# The Paperless Organization

Improved processes and reduction in paper usage through wider use of electronic documents and tablet computers

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by

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# Abstract

This qualitative, descriptive research study aimed to investigate the way in which documents were handled in an organization in relation to how much paper was wasted, and opportunities presented to save paper via new technologies. For the purposes of this study, an example organization was chosen, being the University of Waikato in New Zealand. However, the findings of the investigations comprising this thesis can be considered generalizable across organization types.

The results of the investigations revealed that the university wasted a great deal of paper in the process of performing the three example activities: producing the university calendar, distributing meeting agendas and processing PhD student reports. These activities have been chosen, as an example of other practices, as they involve documents processing, several committees, and diverse types of tasks and includes staff and students working in different positions. This wastage was as a direct result of the inherent drawbacks of working with paper documents. These drawbacks were found to include: the high cost of producing, storing and maintaining paper documents, the risk of lost documents, the difficulties in sharing and tracking the documents, problems of security and delays caused by difficulty accessing the documents in a timely fashion. It was therefore suggested that working electronically would reduce paper wastage, and streamline the performance of the activities in the process.

Specifically, this thesis presents the tablet computer as the key to moving organizations towards their paperless futures. The research explores the potential of using tablet devices in general and the specialist facilities of the iPad in particular as an example of modern technology. Participants in the unstructured qualitative research interviews stressed the functionality provided by the iPad, which overcomes many of the drawbacks of using paper documents. They also highlighted the effectiveness and advantages of using an electronic system as comparing to the current paper-based system.

The final investigation presented in this thesis highlights the tools and applications of the iPad most promising for helping to reduce the use of paper documents in the workplace.

# Declaration of Originality

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: _____ On: 29/06/2012

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# List of Abbreviations

AB              Academic Board

APC             Academic Programs Committee

CSS             Creating style sheets

DMS             Document management system

DVC             Deputy Vice Chancellor

HDCPR           higher degree candidates' progress report

POP             Post Office Protocol

PSO             Postgraduate Studies Office

SMTP            Simple Mail Transfer Protocol

TREC            Text Retrieval Conferences

# Chapter 1: Introduction

Documents are essential to organizations. They provide a means of saving and maintaining evidence and records, they convey important information for and about the business and they facilitate the daily operation of the organisation. Efficient document management technologies are therefore important for all businesses. This research will suggest the modification to the currently used strategy for handling documents, arguing that electronic management would be the best option. The research proposes that organisations move toward a 'Paperless Organization'.

In order to determine the requirements for going paperless, the qualitative research used to discover the problems of using paper-based system and to examine the efficiency of e-documents and specialist facilities such as iPad device to overcomes these problems and reduce the use of paper. For the purposes of this study, the University of Waikato in New Zealand has been chosen as an example of organizations. Small groups of staff and students were individually interviewed in different investigations and an evaluation study. Two of the studies explore the drawbacks in the existing system through three types of practices, representing the university activities, which are producing the university calendar, distributing meeting agendas and processing PhD student reports in terms of paperwork, people, tasks, and the efficiency of productivity. Further examination and an evaluation of prototype software are conducted to discover the solutions of the drawbacks that draw on technology, such as electronic system, and tablet computer, for reduce the use of papers and improvements for current system.

Electronic documents, accessible through devices such as desktop computers, laptops, portable devices and smartphones, offer improved functionality in organisation document generation and management, overcoming many of the disadvantages of using paper documents. This thesis argues that information is more valuable when it is converted from traditional to electronic forms. Electronic documents can save organisations much money, time and effort by reducing the cost of using paper documents and associated incidentals including storage space purchase or rental and upkeep, employee wages and time spent managing and processing paper documents. E-documents can be organised

through electronic document management systems, which facilitate the ease with which documents can be accessed, located, retrieved, shared, modified, preserved and transferred.

Some of the disadvantages of using paper documents that can be overcome by going paperless including the impact on the environment and the organization, the cost in time, money and effort, and the delays in the progress of tasks. Finally, the material costs for ink, printers and photocopiers.

## 1.1 Environmental Impact

Paper documents have many advantages in respect to users' behaviours, feelings and habits. In the traditional paper-based system, paper documents were vital for business operation, and people preferred paper documents for reading, highlighting, analysing, annotating and for checking grammar and spelling mistakes. However, the increased use of paper documents has had serious negative environmental repercussions. For example, the manufacture of papers affects the environment, both in terms of the felling of forests for pulp and in the increase of carbon in the atmosphere owing to the reduction in the number of trees for carbon uptake.

As reported by the UN in 2006, about 312 billion tonnes of carbon are stored in forests' biomass alone. According to an assessment by the UN, almost 2.2 billion tonnes of carbon are added to the atmosphere each year because of the destruction of the forest (The Secret Life Series, n.d.). Global warming has been linked with this deforestation. The increase in demand for paper, including for documents, has seen the logging of a huge numbers of trees (Wood Paper The Zone, n.d.). To produce one tonne of paper, 17 trees must be felled. Paper making also causes significant water pollution, contributing to the statistic that clean water cannot be accessed by more than 300 million people in China alone (China.org.cn).

## 1.2 Organisational Impact

Traditionally, in the workplace, most organisations have depended on paper documents for daily operation, consuming large amounts of paper in the process. Over the past 20 years, there has been an increase in office paper consumption (paper for all printing and writing, and excluding newsprint, packaging and tissue) around the world, but especially in the West (Sellen & Harper, 2003).

The limitations brought by relying on paper documents include the need for space for storage and archiving and the need to employ persons to manage and maintain those documents. Time, money and efforts are wasted on filing, storing, searching and retrieving paper documents. Further, the functionality of paper documents is limited in respect to modifying, tracking, updating, retrieving and sharing.

With advances in technology, the handling of documents has been streamlined. Most recently, daily use of computers, mobile devices and tablets, and the corresponding competition between companies to produce devices with high quality features, have allowed for a reduction in the use of paper in the workplace. Many organisations have made the move towards going 'paperless' by employing technology to overcome the limitations of using paper documents and to protect the environment by reducing demand for paper. As part of this shift, digitising paper documents has become an important objective for organisations. An electronic document management system is expected to be easier and more efficient.

Some of the electronic methods used by organisations to improve their document management systems have included e-file systems, tools, applications, computing devices, tablets and smart phones. Staff can now process tasks electronically, removing the need to handle documents manually. Consequently, having several people working on the same document becomes possible, and sharing the document with other people can be quickly synchronised. Further, the improved tracking afforded by e-documents reduces the time needed for searching for and retrieving documents. Updating is also made easier by eliminating the need to reproduce the whole document with each update, as was required when updating paper documents.

Sellen and Harper emphasised that the means are provided by modern technologies to produce low-cost, high-quailty, personalised paper documents. Moreover, these technologies encourage the effective use of digital documents. Sellen and Harper provided examples of the advantages of employing modern technologies for handling documents. First of all, word-processing applications improve upon the capabilities of the typewriter for some functions such as create, modify, create memo and send mail. Email has become the most commonly used tool for delivering and distributing documents, messages and memos between

people and organisations and has practically eliminated the use of paper for this purpose in the workplace.

Digital documents are easily accessed through networks using smaller, lightweight, wireless computers, with longer life batteries. Additionally, a variety of documents has become available in electronic form, either on CD-ROMs/DVDs or online (e.g., dictionaries, catalogues, newsletters, magazines and journals). Information can also be published, found and retrieved online via network databases and search tools. Increasingly, digital databases, as well as those remaining paper-based systems, are being replaced by online applications. Digitising existing paper documents is also becoming cheaper as technologies for scanning and imaging, and technologies for converting data to an electronic document become readily available. In 1995, it was estimated that the percentage of all documents in organisations stored on paper was at 95 per cent, while those documents stored digitaly was at 5 per cent. However, in the last 10 years, the increase in the use of technology for personal or work purposes has considerably reduced the proportion of paper-based documents in organisations.

In recent years, the use of cloud computing has been a trend among companies, further reducing the use of paper documents. Cloud computing ensures that documents are accessible at all times, the hardware requirements in the workplace are reduced, and money is saved. Increasingly, tablets and smart phone devices are being used to access the cloud. The success of these devices on the market can be linked to their high functionality, appealing physical characteristics (e.g., they are lightweight) and reasonable cost. Further, as technology continues to improve, the simulated experience is becoming increasingly reflective of reality.

To investigate the impact and potential for new technologies in document management in an organisation, this research looked into the phenomenon as experienced by a university; a kind of organisation that involves complex relationships between people, processes, documents and tasks. In the subject university, the University of Waikato in New Zealand, the handling of most documents was based on manual systems, with a consequent negative effect on the organisation's productivity. The research investigates the drawbacks of the current system facilities and handling paper documents in three samples of the university practices, which are producing the university calendar, distributing

meeting agendas and processing PhD student reports. Furthermore, this thesis proposes the solutions for the highlighted drawbacks by examining the efficiency of utilizing e-documents through wider use of electronic system and specialist facilities such as iPad.

## 1.3 Statement of Purpose

The main purpose of this research is to study the potential for using new technologies for document management within organisations. A university is used as an example of a complex organisation. It is important to note that the findings returned in the case of this university will be generalizable across organisation types. Thus, the focus of this study is kept broad, by investigating the practices and approaches that the organisation undertakes in processing documents and by exploring how the use of paper might be reduced by using new technologies, without compromising convenience or security.

For the purposes of this study, published research already conducted on the University of Waikato and feedback from the staff and students is explored by the researcher. In addition, primary research is conducted on site to identify the relevant facilities and the advantages and drawbacks of the currently used system for processing documents. By using this information, it is then possible to propose paper-saving measures for the organisation's document management system.

An organisation can move towards paper free document management through a variety of means. However, this research focuses on just one of those opportunities: the advent and widespread use of tablet computers, and how the increasing commonness of this technology might be harnessed for a wide range of document-related activities within an organisation. The efficiency of employing tablet devices in terms of their potential functionality in handling documents will be explored. The research then offers valuable suggestions and recommendations to improve the efficiency of future systems for document management.

## 1.4 Objectives

The objective of this study is to explore the potential use of tablet computers to reduce the use of paper documents in organisations. This objective will be achieved by carrying out the following steps:

- Identify the nature of a small range of work activities in terms of people, paperwork and processes involved; for example, meetings, course

prescriptions, PhD student progress report, enrolment, exams and lecture notes.

- Discover the difficulties that negatively affect the efficiency of handling and distributing documents within the chosen activities.
- Explore the efficiency of activities and how they are supported at present, in terms of a small range of types of people within the university, for example the Chairperson, supervisor, lecturer, secretary/administrator and higher degree students.
- Determine the drawbacks of using paper documents and examine how this influences the productivity of processing these activities.
- Identify alternative methods that help to effectively reduce the use of paper documents and electronically increase the efficiency of processing the involved documents.
- Identify the different opinions of the associate people regarding the potential capability of tablet devices such as iPads and examine how such technologies could affect the work environment.
- Develop demonstration software to show how systems could be improved.

## 1.5 Research Questions

The research investigates the currently used methods for handling documents within an organisation (in either paper or electronic form). Several practices are discussed, using the University of Waikato as an example organisation. The following questions were devised to facilitate a deep inquiry into the topic.

