreditation process shown in Figure 20 (below) is explained in more detail in Appendix 1.



**FIGURE 20** *The AACSB accreditation timeline*

In the Accreditation Plan, the Business School has to respond to each requirement of AACSB's 21 accreditation standards listed in Table 2 (below). The response has to give information about the current situation but also indicate methods and goals for a continuous improvement in each section.

The examination of all 21 standards in AACSB's "Eligibility Procedures and Accreditation Standards for Business Accreditation" (AACSB International, 2007b) highlights the request for an appropriate, effective and accurate information system across several standards. The School's assurance of quality in research, teaching, learning and management, requires continued adequate information systems to share information, files and knowledge. However, out of these 21 standards there are five

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outstanding standards which require an adequate and effective information system. Based on AACSB's manuscript of "Eligibility Procedures and Accreditation Standards for Business Accreditation" (AACSB International, 2007b), these five outstanding standards are explained in more detail in the following paragraph.

The first outstanding standard is recorded in standard four "Continuous Improvement Objectives" (Table 2, below). In response to this standard the School has to specify actions to be taken to achieve set goals and ensure a continuous improvement in the Business School and the degree programs. Standard eight: "Staff Sufficiency-Student Support" outlines the requirements of staff sufficiency and student support to provide ongoing quality improvement for student support activities and to ensure operational stability. The regulation of stability and ongoing quality improvement through the maintenance of the academic staff sufficiency and their qualifications in the offered courses and programs at the Business School is covered in standard nine "Faculty Sufficiency". On reflection of the School's mission and programs, standard nine requires an information system to enable research active staff members, as well teaching staff members, the best possible preparation environment to offer teaching and learning to students across all programs. Standard eleven "Faculty Management and Support", determines the development of information systems; probably the most important standard and requirements. The standard clearly highlights the importance and essential need for an appropriate information system to have "well-documented and communicated processes in place to manage and support faculty members over the progression of their careers consistent with the school's mission" (AACSB International, 2007b) (p 17). This support might include to management, control and monitoring of the School's tangible and intangible resources, undertaking periodic reviews but mostly to provide other staff members and especially academic and teaching staff members with the support they need to meet the expectations the School holds for them in all their activities which relate to the mission statement. Standard fifteen, "Management of Curricula", expresses the need for information systems in terms of monitoring progress and evaluating success of existing curricula or the development of a new curriculum through a decision of the strategic management. Information systems will support data and information from curriculum assessment and evaluation to enable and also to support curriculum revision.

Standard 1: Mission Statement
Standard 2: Mission Appropriateness
Standard 3: Student Mission
<b>Standard 4: Continuous Improvement Objectives</b>
Standard 5: Financial Strategies
Standard 6: Student Admission
Standard 7: Retention
<b>Standard 8: Staff Sufficiency-Student Support</b>
<b>Standard 9: Faculty Sufficiency</b>
Standard 10: Faculty Qualifications
<b>Standard 11: Faculty Management and Support</b>
Standard 12: Aggregate Faculty and Staff Educational Responsibility
Standard 13: Individual Faculty Educational Responsibility
Standard 14: Student Educational Responsibility
<b>ASSURANCE OF LEARNING STANDARDS</b>
<b>Standard 15: Management of Curricula</b>
Standard 16: Undergraduate Learning Goals
Standard 17: Undergraduate Educational Level
Standard 18: Master's Level General Management Learning Goals
Standard 19: Specialised Master's Degree Learning Goals
Standard 20: Masters Educational Level
Standard 21: Doctoral Learning Goals

**TABLE 2 AACSB's 21 Accreditation Standards**

Source: (AACSB International, 2007a)

Classifying the Business School as a service offering knowledge and information-based institution, the activities and intellectual assets within the Business School can be grouped in management and administrative activities, research activities and teaching and learning activities. Based on this environment, the above examined standards and addressed requirements can be assigned into the School's three main activity groups. These classifications with their correspondent AACSB standards are illustrated in Figure 21 (below).

Standards four, eight and eleven highlight, for management activities, the need for an information system to enable ready access to data, information and knowledge to enable well founded decision making, support and facilitate business improvements and changes to ensure the achievement of set goals. The appropriate information environment should also help to manage high responsible information such as policies and legal compliance requirements. Furthermore, information systems should enhance interaction and collaboration amongst several departments across all functions to be able to provide consistent high-quality experiences and best practice but should also have the possibility of providing only authorised access to stored information.

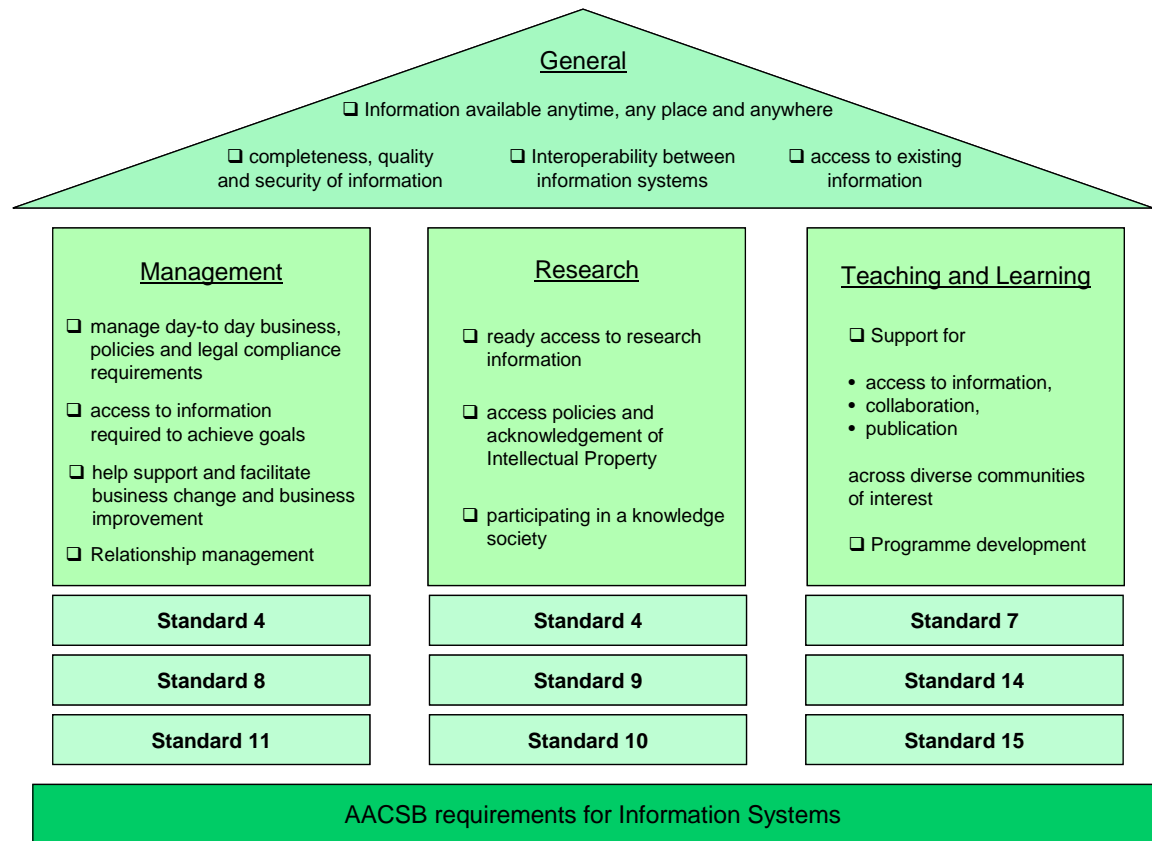


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Standards four, nine and ten in turn set requirements for research activities. They highlight the necessity for ready access to information but mention also the exigency to manage intellectual property and research outputs stored at the Business School. These standards clearly highlight that the literacy of sharing and distributing data, information and knowledge determine a core capability for the School's academic staff members to integrate and participate actively in today's knowledge society.

In order to ensure high quality teaching and learning, standards seven, fourteen and fifteen request an appropriate and effective functioning information system to support access to information across diverse groups of interest such as colleagues, but also students, and diverse access points such as classrooms, seminar rooms and laboratories. To ensure continuous teaching and learning improvement these standards also raise the request to create an appropriate information environment to enhance a continuous programme devolvment.

However, beside these three major activity groups, AACSB's 21 standards also raise some general requests which can be seen as a roof above the three activities pillared, as shown in Figure 21 (below). The general requirements for an information system are the creation of the ability to access information the Business School already holds and make it available anytime, any place and anywhere required. Beside the interoperability between used information systems at the Business School, the standards also stress the need for quality and security of information.



**FIGURE 21** AACSB requirements for Information Systems under one roof

### 3.7. Information to share

The Business School is a knowledge and information-based institution, so therefore managing the knowledge and information environment determines an essential part of bridging the gap between existing knowledge and available knowledge through appropriate and timely information. Although most of these issues reflect on the technical restrictions of information systems in accessing, sharing, protecting and managing information and knowledge, there are also issues about cultural change of individual and institutional behaviour.

Nevertheless, the primary role of making information accessible to all authorised members at the Business School, is to ensure and advance teaching, learning and research to a high quality standard. Therefore all information has to be shared under the following principles: information should

- 
- ▶ be easy to access for authorised members
  - ▶ be securely archived
  - ▶ be accurate
  - ▶ state the latest version
  - ▶ be transparent
  - ▶ fit the purpose

The Business School can be classified as a service offering knowledge and information-based institution, so that all stored data, information and knowledge can be seen as valuable assets. These resources have to be managed and shared in the most efficient way to avoid unnecessary duplication for the benefit of all stakeholders. However, all stored, shared and managed information at the Business School has to comply with all legal, regulatory, and ethical requirements.

In order to ensure an effective and well maintained data repository across the Business School, information systems which are in use to store and disseminate information, should be constantly reviewed and, if required, replaced with reference to AUT's established knowledge management framework.

As a knowledge and information-based institution, the Business School's knowledge assets, which are dependent on effective use of information systems, can be grouped as "Management knowledge assets", "Research knowledge assets" and "Learning and Teaching knowledge assets". The Business School's knowledge assets and correspondent components are illustrated in Table 3 (below).

To ensure a learning organisation, the information systems have to create a framework, culture and infrastructure to support ready access to recorded information, such as reports, minutes, databases, spreadsheets, policies or any kind of recorded data the management and administrative staff members require and are authorised to access. For the academic staff members the information systems has to enable wider and easier access to information assets of the Business School but also AUT wide to enhance the ability to respond to commercial, academic and research opportunities. Furthermore, the information systems should provide for researchers the possibility to readily access research knowledge across the organisation to collaborate both externally and internally with other researchers.

The benefit for lecturers of the establishment of efficient information systems is the achievement of efficiencies through avoiding disparate and duplicated knowledge initiatives for their teaching sessions and through the availability of accessing the information repository through self-service facilities from all classrooms that have a PC connected to AUT's network. The improvement of information accessibility would benefit the Business School's learning environment in a variety of disseminated channels including: seminars, workshops, laboratories, studios, computer laboratories and conferences held at the Business School.

Business School's Knowledge Assets		
Management	Research	Teaching and Learning
<ul style="list-style-type: none"> <li>▶ Management information</li> <li>▶ Strategies</li> <li>▶ Policies</li> <li>▶ Processes and procedures</li> <li>▶ Databases - human resources, financial facilities etc.</li> <li>▶ Reports, minutes</li> <li>▶ Records, archives</li> <li>▶ Staff expertise</li> </ul>	<ul style="list-style-type: none"> <li>▶ Academic staff research data and outputs</li> <li>▶ Doctoral theses</li> <li>▶ Masters theses and dissertations</li> <li>▶ Research management information</li> <li>▶ Digital library resources for research</li> <li>▶ Research expertise</li> </ul>	<ul style="list-style-type: none"> <li>▶ Academic teaching resources</li> <li>▶ Digital learning resources</li> <li>▶ Student portfolios</li> <li>▶ Learning management system</li> <li>▶ Student and staff expertise</li> </ul>

**TABLE 3** *Business School's Knowledge Assets*

#### 4. Methodology

This research adopts a social constructivist epistemology. Social Constructivism emphasizes the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding (Derry, 1999), (McMahon, 1997). Social constructivists believe that reality is constructed through human activity (Kukla, 2000). For the purpose of this research, organisational Information Systems are considered to be constructed by human actors within a strategic organisational context, as opposed to the technological, positivist approach which places IS as an objective entity. Soft Systems Methodology is a qualitative

methodology used within complex situations, such as the development of an IS, while maintaining adequate standards of rigour. Applying systems concepts to qualitative research is particularly suitable for the analysis of Information Systems.

#### **4.1. Soft Systems Methodology**

With the intention of enabling organisational process modelling, Peter Checkland and colleagues started in the 1960's, in a research programme at the University of Lancaster, to develop from earlier systems engineering approaches a soft approach of data modelling (Pidd, 2004). The research programme ran for 30 years and its result is today known as the Soft Systems Methodology (SSM) (Checkland P., 1999). Nowadays Soft Systems Methodology is primarily used to analyse complex problems with diverse definitions of the problem but also in Change Management (Checkland, 1998).

The SSM approach identifies businesses as complex human activity systems and argues therefore that there is a need to examine each component of a business system individually as users and end users react differently than in a context analysis of the whole business system (Patching, 1990). SSM argues that complex systems and problems can not be solved with adamant and deterministic methods. In response SSM offers tools to bring several people and stakeholders together to determine, in their perspective, the nature of a problem situation in conjunction with their views concerning this problem (Checkland, 1998). SSM also attempts to identify individual perspectives of the overall purpose of the system.

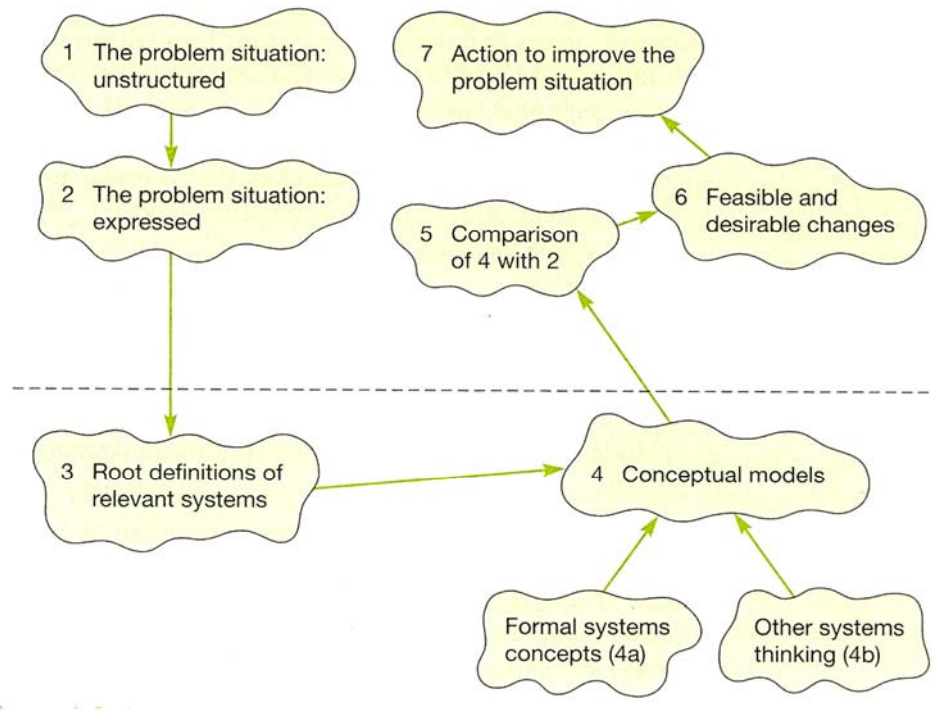
Checkland (1999) identifies the following principles of Soft Systems Methodology:

1. System environments incorporate unpredictable human activities
2. Business systems are complex as they involve human interactions
3. It is essential to recognise the numerous forms of organisations
4. The business problem is incorrect or imprecisely defined
5. The identified problems are often unstructured and not deterministic
6. Systems need to be seen in a holistic systems context

Peter Checkland identified seven stages of the Soft Systems Methodology approach. Some stages are classified as 'real-world activities' and others as 'complementation' or

'thinking stages' (Checkland P., 1999). Although these stages can be listed numerously, Checkland argues that these stages do not have to be examined in a successive order (Checkland, 1998). Some stages allow a simultaneous approach but can also require a revisit of a previous stage.

Figure 22 (below) displays the seven stages of the SSM approach.



**FIGURE 22** *The seven stages of the SSM approach*  
Source: (G. Elliott, 2004) page 229.

Adopting the SSM approach helps the systems developer to investigate the organisation's key activities and processes in order to identify the main stakeholder and end users within these processes (Checkland P, 2006). The aim of SSM is to use the end users' world-view to design and develop systems that fit the organisation and its involved human activities (Checkland P., 1999). However, as SSM is not conceptualised to support implementations or system evaluations, this methodology should ideally be used as a pre step to identify and analyse the systems' problems and provide a preparation for the adoption of harder approaches to implement identified solutions (G. Elliott, 2004).