1. What are the current approaches and methods used to accomplish processes involving documents in a variety of task types throughout the organisation?
2. What are the most significant issues affecting the processing of documents in the activities investigated?
3. How often do staff waste paper in the workplace?
4. Are paper documents still essential in terms of convenience, portability, transmission, sharing and modification? Explain.
5. What are the key challenges the employees face when dealing with paper documents in particular tasks?

6. Does the organisation have an electronic system, and does that system improve the efficiency by which the tasks involving paper documents can be accomplished? What kind of facilities do these systems provide?

7. What needs to be improved to enhance cooperation between staff, to allow them to proficiently share and complete tasks and work as a team on documents electronically?

8. How would tablet devices enhance the processes of the organisation? Can tablet computers be exploited to reduce the use of paper and improve process and handling efficiency in a large organisation?

## 1.6 Overview

This research seeks to answer the research questions given above, focusing on the use of tablet computers within the operations of a university. This includes assessing the efficiency of using electronic documents to overcome the inconveniences of using paper. The research also explores the real potential functionality of tablet computers in terms of document processing and the management of staff tasks and time on tasks. Below, an overview of the thesis is presented, including what each chapter covers and how it contributes to the research objective.

Chapter 2 is a literature review, which provides a background of related works on improving upon the use of paper documents via electronic methods. In Chapter 3, the research design is described. This includes the research method, its justification and the approaches employed in conducting the investigations. Participants' characteristics are also outlined.

The research findings are presented across a number of individual chapters, according to the different studies with specific purposes. Chapter 4 includes a preliminary analysis (Study 1) of different practices around the university in terms of the use of documents involved in meetings, course prescriptions, PhD student progress report. The results of this first analysis then assist in facilitating deeper analysis in Study 2 (see Chapter 5), which investigates activities in terms of the people performing the tasks and the current support available for these activities. Chapter 6 includes Study 3, which concentrates on the analysis of the potential facilities and functionalities of using tablet devices for handling documents and for managing employment tasks and times. This leads to a simple design of electronic software demonstrated in Chapter 7 to examine the efficiency of

processing documents electronically and reducing the use of paper documents. Chapter 8 identifies the functionalities, facilities and features of tablets, web applications and electronic tools that are commonly used for handling documents and managing time and tasks to reduce the use of paper. The discussion of the whole analyses is highlighted in Chapter 9, and addresses the most common and unique aspects of the investigations. Chapter 10 concludes the research and provides suggestions for future work.

# Chapter 2: Literature Review

This chapter discusses the previous research related to the management and use of paper documents within organisations, and the reduction in use of paper and associated improvements in efficiency. Primarily, the literature is discussed with the purpose of providing a background of other organisations' experiences in dealing with either paper or electronic documents. This chapter also examines the tasks and functions involved with paper documents and electronic documents in particular.

## 2.1 Document definition

Documents are different from one field to another. Therefore, there are numerous definitions for use and type. According to the Merriam online dictionary, documents can be defined as proof and evidence, writing conveying information, and computer files. A document is defined as proof and evidence when used as an original or authorized paper, relied on as evidence of or support for something. Alternatively, a document can be writing conveying information, including in the form of a material substance such as a coin or stone having on it a demonstration of views by means of some conformist mark or representation (Merriam-Webster, n.d.).

As well, it can be defined as documentation. In the computer industry, documentation is the material provided to a consumer or other users regarding a product or the procedure of preparing it. In computer science, the document is a computer file comprising information input by a computer user and usually a part of work created with an application, as by a word processor (The Free Dictionary, n.d.).

Document, as identified by The Free Dictionary website (Whatis, n.d.), can be used for convention; that is, based on some comparable or prior documents or specified necessities. For instance, newspaper problems, distinct newspaper stories, verbal history recordings, executive orders and product stipulations. Being paperless requires using electronic documents (e-documents) that can be recorded by electronic devices such as computers to display, interpret and process them.

E-documents, as identified by Kane (n.d.), exist only in electronic form and are generated by software and stored on a computer, network, archive or other storage media. According to Barron (1996), e-documents are "a structured collection of information objects (text, images, video, sound etc.) or references to such objects stored in digital form, which furnishes evidence or information upon any subject". Barron also highlighted that e-documents can include multimedia such as video, sound, text and graphics, which cannot be printed and must be read on a computer. In addition, some documents contain hyperlinks, which link to other documents. We can use the term hypertext document to identify the distinction between text-only documents with links and multimedia documents.

To summarise, the term 'document' may be applied to any representation of meaning, but usually refers to a document in electronic format or to one or more printed pages.

## 2.2 Background

In the past, most documents were on paper and that was the best way to deal with documents (Fuller, 2002). Paper was invented in China, in AD 105. Over the years, paper was made from macerated vegetable fibre, tree back and other vegetation, or from linen and cloth rags. Paper production was difficult and timely (see Figure 2.1).
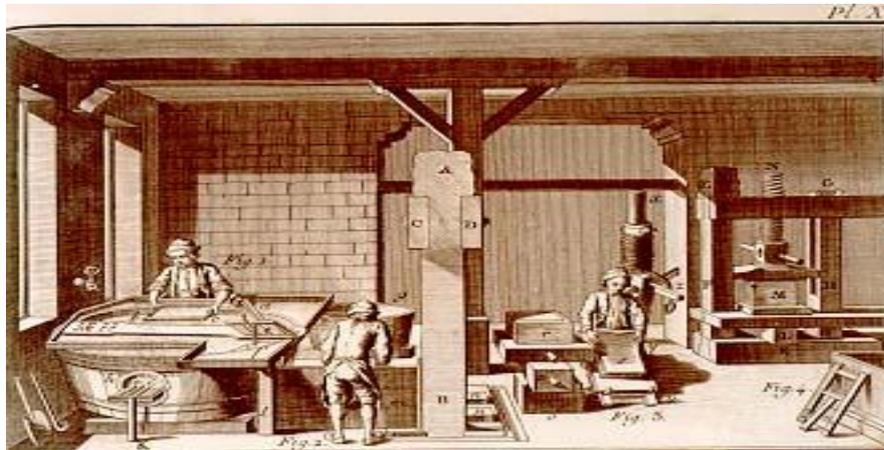


*Figure 2.1:* Thirteenth century paper production involved dipping paper moulds into vats of pulped fibre before placing sheets into heavy presses to remove the remaining water from the paper (source: Fuller, 2002).

Electronic paper began its first stages of development in the late 1960s and early 1970s when the Gyricon was invented by Nick Sheridon in the Xerox Palo Alto Research Center. The idea was for Gyricon to be used in office and

other word processing. However, the display was dull and the contrast was lacking such that it was not useable for its intended purpose (Whatis, 2005).

Smith (2010), in his analysis of the paperless office concept, determined that "we now understand that the 1990s was the most popular century with regards to the paperless office concept. This has established that the concept was the busiest, especially when the economy was booming and investment was possible". His findings can be summarised by the following graph, which presents the percentage of activities adhering to the paperless office ideology across four decades: the 1970s, 1980s, 1990s and 2000s (see Figure 2.2). As Smith stated, the concept was most commonly acknowledged in the 1990s (60 per cent), with this figure falling to 40 per cent by the 2000s.
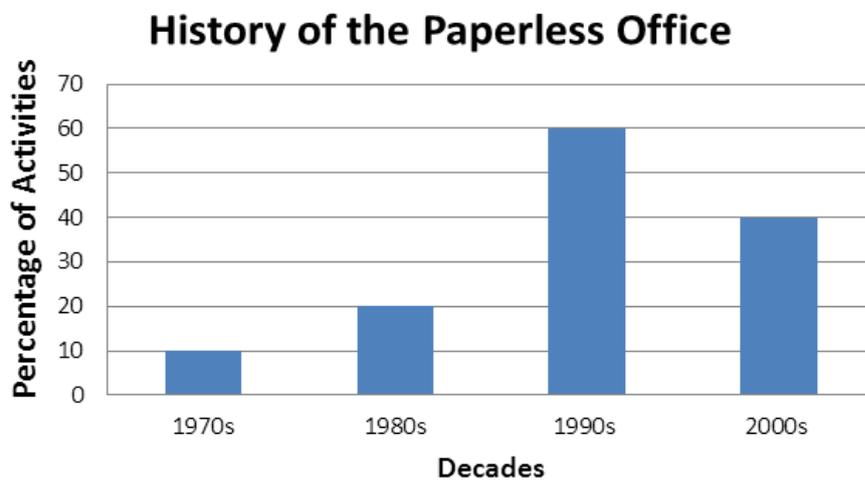


*Figure 2.2:* The popularity of the paperless office concept across four decades (source: derived from Smith, 2010).

Workplaces still rely heavily on paper across a range of practices. However, the capacity of paper documents to achieve full functionality must be taken into account. Firstly, offices using paper need to store, organise and manage that paper through a filing system that includes equipment such as shelves, folders, filing, cabinets and microfiche systems. Such a filing system needs to be maintained and requires a considerable amount of space. Conversely, in a paperless office, there is no need for physical equipment beyond a desk, chair and an electronic device such as a laptop, PC or tablet computer with a large capacity to store documents either locally or in online storage. Certainly, as can be seen by Figure 2.2, the move towards paperlessness has further to do with the growing rate of technological development, rather than the popularity of the paperless

office concept. Technologies within the innovation of the Internet have influenced the behaviour of people, encouraging the use of electronic documents.

Paper documents do remain useful in some respects. However, when documents are electronically handled a number of the challenges and limitations of paper documents are overcome. E-paper (radio paper, electronic ink or just electronic paper) allows the user to browse documents on screen. Moreover, editing e-documents is much easier, with the same document able to be edited endless times. Other advantages of e-documents include their portability and ease of storage. Further, e-paper features a stable image that does not need constant refreshing, it has a wider viewing angle, and reflects ambient light rather than emitting the own light, make e-paper more comfortable on the eyes than conventional displays.

## 2.3 Related Research

Many organisations around the world are adopting the innovations afforded by recent technological developments to augment their work efficiency and productivity and to save time and money. A significant aspect of this is the use of electronic documents and document management as an alternative to using paper documents, often with a view towards reducing paper consumption in the organisation. Some studies on organisations that have made this shift are presented below.

The national school system in New York, as reported by Ryan (2009), made an effort to reduce paper usage by digitising its yearly parent/teacher/student survey. In 2008–2009, about 500 schools participated in an online-only version of the survey, saving hundreds of thousands of sheets of papers. Other benefits included savings in time and a reduction in forms lost.

The University of Waikato has been working on reducing the use of paper documents by employing technologies through an online purchasing system. This has led the university to buy 13,573 (29 per cent) fewer reams of A4 photocopy paper than in the previous year. In addition, the use of the UniMarket system saved $78,000 on photocopy paper, ink and toner usage in that financial year. As a result, the university's environmental footprint has been reduced. Ms Goddard, the university's Environmental and Sustainability Coordinator said, "We've saved approximately 57 pine trees—one 25 meter tall tree makes around 119,100 sheets

of paper, and each ream contains 500 sheets. Our paper is chlorine-free and the mill it comes from is environmentally certified" (University of Waikato, 2012).

The video 'How MasterControl Makes Your Job Easier' (n.d.) comprises interviews with a number of employees involved in different roles in an organisation that has recently adopted a new electronic system known as MasterControl. Employees are specifically asked about how the system compares with the previous traditional paper-based system. The overall finding is that the most effective method of reducing staff time on task and saving money and effort is to go paperless. In the video, the employees note that there is no more need to carry around large boxes, which delayed speed of work. All documents are storing in the system and available for everyone to access from their desktop or laptop. Additionally, the Quality System Administrator highlighted that, in the traditional system, the documents would be manually taken from staff to other people to obtain their thoughts and recommendations about a particular task, then again returned to the relevant people after the changes had been made, and so on to get the initial approval. In contrast, using MasterControl, the documents can be accessed, filed and sent by different users. The staff are able to write comments and reports electronically and everyone is able to see what others write.

The Environment Agency, Abu Dhabi launched the Paperless Day initiative in 2008. Paperless Day was held for the fourth time on 23 November 2011, with approximately 200 global s participating in this day. Razan Al Mubarak, Assistant Secretary General, said:

> *[A] high level of paper consumption remain[s] in many organisation[s]. Paper-Less Day demonstrates that a substantial reduction in paper consumption can be made simple and without pain, which we hope leads to a greater consciousness and effort the other 364 days of the year. The only impacts are positive: less paper usage means less trees are cut down, less energy is used in the end-to-end process and indeed it means less cost for the organisation too* (Gulfnews.com, 2010).

In recent years, organisations in the electronics industry have been competing to develop products that stimulate the imagination of consumers. Tablet devices have become one such success study. They are an increasingly popular electronic device, as they have been designed to facilitate customer needs through a variety of useful applications. In the workplace and in educational

organisations in particular, there have been several studies conducted to examine the efficiency of using tablet devices as part of daily business operation.

In Hilton Worldwide, 1,700 conference attendees were given iPads to facilitate both their hotel stay and their experience of the conference. The attendees could order beverages from wait staff and schedule wake-up calls. As well, users could connect with other attendees on social networks effortlessly and get more information about conference speakers and panels because the tablets were pre-loaded with conference information. Consequently, the percentage of the meeting's paper consumption was reduced by 70 per cent, saving an estimated 50 trees (Hansen, 2011).

Universities around the world are seeking to employ the functionalities and facilities provided in the tablet devices in the educational process. These devices have the potential capability to store the materials and curriculums to be accessible from anywhere and at any time. Moreover, these devices can handle a range of processing tasks such as an enrolment, checking students' attendance and conducting exams, within suitable applications.

In terms of taking advantage of new technologies to develop and facilitate the educational process at a university, the University of King Khalid in Saudi Arabia used iPad devices in electronic tests (see Figure 2.3). The university initiated this method successfully in the Faculty of Medicine, to the delight of students and staff. The step represents a shift in the use of special technological methods in modern education. The university intends to extend the use of this technique to its other colleges. It is also worth mentioning that the results of applying e-learning at King Khalid University revealed distinct advantages over traditional education. A study of more than 2,700 students across 60 classes being delivered either traditionally or electronically showed improved student achievement in those classes using e-learning tools, possibly owing to the increased capacity granted by the technology to integrate a variety of methods in the teaching and learning. The percentage of fails in these courses was reduced. Therefore, it was concluded that e-learning increases the excellence and skill of students (Moria, n.d.).

*Figure 2.3:* Students at King Khalid University doing their exam using iPad (source: Moria, n.d.).

Similar to the Saudi Arabian example, medical school students at Yale School of Medicine received iPads for use in the medical curriculum and in the hospital to replace paper charts and records. Michael Schwartz, Assistant Dean for Curriculum at Yale's medical school said that the students are expected to use their iPads as diagnostic and record-keeping tools. Schwartz highlighted that students can also use the iPad during consultations with patients to show them images of what is affecting them. He said, "You can take a small screen into their room, show them a CAT scan or MRI, and you can have a discussion with the patient" (Mathis, 2011).

## 2.4 Issues Related to Documents

Documents are an integral element in the workplace, as they contain the essential information for the operation of the organization. Interactions with documents in organizations involve various kinds of tasks and functions. This section details some of the task and function types associated with documents in general. This provides the basis upon which tasks can be discussed in the chapters to come.

### 2.4.1 Bulk

Massive amounts of paperwork, such as delivery receipts, payroll records and computerized reports are generated through business. Documents, such as invoices, forms, applications, photos and articles require storage space in which to be arranged and valuable or sensitive documents need to be stored in a safe,

secure environment, in which they will be protected. The bulk of documents, when these documents are in paper form, means that not only is onsite storage necessary, but there might also be a need to pack up the paper files for off-site storage. Such files could also be converted to electronic form to reduce expenses and decrease staff hours for the storage of documents (Hayden, 2011). The option of converting and storing paper documents electronically is the more convenient of options, as it is not easy to access documents stored in cabinets and drawers, regardless of how well they are organized.

The rapid retrieval of documents facilitated by a digital database system is more efficient. For this reason, many s have opted to move to electronic document storage. There are several services and systems available to support conversion of paper documents. One of these services is Scandoc Imaging (2009), which uses TIFF and Adobe Acrobat PDF formats, along with all other major images, document management systems, text and database formats to convert  medical records and office documents to digital images. This process is termed variously as document scanning service, document imaging or digital imaging (Scandoc Imaging, 2009). The results are that the scanned document images and medical records are made available to the  via a local server or secure web server.

Bulk Electronic Document Delivery and Online Storage (Bulk Document Scanning, 2011) is one of Scandoc Imaging's services. It allows for the secure downloading or uploading of electronic documents. This online service supports the reduction of paper use by allowing the organisation to handle their bulk document-scanning requirement. This service can perform scanning projects such as book scanning, magazine scanning, paper document scanning, newspaper scanning, medical reports scanning, microfiche scanning and file conversion. The benefit of this web service include the end of the need to physically store paper documents and associated maintenance, and the freeing up of floor space previously occupied by the physical filing system.

### 2.4.2 Access

Documents, either electronic or paper, need to be available for the user. The accessibility capacity of electronic and paper documents is dissimilar. To find a physical document in a filing system, one requires the full details of the document. Moreover, should the document be out of order in the filing system, locating it becomes extremely difficult. Conversely, electronic documents can be

quickly retrieved via computer and the electronic filing system can be searched to locate specific documents or types of documents. In addition, many tools can help to navigate and jump to particular parts and sections in the context such as graphics and references, allowing the reader to locate relevant content quickly. Electronic documents can be accessed from anywhere at any time by multiple users as needed.

### 2.4.3 Retrieval

The aim of saving and storing documents either electronically or physically is to facilitate document retrieval. Information retrieval is counted as one of the oldest disciplines in Information Technology and Science and was defined by Morres (1950, cited by Nilo, 2011) as "the process or method whereby a prospective user of information is able to convert his need for information into an actual list of citations to documents in storage containing information useful to him".

Extending this definition to accommodate electronic documents, document retrieval can be defined as the ability to search for documents by matching the query stated by the user against a set of free-text records through keywords and other attributes such as date and author. The records are not necessarily structured text; they might be any type of document, such as daily articles, real property records or paragraphs in a manual.

Today, document retrieval systems are widely used in the form of online search engines such as Alta Vista, Yahoo and Google. The first emerge for the document retrieval as field of inquiry and application was in the late 1940s and early 1950s. This emergence was in response to the growing rate of publications in the fields of science, which raised concerns regarding how scientists would remain enlightened of new improvements as they were being reported in the scientific literature. Thus, in the 1950s and 1960s, the first computerized information retrieval systems were launched (Liddy, 2006).

By the 1970s, a number of techniques, including the Cranfield collection (of several thousand documents), had been shown to achieve well on small text corpora. The Cranfield experiments, which ran from 1957 to 1967, launched the basic evaluation paradigm of metrics and experimental procedures that would come to be proven scientifically valid, and thus establish document retrieval as a field of study (Liddy, 2006).

In 1992, with the first of the Text Retrieval Conferences (TREC) at the National Institute of Standards and Technology, large-scale comparative testing of document retrieval systems was begun. This has been maintained and expanded annually. The aim of these annual events is to assess the information retrieval society by providing the infrastructure needed for evaluation of text retrieval methodologies on large text collections. This allows researchers from around the world to test and share details of their systems, through participating on universal test collection of queries and documents. Most members of the document retrieval field believe that TREC positively influences scientific advances and the growth of concentration on document retrieval (Wikipedia, 2011).

Many types of theoretical model are used in document retrieval systems to determine how matching and ranking are performed. The most common models are the Probabilistic, Vector Space, Boolean, and Language Modelling methods. Jones (2007) has found that personal information that has been stored can be processed via four steps. These steps can also be used to find shared documents. For the purpose of this thesis, the first of these steps, 'Remembering', is outlined below.

***Remembering (to look at)*** the documents and files: The opportunity of re-locating and reusing information is often missed because people forget to look. The result is that often a document can be written before realising that the document had already been authored. A study conducted by Whittaker and Sidner (1996, cited by Jones, 2007 ) showed that participants often failed to look inside to-do folders containing actionable email messages, Because of lack of confidence in participants abilities to remember to look, they elected to leave actionable email messages within an already overloaded inbox. Barreau and Nardi (1995, cited by Jones, 2007), observed that people try to remind themselves about an existing file associated with tasks needing to be finished by placing that file on their desktop.

### 2.4.4 Portability

Physical paper is very convenient to handle and use in terms of portability. People feel more comfortable when using a book, newspaper, notebook or printed documents that can be read anywhere and carries, scribbled on and thrown away when done. The viewing of paper-based documents has remained favourable in terms of portability. However, technology is playing a major role in removing this advantage of paper documents.

Wireless notebook technology and handheld devices such as smart phones and tablets computers have significantly increased the portability of online information. Further, the portability of online documents can be improved through web-based networks and remote data access. Paper can be replaced in terms of portability by mobile communication. Moreover, the advantages of e-documents concerning information access and the communication aspects of electronic note taking will further facilitate their take over from paper documents on portability and simplicity issues through ubiquitous, wireless, access and mobile phone/handheld technology.

The younger generations are making the move towards these highly portable devices with increasing rapidity. Most students prefer to store their books, notes and audio files electronically on their mp3 players, tablet computers and mobile phones. For this reason, schools and universities should be leading the way in online portability.

### 2.4.5 Security

As electronic documents that contain critical information generally go through automated process, organizations should aim to secure these documents appropriately. Most of information security solutions are able to do that. However, it can only protect either at their storage location or while transmission. This is not enough. When these documents get to the recipient, the protection is lost. Meaning, these solutions does not provide protection for the entire lifecycle of the electronic document. This may result to that unauthorized recipients can view the vital information.

## 2.5 Disadvantages of Paper Documents

This section highlights the most significant issues encountered by when using paper documents. The use of paper documents has a negative effect on the efficiency of processing and distributing documents in the workplace (MicroPal Systems, n.d.).

### 2.5.1 High cost

The following calculation provides an explanation of the relation between labour cost and paper-based filing system. For instance, when a hundred paper documents are created or received by an organisation every day within an efficient paper-based filing system, the average of each document takes six minutes in order to retrieve and file. The total time needs to handle these documents take 10

hours per day (6 x 100 minutes = 10 hours per day). If we take into account that the hour rate for the labour is $14 (social security and benefits are included), this leads to total labour cost per year equals ($14 x 10) x (226 workdays) = $31, 640. If considering overhead cost for retrieving and filing old documents, the cost will be much greater than expectation.