The soft system approach uses the following three tools to analyse and design the information system (Checkland P, 2006):

1. root definitions
2. rich pictures
3. conceptual modelling

#### 4.1.1. Using the CATWOE model to define root definitions

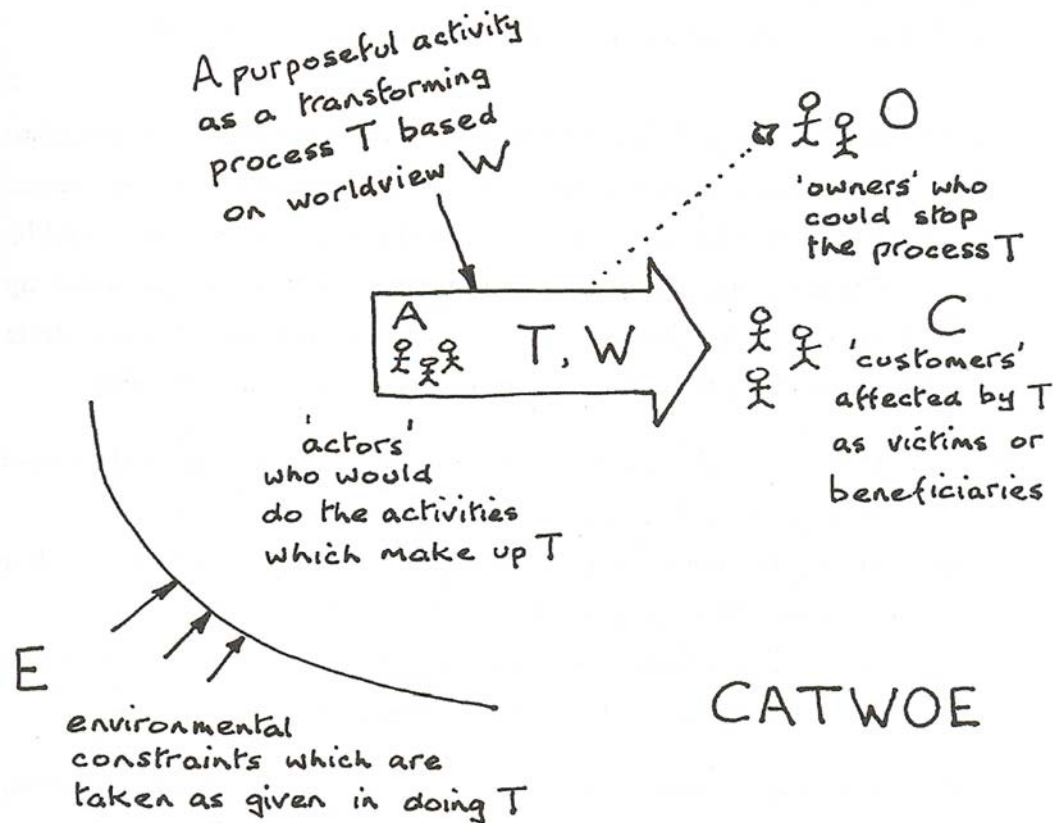
The SSM approach considers the examination of six characteristics clustered in a model known as CATWOE to guide participants, end users, and other stakeholders to define a 'root definition' (Checkland, 1998). A root definition allows the participants to formulate in their perspective the main issue of an information system in a single sentence (Checkland P., 1999). Root definitions are therefore a good way to express in a condensed and distilled form the different views, concerns and ideas of the involved participants.

The CATWOE model is composed of the following six characteristics (Checkland P, 2006):

<b>C</b> – Client:	a person receiving transformed data
<b>A</b> – Actor:	a person transforming data in an information system
<b>T</b> – Transformation:	the change of data that takes place, creation of information
<b>W</b> – Weltanschauung:	the participants' world view and assumptions
<b>O</b> – Owner:	the sponsor of the information system
<b>E</b> – Environment:	internal and external influences on the business environment

Figure 23 (below) illustrates graphically the functionality of the CATWOE model. Within this model the end users are defined as actors (A) who transform (T) given data into new information and distribute this information to other end users (Checkland P., 1999). These users can be classified as the actors' clients (C) or beneficiaries (Checkland P, 2006). This data transformation is influenced in the way it is carried out by the end users' world perception (W) (Checkland, 1998). The intention of the 'Weltanschauung' or world view in the CATWOE model is to take people's and businesses' social, political and cultural views and attitudes as boundaries into consideration (Checkland P., 1999). Stakeholders who are defined as sponsors of the

information system are classified as owners (O) (Checkland P, 2006). Owners have the power and are entitled to influence the use of the information systems. The whole data transformation and end users' acting in their world view, is bounded by environmental (E) constraints (Checkland, 1998).



**FIGURE 23** CATWOE Model  
Source: (Checkland P, 2006) page 41.

#### 4.1.2. Rich pictures

The SSM approach uses rich pictures to capture and express, with icons and symbols, complex issues related to the system's environment and boundaries (Pidd, 2004). These issues might include people and their relationships to each other, organisational and also technical issues. Expressing relationships in rich pictures might include social roles and human behaviour within the system's environment (G. Elliott, 2004). Hence rich pictures help to highlight and express conflicts which have not been considered with the other tools, i.e. CATWOE model (Checkland P., 1999). Often rich pictures are used as communication tools, in combination with the examination of the CATWOE



model, to encourage participants to disclose their 'world view' of the systems' environment (Checkland P, 2006).

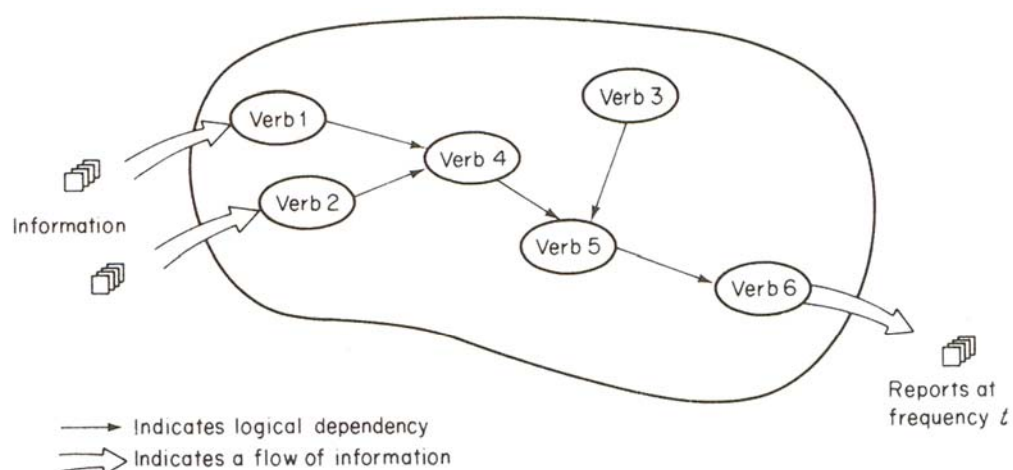
Although rich pictures are a good way of analysing and displaying human to technical systems interactions, this technique requires a high level of individual freedom for the participants to enable the debate of organisational and human issues (G. Elliott, 2004).

An example of a rich picture is illustrated in Chapter 2.4.2.2, Figure 18 (above).

#### 4.1.3. Conceptual model

After the examination of the CATWOE model, in conjunction with rich pictures a root definition can be defined. The knowledge gained of these processes and involved activities is then related and logically linked in a conceptual model (Checkland P., 1999). This model should ideally be conceptualised so that it can be understood by all involved stakeholders. The conceptual model attempts to address some of the identified issues and illustrate possible solutions (Checkland P, 2006). However, the conceptual model can also only be used as a tool to carry findings forwards into the next development phase (Checkland, 1998).

Figure 24 (below) illustrates a general form of a conceptual model of a human activity system.



**FIGURE 24** *An example of a conceptual model*  
 Source: (Checkland P., 1999) page 287.

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## 4.2. Methodology of recruiting participants

This research involves six interviewees identified as 'key informants' to the information system development process. The single most important criterion in recruiting participants was to cover as many operations within the organisation as possible: such as senior management, academic and administrative staff within the Business School. In addition interviewees with expertise in IT and IS have been interviewed in order to examine the capabilities of the currently used information systems at AUT.

In order to identify through interviews the end users' requirements on information systems, the follow participants have been nominated, in collaboration with the Accreditation Manager and Faculty Manager, and have been approved by the Deputy Dean of Business Faculty.

- ▶ An Academic staff member
- ▶ A senior administrator
- ▶ Senior manager (#1)
- ▶ Senior manager (#2)
- ▶ IT manager (#1)
- ▶ IT manager (#2)

The selected interviewees had to fall into one of the following cluster groups: Staff member with technical expertise, institutional knowledge, Business School specific knowledge or end user/client. In addition, it was important that each cluster group should be represented by at least one interviewee.

The IT manager (#1) has been chosen to provide an understanding of the technical construction and limitations of existing information systems at AUT. The IT manager (#2) has been chosen to link this research with existing projects around information management at AUT (i.e. records management, information architecture). The senior manager (#2) has been chosen to clarify IS related operations and processes at the Business School from the management perspective. A representative academic staff member has been chosen to investigate the special needs of IS for research and teaching and learning. And finally an administrator has been elected to explore the needs and requirements of an applied technical level for administrative tasks.

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In order to preserve the participants' privacy and confidentiality of information the participants are known by the researcher, but have been given the option to remain anonymous to the rest of the involved participants and research supervisor. This ensures that individuals or groups can not be identified in this research or in any kind of reports. Furthermore, information that will be gained by the researcher is role related to the organisation and not to each individual carrying out the role.

A "Participant Information Sheet" was given to each interviewee in order to distribute information about the project. Furthermore only participants have been chosen who are competent to give fully informed consent.

### **4.3. Procedure**

This dissertation is primarily exploratory research and more based on inductive, rather than on deductive, research. The procedure for this study consists of the following four phases which have to be undertaken to elaborate a suitable Information Systems Development at AUT Business School using Soft Systems Methodology:

**Phase 1** – Review of literature and secondary data

**Phase 2** – Exploring primary data through conducting interviews

**Phase 3** – Data analysis

**Phase 4** – Providing recommendations

#### **Phase 1 – Review of literature and secondary data**

To ground a foundation of IS specific knowledge, the first phase incorporates a literature review on the topic of IS Development. Further secondary data, incorporating completed or planned projects in terms of knowledge management, information architecture and information systems conducted at AUT, will be examined. The examination of this secondary data will connect this research to existing projects but also build on existing knowledge. In addition to AUT specific available internal information, AACSB's requirements on quality assurance, in terms of using appropriate information systems, will be examined as an external environmental constraint.

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## **Phase 2 – Exploring primary data through conducting interviews**

The second phase incorporates the collection and examination of primary data through conducting six semi-structured interviews with AUT staff members. The purpose of the interviews is to identify the users' requirements for information systems but also to evaluate available IS at the Business School and their use.

The epistemology supporting this research searches for existing knowledge in answers to the questions like "What do you know?" and "How do you know it?" (Bryman, 2003). The interviews may result in individual knowledge gaps but the primary focus and purpose of the interviews is to highlight restrictions and limitations of existing information systems and provide a list of user requirements. Addressing these kind of questions in the interviews to analyze the level of knowledge and its acquisition also covers the focus of ontology i.e. answering questions like "What are the knowable things?" or basically "What is there?" (Bryman, 2003).

The interview form to be used in this research is semi-structured. This form of interview allows themes to be explored but keeps the interview very flexible as new questions can be brought up, dependent on the interviewee responses (Bryman, 2003). These characteristics allow the interview to flow more like a conversation rather than as a structured interview with set questions. They also give room for new ideas or issues to be explored which have not been defined in the preset framework. Nevertheless a set framework is important to enable an evaluation of the user requirements through a reliable aggregated and comparable data collection in response to exactly the same questions.

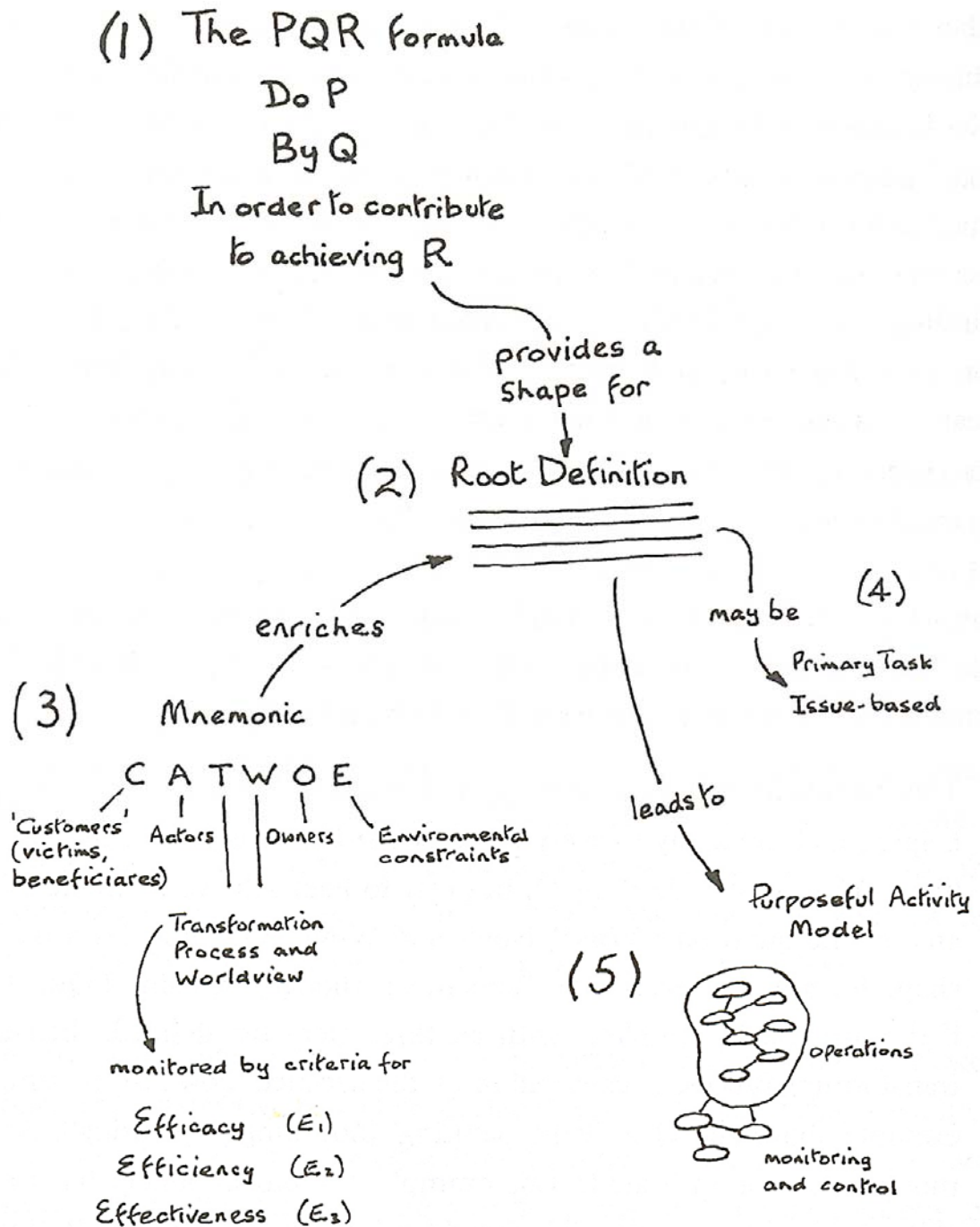
The following indicative questions will be asked at the interviews:

- ▶ Interviewees' use of IS tools and software
- ▶ General difficulties experienced in locating files
- ▶ Major advantages and disadvantages of the system
- ▶ Suggested changes / improvements to the system

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Figure 25 (below) illustrates the content structure of the conducted interviews. The chosen structure is based on Checkland's and Poulter's (2006) proposed guidelines to build models of purposeful activity.

The first stage of the interview adopts Checkland's proposed "PQR formula" (Checkland P., 1999) (p. A23) to examine and scope the interviewees' purposeful activities. By answering the PQR questions: 'What are your core activities?' (P), 'How do you perform them?' (Q) and 'Why do you perform them?' (R), this leads to a first draft of the root definition. This can be identified as the second stage in the content structure. In the third stage the CATWOE model is used to examine the interviewees' IS environments, perceptions and in particular their world view and justification of activities. The interviewees are also asked to draw a rich picture of their environment and identified issues whilst the CATWOE model is discussed and examined. This in depth discussion is used to revisit and redefine the root definition made in the second stage. Checkland's proposed fourth stage will not be examined and discussed in the interview. In the last stage, the interviewees are asked to summarise the identified issues and their concluded root definition in a conceptual model and propose a solution for a restructure of the information management.



**FIGURE 25** The content structure of the conducted interviews  
Source: (Checkland P, 2006) page 40.

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### Phase 3 – Data analysis

In the third phase the conducted primary data will be analysed and evaluated in terms of identifying user requirements of information systems but also evaluate currently used information systems at AUT Business School (“Knowledge Base”, “Novell GroupWise”, “I-drive” and “Wiki-Software”). The systems evaluation will be conducted in terms of possibilities and restrictions in expanding to a ‘file and knowledge sharing’ system. SSM techniques are used to perform this organizational analysis based on underlying human activities (Wilson, 1984).

The first stage of the data analysis will strive to identify essential requirements of the information systems used. These requirements include AACSB’s requirements and the end users’ requirements. The collected data of each participant in the CATWOE model, including the rich picture and in particular the defined ‘root definition’ (Checkland, 1995), will be collaborated with the data of the other participants. This aggregated data will then be analysed against each characteristic of the CATWOE model, using in particular the ‘Weltanschauung’ to conclude the users’ requirements.

The second stage involves the systems analysis of the four currently used information systems at the AUT Business School to evaluate whether these systems can be modified to a ‘file and knowledge sharing’ system. The data given in the PQR formula will be examined to identify which user group is using a particular system. In conjunction with the given information in their ‘Weltanschauung’ individual justifications for the identified use will be provided.

### Phase 4 – Providing recommendations

In the fourth and final phase, a realisability analysis is performed to determine the implications of the user requirements (identified through interviews) upon an existing information system or a new system. Either modifications to a currently used system, or system requirements for a new system, will be recommended.

The identified findings and given recommendations are then integrated into a ‘conceptual model’ (Checkland P, 2006). This model is used to propose a solution for the identified issues.

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#### **4.4. Ethical risks for the participants**

As the purpose of the interviews is not to evaluate individual knowledge, capabilities, or to measure individual staff member performance, this research does not comprise moral, physical, psychological or emotional risks to the participants. In particular, there is not considered to be any risk to interviewees' employment arising from the disclosure of information. The interviews do not record or measure how intensively or efficiently each interviewee uses the current available IS. The purpose is focused on each individual's skills, experience and activity field in order to highlight as many issues as possible which have to be solved through a modification or have to be fulfilled by the new system.

### **5. Data Analysis**

#### **5.1. Introduction to the currently used IS at the Business School**

To begin the evaluation of the four information systems currently used at the Business School ("I-drive", "Novell GroupWise", "Knowledge Base" and "Wiki-Software") in terms of their possibilities and restrictions of 'file and knowledge sharing', the four systems are briefly described in the following paragraphs.

The "I-drive" is the virtual share drive of AUT's Local Area Network (LAN) which has been made available to all AUT staff members as individual users or working groups. Dependent on each user's position and role, s/he has been given access to a particular section of the "I-drive" where folders can be created and modified. However, the users have only minimal control over their folders as they lack the ability to control other people's use of these folders. The "I-drive" is backed up to tape to ensure the drive can be recreated should the server fail.

"Novell GroupWise" is primarily used as an e-mail system but does have some fundamental document management functionality which can be used to share documents in a more controlled manner. "Novell GroupWise" incorporates an archive for e-mails, a separated document store and an advanced search tool that will work on both e-mails and documents. The stored files in "Novell GroupWise" are kept in a



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different location from data in the virtual “I-drive” but are also secured. This feature allows file sharing with every staff member who has an e-mail address at AUT.