### 2.5.2 Lost and missing documents

A study conducted by Cooper and Lybrand reported that "7.5% of all documents get lost and 3% of the remainder is misfiled". This means 10 documents out of hundred are likely to be setting on the wrong place and some documents cannot be reproduced in case of lost. As a result, the risks and costs associated with paper filing systems are dramatically increased.

### 2.5.3 Hard to share

Paper documents are only located in one place at a time within Paper-based filing systems. Therefore, office workers generally have to make their own copies to share documents. "The average document gets copied 19 times, and of course, many of these copies also get filed", reported by Cooper and Lybrand.

### 2.5.4 Security issues

The security control of maintaining paper documents is very low. Therefore, it is difficult to track who used or copied such an important paper document. This may result into risking an organisation by leaking vital information to unauthorized personal.

### 2.5.5 Storage problems

Storing huge number of documents in office cost organisations financially. For example, to store five thousand documents require a large space and purchasing cabinets and annual cost for maintaining. However, using an external 160 GB hard drive allows workers to store the same number of documents mentioned above costing approximately $100.

### 2.5.6 Slow access

In case of paper-based system, Finding and reviewing a document is slow. For instance, when a customer requires a document and needs immediate response, there will be delay to the respond due to the amount of time spent searching for the document. This then could lead to customer dissatisfaction. Furthermore, the amount of time spent to refile documents might result in lose some of them.

## 2.6 The Advantages of Using E-Documents

In response to the issues and drawbacks of using paper documents as outlined in Section 2.5, this section discussed the advantages of using electronic documents as an alternative to paper.

### 2.6.1 Access

As mentioned, electronic documents overcome the problem of locating and accessing physical documents. In recent years, most documents have been digitized for electronic use. After scanning, these documents become available and can be accessed from any computer either by authorized employees in specific organization or through the Internet. This direct access stands in obvious contrast to traditional paper document storage, request, retrieval and delivery.

Further, when traditional files are used, they cannot be accessed simultaneously by more than one user. Tracking the movement of these files can also be difficult. In contrast, users of e-documents can retrieve, share and send files at any time, from any access point, regardless of how many people are already accessing the file. The fact that this can all be done using a single computer further amplifies the advantages of using e-documents over paper documents.

In the university example, the organization's consumers (that is, students) can face problems accessing the required textbooks for their courses when these books are printed, rather than electronic. These problems stem from the cost of some textbooks and a lack of availability in libraries or via used book stores or websites. E-textbooks offer a solution for students, who can access them any time during their studies. The benefits for reducing paper usage include a reduction in the number of pages photocopied from reserve collection textbooks in libraries, and a reduced need for printed textbooks.

Currently, about 10,000 e-textbooks can be accessed by students through a third-party company called Course Smart. This collection includes titles from the five biggest textbook publishers. Course Smart is a subscription-based service that charges a fee for students to access e-textbooks of their choice for a limited time. According to Anaheim University, which was the first paperless university, spokesman David Bracey said, "many of our processes are already digital, and we are now working with the publishers to convert all of our textbooks into e-books

so that our entire curriculum can be downloaded and stored on the Sony Electronic Book Reader or the Amazon Kindle" (Bracey, 2009).

### 2.6.2 Storage

Documents need to be stored and saved in a convenient place. As already mentioned, paper documents require physical filing, which costs space, employee hours and money for equipment and maintenance. In some cases, such as for large drawings or photographs, special storage equipment is needed. Then, even if all precautions are taken, in the event of fire or flood for example, these documents can be lost. There is no option for backing up files as there is for electronic documents.

The importance of allocating space for and organizing information electronically was put forward by Vannevar Bush who used his Memex device to store all his books, records and communications. This thesis subscribed to his idea that people, while good at accumulating documents, are not good at selecting and retrieving their items. Currently, most use electronic systems designed to save items with their metadata such as name, price, type, model, size and location. Documents can be stored in elaborate systems that support users to satisfactorily save and retain their documents for later retrieval.

Referring again to the library example within the context of a university, where books are stored on paper, the size of the library becomes an issue, as does the transport, maintenance, replacement, purging and expansion of the collection. An e-library in contrast requires only a well-organized hard drive. Further, with the ever-expanding capacity of both hard drives and online server space, it seems unlikely storage space will become an issue within the lifetime of the author of this thesis. In using e-documents, users have many options for saving and sending those documents, including by email, flash memory, CD or DVD or by storing them on a file system.

### 2.6.3 Filing

When people work on a task, including ones that involve e-documents, they typically require some assistance to organize, store and save their progress. Lists or calendars can be used to this effect, such that these days these tools have become crucial for most people. When lists and calendars and other tools are used electronically, they achieve a greater functionality, helping organize the users'

files, documents, time, tasks and appointments. Using these systems does not diminish the capacity of the brain to achieve these tasks alone.

A Document Management System (DMS) is a kind of operating system to organize predictable data, keep track of files, allow users to store, retrieve, update, backup and restore files and to protect data from viruses. Such systems also provide a degree of privacy, as well as customizability. Many programs offer the capacity to update data in the same file, almost simultaneously. Via the file system programs, the users can access the data by file name or directory. The physical location of the computer files can be maintained by using file systems on data storage devices such as optical discs, hard disk drives, floppy disks, or flash memory storage devices. File systems have many features allowing the users to create folders with sub-folders, name these folders, back up the data, restore anytime, and protect the data from viruses and access by unauthorized people.

There are many benefits of using a DMS. Some of these benefits are tangible (that is, they can be measured by the senses and quantified), whereas others are intangible (that is, not easy to measure and attribute to the use of a DMS) (Enterprise Content Management, n.d.). Some tangible benefits of a DMS are listed below.

### 2.6.3.1 Reduced storage

Scanning documents and integrating them into a DMS greatly reduces the space required for document storage. One effect of this is that commercial property is no longer necessarily required for the operation of a business in terms of storing its files.

### 2.6.3.2 Flexible retrieval

E-documents provide for retrieval that is more flexible, with no limits placed on how many people can access the document at any one time. Further, by storing documents electronically through a DMS, they can be located and retrieved in less time without having to leave one's desk.

### 2.6.3.3 Flexible indexing

Electronic documents can be stored within a DMS and indexed in several diverse ways concurrently.

### 2.6.3.4 Improved, faster and more flexible search features

Due to the way in which electronic files are indexed, they can be retrieved by any word or phrase in the documents in a DMS. This is known as a full-text search. Moreover, single or multiple taxonomies or categorisations can be applied to documents and folders to allow for useful classification and categorisation of documents.

### 2.6.3.5 Controlled and improved document distribution

E-documents are easy to share in a controlled manner with colleagues and others through networks, by email or via the web.

### 2.6.3.6 Improved security

DMS provides enhanced document protection for sensitive documents. Many solutions are introduced by DMS that control the access of individuals and groups to folder and/or documents. Further, an audit trial can be provided by the DMS to show who browse or modified an item and when. Such security and tracking measures are not possible in the traditional paper-based model. Many of the security concerns of paper-based systems are in fact removed by the security tools available in the DMS.

### 2.6.3.7 Disaster recovery

E-documents can easily be backed-up for off-site storage and disaster recovery by a DMS, which provides reliable archives and an efficient disaster recovery approach. This is not possible with bulky and perishable paper files.

### 2.6.3.8 No lost files

Replacing lost paper documents is expensive and time consuming. However, within a DMS, electronic documents are centrally stored and protected from loss by a range of in-system safeguards; they cannot be lost or misplaced. Moreover, the rate of misfiling is likely to be less, and easily rectifiable in cases that this does occur. Through the Full-text searching mechanisms, the files can be quickly and easily found and moved.

### 2.6.3.9 Digital archiving

Documents to be retained can be protected from over-handing by storing them electronically in a digital archive.

### 2.6.3.10 Improved regulatory compliance

The organization can confirm the validity of information saved and display compliance with policies and obligations through the combination of security control, audit trails, archiving and disaster recovery provided by a DMS.

### 2.6.3.11 Improved cash flow

The flow of cash and all the documentation associated for make decisions can be immediately accessed and centrally controlled, throughout enhancing the productivity of processing documents-based process, for instance, invoices, debt collection.

## 2.7 Conclusion

The efficiency with which workplace tasks can be performed depends on the way in which documents are processed and the systems used. It is the contention of this thesis that systems still reliant on paper documents are more inefficient than systems that have been digitized. This chapter has provided an overview of paper and electronic documents, including the advantages and disadvantages of the document types in relation to workplace efficiency (see Sections 2.4–2.6). It has been argued that technological developments over the last 50 years have led to improvements in the way that documents are used. This has been supported by examples of the experiences of several (see Section 2.3).

It is clear from Sections 2.5 and 2.6 that electronic documents have many advantages over paper documents. The observation is that the use of paper documents is convenient in some respects. However, their drawbacks are overcome by the functionality of electronic documents. Processing tasks through electronic documents is more efficient, as users can store large amounts of information without the concern for storage space. Additionally, accessing electronic documents is not restricted in space; they can be simultaneously accessed from multiple devices through an electronic system or the Internet. Users can also more easily retrieve e-documents, as they can be found by words or phrases through search tools connected to the DMS in which they are stored. The flexibility of sharing and distributing electronic documents is also far enhanced in comparison to traditional documents. Colleagues can work on the same file concurrently, and files can be emailed and shared over the Interment. The ability to make as many copies of the e-document as are needed allows for changes to be made to the copies while the original is maintained. Finally, electronic documents

can be updated at any time and the new versions provided to the users instantaneously.

To summarize, the literature review highlighted that many organizations improved their manual systems that rely on paper documents by using technology. It has been observed that the use of paper documents has negative effects on both organization and the environment. Furthermore, the functionality of paper documents is not efficient in terms of different tasks such as access, sharing, retrieval, portability, security, synchronization. Handling paper documents has many disadvantages, such as high cost, the potential for misplacing them, difficultly in sharing, and storage and security problems, leading to a reduction in productivity in the workplace.

Electronic papers effectively overcome the drawbacks of physical papers for processing tasks. Furthermore, the digitized documents can be efficiently administered through electronic file systems. These systems have the facilities and functionalities to significantly reduce the consumption of paper and achieve tasks competently. Many organizations have designed software and electronic systems that can be accessed from different places.

Furthermore, many different types of organizations utilize tablet devices for processing electronic documents stating that these devices play a major role in reducing the use of paper and increasing productivity and collaboration between staff. These devices have high functionality compared to paper for handling documents in terms of reading, sharing, transmission, synchronization, tracking and retrieval.

Taking a university as a particular example this research will investigate the effectiveness of the use of electronic documents and tablet devices in reducing paperwork and increasing productivity in the workplace.

# Chapter 3: Research Methodology

The research investigates the capability of tablet computers, specifically the iPad, to help effectively handle documents, accomplish tasks in electronic manner and apply the notion 'paperless' in an organization. In determining this, it is necessary to examine the current system used for processing documents in many practices around an organisation. The University of Waikato has been chosen as the example organisation on which this thesis is based. Following the examination of the current system, the potential facilities and functionalities of tablet devices for improving the document handling process are assessed, and the use of an electronic system is compared to the traditional system.

This study seeks to answer the research questions by conducting three types of investigations of the chosen practices and one more user study evaluating a prototype electronic system. In order to perform these studies, interviews of individuals are conducted to determine the efficiency of handling documents in current practices. In addition, other individuals took part in another study in order to explore the potential capability of using tablet devices such as iPad for reducing the use of paper. Furthermore; trial system is evaluated by number of individual staff and students who participated in user study based on questionnaires. These studies were largely interview and survey based; hence, this chapter describes and provides justification for the research method used for conducting the investigations and collecting the data.

## 3.1 Methodology

This research employed the descriptive method of research, which supports the researcher to gather information concerning current prevailing conditions and practices in the area of study. This method can provide quality, accurate findings on any subject (Angilo, 2011). Employing the descriptive research method ensures that the responses provided by the interviewees give rich information on the research question. As the respondents chosen for the study provide firsthand accounts of the phenomenon under study (e.g., the practices involving documents in the university), the data obtained enhance researcher knowledge about the phenomenon, allowing him or her to pursue secondary data

sources, thus deepening the quality of the data obtained. The aim of the descriptive studies is to find out 'what is', so the methods used to collect the descriptive data include observation and survey (Borg & Gall, 1989, as cited in What Is Descriptive Research?, 2001).

The research endeavours to explore a variety of activities around the university in regards to the people, tasks, processes and documents involved. The research identifies the currently used systems, applications and support tools, and determines the drawbacks and problems encountered by the staff and students. Following this, the study can provide efficient suggestions to improve the procedures and techniques used to share and process the documents. These suggestions involve digitising the process, and moving the organisation towards being paperless.

### 3.1.1 Research data type

The descriptive research method can use qualitative and/or quantitative data, which gives the researcher a variety of options from which to choose when conducting his or her research. For the purposes of this research, the qualitative research method was used to collect the data because verbal information was deemed most useful to understand the social reality in individual groups in the university and to explore their experiences.

Thus, the qualitative method was used to provide valuable information about the currently used systems, techniques and approaches in different types of practices around the university. Staff and student behaviors, experiences, perceptions and recommendations were considered to discover the drawbacks and obstacles that influence the efficiency of distributing and processing documents in the organization. These same data are used to suggest improvement (through tablet computers) to methods of sharing, modifying and annotating documents. Before providing further information about the current study, it is appropriate to provide some explanation of qualitative research.

This investigation requires the researchers to explore the behaviors, perspectives, feelings and experiences of individuals; the qualitative approach is the proper method for many reasons. First of all, the qualitative approach collects verbal information rather than numerical information through individual interviews. Secondly, qualitative research is a type of social inquiry that concentrates on how people interpret and make sense of their experiences and the

world in which they live; for example the people involved in the studies provide some valuable information about their experience in regarding to the chosen practices. The qualitative research method aims to understand the social reality of individuals, groups and cultures. For instance, this method allows the researcher to recognize the variety of opinion for individuals involved in different positions and practices. Qualitative research was defined by Ereaut (n.d.) as having multiple focal points (see Figure 3.1).
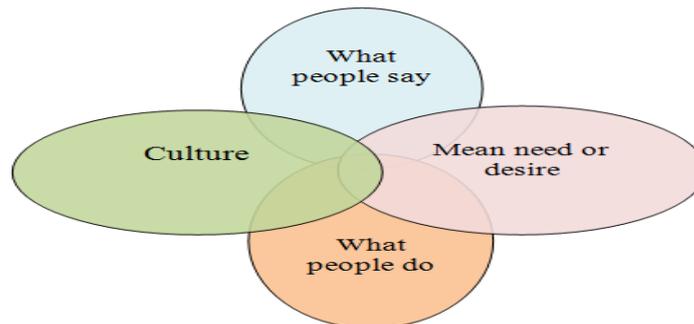


*Figure 3.1:* The focal points of qualitative research, as represented by a Venn diagram with the intersecting point being the data collected (source: Ereant, n.d.).

To explain these focal points, the following definitions are given by Ereant (n.d.):

> ***What people mean, need or desire:*** *emotional drivers, conscious and unconscious; researching the psyche.*

> ***What people say:*** *the information they have, what they comprehend; investigating the conscious mind.*

> ***What people do:*** *the actions they take, and what they see themselves doing; researching important behaviour.*

> ***The culture within which people (and brands) live:*** *culture forces and meaning systems; researching shared meaning, norms and codes.*

## 3.2 Data Collection

In qualitative research, the data can be gathered from different types of sources and by various techniques including records, documents (written, workplace or web-based), case-study, observation, survey or interview. An interview technique was used to collect the qualitative data to acquire essential information about the interviewees' opinions, predictions, experiences and perceptions regarding the facilities, functionality and efficiency of the currently

used system in the workplace, and about the improvements offered by tablet devices.

### 3.2.1 What is 'interview'?

An interview involves talking and listening to people to gather data from individuals through conversation. The researcher/interviewer collects the data, often by using open-ended questions. The subjects, chosen due to the importance of their views, are the primary data for the study. Kvale (1996, p. 14, as cited in Sukamolson, 2005) regarded interviews as "an interchange of views between two or more people on a topic of mutual interest, [with] human interaction for knowledge production [at its centre, and emphasizing] … the social situations of research data". Interviews are excellent tools for reaching the story behind the interviewees' experiences. They allow the interviewer to pursue information related to the research topic (McNamara, 1999, as cited in Valenzuela & Shrivastava, n.d.).

### 3.2.2 Unstructured interview style

An unstructured interview style was utilized in this research for gathering data because the researcher was an outsider to the study area, and needed the flexibility to probe unexpected points arising in the course of the interview. The unstructured interview possesses the following strengths: the questions are not restricted and this style is useful when the researcher has inadequate or no knowledge about a topic. The flexibility of this type of interviews also allows the researcher to investigate underlying motives. However, unstructured interviews might not be appropriate for inexperienced interviewers (Sukamolson, 2005).

The interviewer used open-ended questions in the investigations to obtain different types of information and observations from the subjects. The subjects were found to be involved in many activities and occupy different positions. Hence, using open-ended questions provided the opportunity for the respondents to give more relevant information regarding diverse aspects about which the interviewer may have been unaware. Further, the interviewer could discuss and examine ideas as they were provided by participants. It should be noted that open-ended questions are not easy to analyze statistically because the data needs to be reduced in some ways. However, they allow the subjects to provide a greater variety of responses (Jackson, 2009, p. 89, as cited in Hale, 2011).

The result of the interviews process was that every interview was different, as the interviewees were supported to contribute openly and provide as much detail as possible, either unsolicited or by additional questions. This makes the aggregation of the results, as well as the comparison of the information provided by the respondents during the interview, more effective. The data collected through the individual interviews was recorded and the notes were taken by the interviewer, then the data has been prescribed and gathered together in terms of the common and unique differences and similarities.

## 3.3 Ethical Considerations

It is important to observe some ethical issues since the investigations require the use of human beings as respondents. All the essential details of the research including the purpose behind it were provided to the interviewees so that they could make an informed decision about whether to take part in the studies. In addition, privacy and anonymity of personal information were considered, as the interviews concentrated on the respondents' opinions. The ethical approval and outline of the research was submitted to the Ethics Committee, School of Computing and Mathematical Sciences to obtain permission to conduct the investigations (see Appendix A) and evaluation study (see Appendix F). The Consent Form was collected from the interviewees and their before conducting the interviews to ensure that information was acquired intentionally (Tourangeau, 2011). The Research Consent Form (see Appendix C) was provided to the respondents to sign to indicate their agreement to participate in the studies. They were also alerted to the fact that they would be voice recorded and that the researcher would be taking field notes.

## 3.4 Summary

This chapter has described the approaches and methods to be used in this thesis. The qualitative research method was used as the researcher deemed it most appropriate for the purpose of the research, which was to collect deep data on the reality (e.g., the experiences and opinions) of the participants. The data collected were then analyzed as part of three studies, and this is the topic of the following three chapters.

# Chapter 4: Analysis of Currently Used Practices in the Conducting of Activities in the University

## 4.1 Introduction

This chapter includes the analysis of a small range of activities in terms of the people, paperwork and processes involved. Three activities, including course prescriptions, meetings and PhD student progress reports, have been chosen as examples of the activities performed throughout the university.

The main purpose of this investigation is to identify the current approaches utilised for processing activities and handling associated documents. This study investigates how efficient the currently used systems, both manual and electronic, are for supporting the producing and distributing of the required documents. In addition, this investigation explores the drawbacks and problems encountered by employees in undertaking specific tasks. This investigation provides a foundation for the analysis of the investigations presented in the following chapters.

## 4.2 Procedure

The researcher individually interviewed three people involved in the selected practices. In the interviews, many points were discussed in terms of system functionality and efficiency, documents, processes and people.

## 4.3 Analysis of Activities

Below, the analysis and finding of this study are divided according to the activity type to which they refer: course prescriptions, meetings or PhD student progress reports.

### 4.3.1 University calendar

#### 4.3.1.1 Description of activity

This section examines some of the current processes used in the annual 'prescription round' at the university. These processes underpin the production of the university calendar (see Figure 4.1), a significant annual activity and one that follows a highly prescribed schedule and a much-formalised sequence of approvals and changes.
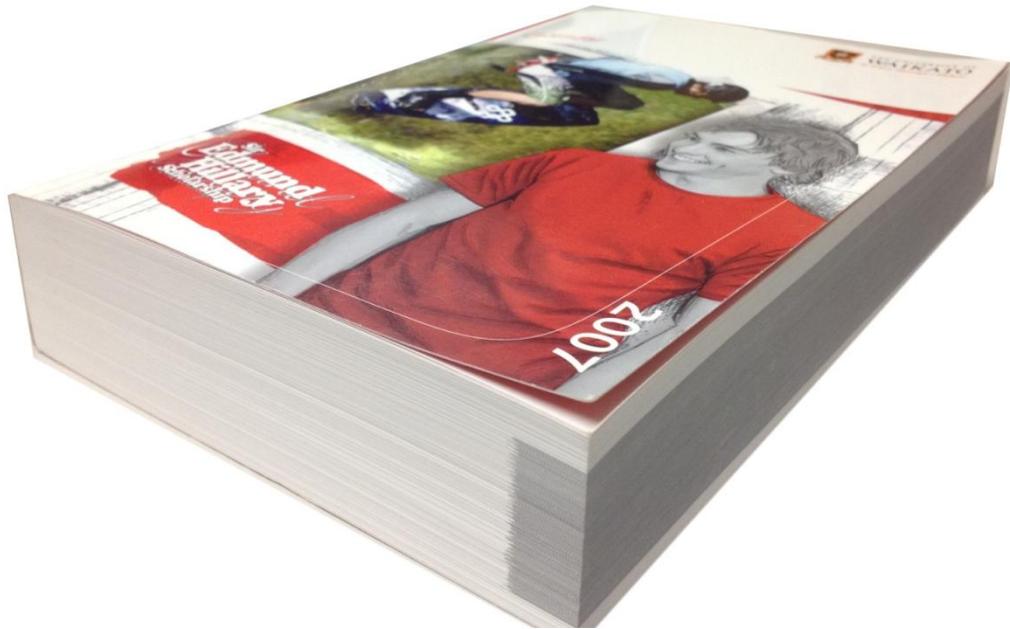
*Figure 4.1:* Hard copy of the university calendar.