The “Knowledge Base” is integrated into AUT’s online web database (also known as an intranet database of frequently asked questions). Users cannot generally upload information or files to this database as this is done centrally.

The “Wiki-Software” is a web based collaborative information publishing platform where users can edit pages they have been given rights to. The access to created pages is controlled through groups of users. As pages are edited, previous versions are kept in a history list so that these can be recalled by the users. Although this is a quick method of creating and disseminating information to a group of any size and enhances the collaboration of sharing information, the “Wiki-Software” only allows the linking to files stored on a shared drive. Actual storage of files in the “Wiki-Software” is not possible.

## **5.2. Evaluation of the Interviews**

This section evaluates the responses in terms of CATWOE, user requirements and root definitions. In contrast to Checkland’s approach, these elements are presented in the following order which is considered to be a more logical format:

- ▶ A - Who are the actors?
- ▶ PQR - Formula and Transformation
- ▶ C - Who are the clients of transformed data?
- ▶ O - Who are the owners?
- ▶ E - Environment
- ▶ W - Weltanschauung
- ▶ Justification for the use of the systems
- ▶ Evaluation of the identified user requirements
- ▶ Root Definition

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### 5.2.1. A - Who are the actors?

Based on Checkland's proposed CATWOE model, the interviewees can be classified either as actors, owners or clients of a data transformation activity. Although only some of the interviewed persons have in (regards to their position) a dual function in the CATWOE model, both as an 'owner' and 'actor' of the transformation activities all interviewees can be considered as 'actors' as all are processing and sharing information.

The academic staff member chosen for interview ('Academic') is a Senior Lecturer in the Management Faculty. Before working at AUT the lecturer worked in a range of senior international positions in the private sector. S/he is also an active member of the University's trade union (ASTE).

The senior administrator interviewed ('Senior Administrator') represented the interests of administrative staff members at the Business School. This person's role includes providing assistance to senior faculty managers and conducting independent project management, therefore requiring a high level of skills and knowledge of information systems and ICTs.

The role of the first senior manager interviewed (#1) is to manage and co-ordinate faculty resources. This person relies heavily on good information management and file sharing systems.

The second senior manager to be interviewed (#2) is required to manage the operations and processes in the Business School. In order to enable quality assurance through efficient staff and student oriented support services the interviewed person also relies on appropriate file and information management tools.

The senior IT manager (#1) works with project groups, directors and line managers in a partnership approach to introduce improvements in information systems and related projects. Partners include other departments within the Information Technology Services Directorate, internal suppliers, external suppliers, and most importantly – clients across all departments within AUT.

The second interviewee with IT expertise (#2) works closely with the AUT governance to help in the development of IT-strategies, policies and plans. In collaboration with the

IT-Strategy team this person also hosts and monitors IT and information systems development projects to enable AUT the application of well matched information tools to corresponding operation processes. S/he is also responsible for continuously reviewing the “information architecture” - information formats and structures, and ensuring that all IT and information systems development projects at AUT are consistent with AUT's strategic direction and IT policies and values.

#### 5.2.2. PQR - Formula and Transformation

Recommended by Checkland (1999) not to formulise root definitions based only on the assessment of the CATWOE model, the following section includes the examination of the “PQR - Formula”. The concept of this formula is simple: Do ‘P’ by ‘Q’ in order to achieve ‘R’. The examination of this equation will answer the following questions:

(P) - What kind of information is processed and transformed?

(Q) - How is this information transformed?

(R) - Why is this information transformed?

Identifying each interviewee's answers to these three questions will provide the opportunity to draft, at the end of this section, a root definition for each respondent. The modification of these drafts by the interviewees will be covered at the end of this chapter.

#### P – What kind of information is processed and transformed?

The academic interviewee described three general purposes for processing information within the Business School's teaching environment. Firstly, the position requires the creation, storage and sharing of information in a ‘multiple discipline environment’. This indicates sharing information about student assessments, study guides, student performances in exams and assignments and their progress and lesson plans. Also samples of student work and historical information need to be available and accessible to numerous lecturers within, and across, disciplines. This can also involve the integration of a new staff member, hence a new information sharing environment. Secondly, academic staff members have to distribute and share information about student marks with the “Programme Administration Team”, Discipline Chairs or Director of Business Interdisciplinary Studies.

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The senior administrator has to manage several documents and share these with different stakeholders from academic groups and managers but also with the AUT governance. This includes four categories of file creation, distribution and sharing:

1. management of travel documents
2. general personal assistant support in managing appointments
3. managing HR information i.e. monitor and control recording of staff leave and time schedules for staff performance reviews
4. monitoring and managing general staffing documentation.

The senior manager (#1) deals with the creation, transformation and sharing of health and safety documents with all allied staff members at the Business School, procurement information of resource materials, asset inventory and the management of resource material in databases.

The main activities of the senior manager (#2) in terms of data processing and transformation are monitoring of student numbers forecasting, programme development information, general staff and student related administration.

The IT manager (#1) has a dual role in CATWOE model, both as an “actor” and as an “owner”. S/he is an “actor” as s/he is using the systems to communicate and share information with other stakeholders. The main scope of his/her duties is to monitor projects on which the departmental system analysts and business analyst are working and to develop with other line managers concepts such as “information architecture” which considers him/her to be also classified as an “owner”. Furthermore s/he shares departmental issues such as budgeting and HR duties with the IT Service Director.

A similar dual role applies to the IT manager (#2). The IT manager (#2) is mainly responsible for monitoring projects and IT developments. This role involves sharing project documents, developing IT processes and best practice within the department, in addition to developing policy documents with IT managers, directors and executives. Minor departmental issues such as finance and budgeting are as also discussed and shared on a regular basis.

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Q – How is information transformed?

The senior lecturer currently uses only the “I-drive” for sharing files in common with the majority of academic staff members at the Business School. After files have been created and placed in the appropriate folder on the “I-drive”, e-mails are sent to colleagues to inform them about the storage of a new or updated file. “Knowledge base”, “Wiki-Software” and “Novell GroupWise” are not used at all by academic staff members as a file sharing system.

The senior administrator makes different use of the information systems. For example, s/he uses mainly “Novell GroupWise” to send files as e-mail attachments to her/his relevant “clients” or beneficiaries. The senders, as well as the recipients, save a version of the document on their personal desktop drives. Changes to the documents made by the e-mail recipients are sent via e-mail in a modified document back to the original sender. A manual check is made of all amendments which are condensed to a final document. Through a manual check in the document of the several responses, the assistant manually processes all changes to the original document. Besides a few files containing general information which is stored on the “I-drive”, the Executive Assistant to Dean and most of the administrators mainly share files via e-mail as attachments and store files on personal share drives.

A similar approach to using the systems applies to the senior manager (#1). All files are mainly distributed and shared through the e-mail function in “Novell GroupWise”. In contrast to the administrator, most of the files though are stored in parts on the “I-drive” but also on personal share drives like the laptop. Similar to the administrators’ approach, modified documents by her/his “clients” are manually checked and stored on a personal drive. The updated files are then uploaded to the “I-drive” to disseminate the information. Although the senior manager (#1) is using his/her own set saving and naming standards, this approach certainly increases the creation of numerous duplicated files on several drives (but also including the same drive) if versioning of files is not kept under control.

The senior manager (#2) also shares in particular documents for student forecast and programme development via e-mail as attachments. This again means that every staff member within this particular “circle of information sharing group” is saving a version of the file on their personal share drives. Although a final version of the document is saved at the end of the process on the “I-drive” or “Knowledge Base”, this approach of

file sharing is creating (similar to the administrator's and other senior manager's approach) a vast amount of stored duplications in different drives and, in particular, different versions of the document. Unfortunately, even within small information sharing groups there are no set naming and storing standards.

As shown in the rich picture, Appendix 6, the IT manager (#1) uses a specific project management system called "I-Tool" to monitor projects a special expertise working group or a project steering committee is working on. However, alongside the live documentation on "I-Tool", all project related created files and information within these groups are also saved on the "I-drive". In contrast to the Business School's folder structure on the "I-drive", based on fields of responsibility, the IS department structured the folder based on projects. Departmental issues, such as budgeting and staffing issues, are shared within the drafting period via e-mail and only the final version is then stored on the "I-drive".

A different approach to monitoring projects is used by the IT manager (#2) and his/her IT-team. "Novell GroupWise", and the supported feature of sharing files and documents within this software, is used as the main platform to shared project related files within the team. This feature allows sharing of files with every staff member who has an e-mail address at AUT. As shown in the rich picture, Appendix 7, the development of policy documents, IT processes and best practice with other IT managers, directors and executives in turn are shared within the draft phase via e-mail. Only the final version is then disseminated on "Knowledge Base". Although departmental issues such as budgeting and staffing issues are shared with her/his director via e-mail attachments, the final version of a document is, unlike the IT manager's (#1) approach, not saved on the "I-drive" but shared in "Novell GroupWise" through the shared folder function.

#### R – Why is information transformed?

The justification for the above classified activities, data transactions and use of the available file sharing system is based on the need for working and sharing information within teams. The examination of the "PQR formula" based on the transformation modelling of purposeful activities in a rich picture led each interviewee to their draft of a root definition.

The academic staff member identifies with the statement “A file sharing information system is used to facilitate students’ learning in a team environment” the need for a system supporting collaborative working. The senior administrator justifies her/his carried out activities and transformations with her/his perception of personal best practice to share confidential information. Hence the assessment of the PQR-formula led to the following statement: “There is a need for an information system to support the “clients” in the most efficient and effective way.” The main purpose of the senior manager’s (#1) activities in information sharing with other staff members of the Business School is based on the responsibility of managing the Business School’s resources and allied administration. In the first draft of the root definition the senior manager (#1) clearly identified with the statement: “The way to use available information systems at the Business School is not clearly communicated, especially because the users play a passive role through not expressing their needs but also through their low willingness to adopt changes”, a lack of active and innovative collaboration along with introduced and implemented technology. The senior manager’s (#2) role and drafted root definition clearly underpins the need and main purpose of “Using the information systems to manage the operations at the Business School in the most effective and efficient way”. The IT manager (#1) scopes the responsibilities in her/his role as the needs for “improving the use of the information systems across AUT to obtain the investments made into these systems” as a clear root definition draft in terms of investigating new systems. The IT manager (#2) defines in her/his root definition draft the purpose of her/his and the department’s role and function of “hosting and monitoring the development and implementation of IT projects” as a necessity for successful IT-development integrations and implementations at AUT.

#### 5.2.3. C – Who are the clients of transformed data?

As shown in the senior lecturer’s rich picture, Appendix 2 s/he defines colleagues of the same or a different discipline, discipline chairs, the Programmes Administration Manager as well as programme administrators as her/his “clients” or “beneficiaries”.

The senior administrator’s rich picture shown in Appendix 3 indicates probably a wider scope of stakeholders or “clients” who rely on an accurate, timely and adequate activities and data transformation performance. In terms of managing the travel documents, there are academic staff members as well as allied staff members who rely on an adequate data transformation and distribution. In terms of the diary and appointment management there are mainly executives and line managers who rely on

an accurate personal assistance support. This role also involves certain assistance to school managers in managing internal HR matters such as monitoring allied staff leave, time schedules for staff performance reviews and the relocation expenses for new academic staff members.

The senior manager's (#1) clients or beneficiaries of her/his data transformation can be classified in three groups. The first group is determined by staff members of the Business School such as the administration teams and academic staff members. Within this group, information is mainly shared via e-mail but also through the establishment of shared folders in "Novell GroupWise" or the "I-drive". The second group is classified as staff members working externally to the Business School, such as procurement, human resource, finance and IT departments. Information and file sharing within this group is based on e-mailing files as attachments or to share files within a small group through a shared folder in "Novell GroupWise". The third and final group includes file and information sharing via e-mails with parties outside AUT such as suppliers.

The senior manager's (#2) working environment involves, of all the interviewees, probably the biggest range of "clients" or beneficiaries who rely on accurate data transformation and distribution on a regular basis. The senior manager (#2) distributes received student forecast information from the administrative team to several correspondent executives and Finance Manager. As shown in the rich picture Appendix 5, the senior manager (#2) is sharing programme development information with the Faculty Registrar and the School Managers. Monitoring staff leave and other administrative and departmental tasks have to be shared in an interactive form with personal assistants.

The IT manager's (#1) "clients" of the processed transformations are, in general, other departments which can be identified as internal customers, the administrators and developers in project teams, project steering committees and other line managers across AUT and certainly the IT Service Director. As shown in the rich picture, Appendix 7, the IT manager (#2) identified similar to the IT manager (#1) several other departments across AUT who work in the same project groups or working groups such as the "academic portfolio development" or "information architecture" as her/his "clients".



#### 5.2.4. O - Who are the owners?

As shown in Appendix 2-7 the interviewees identify, in their perception of the Business School's and AUT's environment, some similar but also several different "owners". In their perception these identified "owners" have the power to influence and change regulations, processes or the use of IT resources.

The senior lecturer identifies the Programme Administration Manager, the Business School's executives, the director of the Centre for Business Interdisciplinary Studies, the discipline chairs, the IT department, as well as New Zealand's legislation, as owners. In turn, the senior administrator classified the IT department, Faculty Manager, Registrar, Resource Manager, Human Resource Management and the Business School's executives as her/his "owners" with power to influence her/his method of working with the information systems.

The senior manager (#1), senior manager (#2), IT manager (#1) and IT manager (#2) can certainly be classified as actors who transform data, but can also be seen as owners in the system's environment with the power to influence and intervene in the approach of IT systems and resources at the Business School. Thus, besides her/his own role as an owner, the senior manager (#1) defines the Faculty Manager and School Managers as owners with similar or higher power to influence the use of information systems at the Business School. The senior manager (#2) is picturing the same constellation but adds the Dean and Deputy Dean of the Business School to the picture. In turn the IT manager (#1) identifies only herself/himself, the IT Service Director and the AUT Governance as owners. The IT manager (#2) adds to the IT manager's (#1) exposed picture the IT Strategy Team, E.M.T. (Executive Management Team) and other departments such as Finance, HR and Marketing etc. as powerful owners.

#### 5.2.5. E - Environment

The senior lecturer's activities and transformations displayed in the rich picture, Appendix 2, is framed by the law and its privacy acts for the legal storage of student work, the university exam board and administrative regulations and restrictions as the internal environment. The academic also describes the necessity of processing only transactions which fit within discipline but also within the constraints of other disciplines as a further internal environmental factor. In turn, the New Zealand Institute of

Chartered Accountants (NZICA) and its requirements on programme and paper curriculum is identified by the senior lecturer as an external environmental factor. The senior administrator classifies in her/his rich picture New Zealand's law with its collective agreements and privacy acts as an external environmental factor. The AUT Governance, available IT hard and software resources combined with appropriate and professional IT staff support service are the main influencing internal environmental parties. In the senior manager's (#1) perception the environment influencing the use of systems at the Business School is referred primarily to external bodies such as New Zealand's government and its legal legislations, technology, banks, global market, and competitors. In turn, the senior manager (#2) believes that mainly internal factors, such as the diversity within teams and the different perceptions of their roles within the team, and the Business School's environment lead to an insufficient use of IT resources to create a knowledge sharing environment. The IT manager (#1) believes that the AUT Governance, also known as the E.M.T (Executive Management Team), alongside AUT's senior management and also the commercial pressure for efficiency determine the parameters of AUT's working environment. The IT manager (#2) pictures in her/his rich picture shown in Appendix 7 the same constellation but adds the departments with their powerful role as well as New Zealand's legislation - in particular the public records act as important environmental factors.

#### 5.2.6. W - Weltanschauung

This section describing each interviewee's 'world view' or "Weltanschauung" explains why the 'actors' and 'owners' use the information systems. In this sense, this section describes the value that people place on these particular systems and therefore provides the justification as to why (or why not) these persons use these systems and how they use them.

The academic staff member complains of not being informed about capabilities behind the information systems or about alternative approaches to sharing files. The senior lecturer describes in his "Weltanschauung" the creation of an environment by individual groups of academics. This environment is based on the perception of the need for individuals/actors to create own forms of information sharing or even the creation of isolated information systems (e.g. databases). These micro systems are considered as unnecessary by other stakeholders. The academic's reasons here are the cost and the lack of communication between allied staff and academics when establishing user requirements. The lecturer also argues that there is no understanding of the

information sharing processes between academic staff members, administrators and management. S/he also believes that not involving academic staff members in the information systems development process is the main cause of this problem. However, in turn, s/he argues that academics do not have time, nor even want to be involved in, systems developments.

The senior administrator stated that the main reason for sharing files via e-mail is due to her/his mistrust of the "I-drive" in accessing files. However the administrators are also under instructions from their superiors and managers to use particular systems in a certain way. This results in some frustration and apathy which then lead most of the staff members to resign themselves and "join the flow". Administrators often learn about systems from their own experiences as they lack the knowledge and training that would provide them with better alternatives. Consequently, it is common practice to store files in personal 'C' drives.

The senior manager (#1) believes that the problem outlined above is due to the use of irregular forms of communication for informing staff members of system changes and new features. The use of newsletters, notice boards and verbal communication in meetings acts to reduce the proactive involvement of staff members in the change process. Furthermore, the senior manager (#1) believes that online training would be a valuable method of making staff members more familiar with available software and systems. Training should also be made compulsory and driven by senior managers in the Business Faculty. This respondent also considers it necessary that staff PCs be continuously updated with the latest available software and the IT department should regularly evaluate users' needs in this regard to help prevent reduced performance. According to this respondent a "Business IT User-Group" consisting of representatives of each department has been established with the purpose of disseminating information to end users about IT issues, opportunities, use of systems and legislation. However, communication from this group has been poor, with the result that little has improved. This interviewee also claims that the mentality amongst the Business School's staff members is more like to "join the flow", instead of asking for training or for explanations as to how activities could be carried out in a different and probably more effective and efficient way. Many problems have been caused by a laissez-faire attitude towards staff performance in the past few years, which has led to an underestimation of the need for setting and implementing operational standards at the Business School. Although this attitude has changed since AUT became a university in 2000, the steady development of systems and technologies since then has led to the

situation that the Business School and its employees attempt only to keep up rather than to keep ahead of these developments.

Although the senior manager (#2) argues that training for new staff members exists, s/he still agrees that it is insufficient and unstructured. The result is that the working environment is more likely relationship driven rather than operation or result driven. S/he also believes that this has now become a major concern as most staff members do not know their position in the Business School's operational chain or which processes are related or dependent on each individual. This respondent also believes that the access to folders on the "I-drive" has to be changed from a centralised to decentralised approach as it has become, overtime, too difficult to get quick access to folders. This is in particular an important need as the "I-drive" is determined to be currently the prime file storage. However, in order to increase efficiency simultaneously file naming and sharing standards need to be implemented. In terms of a continuous improvement the senior manager (#2) highlights the importance of involving every staff member to identify and address issues, in particular to be able to do more in depth analysis of existing IT resources. In turn staff members could be rewarded for good collaboration in this proactive staff involvement.