An interview was conducted with a female in the 30–39 age bracket, who was employed as Academic Information Project Manager of the Academic Administration section of SASD and who was responsible for the prescription around the university. She highlighted that the calendar has to be produced a year ahead. Further, it has to contain all crucial information and details about the courses that are offered that year, information on university staff, regulations governing the university, fee information, details about research and other generic information. Much documentation comprises this process, which needs to be signed off by the faculties prior to going through the approval process. This investigation was made during the process of the 2012 prescription round. The Academic Programs Committee (APC) works on several kinds of tasks and processes around the university and plays a major role in the approval process of the prescription round.

### 4.3.1.2 Course prescriptions

The calendar shows every course in the university, and must be updated and edited every year. Initially, each faculty submits a spreadsheet including the descriptions of all the courses, templates for the new courses, and a sheet outlining the changes that have been made to the courses. Following the compilation of the calendar, faculties receive a physical document of about 450 pages so that they can check for any changes or additions that need to be made to the courses offered. Having this document as a hardcopy causes many problems.

Printing many copies for the different faculties is expensive; the documents have to be transferred manually; the various people that have to work on a single copy of the document cannot do so simultaneously; and finally, accessing the document is restricted and only available in workplace.

### 4.3.1.3 Changes in courses

Once the faculty has finalised the changes, additions or deletions to be made to its course offerings, these changes need to be approved by the APC, which consists of all the representatives from each faculty, the Deputy Vice Chancellor (DVC) and a representative from the Academic Services. After these changes have been approved by the APC, the final document is sent to the Academic Board (AB). Once the prescriptions have been approved by the APC, all amendments can be made to the course offerings.

During this time, additional amendments continue to be made by the respective faculties. The process is conducted through a 'paper addition, amendment or cancellation template'. Once the Academic Information Project Manager receives these templates, she will seek approval from the Chair of the APC (the DVC) for approval of these amendments.

Once these changes have also been made on JadeSMS, the university's internal network, the prescriptions are again sent as 'calendar proofs' to the faculties for any final amendments. When the faculty gets this second copy, they make all the changes on the sheets manually by writing comments and highlighting any amendments.

Throughout this lengthy process, a large number of application forms are sent to the DVC to approve. Further, these applications might be sent synchronously. All these applications and the files for each calendar are kept in the office for four to five years and later archived. This represents a significant paper saving and reduction on storage space should future improvements render this process paperless.

All information gathered through this process is also entered electronically in the university's computer system, SADS. This system includes three programs used to fulfil various functions in the production and dissemination of the calendar: JadeSMS (in which the information is entered for later access), Frame Maker (to produce the calendar) and Dreamweaver (to make the website changes).

By the eighth month of the prescription process, all amendments to the calendar have been completed. The calendar is then sent to the university printer for printing. Around 2,100 copies of the calendar are printed each year. These copies are then disseminated to all faculties, departments and sections within the university, as well as to external throughout New Zealand, including other universities, Institutes of Technology, Public Libraries and other places of value. Around 400 copies are sent abroad as part of international marketing.

### 4.3.1.4 Processing the documents involved

The following flow diagram (see Figure 4.2) outlines the process of producing the university calendar in terms of the involved departments, faculties and committees.
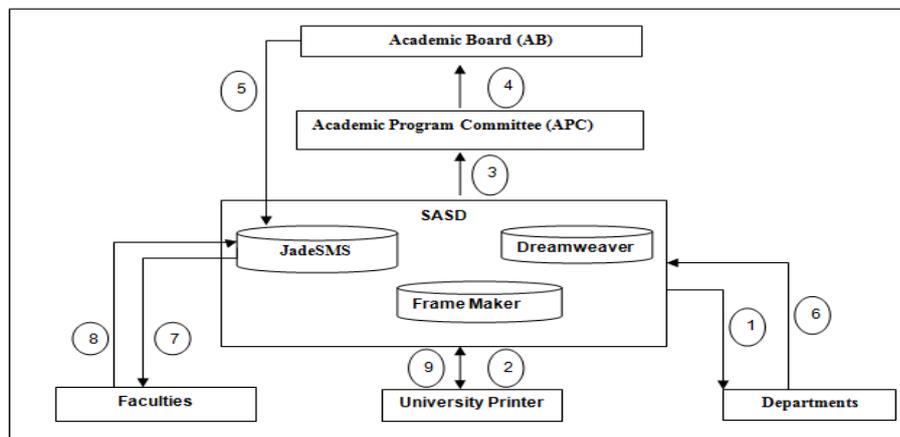


*Figure 4.2:* The stages involved in producing the annual university calendar.

The Below steps will explain the processes are taken for producing the Rainbow document.

1. Each department sends through changes to paper offerings, called the 'Prescription Round'.
2. The Academic Information Project Manager accumulates all the documents and sends them to the printer to make 30 copies of Rainbow document.
3. All the changes are approved by the Academic Programmes Committee.
4. Rainbow Document sent and seen through by Academic Board.
5. Changes to the prescriptions are made on JadeSMS.

6. Further changes are received to the prescriptions, of which approval is sought by Academic Information Project Manager through out of session approvals to the Chair of APC.

7. Second lots of changes are sent to each faculty for final.

8. Comments are made or are highlighted and are sent to Academic Information Project Manager for making changes on JadeSMS.

9. Once completed, Calendar is sent to printers. Approximately 2100 copies are printed, and the Calendar  as well available online for staff and students

10. Calendar is disseminated to relevant parties.

### 4.3.1.5 Findings

The currently used procedure clearly depends heavily on the use of paper documents at all levels of the process of compiling, editing and producing the university calendar. The inability for multiple parties to work simultaneously on hardcopy documents means that the process is slower than it would be if this were possible. The process is further slowed by the need for all hardcopy documents to be approved by the APC, which only meets on a monthly basis. Another potential drawback of collecting amendments on hardcopy documents is that comments may be difficult to read due to poor handwriting.

### 4.3.1.6 Discussion

Currently, almost all documents involved in this activity are handled manually. The use of electronic applications is restricted to a limited range of specific tasks including backing up the information, and designing the booklet and arranging it for printing. Retrieving the documents through email is not convenient, as each staff member receives a large number of emails every day. As noted in the literature by Jones (2007), citing Whittaker and Sidner (1996), staff often fail to look inside to-do folders containing actionable email messages.

Another warranted question is how important is the production of a hardcopy? Why does the university continue to print 2,100 physical copies of the calendar when most students and staff have almost continual access to the website? Producing hardcopies every year is expensive. Moreover, these books, which remain valid for only one year, comprise over 200 sheets of paper each; paper that is destined for the trash at the end of the relevant year. This paper should be, and can be, saved.

Another area in which paper can be saved is in the calendar compiling process itself. Currently, the templates are sent electronically through email. However, the staff have no way of filling these templates in electronically; they must be printed and worked on in hardcopy. This is not only a waste of paper, but also the need to deliver the amended documents in person or by mail further slows the processing of these documents. This would not be the case if electronic templates had the functionality to be edited electronically, eliminating the need to work with hardcopy.

A further point that can be made for moving towards the electronic revision of the university calendar is that under the current system the calendar cannot be updated during the study year. If the system was electronic, this could be operated to allow staff to directly locate specific files and make the necessary changes for other to read and quickly receive. The necessary checks could still be integrated into this electronic process before final approval and availability of the amended data for students.

Finding and accessing documents by using a search tool is more efficient in an electronic system. Search tools allow the user to find precise files in different ways; for instance search tools in desktop significantly assists to find information remembered by the users.

Digitizing the involved documents and processing them electronically would increase the efficiency of producing the calendar and create an appropriate environment for people to easily and safely store, retrieve, modify and transmit the necessary documents. Moreover, individual faculties would be able to amend their course descriptions at any time. By working electronically, staff can contribute their parts of the task concurrently, streamlining the process and significantly reducing wait time. No functionality would be lost by using an electronic version of the university calendar only, as staff and students can view the most recent version for the calendar online, as can potential international students, who can browse the course descriptions online while still overseas.

### 4.3.2 Meeting agendas

#### 4.3.2.1 Description of activity

Meetings are a necessary and common activity practiced by. Meetings provide a forum for discussing and reviewing many points regarding the progress of the organisation's present tasks and often end with decisions having been made

and plans established. Meetings need to be organised by a leader, who must inform the members of the details about the meeting, such as location, time and agenda. Participants in a meeting should know in advance the topics to be covered, how the meeting might flow, and what the outcome of the meeting is expected to be. This is the purpose of the agenda. Thus, the agenda should be circulated in advance of the meeting so that participants can prepare as needed.

Meetings permeate most of the management structures of the university. This section focuses on the meetings held by the APC. The APC is one of the most important committees in the university and is responsible for other subcommittees. This committee meets 10 or 11 times every year and has 12 members. These members are from different faculties and departments around the university. Each member must receive an agenda and any accompanying documentation.

Some points about the structure of the APC, the process of running the meetings and the way in which the required documents for each meeting were handled were discussed with a female in the 30–39 age group who works as a secretary and had been supporting the APC for two years at the time of the interview.

It was revealed that the Committee produces a large volume of paperwork in regards to this activity. Each member receives a minimum of two documents at each meeting, in addition to the paperwork associated with their memberships in other academic committees. Typically, all documents are sent to the Committee members in hardcopy, although occasionally they receive documents electronically, usually when the documents contain correspondence or are only for the members' information.

Sometimes, meetings can have more than one agenda, each with a number of items. Each item could potentially have a corresponding set of documents. In certain cases, the documents supplied to Committee members are confidential and should be returned to the meeting leader. However, many of the documents can be sent to them as a copy.

### 4.3.2.2 Distribution of meeting agenda

The following diagram (see Figure 4.3) briefly outlines the way in which the agenda is distributed and how it is handled by the individuals who receive and use it.
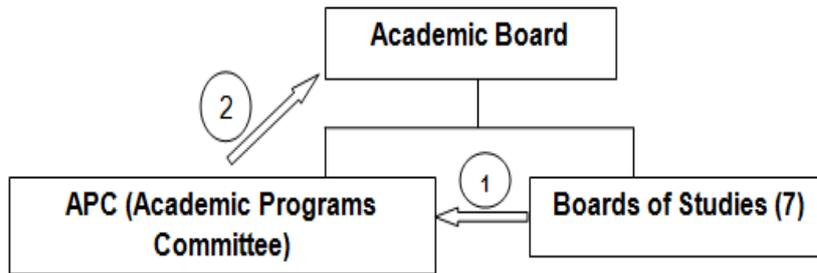
*Figure 4.3:* Process of distributing the agenda.

The AB has many subcommittees, including the APC, which is itself involved with other subcommittees, such as the Teaching Quality Committee, the Student Discipline Committee, the Postgraduate Studies Committee, the Scholarship Committee, the Student Admission Committee and the Special Consideration Subcommittee.

In terms of setting meeting agenda, the APC connects to the Board of Studies. It then sends the agenda and required documents to the university printer to print.

### 4.3.2.3 Findings and discussion

As part of the current process, a member of the APC receives a number of important hardcopy documents for each meeting. As with all official university documents, these documents are to be retained. This requires storage space. Since the agendas are rarely sent electronically through email, and since there is currently no electronic system available for members through which they can share, save and browse meeting agendas, it can be said that the currently used system for processing agendas does not support members to conveniently view and make queries regarding specific agendas. Email is currently used for querying about agendas. However, email cannot address the other points required for the process to be fully digitised. It would be advantageous if members could browse and review agendas from previous meetings, especially while a present meeting is in progress. For those staff members with laptops, smartphones or tablet computers, having an electronic document on hand would also satisfy the need for having a copy of the agenda with them during the meeting to track the meeting topics.

New technologies are capable of replacing the current traditional system of agenda preparation, dissemination and storage. An electronic system would allow

members to access the agenda during the meeting and browse the agendas for previous meetings. If agendas were to be made available online through a web application or similar, preparation by members for meetings would be more efficient as members would be able to view past and present agendas anytime and from anywhere. Using an electronic system would also allow for meeting leaders to share the agenda and collect and respond to inquiries from staff about specific aspects of the agenda. Electronic systems could store all of the agendas, even for previous years, in the database and categorise them for easy access.

### 4.3.3 PhD student progress reports

#### 4.3.3.1 Description of activity

Having PhD students provide reports on their progress is compulsory in most universities. The benefit of the report is to track the progress of the student's work at intervals during the thesis-writing period. The PhD student submits a progress report every six months. The report should include a summary of the previous 6 months' progress and an outline of the planned programme for the next six months. It should also mention the difficulties faced, such as in terms of supervision or resource location.

The Team Leader for the Postgraduate Office was interviewed regarding this activity. She emphasised that the current transmission method for the documents is not convenient because there is no electronic system to help the involved people share the documents. Thus, a great deal of time and paper is wasted. In addition, transmitting reports manually between staff increases the risk of lost documents. Tracking the documents is also difficult, and sometimes documents can be misplaced, or their location in the process can be unknown. Privacy is also lacking in the process, as each supervisor can read others' comments, which can affect his or her opinion. The respondent said 'the Postgraduate Studies Office currently claims from the ITC to provide and create an electronic system to achieve all the student reports efficiently and safely as well'.

#### 4.3.3.2 Processing the PhD student progress reports

Processing the document of the report involves a number of people, each of which must contribute to a specific part of the report. Figure 4.4 outlines the people through whom the PhD student progress reports currently pass as they are processed.
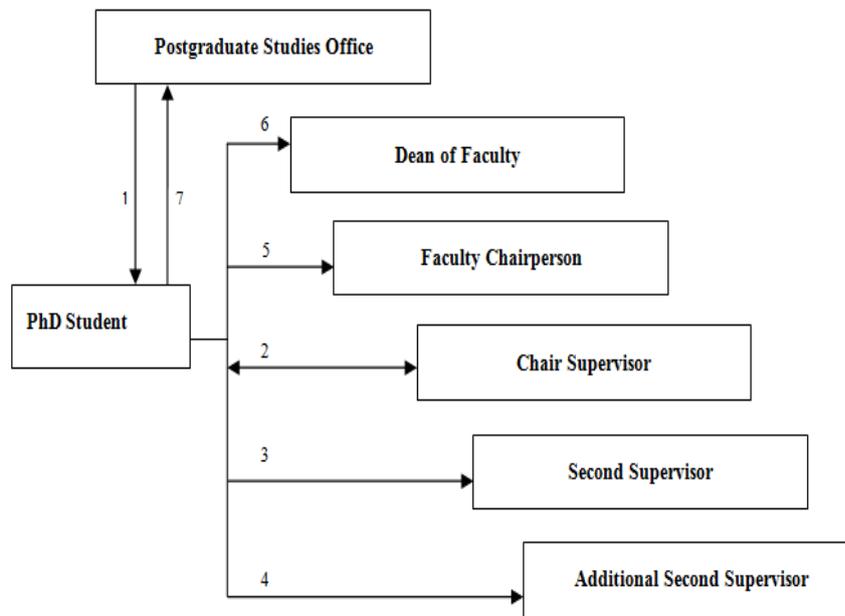
*Figure 4.4:* Process of providing feedback on a PhD student progress report.

First, the PhD students obtain the report form from the Postgraduate Studies Office (PSO). Once the report has been prepared by the student, it is passed to one or two supervisors, who write their comments about the student's progress. The supervisor/s return the report to the student so that he or she can read the comments and discuss them with the supervisor/s. From this point, the report is sent to the Chairperson of the relevant faculty, and then to the Dean of the faculty so that he or she can read the comments and add any additional comments. Finally, the reviewed report is submitted to the PSO or handed back to the PhD student in person.

### 4.3.3.3 Findings and discussion

To handle tasks efficiently, the people involved in bringing the process to completion must have a convenient way of sharing, modifying, accessing, saving, annotating and commenting on a document. There is no reason for the documents to be paper-based. In fact, there are a number of disadvantages of not having these documents in electronic form. These include that tracking the whereabouts of the documents is often not easy, and that sharing the documents manually through traditional internal mail causes a delay in the progress.

As can be seen from Figure 4.4, the PhD student is responsible for passing and delivering the reports manually to other staff. Where the involved people are not currently on campus, the progress of processing the report is delayed. This would not be an issue if an electronic system for sending the document existed.

Further, because the current process requires feedback to be handwritten, the report is not available for access by multiple persons simultaneously. Only one person can process the report at any given time.

This process is unsustainable, but in terms of time management, and in terms of the amount of paper wasted by continuing with a traditional document management process. This is amplified by the expected growth in PhD students at the study university in the coming years.

## 4.4 Conclusion

This chapter identified and discussed the document handing strategies utilized at the University of Waikato for three selected activities. These activities were chosen as examples of the activities undertaken across the university. It was found that all of these activities required that documents pass through a number of departments and/or committees, and that overall, the current paper-based methods were inefficient. Specifically, Section 4.3.1 discussed the use of documents for producing the university calendar. Section 4.3.2 explored the procedure for distributing a meeting agenda in a certain committee (the APC) as an example of other committees. The method for processing PhD student progress reports was covered in Section 4.3.3.

Some common inefficiency was identified across all of the activities. First, the method of sharing the documents involved is not convenient. Most templates are sent by email, but other documents are delivered through the university's internal mail system. Regarding email, staff found that they receive large number of emails every day, many of which included attached files. This makes locating a specific file difficult. Further, the only option open to staff wanting to query a document is email, which is not efficient for obtaining a quick response.

Using paper documents also causes a delay in the progress of activities. Staff have to be on campus to access and contribute their part to the documents. In addition, staff cannot work on a document simultaneous to other staff; they have to wait for their turn with the document. Tracking paper documents is also complicated within a traditional system. Staff may not know who is working on a document at any given time, or who should work on a specific task. Another comment made in relation to meeting agendas specifically was that the ability to browse past agendas electronically would have been beneficial.

Indeed, while some aspects of the current process are digitized, in that templates and forms are available via email or online. In their current state, templates cannot be electronically updated or amended. They have to be printed and then commented by hand. This presents a number of problems including that sometimes staff encounter difficulties when reading others' handwriting.

In this chapter, the focus been in the functionality of current system and paper documents for processing documents related to specific activities. Participation by Individuals which is described in the next chapter will provide more perceptions about the efficiency of the facilities in current structure in terms of processing documents and managing the tasks and the time

# Chapter 5: Support for Individuals

## 5.1 Introduction

Three examples of university activities were preliminarily investigated in Study 1 (see Chapter 4). These were the production of the university calendar, the distribution of meeting agenda and the provision of feedback on PhD student progress reports. This chapter aims to extensively investigate these activities by interviewing a small set of targeted respondents, to gather details regarding how these activities are presently supported, what problems people face in performing their tasks and their perceptions of the functionality of the documents.

The research employs this study to expand the understanding of the strategies and approaches taken to document handling in each chosen activity. Interviewees in Study 1, as presented in Chapter 4, provided initial responses on the systems used in the activities. This study, Study 2, therefore aims to expand on Study 1 by collecting additional views from identified staff, as well as, where relevant, via student behaviours and feedback about the current system. The following points are addressed in this study:

1. What is the currently used system in terms of handling documents, either paper or electronic, within regular office work? Elaborate on findings of Study 1.

2. What are the obstacles encountered in the course of producing the university calendar? How is the sharing, transmitting, modifying, annotating and tracking of the involved documents supported (or not supported) and what room for improvement is there?

3. What are the obstacles encountered in the course of producing and disseminating the meeting agenda? How is access to the agenda, and the ability to read, annotate and highlight the agendas both past and present facilitated (or not supported) and what room for improvement is there?

4. What are the obstacles encountered in the course of processing PhD student progress reports? How is the process supported (or not supported) and what room for improvement is there?

5. How would an electronic system benefit staff in terms of managing their documents, tasks and time? Give some initial indication of how a table computer such as the iPad might provide the required functionality.

## 5.2 Subjects

Ten participants were interviewed for this study. Each participant was involved in one of the activities analysed in Studies 1 and 2, as well as having additional roles for other tasks around the university. The interviewees are diverse in terms of their positions and roles in the workplace. This was thought to be beneficial for enhancing the obtaining views about the current systems and the usage of documents.

## 5.3 Procedure

The researcher interviewed a range of people in a one-on-one, face-to-face setting to explore their experiences and perceptions regarding the efficiency of current systems for supporting activities. Interviewees were also asked about how they managed their time and tasks as part of the current systems for the activities. Each interview session lasted about 30 minutes. Most of the interviews were conducted in the on-campus offices of the participants, although some were conducted in the researcher's laboratory, to provide access to a desktop computer.

At the beginning of each interview, the participant was provided the Participant Information Sheet (see Appendix B), which explained the purpose of the study, the procedure and a description of the study, a declaration of the participant's rights and the contact details for the researcher and his supervisors. The participant was informed that he or she could ask questions at any time, that he or she was free to decline to answer any question, and that he or she could withdraw from the study at any point. The participant was also informed that, should they agree, their answers would be recorded and field notes taken. The participant was then asked to sign the Consent Form (see Appendix C).

The interview questions asked of participants differed depending on the activity being investigated, although some basic questions remained similar across the activities (see Appendix D). Further, because the interview style was open and semi-structured, responses could be probed further where necessary. In this way, the researcher was able to discover the current document handling processes and problems involved in those processes in regards to the investigated activities.

The questionnaire consisted of three sections, with the middle section varying depending on the activity being investigated. The first section of the questionnaire explored the interviewees' regular work, with a focus on how much paper was used and wasted in the course of that work. The following section of the questionnaire examined a specific activity: producing the calendar, disseminating meeting agendas for the APC or providing feedback and checks on PhD student progress reports. The final section of the questionnaire explored the tools used by the interviewees for managing staff tasks and time. The data collected from the interviews was then analysed by the researcher. The results of this analysis are presented below.

## 5.4 Analysis of Activities

### 5.4.1 Regular work within activities

Various aspects concerning the regular work of staff in regards to their tasks, and their processing and handling of documents was investigated with interviewees. The interviewees were asked about their usual tasks; how often they consumed and wasted paper; what kinds of tasks if any were electronically processed; and what their point of view was regarding the drawbacks and conveniences offered by paper documents. Findings from the analysis of respondents' answers are provided below.

#### 5.4.1.1 Experience/positions

The interviewees varied in their experience with tasks, and they had thus been involved with several types of documents during their time in the workplace. This generated a range of reactions and views about the use of documents in the investigated activities.