The senior manager (#2) desires the implementation of file naming and file storage standards based on the upcoming public records act, and move away from using the "I-drive" through the implementation of a new system whereby all files are stored in one single place like a "big pot" which enables every user access to all files except those which are classified as access restricted and giving should also be given by each user. In order to achieve this vision, the senior manager (#2) believes that certain actions, such as restructuring the owner's power and field of activity, the establishment of principles and implementing compulsory training sessions, need to be taken to enable monitoring of individual performances.

The IT manager (#1) described in her/his 'Weltanschauung' a strong need to change the organisational culture with its high level of freedom for AUT's staff members. S/he suggests applying the top down principle but not from a control perspective but more from a communication and delegation principle. The IT manager (#1) argues that there is no efficiency across AUT as nobody, and especially most managers, don't want to be accountable for initiated project outcomes. There is even no monitoring of performances. S/he even believes most of them are scared of change. However, the IT manager (#1) also believes there is no added value to centralising the upload of files

and folder access given to a particular position. Hence, this operation should instead be processed automatically through the system itself. Although the IT manager (#1) identifies AUT compared to other universities with the lowest administration/academic staff ratio and functions through the integration of all faculties more likely as a unit, s/he believes that AUT must face strong commercial pressure for efficiency. Therefore s/he identifies the implementation of appropriate IS tools as a key success factor.

The IT manager (#2) admits that insufficient IT training is provided to staff members. However, at the same time s/he argues that the IT department was not allowed by CEPD (Centre for Educational & Professional Development) to provide IT trainings. Although CEPD argued they would be in charge of staff development training sessions, this has never been offered. S/he also argues that some departments, such as Human Resources, do not collaborate in this manner as they refused the proposed idea of implementing an "IT user license" to each staff member. In order to receive this license all users have to pass a certain level of skills in commonly used software applications such as MS Word or MS Excel.

Similar to the IT manager (#1), the IT manager (#2) believes there are big issues in AUT governance as there seems to be no delegation of authorities in the field of expertise or even realisation the growing importance of using IT in the most effective and efficient way. The IT manager (#2) also argues that the IT Strategy department does not have sufficient power to develop and address IT issues as they are supposed to be. In the current approach departments such as HR, Finance or Marketing drive, in collaboration with the IS team, the development of new applications or technologies. The main purpose of the IT-Strategy team is then only to host and monitor the development process. Hence the need to drive the implementation of a 'business enterprise architecture and information management with best practice' in order to avoid high intangible costs through not using IS in the most efficient way. In regards to a calculation the IT manager (#2) proposed to AUT governance, the costs for file storage are increasing exponentially. The calculated file storing cost in 2008 is NZ\$ 250,000 and increasing by 2010, in regards to the new public records act, up to NZ\$ 1.5 million. By 2026 the storage costs might even consume the entire AUT revenue. As the new public records act even requires the storage of certain e-mails for up to 25 years the IT manager (#2) highlights explicitly the importance of changing the habit of sharing files in e-mail attachments. Although AUT started with the foundation of a Knowledge Management group, the IT manager (#2) believes that good information management needs to be set up first before Knowledge Management is even possible.

This interviewee is currently evaluating and identifying, in collaboration with the IT manager (#1) and other stakeholders, the user needs across the entire AUT for an 'enterprise document management system' which will enable the sharing of files in the most efficient and effective way.

#### 5.2.7. Justification for the use of the systems

In order to transform, store, share and retrieve files via the "I-drive", the senior lecturer, senior administrator and the senior manager (#2) experienced several difficulties. They argue that the "I-drive" does not provide any information about what kind of files or information is available on the network-drive, who modified and published the file last and what version is the retrieved file. A further important missed feature of the "I-drive" is the display of any other with related content files to the retrieved file. The lack of version and track control with no search function, disclosure of related files and ownership of the file makes it difficult to operate with minimised resources and produce desired results. It also involves taking a high risk that one may not be working on the latest version of a document and therefore decisions may be based on inaccurate and untimely information. The senior administrators in particular do not use the "I-drive" in an extensive way as they claim a lack of folder access security means they do not know who else has access to the same folders on the share drive. Providing a shared drive to the administrators seems not to be the best information system to share or store files other than general, rather than confidential, data. The IT manager (#2) admits that security of access control on a network storage system like the "I-drive" is a significant issue. The senior manager (#2) is using the "I-drive" not with the main purpose to share files but more to disseminate final versions of documentations. Furthermore, s/he referred to the centralised system whereby the senior manager (#1) grants permission for access to folders as a definite disadvantage of the "I-drive" as it can take several days to provide access permission to a particular folder. Several other disadvantages, such as the intransparency of folder contents and limited accessibility to existing information, were pointed out.

Although there are several disadvantages in using the "I-drive" as a files sharing system, the familiarity of the system and the desire to avoid maintaining files in two different locations are its biggest advantages, which might have led the senior lecturer and probably many other staff members to "join the flow" and use the "I-drive" instead of the folder sharing feature in "Novell GroupWise". Furthermore interviewees argue

that there was, and is still, a lack of information and promotion of the possibilities of sharing files through “Novell GroupWise”.

“Novell GroupWise” can be used to share files either through its folder sharing function or in its use as an e-mail software application. However, apart from the IT manager (#2), every interviewee is using “Novell GroupWise” as an e-mail application to share files. The interviewees state that normally documents are e-mailed as an attachment to a single person or group of clients. If any changes to the document, occur the clients normally e-mail a modified file back to the sender. The initial sender is then usually manually carries out all single changes in the initial send file. Processing file maintenance and control in this particular manner is without question the most detailed and secure file control technique but also the most time consuming way of managing files. Furthermore, the interviewees assert that they do not store files in “Novell GroupWise” mail box. Files are stored only on their personal ‘C-drive’ or their personal ‘H-network drive’. This approach ensures, on the one hand, a track changing control and probably also a kind of version control as it is assumed the attached file in the e-mail is the latest version but results, on the other hand, also in the loss of historical and holistic file storage. Furthermore, as there are no agreed standards of file naming and storing, this method increases the risk of file losses, as files are individually archived, based on no agreed standards, on personal share drives and only selected users which have been given proxy access are able to retrieve archived files. The justification for this working method is simply founded in the quick accessibility to the system but more in the high flexibility in the determination with whom a particular file needs to be shared with. In turn this method of file sharing also increases the creation of vast duplications stored in several personal drives which also makes it impossible to share knowledge across disciplines or departments. The senior manager (#2) even points to the worst case scenario which is the risk of a loss of intellectual property.

Although “Novell GroupWise” is a shared service across AUT and offers, besides the e-mail functionality also folder sharing features with control file, access the IT manager (#1) as well as the IT manager (#2) point out some technical issues which might destroy the form of the files as the software renames and codes the files once they are saved in “Novell GroupWise”. Furthermore, the system offers the possibility to store files but does not archive them in a systematic manner. However, the IS manager highlights a further advantage of the low systems administration which is covered by one person for more than 2,000 users.

It is most likely that all staff members at the Business School are aware of the “Knowledge Base” and its possibility of sharing files. However, this intranet based system comprises a lack of security in regards to external file access and also unrestricted access for internal users which is again not wanted for confidential data. Furthermore, most users complain that information is rarely and slowly updated on this system. This seems to be a reason why this platform is seldom used to share files. In addition the system’s search function also does not deliver accurate search results. Therefore the “Knowledge Base” is nowadays only used as a ‘staff work area’ to provide general information such as presentations, health care policies, handbooks, guides, policies and regulations etc. The senior manager (#2) argues that the centralised upload of information is of advantage as the published information can be monitored and controlled to meet certain standards. In turn the IT manager (#2) argues that this web centre developed shared service across AUT has, besides the lack of security and centralised upload, also a further big disadvantage as the “Knowledge Base” has only a limited storage capacity which slows the system down as more files are stored.

The senior lecturer, executive assistants, senior administrator and managers argue that almost all Business School staff members, including themselves, are not aware what capabilities the “Wiki-Software” offers and some are not even aware that the software exists.

The IT manager (#2) who was the initial developer of the “Wiki-Software” identifies the software as a good possibility to share information e.g. of projects as everyone can add information to an existing text and can be therefore classified as a ‘self managed’ system. However, s/he also clarifies that this software does not have the capability of file management as files can only be linked in the posted ‘Wiki-page’ but not stored. Furthermore, s/he argues the software is still user unfriendly and requires several training sessions so that users will be able to use the system.

Table 4 (below) summarises the use of the four information systems by each interviewee. Supposing all file sharing activities performed by each interviewee is in total 100 %, the table below shows, for each user group, the breakdown of all file sharing activities performed by each information system to highlight in a condensed form which system is used most to share files but also to indicate the different approaches to the systems by the interviewees. As above examined and displayed in

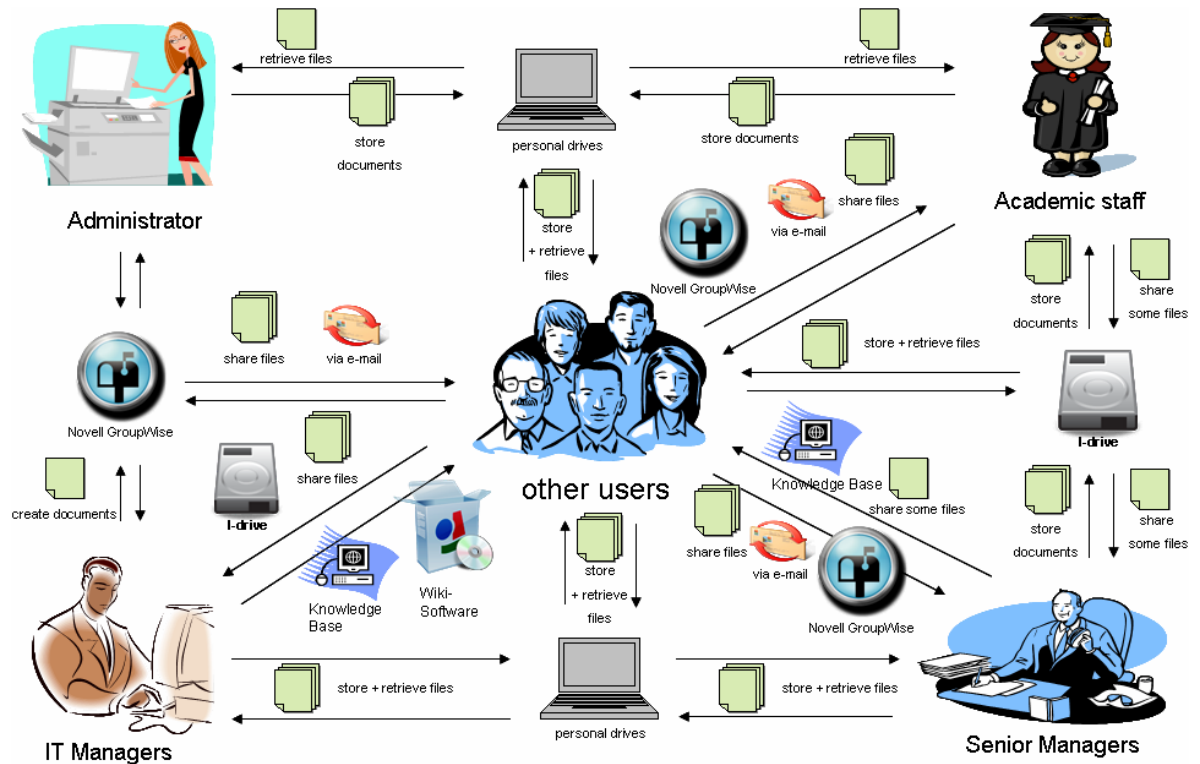


the table below, the e-mail function of “Novell GroupWise” seems to be, regardless of the user group, the most used system approach to share files.

User Group	I-Drive	Novell GroupWise e-mail function	Novell GroupWise Shared folder function	Knowledge Base	Wiki- Software	$\Sigma$
'Academics'	20 %	80 %	-	-	-	100 %
'Administrators'	10 %	80 %	-	10 %	-	100 %
'Senior manager (#1)'	20 %	40 %	20 %	20 %	-	100 %
'Senior manager (#2)'	30 %	60 %	-	10 %	-	100 %
'IT manager (#1)'	50 %	40 %	10 %	-	-	100 %
'IT manager (#2)'	-	10 %	70 %	10 %	10 %	100 %

**TABLE 4** Use of the four evaluated information systems by the interviewees

The systems applications shown in percentages above in Table 4 are graphically displayed in Figure 26 (below). This graphic illustrates for each interviewee the different use and approach of the available systems at the Business School to share files with other users.



**FIGURE 26** Conventions of the Business School's systems to share files

Table 5 (below) displays and summarises the advantages and disadvantages, identified in the interviews, of each system application in terms of a file sharing systems. In addition the table highlights and identifies the "I-drive" as a familiar and primarily used file sharing system but indicates, at the same time, numerous disadvantages which form the justification for most in Chapter 5.2.8 (below) identified user requirements.

I-drive	
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▶ primarily used to store files</li> <li>▶ familiar system</li> <li>▶ possibility of multiple folder access giving</li> </ul>	<ul style="list-style-type: none"> <li>▶ centralised access giving to a folder</li> <li>▶ inflexible and time consuming access giving to folders</li> <li>▶ not all users have access to all information</li> <li>▶ intransparent structure</li> <li>▶ uncertainty of stored information</li> <li>▶ encourages users to work in small groups rather than in the "big Business School team"</li> <li>▶ high costs of sharing files</li> <li>▶ no track and version control</li> <li>▶ no search function</li> <li>▶ creation of duplications</li> <li>▶ opacity of folder contents</li> </ul>
Novell GroupWise	
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▶ quick individual file sharing via e-mail</li> <li>▶ low administration of the system</li> <li>▶ usability for e mails but also for file sharing</li> <li>▶ quick system accessibility</li> <li>▶ flexible file access giving</li> </ul>	<ul style="list-style-type: none"> <li>▶ no version control, same file is saved on several personal drives</li> <li>▶ creation of duplications if shared via e-mail</li> <li>▶ does not archive documents</li> <li>▶ all files can be accessed through search function</li> </ul>
Knowledge Base	
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▶ in the process of renaming wordings to make the system more attractive</li> <li>▶ centralised information upload, control of published information</li> <li>▶ shared service across AUT</li> </ul>	<ul style="list-style-type: none"> <li>▶ Centralised upload takes too much time to publish information</li> <li>▶ Not good security of information in the intranet</li> <li>▶ Limited capacity to store information</li> <li>▶ Bad search function</li> <li>▶ No restricted information access</li> </ul>
Wiki-Software	
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▶ self managed system by the end users</li> <li>▶ developed at AUT</li> <li>▶ suitable to share information i.e. of projects</li> </ul>	<ul style="list-style-type: none"> <li>▶ not suitable to share files</li> <li>▶ files can not be stored or archived</li> <li>▶ user unfriendly</li> <li>▶ difficult to use – trainings required</li> </ul>

**TABLE 5** *Advantages and disadvantages of the evaluated information systems*

### 5.2.8. Evaluation of the identified user requirements

Table 6 (below) summarises the interviewees' responses regarding their IS requirements, which they perceive would provide a more efficient and effective use of a file sharing system. These responses are outlined below in more detail.

Identified user requirements
<ol style="list-style-type: none"> <li>1. Systems' accessibly from outside AUT</li> <li>2. Decentralised folder access control by the end user</li> <li>3. Classification of files (private, public or confidential)</li> <li>4. Search function + view keyword related files</li> <li>5. Display author of the file</li> <li>6. Automatically and chronological file archiving</li> <li>7. Version control of stored files</li> <li>8. Track changes (who modified and saved the file)</li> <li>9. Files need to be stored in one system</li> <li>10. System needs to be flexible for changes in the Business School</li> </ol>

**TABLE 6** *Identified user requirements*

The IT manager (#1) and IT manager (#2) in particular have been asked to comment whether the identified user requirements can be realised with an existing system or whether a new system needs to be purchased. These IT experts will comment in the following paragraphs on each identified user requirement.

1. With regards to the first requirement "systems accessibly from outside AUT" the IT manager (#2) states that this request is not possible with any of the four assessed information systems. However, the request and need for a 'mobility working' has been recognised by the IT manager (#2). Therefore s/he is currently developing a concept which enables all staff members across AUT to log in from outside AUT into the LAN-Network and have access to all files the staff members would have if they log in at AUT campus. This concept is called 'virtual desktop' and works similar to the 'HRISS' concept which is a web based front end page of the "Pay Global" information system located in AUT's LAN-Network. The concept of the 'virtual desktop' is designed to function as a portal

where staff members can work on their documents stored at AUT server. Although the user is accessing these documents, these files remain “physically” on AUT server which also enhances the security of documents through daily server back ups. The IT manager (#2) is striving to finish this project by mid 2008.

2. The necessity of the users’ request for “decentralised folder access control by the end user” is questioned by both IT experts. The IT manager (#2) admits that there is an existing possibility in “Novell GroupWise” to carry out this request but argues at the same time that there are better approaches to empower end users for access control. The reason for this is the labour intensive and time consuming approach of this feature. Every stakeholder has to be entered, maintained and deleted manually from a group list. Hence, this approach seems only to be appropriate for small groups such as project or working groups.
  
3. The IT manager (#2) concedes that a classification of files i.e. in private, public or confidential files is only possible with “Novell GroupWise” and only to a certain extent through a manual classification. The IT managers and a panel of IT professionals are currently investigating user requirements across AUT to conceptualise a model for an ‘enterprise document management system’ which might enhance the classification of files in e.g. business records, private records, student related files, confidential or public information. This new system will use ‘meta-tags’ in a ‘document index’ to classify, on the one hand, files but, on the other hand, also controls file access. Meta-tags are HTML or XHTML codes placed as tags in the head section of a document but are often not directly visible to the user. Meta-tags can be used to specify a document by its content, keywords or any other specification. This categorisation helps search engines to find and retrieve files correctly. The IT and IT manager (#1) argue that the use of meta-tags will enable a file-search function by author, role, position, project, topics, etc. The implementation of this “information architecture” in the new software will allow users to classify the files. The IT manager (#1) in turn believes AUT should purchase a software which scans and classifies all files automatically before they are stored on the server. Although these investigations have only recently started the IT manager (#1) believes that the new public records acts which becomes effective in 2010 will increase the development pressure on AUT and enhance the implementation of a new file system.

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4. Although there is a search function in “Novell GroupWise” and in “Knowledge Base” the interviewees argue that the search results are inaccurate. Both IT professionals express, once more, that the approach of ‘meta-tags’ used in an ‘enterprise document management system’ might provide more accurate search results.
  5. The IT manager (#2) admits that the users’ request to “display the author of the file” is an important issue in terms of intellectual property protection. S/he also believes that this request has to be addressed as a major issue in the considerations of purchasing a new software. However, the IT manager (#1) also highlights the possibility of an owner search in “Novell GroupWise” as time solution in the meantime.
  6. The IT manager (#2) explains that a current project is investigating the possibilities for “automatic and chronological file archiving”. However, both managers explain that currently this function is only to a very small extent possible in “Novell GroupWise”. The reason for this limitation is based on the limited storage capacity which might slow the system down once it is used. However, both believe that the new system will allow chronological file archiving if files are classified by year or month in the meta-tag.
  7. Both IT professionals argue a “version control of stored files” is currently possible only through manual input and maintenance in “Novell GroupWise”. Although this request has not been investigated so far by the IT department the IT manager (#2) believes a version control will be possible with the new ‘enterprise document management system’.
  8. The IT manager (#2) affirms that in a collaborative working environment the request for “track changes” is an important feature as it enables monitoring of files. S/he points to “Novell GroupWise” as the only system that provides similar track changing information. However, this system does not state any information of changes made in the file.
  9. The interviewees argue that the current information architecture at AUT does not allow the storage of files in one single system. Furthermore, spreading files and information in four different systems leads to frustration for many staff

members. The current information architecture seems to make information retrieving difficult as files can rarely be found. This might have led the interviewees to request “files storage in one single system”. Both IT managers are convinced the new ‘enterprise document management system’ with its file classification through meta-tags will allow storing and retrieving files from one single system.

10. The IT manager (#2) agrees that a “system needs to be flexible for changes in the Business School” and admits, at the same time, that this is one of the biggest limitations all four currently used systems have. S/he believes there is a need for a ‘virtual presentation layer’ to solve this issue. This concept is based on a system with a set framework and flexible content management. This proposed flexible content management will allow for instant file classifications through a ‘document index’ or ‘meta-tags’. In the event that the company changes its operational structure the ‘virtual presentation layer’ would only require changes in the document indexes and meta-tags to display and retrieve files in the new required structure. This modern system structure requires only changes in the file classifications and not in the system’s framework. These characteristics seem to classify this systems approach as a flexible system.

#### 5.2.9. Root Definition

Based on the individually composed rich pictures and CATWOE model shown in Appendix 2-7, the interviewees highlighted their major issue of information and file sharing with the current available systems in the Business School’s environment in the following composed root definitions.

The senior lecturer identifies in her/his root definition: “There is a need for an information system to enhance working in a team or along with other teams to facilitate students learning”. The senior lecturer highlights with this statement the importance of the system’s support function in its application but also with its focus on the Business School’s core business, students learning.

The senior administrator composed her/his root definition as follows: “There is no clear communicated and trained standard of using existing information systems to share files”. This root definition clearly underpins the need for implementing standards but

provides, at the same time, a justification for why most users use the systems as examined above.

The senior manager (#1) exposes another issue in her/his root definition: "The Business School needs to define and implement standards of using information systems but also set up introduction trainings for new staff members as a compulsory parameter within the Business School's environment to standardise and maximise the use of the information systems".

The senior manager (#2) considers in her/his root definition a different angle which might have caused the issues of not utilising IT systems in the most effective way: "Working in an environment with no set standards of information storing and sharing enabled the creation of a culture in which users might have an oversized level of freedom. Furthermore, the significant change from an Institute of Technology to a University resulted in big internal and operational changes. These changes seem to make the use of the current systems in their set up not flexible enough to adapt to new requirements."

The IT manager (#1) highlights in his root definition an urgent issue which might have to be solved first: "There is a strong need to identify across AUT the users' requirements for a file sharing system to be able to evaluate possibilities for changes on current systems or the need for a new system. However, in the first instance a cultural change driven by executives within each faculty needs to occur otherwise any changes on current systems or even the purchase of a new system will not be utilised as conceptualised."

Similar requests and identified issues are also a significant component of the IT manager's (#2) root definition: "The current AUT governance needs to take more responsibility in terms of identifying and addressing IT issues for a better management of information and knowledge and comply with forthcoming legislation changes. There is also a strong need for authority changes between departments and business units. IT issues and development needs should not be assessed by departments and the EMT (Executive Management Team) but rather through the IT department itself as this department has the most appropriate expertise in this sector." The IT manager's (#2) addressed issues in her/his root definition clearly highlight the frustration of the empowered IT department and lack of authority delegation and decision making to departments with the required expertise.



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## 6. Discussion of Results

### 6.1. Findings

Three questions arise out of the data collected in the CATWOE model and rich pictures as follows:

1. To what extent does the current information architecture support and add value to the Business School?
2. What are the major issues highlighted in the respondents' "Weltanschauung"?
3. Based on the identified user requirements will the current information architecture and available IS support or hinder the accomplishment of the Business School's mission statement (discussed in Chapter 3.2)?

With regard to the first of the three questions above, it appears that the Business School needs to empower its stakeholders by making data and information readily available and to enhance its transformation into knowledge. Therefore the Business School needs an information architecture which affranchises its rich repository of stored information, documentation, policies, reports and research outputs and develop an efficient working and information literate community.

The evaluation of the CATWOE model and rich pictures identified a number of major issues with the current information architecture. It has been identified that the use of four information systems to store files makes it difficult for the users to know in which IS a particular file can be found. Furthermore the Business School has not implemented standards for using the available IS nor for naming and storing files. It became apparent overall that the importance of IT with its capabilities, and in particular its influence on the Business School's performance, might have been recognised but not fully understood. It appears that the Business School develops its IT in a reactive fashion rather than as a means of enhancing its overall performance. Further problems will arise from the significantly increasing file storage costs triggered by the upcoming introduction of the new public records act in 2010.

Hence, the answer to the first question is that the current information architecture and related policies and regulations for the use of IS and IT require revision in order to facilitate an information and knowledge sharing environment.

The second question targets the analysis of the interviewees' "Weltanschauung" examined in Checkland's CATWOE model. A number of key issues arise from this analysis as follows:

1. It appears that sufficient staff IT training is lacking, particularly for new staff members. Currently new staff members are more likely informally and briefly introduced to available resources and, more importantly, to the system's capabilities.
2. Further weaknesses are the methods used for communicating and discussing IT systems and developments. These issues and systems possibilities are disseminated through newsletters and on an irregular basis in meetings. Nevertheless the working attitude of many staff members seems to be somewhat 'laissez faire' as they hardly communicate their IT and IS requirements nor work proactively on continuous improvement of utilising available IT resources in a more efficient manner.
3. The IT department does not supply staff workstations with updated software and hardware on a regular basis which may be a major barrier to a more efficient working environment. However, as the IT manager (#2) argues, the IT department has very little influence in driving developments or innovations. According to the IT manager (#2), the power to drive IT developments lies with the Human Resources, Finance, and Marketing Departments although this function lies outside of their field of expertise. It is suggested, therefore, that the IT Department should be empowered to assist in IT developments and governance. The author believes that the AUT governance must drive IT developments with a higher priority but also delegate authorities for developments to the departments and groups with the appropriate expertise.
4. A further result of the findings seems to be one of the most significant. The lack of set standards and regulations seems to provide staff members with a high level of freedom in their output. Furthermore, there appears to be also a problem with managers adopting a "laissez faire" attitude towards accountability and the monitoring of project outcomes which they have initiated. These performance issues have a detrimental effect upon efficiency within the Faculty. Furthermore, neither administrators nor managers want to be accountable for their output.

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5. The information systems are underutilised; the major cause being personal attitudes and regulations which raise issues between several stakeholders and frame the organisational culture and working environment. Therefore to assist in answering question three (above), an Entity Relationship Diagram (ERD) shown in Figure 27 (below) is used as a data modelling tool to summarise the interview data and to identify issues in the relationships amongst the interviewees. This process has proved to enable a good analysis and highlight major issues in relationships.

The issues identified and illustrated in Figure 27 (below) clearly highlight issues in the organisational culture and refer to personal attitudes in the workplace. Each group complains in a certain way about the passive personal attitudes enhanced through the high level of freedom given by managers and executives. Overall there is a recognisable level of mistrust, disappointment, reproaches and anger towards the other stakeholders. However, Figure 27 (below) also indicates that the managers realise there are some major issues to be addressed.

Question three can therefore be answered that there is no need to evaluate whether the current systems can be modified or not to meet the user requirements. As examined in Chapter 5 most user requirements can be solved by “Novell GroupWise”. However the Business School first needs to solve the issues caused by the organisation’s culture. This might include delegating authority and implementing regulations in order to improve management action. However, in a long term perspective the Business School will need to take a holistic approach and change the structure of the information architecture. The author considers a fully integrative, embedded information architecture combined with the implementation of an ‘enterprise document management system’ will meet all user requirements identified in Chapter 5.

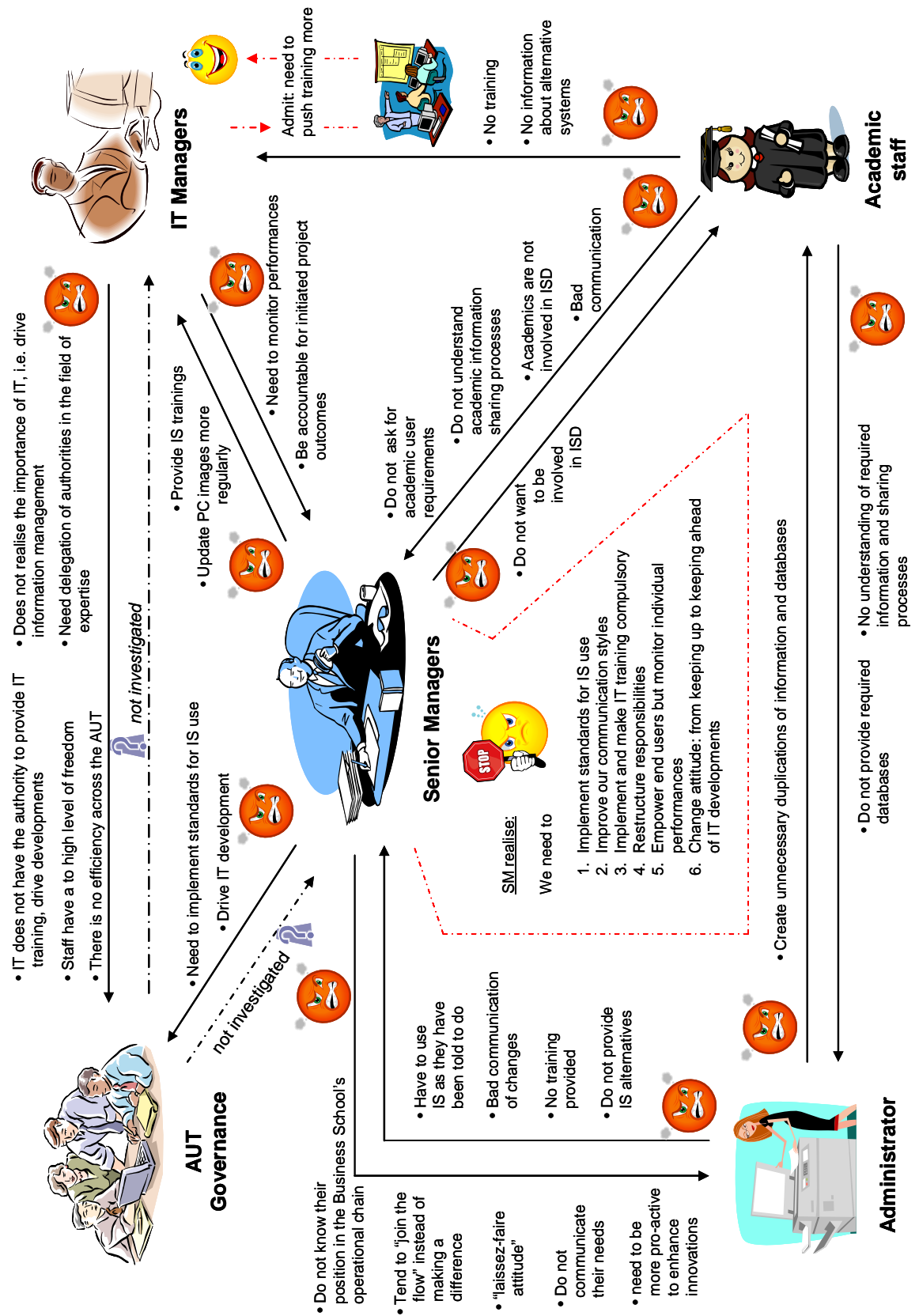


FIGURE 27 Entity Relationship Diagram (ERD)

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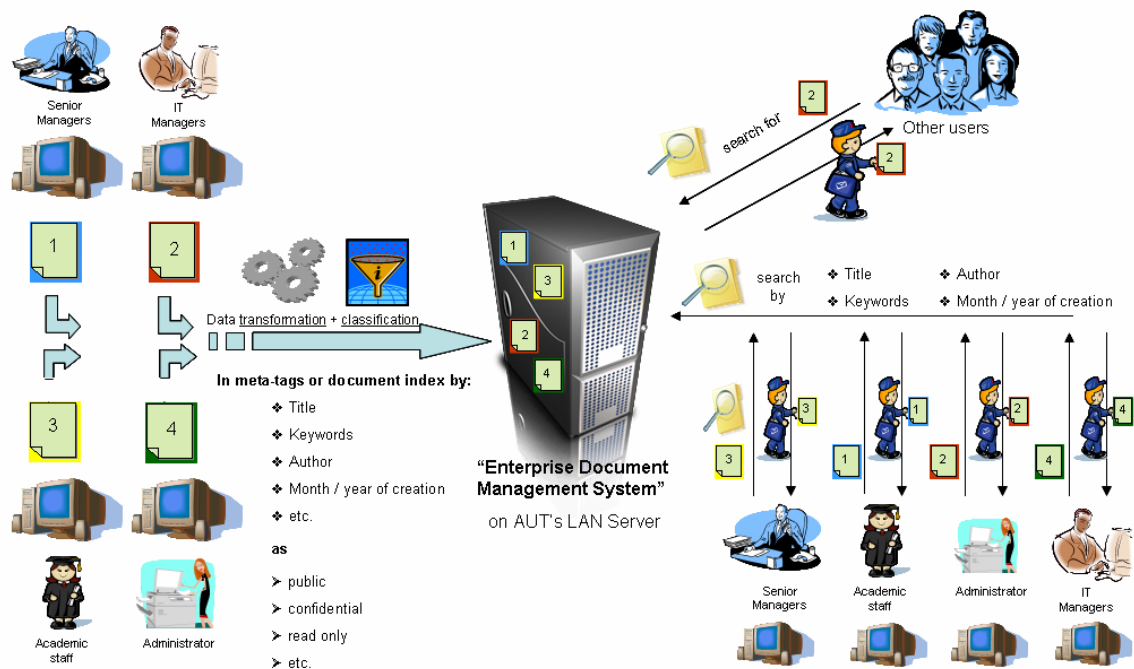
## 6.2. Contributions and Implications

As AUT has been identified in Chapter 3 as a primarily relationship driven organisation with the purpose of dealing with knowledge, recommendations in this section consider challenges which arise with breadth and complexity of the involved organisation's functions and personalities. The following three questions will guide the identification of recommendations which strive to develop and resource a cultural strategy addressing the identified issues and support considerations for a new information architecture.

1. How might the information architecture be modified to ensure the achievement of the identified user requirements?
2. What are the recommendations?
3. What are the proposed cultural considerations and actions?

Checkland's proposed and examined conceptual model (Chapter 4) has been used to answer question one (above). Figure 28 (below) shows a conceptual model proposing file classifications through 'meta-tags' in the 'document index' in a new 'enterprise document management system'. In this model any user can create files and store them through the classification i.e. with its title, keywords, by author etc. as public, read only or confidential data, in one single big system on AUT's network server. The 'search' function will allow retrieval of stored files through its classification. This proposed concept will enable all users to gain access to all created information in the Business School and create a knowledge sharing environment. Although all files are stored in one single place and therefore accessible to all users, the file classification as 'confidential' or 'read only' will provide the user protection of their created files against unwanted files access.

### Conceptual model of a new file sharing system



**FIGURE 28** *Conceptual model of a new file sharing system*

Table 7 (below) illustrates the evaluation of the identified users' requirements for a file sharing information system with the above proposed conceptual model. The evaluation shows that the proposed conceptual model will meet the identified user requirements. However, two of the users' systems requirements shown in Table 7, "accessibly from outside AUT" and "track changes" can not be evaluated at this point. As examined in Chapter 5 these requirements depend on other components provided from AUT's IT department i.e. the creation of a 'virtual desktop'.

Evaluation of identified user requirements with the proposed conceptual model	
1. Systems accessible from outside AUT	?
2. Decentralised folder access control by the end user	+
3. Classification of files (private, public or confidential)	+
4. Search function + view keyword related files	+
5. Display author of the file	+
6. Automatic and chronological file archiving	+
7. Version control of stored files	+
8. Track changes (who modified and saved the file)	?
9. Files need to be stored in one system	+
10. System needs to be flexible for changes in the Business School	+

**TABLE 7** *Evaluation of identified user requirements with the proposed conceptual model*

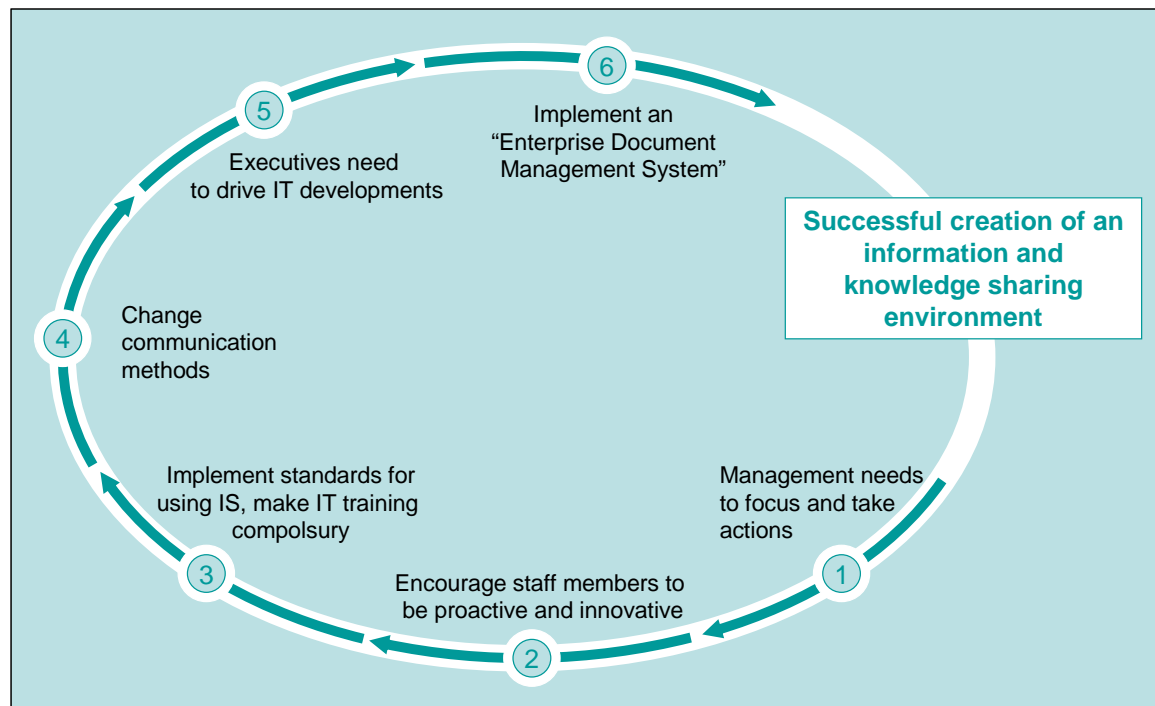
To answer question two, the following recommendations are made on the basis of the above analysis:

1. There is a need for a change in culture to create an information and knowledge sharing environment in which data will be accessible from multiple perspectives. As shown in Figure 29 (below) the first recommendation addresses the senior management. In order to ensure a successful change in the Business School's culture and freedom of its staff members the senior managers need to concentrate more consistently on the issues addressed (Chapter 6.1) and in particular start to take actions. These actions need to be carried out from a top down principle, not from a control perspective but more from the communication style.
2. In the second step all staff members need to be encouraged to express their IS requirements and in particular work more proactively towards developments and innovations.
3. The Business School's managers and executives need to implement standards for using the information systems as well as for naming and storing files. Although a working group initiated by the AUT has been investigating records management for 18 months yet no standards have been defined and disseminated. Hence,

individually identified and implemented standards are seen as better than working without any standards.

4. After implementing these standards the senior management needs to introduce compulsory IT and IS training to existing staff and, more importantly, to all new staff members to ensure the defined standards are communicated and performances can be monitored. In the fourth step the communication method of informing staff members about IT and IS issues, possibilities and alternatives need to be changed from a passive approach through newsletters to a more active approach i.e. regular training sessions.
5. The senior managers need to ensure the Business School's executives understand the importance and need to drive IT developments with a higher priority. In this phase the executives need to understand how critical efficient IT and IS use can be for the organisation's success. IT and IS developments need to be driven with the approach of "being one step ahead" instead of "only trying to keep up" with students' and competitors' developments.
6. The sixth and final step incorporates the implementation of an 'enterprise document management system' to meet the user requirements identified in Chapter 5.

### Recommendations for a cultural change to enhance information management



**FIGURE 29** Recommendations to create an information and knowledge sharing environment



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The following examination of cultural considerations and actions will answer question three. In order to carry out the above proposed recommendations a formal communication plan needs to be developed to ensure awareness but also to facilitate the dissemination of the proposed changes to all staff members. It is necessary to make clear to all stakeholders that appropriate sharing of data, information and knowledge has a collegial benefit. Clear communication of the benefits to individuals and groups is a key factor to avoid staff's rejection and encourage them to an active collaboration. The election of a strong visible sponsorship, but also with a strong, structured and focused management, to drive this initiative determines a further key success factor.

As “management knowledge”, “research knowledge” and “teaching and learning knowledge” have been identified in Chapter 3 as the Business School's core knowledge assets, the following section proposes recommendations for actions to be taken in each of these areas.

### **Actions for Management**

1. Establish governance arrangements for restructuring information management at the Business School
2. Map the current information flow and identify gaps
3. Implement standards for using IS, and introduce compulsory IT trainings for existing and new staff members
4. Implement standards for naming files within the Business School, to work towards the records management and Public Records Act
5. Where possible, store information in a central integrated administrative system

### **Actions for Research**

The following actions are proposed to provide researchers with an infrastructure which enables global collaborative research through seamless and cost-effective access to information they need:

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1. Include and provide in the new information architecture a range of library information resources appropriate to research
  2. Provide in the new information architecture institutional repositories of published research outputs
  3. Develop standards and good practices for sharing research data
  4. Provide IT helpdesk support for the management of stored research information
  5. Provide an information architecture to enhance information literacy tailored to research needs

### **Actions for Learning and Teaching**

The following actions are proposed to provide an infrastructure which supports seamless integration of learning resources to enable collaborative learning and provide students and staff members with required skills to work in a knowledge society:

1. Provide an information management which enhances innovative contributions to learning and teaching
2. Provide collaborative information exchanges during teaching sessions
3. Introduce a content management system using meta-tags to provide easy access to learning and teaching resources

### **6.3. Validating the Research Model**

To evaluate the users' requirements for a suitable file sharing information system, in the first instance the decision had to be made as to whether this research was going to be carried out from a quantitative or qualitative perspective. This study attempted to identify the user requirements through an in depth analysis of the users' intentions and perceptions of their work environment. In particular this goal identified the qualitative methodology as the more appropriate approach. Within the wide range of the available qualitative approaches the Soft Systems Methodology (SSM) combined with Checkland's proposed CATWOE model and rich picture approach provided the most suitable tools. In particular the CATWOE model enabled the interviewees to express their perception of their current work environment and highlight in particular in their "Weltanschauung" issues which need to be addressed in the development of a new

information system. Using rich pictures enabled the interviewees to express their work environment and use of the systems graphically but also helped them to formulate, at the end of the interviews, in one sentence a root definition to express their major issues in utilising existing information systems in their environment. As this research turned out not to be an explicit systems evaluation but more an evaluation of issues between several stakeholders within the Business School, the chosen research model seems to be the most appropriate tool.

The joint application development (JAD), in combination with the prototype development, has been recommended in Chapter 2 as the most appropriate development method. Taking the data analysis and findings into consideration affirms this initial recommendation. In particular the JAD approach, with its group meetings and working groups, will enhance the given recommendations and actions to solve the identified relationship issues and create a collaborative ISD environment. It is believed that continuing to express conceptual models in rich pictures as proposed in the prototyping approach will ensure a successful ISD of an 'enterprise document management system'.

#### **6.4. Limitations and Implications for further Research**

The small sample size of only six interviewees is probably one of the biggest limitations in this study. Although some stakeholders are represented by two interviewees other stakeholders are only represented by one respondent or even not considered at all. Furthermore, the interviews have been conducted on a one by one basis. Group interviews might have increased the confidence of some interviewees to raise issues as they might have felt more supported within a group of people with the same issues and perceptions. Group interviews might also have provided a much better foundation for collaborative engagement.

A further significant limitation might be the bias of the information provided by the interviewees. As the researcher is also a staff member at the Business School and known by most of the interviewees, the quality of the research output was certainly enhanced. The interviewees might not have told an external researcher about internal relationships issues or constraints in the work environment. The personality and relationship of the researcher to each interviewee might also have affected the level of insight knowledge provided to the research.

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Asking the interviewees to draw their rich picture on a blank piece of paper certainly provided the widest possible scope of data collection as every interviewee had been given the opportunity to drive the content of the interview towards their personal beliefs and issues. However, not confronting the respondents with the previous created rich pictures might have been a missed opportunity to build on already existing knowledge to identify issues in a collaborative examined environment.

The last considered limitation is based on the chosen CATWOE model. Although Checkland proposed this model he admits that the CATWOE model can only be used if the researcher is integrated in the organisation or institution, as this model requires mostly sensitive information.

One of the implications of this study for further research is the cognition that the JAD and Prototype systems development approach should be carried forward to identify user requirements across AUT but also to develop conceptual models for the implementation of a new file sharing information system. Furthermore, the Business School needs to use the opportunities of JAD approach and work closely with AUT's records management work group to identify file naming and storage standards. Further study should also investigate the new Public Records Act and its influence on the development of an information system at the Business School. Continuous investigations should also be done on the implications of the information system development at the Business School with the framework and programme of AUT's Knowledge Management group.

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## **7. Conclusion**

Developing a file sharing information system for the Business School will be, as in any other organisation within the dynamically changing tertiary sector, a big challenge. The implementation of a new information system, i.e. an 'enterprise document management system' will have to deal with the complexities of the Business School across teaching, learning, research and administrative functions. The biggest challenge might be the necessity of finding a software solution which serves these three core assets equally but meets also all their individual requirements.

The following sections will summarise the research findings and will also highlight the most important implications for the Business School's Management.

### **7.1. Summary of Research Findings**

Evaluating all conducted CATWOE models, rich pictures and root definitions makes it very clear that initial discussions with the Business School's management about conducting a study to evaluate the information systems' capabilities and the need for modifications was at this stage premature.

The analysis of the findings in Chapter 6 clarifies that the Business School's issue of not sharing files and documents in the most efficient and effective manner is not caused through using inappropriate or incapable systems. As illustrated in Figure 27 (above) the identified issues are founded in the organisation's culture, with its lack of setting operational standards and regulations, but also with its high level of freedom for staff members which might have enhanced the identified relationship issues between several stakeholders. It is most likely that these identified issues in the organisation's culture resulted in available IT resources and capabilities not being used to their maximum potential. As examined and outlined in Chapter 5, most identified user requirements can be solved by "Novell GroupWise". Hence, there is no need to modify any of the current information systems. The Business School needs to first solve these cultural issues not only to increase the use of the current available system but also to enable, in a longer term perspective, the implementation of a new 'enterprise document management system'.

Table 8 (below) links the research findings with the initial proposed research aims and highlights the achievement of all four proposed goals.

Evaluation of the proposed research aims	
Proposed research aims should	Status
1. have defined which information has to be shared	+
2. define the users' system requirements	+
3. identify current technical restrictions of sharing information	+
4. highlight possible modifications of currently used Information Systems or identify whether a new Information System has to be purchased to meet the defined user requirements	+

**TABLE 8** *Evaluation of the proposed research aims*

## 7.2. Implications for Management

To show, as a university, leadership in developing an information system to enable the preservation and distribution of information in order to produce knowledge but also to show greater responsibility in the transformation to a knowledge society, the Business School's management needs, in the first instance, to understand the importance of carrying out actions immediately to enable a quick change of the identified cultural issues. The imperative need for these immediate actions is in particular founded in aligning the new information architecture with the new Public Records Act by 2010. To enhance these changes it is recommended that standards and regulations for using IT and IS are implemented, compulsory and regular IT and IS training sessions are introduced, restructure responsibilities and authorities are restructured towards a more expertise related approach and, most importantly, the communication style is changed from a passive to a more proactive approach.

29, 883 words

(excluding preamble, tables and appendices)

## 8. References

- AACSB International. (2007a). *Accreditation*. Retrieved 25.09.2007, 2007, from <http://www.aacsb.edu/>
- AACSB International. (2007b). *Eligibility Procedures and Accreditation Standards for Business Accreditation*. Unpublished manuscript, Tampa, FL 33602-5730 USA.
- Adelman, S. (2003). *Impossible Data Warehouse Situations*. New York: Addison Wesley.
- Alter, S. (1996). *Information Systems - A Management Perspective*. New York: The Benjamin/Cummings Publishing Company, Inc.
- Alter, S. (1999). *Information Systems - A Management Perspective* (3rd ed.). New York: Addison Wesley Longman.
- Angehrn, A. (1997). Designing Mature Internet Business Strategies: The ICDT model. *European Management Journal* 15(4), 361-1369.
- Auckland University of Technology. (2006). *Annual Report 2006* (Report). Auckland.
- Auckland University of Technology. (2007). *Knowledge Management*. Retrieved 05.10.2007, 2007, from [http://www.aut.ac.nz/staff/knowledge\\_management/](http://www.aut.ac.nz/staff/knowledge_management/)
- Back, A., Krogh von Georg, Seufert, Andreas, Enkel Ellen (2005). *Putting Knowledge Networks into Action*. Heidelberg: Springer Verlag.
- Belkin, N. J. (1980). Anomalous states of knowledge as a basis for information retrieval. *Canadian journal of information science*, 5, 133-143.
- Beynon-Davis, P., Owens, Ian, Williams, Michael D., . (2004). Information systems evaluation and the information systems development process. *The Journal of Enterprise Information Management*, 17(4), 276-282.
- Bryman, A., and Bell, Emma. (2003). *Business research methods*. New York: Oxford University Press.
- Brynjolfson, E. (1993). The productivity paradox of information technology. *Comm. ACM*, 36(12), 66-67.
- Checkland P, a., Poulter, J., (2006). *Learning for Action - A Short Definitive Account of Soft Systems Methodology and its use for Practitioners, Teachers and Students*. Chichester, England: John Wiley & Sons Ltd.
- Checkland, P., and Holwell, S. (1998). *Information, Systems and Information Systems*. Chichester, England: John Wiley & Sons, Ltd.
- Checkland P. (1999). *Systems Thinking, Systems Practise - Includes a 30-year retrospective*. Chichester, UK: John Wiley & Sons, LTD.
- Chowdhury, G. G. (1999). *Introduction to Modern Information Retrieval*. London: Library Association Publishing.
- Clark, T. (2005). *Storage - Virtualization - Technologies for simplifying data storage and managment*. Indiana, United States: Pearson Education inc.
- Dalkir, K. (2005). *Knowledge Management in theory and practice*: Elsevier Inc.
- Davenport, T. H. (1993). *Process Innovation, Reengineering Work through Information Technology*. Boston, Massachusetts: Harvard Business School Press.
- Deloitte & Touche. (1998). *Information Technology Control Guidelines* (3 ed.). Toronto: The Canadian Institute of Chartered Accountants
- Derry, S. J. (1999). *A Fish called peer learning: Searching for common themes*. In A. M. O'Donnell & A. King (Eds).
- DSDM Consortium. (2007). *The essential introduction to DSDM*. Retrieved October 2007, 2007, from [www.dsdm.org](http://www.dsdm.org)
- Elliott, G. (2004). *Global Business Information Technology - An Integrated Systems Approach*. London: Pearson Education Ltd.
- Elliott, G., and Starkings, S. (1998). *Business Information Technology - Systems, Theory and Practice*. New York: Addison Wesley Longman.
- Gill, S. L. (1988). *File Management and Information Retrieval Systems* (2nd ed.). Englewood, Colorado: Libraries Unlimited Inc. .

- Gordon, J. R., Gordon, Steven R. (1999). *Information Systems - A management Approach* (second edition ed.). Orlando: Harcourt Brace & Company
- Healy, S. (2001). ISO 15489 Records Management - its development and significance. *Records Management Journal*, 11(3), 133-142.
- Hicks, J. O. J. (1990). *Information Systems in Business: An Introduction* (2nd ed.). New York: West Publishing Company.
- Jessup, L. M., Valacich, Joseph S., . (1999). *Information Systems Foundation*. Indianapolis: Robert Linksey.
- Jones, C. (1993). Sick Software. *Computerworld* 115-116.
- Kukla, A. (2000). *Social Constructivism and the Philosophy of Science*. New York: Routledge.
- Laudon, K. C., Laudon Jane P. (2002). *Management Information Systems* (7th edition ed.). New Jersey: Prentice Hall.
- Liebowitz, J. (2000). *Building organisational Intelligence - A Knowledge Management Primer*. New York: CRC Press LLC.
- Lybrand, C. a. (1996). Managing Information and System Risks: Results of an International Survey of Large Organisations, Technical Report.
- McMahon, M. (1997, December). *Social Constructivism and the World Wide Web - A Paradigm for Learning*. Paper presented at the ASCILITE, Perth, Australia.
- McNurlin, B., Sprague, Jr., Ralph H.,. (1989). *Information Systems Management in Practice*. Sigapore: Prentice-Hall International Editions.
- Muthukumar, J. G. H. (2005). A knowledge management technology architecture for educational research organisations: Scaffolding research projects and workflow processing. *British Journal of Educational Technology*, 36(3), 379.
- Nair, M. (1999). *Activity-Based Information System*. New York: John Wiley & Sons INC.
- Neo, B. S. (1991). Information Technology and global competition: A framework for analysis. *Information & Management* 20(30), 151-160.
- Nickerson, R. C. (1998). *Business and Information Systems*. New York: Electronic Publisher Services Inc. .
- Nickerson, R. C. (2001). *Business and Information Systems* (2nd edition ed.). New Jersey: Prentice Hall Inc.
- Nonaka, I., Ryoko, T., Noboru, K. (2000). SECI, ba and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*, 33(1), 5-32.
- Nunamaker, J. F., Jr. (1992). Build and learn, evaluate and learn. *Informatica*, 1(1), 1-6.
- Nykamp, S., and Magalitta, Joseph., (1991). Software speeder-uppers. *Computerworld*, 51, 53.
- O'Brien, J. A. (2004). *Management Information Systems* (Vol. 6th edition). New York: George Wertham
- O'Brien, J. A., Marakas, George M. (2007). *Introduction to Information Systems* (13th ed.). New York: McGraw-Hill/Irwin.
- Oz, E. (2006). *Management Information Systems* (5th ed.). Canada: Thomson Course Technology.
- Patching, D. (1990). *Practical Soft Systems Analysis* London: Pitman Publishing
- Pidd, M. (2004). *Systems Modelling - Theory and Practise*. Chichester, England: John Wiley & Sons, Ltd. .
- Probst, G., Raub, Steffen, Romhardt, Kai. (1998). *Managing Knowledge - Buliding Blocks for Success*. New York: John Wiley& Sons LTD.
- Purba, S. (2000). *Data Management* (3rd edition ed.). London: Auerbach Publications.
- Rollett, H. (2003). *Knowledge Management - Processes and Technologies*. United States of America: Kluwer Academic Publishers.
- Schultheis, R., Sumner, Mary. (1995). *Management Information Systems - The Manager's View* (3 rd ed.). Boston: Richard D. Irwin INC.
- Sundaram, D., Portougal, Victor. (2006). *Business Processes - Operational solutions for SAP Implementation*. London: IRM Press.



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- Taylor Chudnow, C. (2003). File Systems and Storage. *Computer Technology Review*, 23(7), 30.
- Teng, J. T. C., Grover, V. and Fiedler, K. D. (1994). Redesigning business processes using IT. *Long Range Planning*, 27(1).
- Ward, J., Griffiths, Pat. (2000). *Strategic Planning for Information Systems* (2nd ed.). Chichester: John Wiley & Sons Ltd.
- Wilson, B. (1984). *Systems: Concepts, Methodologies and Applications* Willey. Chichester.

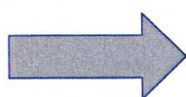
## Appendices

### Appendix 1 AACSB International accreditation process

Source: (AACSB International, 2007a)



## The Accreditation Process

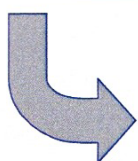


### STEP A – Membership

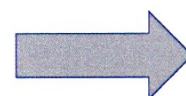
1. Are you an AACSB member? If so, move to Step B. If not, download a membership application from <http://www.aacsb.edu/members/joining.asp>

### STEP B – PreAccreditation

1. Submit Eligibility Application to PreAccreditation Committee (PAC). Applications can be downloaded from <http://www.aacsb.edu/accreditation/process/process-toc.asp>
2. PAC reviews application for accreditation standards issues.\*
3. PAC assigns a mentor to work with the applicant; mentor visits.
4. PAC forwards recommendation on eligibility criteria and scope of review to Accreditation Coordinating Committee (ACC) for concurrence.
5. Applicant and mentor work together to address PAC issues and design an Accreditation Plan within the applicant's Strategic Plan – applicant submits Accreditation Plan to PAC.
6. PAC reviews Accreditation Plan.\*
7. PAC forwards Accreditation Plan to Initial Accreditation Committee (IAC) along with PAC recommendations.



### STEP C – Initial Accreditation



\* Materials are revised and resubmitted until deviations are eliminated.

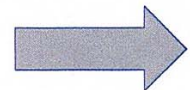
## The Accreditation Process - Business

### STEP C – Initial Accreditation

1. The Initial Accreditation Committee (IAC) reviews the Accreditation Plan.\*
2. Accreditation Plan is implemented.
3. Applicant submits Annual Reports to IAC for review; mentor submits annual recommendation.(AP implementation may take up to 3 years)
4. IAC reviews materials and recommendation to continue with AP implementation or apply for Initial Accreditation.\*
5. When applying for Initial Accreditation the school submits application to AACSB.
6. At this time two years remain in the PreAccreditation process and the IAC appoints a team Chair.
7. Applicant works with Chair to prepare a Self-Evaluation Report (SER) and refine Strategic Plan.
8. Applicant, Chair and IAC select the peer review team (PRT). PRT and IAC review the SER and annual reports.\*
9. PRT, with IAC concurrence, submits previsit letter to applicant at least 45 days prior to visit.
10. Visit occurs. PRT submits report to IAC and applicant with its recommendations.
11. Applicant submits a response to the PRT report (optional).
12. IAC reviews team report and recommendation and concurs or remands to the PRT.\*
13. IAC forwards recommendation to accredit to AACSB Board for ratification.
14. Board ratifies or remands to IAC – when Board concurs, member is accredited and joins the AACSB Accreditation Council. Accreditation is valid for six years, with a maintenance visit in year five.



### STEP D – Maintenance of Accreditation



\* Materials are revised and resubmitted until deviations are eliminated.

## The Accreditation Process - Business

**STEP D – Maintenance of Accreditation**

1. Annually:
  - a. Refine Strategic Plan.
  - b. Prepare Annual Maintenance Report.
  - c. Participate in AACSB accreditation data collection.
2. Year three (from last visit):
  - a. Accredited member submits maintenance review application and cover letter, including list of degree programs, exclusion requests, comparison groups, and catalogs.
  - b. MAC forwards copy of materials with recommendations to ACC to review eligibility issues and scope of review\*
3. Within two years of scheduled maintenance review:
  - a. Accredited member and MAC choose peer review visit team (PRT).
  - b. Set visit date.
  - c. 60 days prior to visit, accredited member provides PRT with 5<sup>th</sup> Year Maintenance Report, annual maintenance reports, policies and executive summary.
  - d. Accredited member and PRT confer to determine what additional information and/or clarification is needed prior to the visit.
4. PRT visits - submits report to MAC and accredited member with its recommendations.
5. Accredited member submits a response to the PRT report (optional).
6. MAC reviews team report and recommendation and concurs or remands to the PRT.\*
7. MAC forwards recommendation to extend accreditation to AACSB Board for ratification.
8. Board ratifies or remands to MAC – When Board concurs, accreditation is extended for six more years, with the next maintenance visit in year five.


**STEP D – Begins Again**

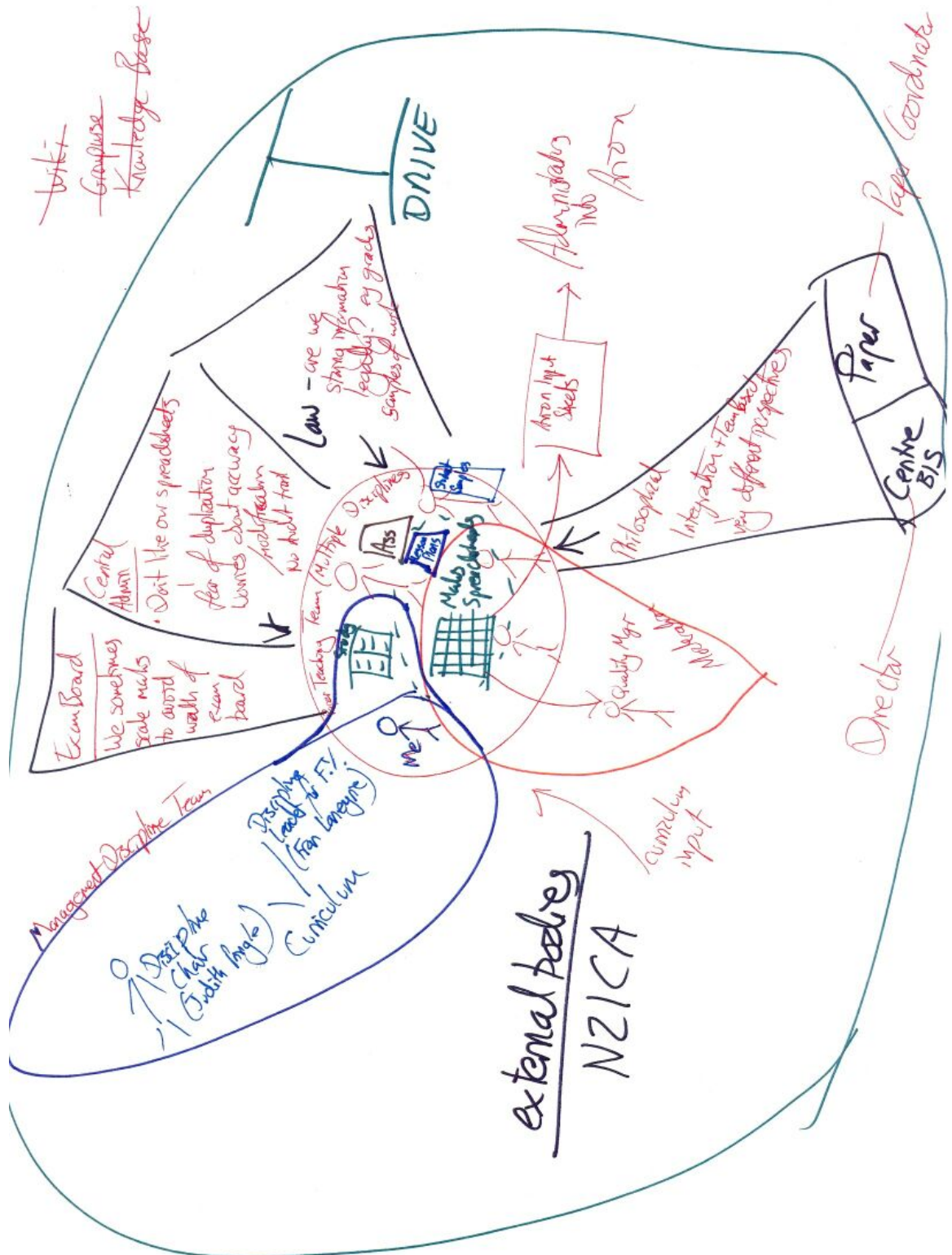


\* Materials are revised and resubmitted until deviations are eliminated.

**Appendix 2** Interview records – Academic staff member, Senior Lecturer

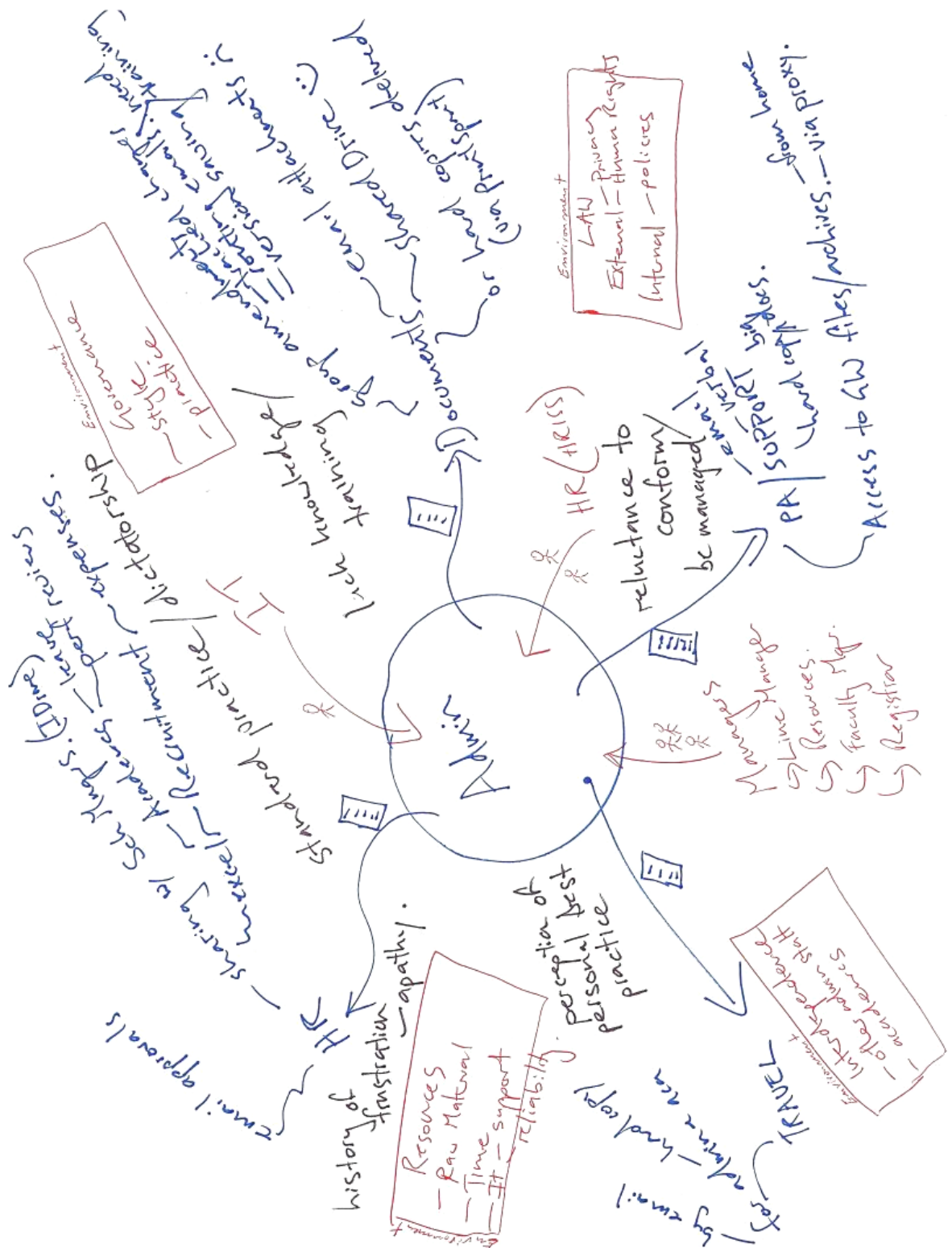
Interviewee: Academic staff member		
<b>C</b>	<b>Clients</b>	<ul style="list-style-type: none"> <li>- colleagues of the same or different discipline</li> <li>- colleagues who teach the same paper</li> <li>- Programmes Administration Manager</li> <li>- administrators</li> </ul>
<b>A</b>	<b>Actor</b>	<ul style="list-style-type: none"> <li>- Senior Lecturer and Scheduling Manager, Business Interdisciplinary Studies (BI)</li> </ul>
<b>T</b>	<b>Transformations</b>	<p>a) Create, store and share information in a “multiple discipline environment”</p> <ul style="list-style-type: none"> <li>- student assessments</li> <li>- study guides</li> <li>- student performances (marks, process...)</li> <li>- lesson plans</li> <li>- samples of student work</li> <li>- historical information</li> </ul> <p>b) Share study guides, study curriculum within the same discipline</p> <p>c) Distribute student marks to “Programme Administration Team”, Discipline Chairs or Director of Business Interdisciplinary Studies</p>
<b>W</b>	<b>Weltanschauung</b>	<ul style="list-style-type: none"> <li>- The perception of creating information/information systems which is not wanted by other stakeholders</li> <li>- In return the appropriate information systems are not provided</li> <li>- Indicated reasons could be: <ul style="list-style-type: none"> <li>• cost</li> <li>• lack of communication between. allied staff and academics to examine requirements</li> <li>• no understanding of the information sharing processes between academics</li> <li>• no involvement of academics in the IS development. academics don't have time or want to be involved</li> </ul> </li> </ul>
<b>O</b>	<b>Owner/s</b>	<ul style="list-style-type: none"> <li>- Programmes Administration Manager</li> <li>- Business School Executives</li> <li>- Law</li> <li>- Director of Business Interdisciplinary Studies</li> <li>- Discipline Chairs</li> <li>- IT Department</li> </ul>
<b>E</b>	<b>Environment</b>	<ul style="list-style-type: none"> <li>- Law (Privacy Act, legal storage of student work)</li> <li>- Administrative regulations and restrictions</li> <li>- University exam board (scaling of marks)</li> <li>- Need to fit as a discipline in the constraints of the other disciplines</li> <li>- NZICA have curriculum requirements</li> </ul>





### Appendix 3 Interview records – Senior Administrator

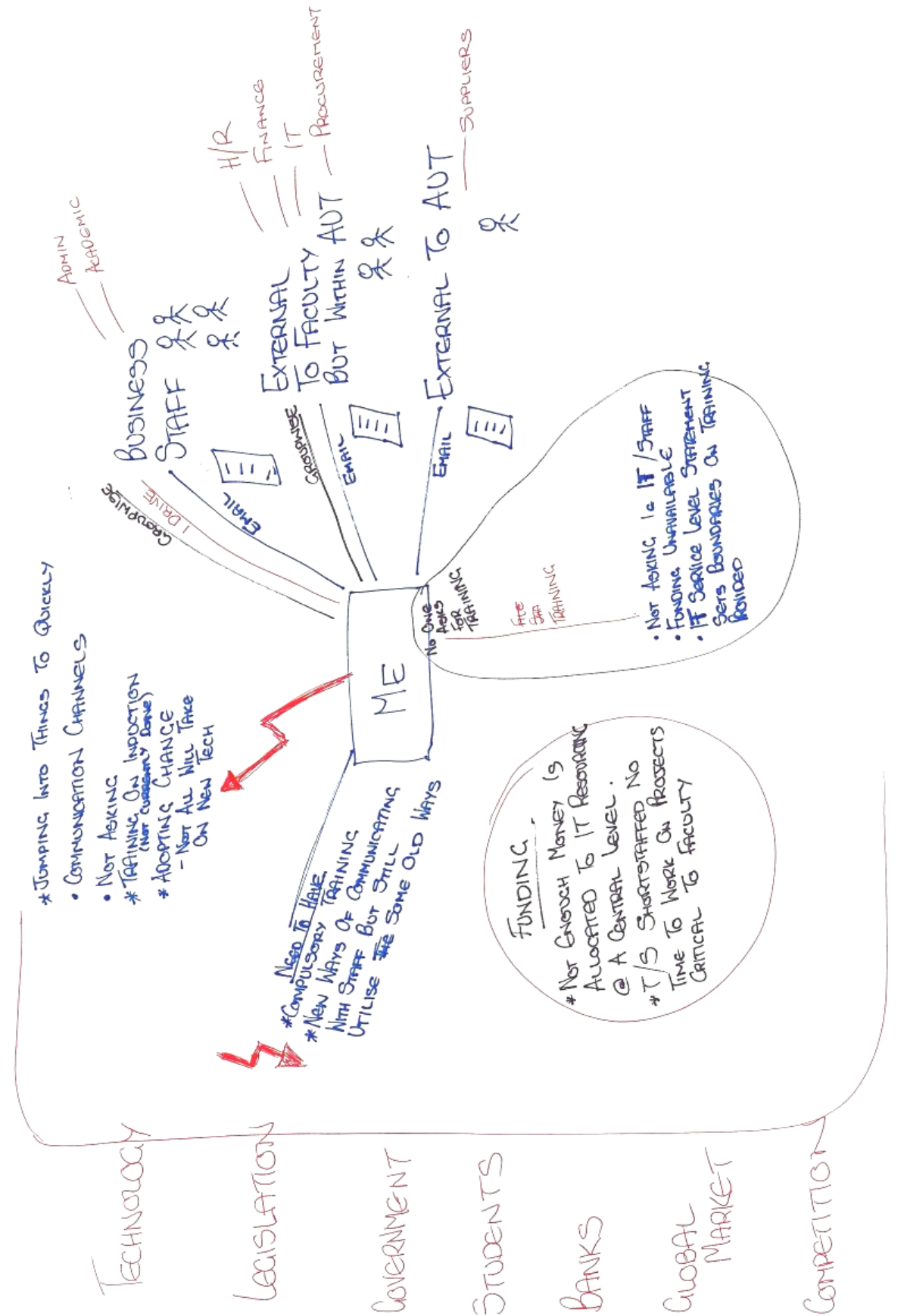
Interviewee: Senior Administrator		
<b>C</b>	<b>Clients</b>	<ul style="list-style-type: none"> <li>- Academics</li> <li>- Administrators</li> <li>- Line Managers, School Managers</li> <li>- Executives ( Dean, Dep. Dean)</li> </ul>
<b>A</b>	<b>Actor</b>	<ul style="list-style-type: none"> <li>- Executive Assistant to Dean, AUT Business School &amp; Pro Vice-Chancellor International AUT University</li> </ul>
<b>T</b>	<b>Transformation</b>	<ol style="list-style-type: none"> <li>1. Travel documents, sent via e mail, hard copies</li> <li>2. PA support, i.e. all diary duties and managing appointments</li> <li>3. HR information <ul style="list-style-type: none"> <li>- monitor and manage recording of staff leave</li> <li>- monitor time schedules for staff performance reviews</li> <li>- monitor and control for School Managers the relocation expenses</li> <li>- for new academic staff members</li> </ul> </li> <li>4. Documents <ul style="list-style-type: none"> <li>- manage documents for job advertisements/recruitments</li> <li>- documents are e-mailed to a group of clients, if changes occur they e-mail this file back. The administrator is then doing all single changes manually.</li> <li>- Documents are mainly shared via e-mail, some general information is shared on the I-drive and some as hard copies.</li> <li>- Files are stored in the mail box and personal share drive</li> </ul> </li> </ol>
<b>W</b>	<b>Weltanschauung</b>	<ul style="list-style-type: none"> <li>- Only use e-mailing to share files, result of mistrust of security of I-drive</li> <li>- Perception of personal best practice of storing files in personal drives</li> <li>- History of frustration / apathy</li> <li>- standard best practice / join the flow</li> <li>- being told by their "owner" to use particular systems</li> <li>- lack of knowledge of other systems</li> <li>- lack of competent training on how to use other systems</li> </ul>
<b>O</b>	<b>Owners</b>	<ul style="list-style-type: none"> <li>- IT</li> <li>- Faculty Manager</li> <li>- Registrar</li> <li>- Resource Manager</li> <li>- Line Managers</li> <li>- HR</li> <li>- Executives</li> </ul>
<b>E</b>	<b>Environment</b>	<ul style="list-style-type: none"> <li>- Law ( collective agreement, privacy policy)</li> <li>- AUT Governance</li> <li>- IT Resources</li> <li>- Time</li> <li>- IT Support</li> </ul>





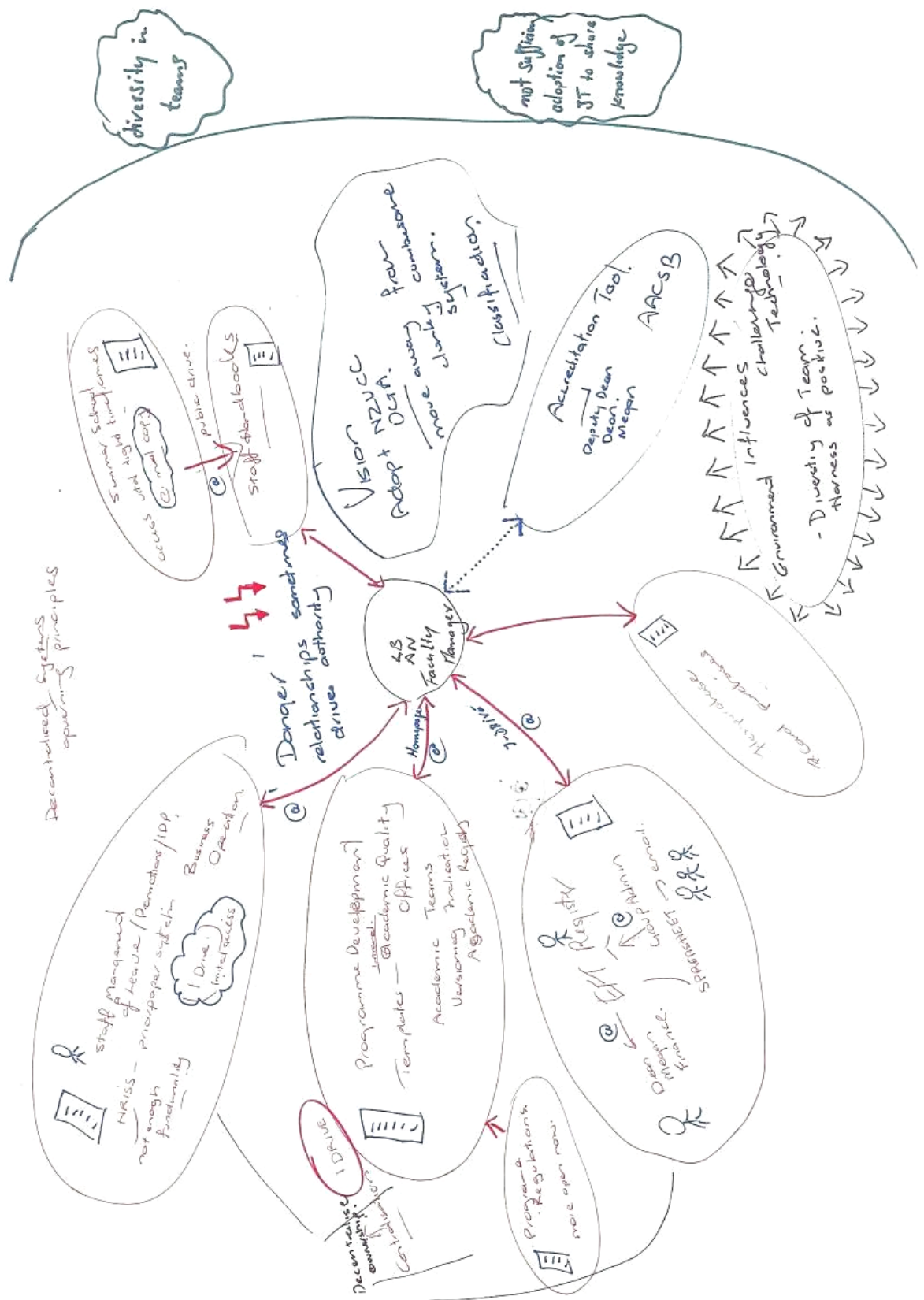
#### Appendix 4 Interview records – Senior manager (#1)

Interviewee: Senior manager (#1)			
C	Clients		<ul style="list-style-type: none"><li>- Administrators</li><li>- Academics</li><li>- IT-Department</li><li>- Procurement</li><li>- Finance Department</li></ul>
A	Actor		<ul style="list-style-type: none"><li>- Faculty Resource Manager</li></ul>
T	Transformation		<ul style="list-style-type: none"><li>- Health and Safety (HR Department) via e-mail, shared folder in GroupWise</li><li>- Procurement via e-mail, shared folder on I-drive</li><li>- Asset inventory, via e-mail to Finance department</li><li>- Resource database management</li></ul>
W	Weltanschauung		<ul style="list-style-type: none"><li>- Staff do not ask for possibilities, so they did not get</li><li>- There is no training for existing or new staff,</li><li>- There are no standards for using IS</li><li>- Trainings and standards need to be compulsory</li><li>- The use of the IS is not clear to many users</li><li>- IT has to push more innovations, re-image PCs regularly</li><li>- Need a new communication policy</li><li>- Users start to create own ways of storing and naming files</li><li>- Standards for naming files need to be defined</li><li>- Dean needs to drive the use of IT devices to be one step ahead instead of just trying to “keep up”</li><li>- The BS has to spend money to make money</li><li>- Too many systems exist at the AUT containing the same information – need only one place for information storage</li></ul>
O	Owners		<ul style="list-style-type: none"><li>- Resource Manager</li><li>- Faculty Manager</li><li>- School Managers</li></ul>
E	Environment		<ul style="list-style-type: none"><li>- Technology</li><li>- Legislation</li><li>- Government</li><li>- Students</li><li>- Banks</li><li>- Global Market Competitors</li></ul>



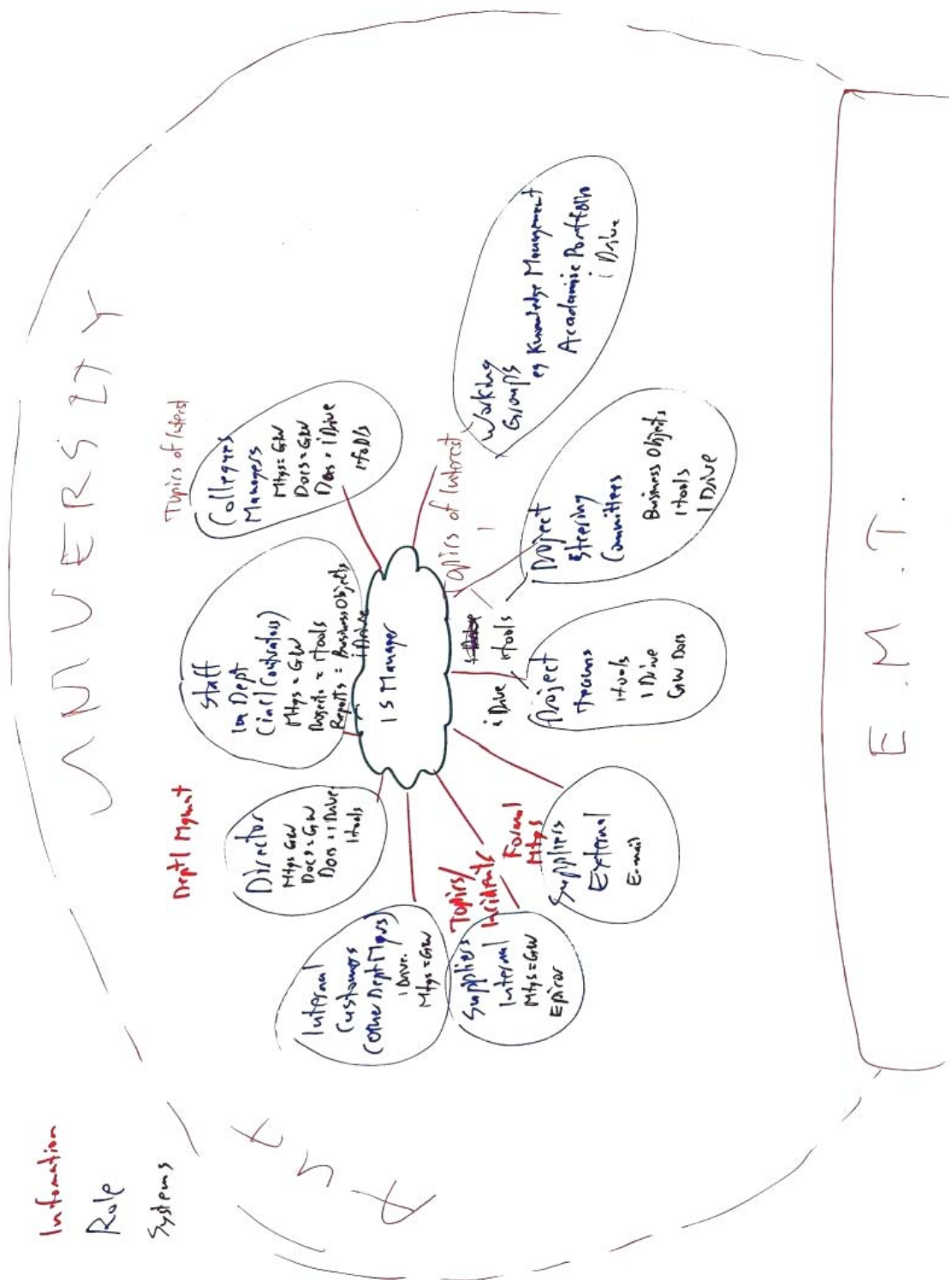
**Appendix 5 Interview records – Senior manager (#2)**

Interviewee: Senior manager (#2)		
C	Clients	<ul style="list-style-type: none"><li>- Registrar</li><li>- Dean + Dep. Dean</li><li>- Administrators</li><li>- School Managers</li><li>- Finance Manager</li></ul>
A	Actor	<ul style="list-style-type: none"><li>- Faculty Manager</li></ul>
T	Transformation	<ul style="list-style-type: none"><li>- EFTS forecast information (from Admin to Dean, Finance Manager). Saved each time in personal D-drives</li><li>- Programme development information. Templates from intranet, sent within a group via e mail, saved individually</li><li>- Monitor staff leave, on I-drive</li><li>- Promotions, some on hard copy some on I-drive</li><li>- Summer School info i.e. booklet, staff hand book</li><li>- Changes to programmes, share with Registrar, on I-drive</li><li>- Most information is shared via e-mail and then stored on individual drives, the final version is then saved on I-drive</li></ul>
W	Weltanschauung	<ul style="list-style-type: none"><li>- There is not sufficient training in IT and IS use</li><li>- Most new staff join the flow</li><li>- Centralised I-drive, too difficult to get access to folders</li><li>- AUT does not protect intercultural property</li><li>- Most do not know how to use IS in a better way</li><li>- Sharing information needs to be decentralised</li><li>- I-drive is primarily used, as everyone else uses this, but is not effective</li><li>- Need to decentralise access giving but set standards</li><li>- BS is relationship driven rather than operation or result driven</li><li>- Every staff member should be involved in addressing issues</li><li>- Maybe reward good collaboration</li><li>- Not everyone knows his position in the BS operational chain</li><li>- Vision: implement GDA public record act, naming standards</li><li>- Move away from I-drive</li><li>- Stakeholders should be given access to files individually</li><li>- All information and files in one big "pot". Only classify confidential data</li><li>- Benchmark with other universities</li></ul>
O	Owners	<ul style="list-style-type: none"><li>- Faculty Manager</li><li>- Dean + Dep. Dean</li><li>- Resource Manager</li><li>- All staff/users at the Business School, responsibility to improve activities and processes</li></ul>
E	Environment	<ul style="list-style-type: none"><li>- Diversity within teams, different perceptions of their role</li><li>- Not sufficient adoption of IT resources / possibilities to share knowledge</li></ul>



## Appendix 6 Interview records – IT manager (#1)

Interviewee: IT manager (#1)		
<b>C</b>	<b>Clients</b>	<ul style="list-style-type: none"> <li>- other IT Managers</li> <li>- administrators</li> <li>- Systems and Business Analysts</li> <li>- IT Service Director</li> <li>- internal / External Suppliers</li> <li>- other departments across AUT as customers</li> <li>- project teams (created by topics of interest)</li> <li>- working groups e.g. Knowledge Management group</li> </ul>
<b>A</b>	<b>Actor</b>	<ul style="list-style-type: none"> <li>- IS Manager</li> </ul>
<b>T</b>	<b>Transformation</b>	<ul style="list-style-type: none"> <li>- Monitor projects (i.e. academic timetabling), with administrators, Systems and Business Analysts, via e-mail, I-drive, I-tool</li> <li>- With other Managers, topics of interests, e.g. information architecture, e-mail + I-drive</li> <li>- With IT Service Director departmental issues, budget, HR... I-drive and e-mails</li> <li>- Internal customers/other departments, e-mail</li> <li>- Project teams, project steering committee and working groups, project details, I-tool and I-drive</li> <li>- Information is shared on I-drive by project</li> <li>- Drafts are e mailed, and then published and stored on I drive</li> <li>- I-tool is used to monitor progress in projects, not to share files</li> </ul>
<b>W</b>	<b>Weltanschauung</b>	<ul style="list-style-type: none"> <li>- Need to use top down Principle to change culture and freedom, not about control - its more about communication</li> <li>- There is no added value to centralise upload of information and access giving. It should link to the system</li> <li>- Issue: most managers do not want to be accountable for project outcomes, there is even no monitoring/reward</li> <li>- There is no efficiency because no one wants to be accountable, scared of change</li> <li>- Each project needs a competent sponsor / project leader</li> <li>- AUT has a commercial pressure to be efficient, but has, compared to other universities, the lowest admin/academic ratio</li> <li>- Compared to other universities AUT integrates all faculties and works more as a unit</li> <li>- Strong need for good IS tools as AUT is a big organisation and even geographical split in many campuses</li> </ul>
<b>O</b>	<b>Owners</b>	<ul style="list-style-type: none"> <li>- IS Manager</li> <li>- IT Service Director</li> <li>- AUT Governance</li> </ul>
<b>E</b>	<b>Environment</b>	<ul style="list-style-type: none"> <li>- E.M.T</li> <li>- Senior Management of the AUT</li> <li>- Commercial pressure for efficiency</li> </ul>



## Appendix 7 Interview records – IT manager (#2)

Interviewee: IT manager (#2)		
<b>C</b>	<b>Clients</b>	<ul style="list-style-type: none"> <li>- IT Strategy staff members</li> <li>- other departments at AUT on project groups</li> <li>- working groups (e.g. academic portfolio, information architecture)</li> </ul>
<b>A</b>	<b>Actor</b>	<ul style="list-style-type: none"> <li>- IT Strategy Manager</li> </ul>
<b>T</b>	<b>Transformation</b>	<ul style="list-style-type: none"> <li>- project documents, shared within the department through GroupWise</li> <li>- policy development documents, with other IT Managers, Directors and Executives, via e-mail, final version is then published on Knowledge Base</li> <li>- little finance and departmental budgeting, with Director, via e-mail, stored in GroupWise</li> <li>- IT processes + practices, worked with other IT-S staff on drafts saved in GroupWise, final version is then disseminated on Knowledge Base</li> </ul>
<b>W</b>	<b>Weltanschauung</b>	<ul style="list-style-type: none"> <li>- Staff training by the IT staff was not allowed by CEPD (Centre for Educational &amp; Professional Development)</li> <li>- IT is not pushing staff training enough</li> <li>- Some departments, such as HR, do not collaborate, i.e. for "IT user licence"</li> <li>- Not using IS in an efficient way results in high intangible costs</li> <li>- AUT governance does not understand the growing importance of using IT effectively and efficiently</li> <li>- There is no delegating governance at AUT, + they need to drive implementation of a "business enterprise architecture and information management with best practice"</li> <li>- File storage costs are increasing exponential, \$250,000 (2008). \$1.5 Mil (2010) and entire AUT revenue by 2026</li> <li>- Network building becomes cheaper, 10 GB downstream broadband, home 2 MB, I-drive 0.5 Terra Bite</li> <li>- IT department has no power, HR, etc. develop with IS team business cases for new developments, IT-S is then only hosting/monitoring the development</li> <li>- Wiki-Software was build into AUT to meet internal needs</li> <li>- first need a good information management then KM possible</li> <li>- Have to stop sharing files via e-mail, because public record act requires the storage of e-mails. Will cause storage problems</li> <li>- The 'enterprise document management system' will meet the identified user requirements</li> </ul>
<b>O</b>	<b>Owners</b>	<ul style="list-style-type: none"> <li>- IT Strategy team</li> <li>- E.M.T. (Executive Management Team)</li> <li>- Departments (Finance, HR, Marketing...)</li> </ul>
<b>E</b>	<b>Environment</b>	<ul style="list-style-type: none"> <li>- E.M.T. (Executive Management Team)</li> <li>- Departments</li> <li>- Law ( public record acts)</li> </ul>