It was reported by the administrative staff, that the majority of their tasks were processed using paper documents. Some of the tasks that had to be handled manually included processing student grades, handling student assessments, updating and printing course outlines, handling staff CVs, processing research finding proposals, making contracts with companies and generating meeting agendas and accompanying documents (as reported by two respondents). A few tasks could be processed electronically. One respondent gave the examples of maintaining the website, reviewing applications for publications, exporting the database to the Internet and keeping track of directions. Yet other administrative tasks involved both a manual and an electronic component. Two respondents gave

the examples of faculty meeting agendas and supervising PhD and Master's students.

Educational tasks were reported by those participants working in that area to include both paper and electronic documents. Four of the respondents noted that some documents, such as lecture materials, scientific papers, student assessments and research papers and reports could be handled and shared electronically. However, at least in part, these same tasks required some manual processing for the sake of efficiency. Three of the interviewees were PhD students, and thus contributed their views on the PhD progress report activity, which they claimed to be processed mainly on paper. They also gave the examples of lab exercises and marking as tasks that had to be managed manually. In total, these examples appeared in the interviews of five participants.

Interviewees also reports that they preferred to work manually with certain kind of documents. For example, six of the interviewees gave the examples of student thesis drafts (reading and annotation was deemed easier in printed form), scientific papers (reading more comfortable in print) and documents for meetings (reading and annotating more convenient in print). The point was also made that some documents and forms need to be signed manually. Some final examples of documents that are handled on paper include research papers (for ease of annotation) postgraduate student forms, conference leave forms and qualitative research data (to assist in analysis).

### 5.4.1.2 Consuming/wasting paper

The interviewees were asked how often they consumed paper during their main work activities. The responses are shown diagrammatically in Figure 5.1. It is clear that the interviewees usually use paper documents for accomplishing their tasks.
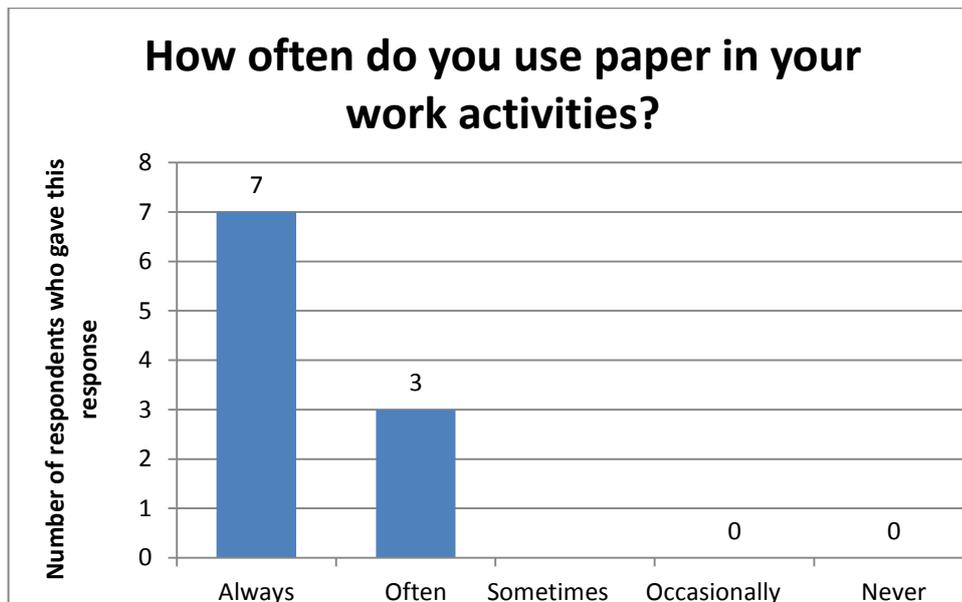
*Figure 5.1:* Responses revealing that activities remain strongly paper-based.

In the same section of the questionnaire, respondents were asked how often they wasted paper during the course of their work. Figure 5.2 presents the responses. Most of the respondents said that they always or often wasted paper in the workplace. However, two of the participants reported trying to reuse paper by collecting used papers in a box rather than throwing them out directly.



*Figure 5.2:* Responses indicating that wastage is common.

### 5.4.1.3 Tasks achieved electronically

Two of the respondents reported dealing with some files in Word, Excel and PowerPoint. Image files were reportedly processed by Photoshop in some cases, and applications such as Endnote and Dreamweaver were used by some participants. Another interviewee used an application for coding. Three of the interviewees stated that they managed their diary electronically by using

applications installed on their mobile phones, for example a mobile calendar or Google Calendar.

Most of the participants agreed that some documents and tasks needed to be electronically processed. Examples given included reading topics, writing reports and research papers, typing notes and commentary, and correcting language within PDF and Word files. Marking assessments was also achieved electronically in some cases, and respondents reported using PCs and iPads to read emails and browse the Internet.

### 5.4.1.4 Drawbacks of using paper documents

Interviewees noted a number of difficulties and disadvantages in using paper documents in their tasks. As highlighted by three of the respondents, using paper documents requires effort to organise them in a cabinet or folders. Four of the interviewees indicated that the use of paper documents consumed a lot of time, and that they could potentially be lost. In the case of the PhD progress reports, only one person can work with the documents at a time, which slows the process down. Again, the risk of documents being lost was also identified: *"Postgrad forms sometimes lost in processing ... misplace papers at home or office"* (Chairperson).

Some other complaints included that paper documents cannot be saved and that they often get stored in the wrong place (PhD and Master's Supervisor). An academic lecturer emphasised that her printer was on the other side of the college building. She did not have one in her printer at office. Concern was also expressed regarding version control, as the user might have multiple hard copies for one document because when updating paper documents, they have to be electronically updated and printed out again. Most of the interviewees agreed that handwriting on physical copy caused problem for both staff and students in understanding what had been written. Staff and students were also required to rewrite and update electronic versions according to feedback and comments provided on hardcopy.

### 5.4.1.5 Storing paper documents

This subsection concentrates on the systems used by interviewee's to store physical documents in their daily office work. One office administrator reported that her daily work involves a large number of documents, and that paper documents are kept in two box files in a cabinet, with documents being ordered by year. She reported that most documents were electronically saved on computer

and that her office was currently trying to reduce the number of physical files stored. A Senior Research Management Advisor commented that the need to store paper documents could be reduced by not printing the documents. A number of respondents observed that university copyright law meant that some specific documents had to be printed and filed away so that staff had access to a hard copy.

### 5.4.1.6 Convenience of handling documents

Respondents were asked for their opinions regarding the convenience of printed versus electronic documents in terms of look, portability and feel. Responses indicated that e-documents were preferred in the case of simple documents, as they could be easily emailed in this case. However, when the file is very long or there are multiple files, a printed version was preferred, especially for annotation. In cases that a number of pages of the same document had to be viewed simultaneously, such as for comparison, printed documents were preferred. It was considered that it was easier to work with printed documents in this case, rather than scrolling back on a screen.

### 5.4.1.7 Multiple versions (copies)

Five of the interviewees pointed out that having more than one copy of a document allows modifications to be made to the additional copies while the original is unchanged. Three of those interviewed thought that where many changes were needed, and multiple copies of one document were likely to result, using electronic documents was preferred as more efficient. This is because multiple copies can be saved under different names and easily numbered with a last-modified date. Moreover, sometimes making changes and comments on a hardcopy is not allowed unless the user has been provided a number of hardcopies.

### 5.4.1.8 Involvement in other activities

The participants interviewed in this study were also engaged in activities other than those focused on in Studies 1 and 2. They reported that they handled documents in those activities in a similar manner to how they handled documents in the three example activities. The other activities in which the respondents undertook tasks are given in Figure 5.3

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## The other activities undertaken by participants in their daily work
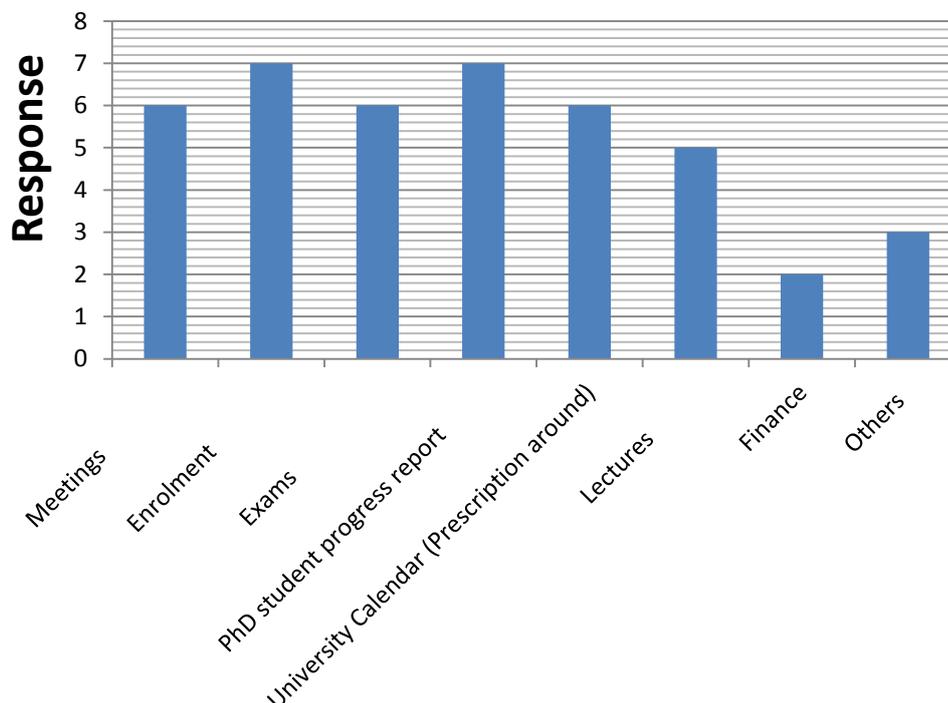


*Figure 5.3:* The activities other than those used as examples in which the participants were involved.

### 5.4.1.9 Summary

It was observed that paper documents are commonly used in most of the administrative and educational tasks undertaken by the participants in this study. Some participants reported preferring to handle certain tasks manually (e.g., where annotating or lengthy reading was required). Participants felt that paper documents are better for reading and making comments. In contrast, participants felt that some regular work would be improved by being electronically achieved. This was especially the case when documents were simpler and shorter, where they had to be handled quickly and emailed, or where it was preferable to be able to update them from anywhere, at any time.

Regarding the drawbacks of using paper documents as reported by the interviewees, the most common drawbacks were that paper documents require storage, they are time intensive, they are easily lost, they do not support multiple people working concurrently and they are not as efficiently updated as electronic versions of the same document.

### 5.4.2 Course prescription

This section of the questionnaire focused on the process of producing the university calendar. Six participants responded to this section; they were all on a committee responsible for producing course prescriptions. The aim of this section of the questionnaire was to gain a deeper understanding of the document handling processes involved in this activity, to determine the extent to which the activity was supported by the current process, and to identify the obstacles faced by those undertaking in this activity. Findings from the analysis of respondents' answers are provided below.

#### 5.4.2.1 Type of documents

The interviewees were asked about the type of documents handled for processing templates of course prescriptions. As shown by Figure 5.4, the use of paper documents is more common than the use of electronic documents. Four of those interviewed said paper documents were most common for producing the course prescription. However, two interviewees said that most of the documents involved were electronic. It seems that the current system mostly depends on processing documents in paper form.
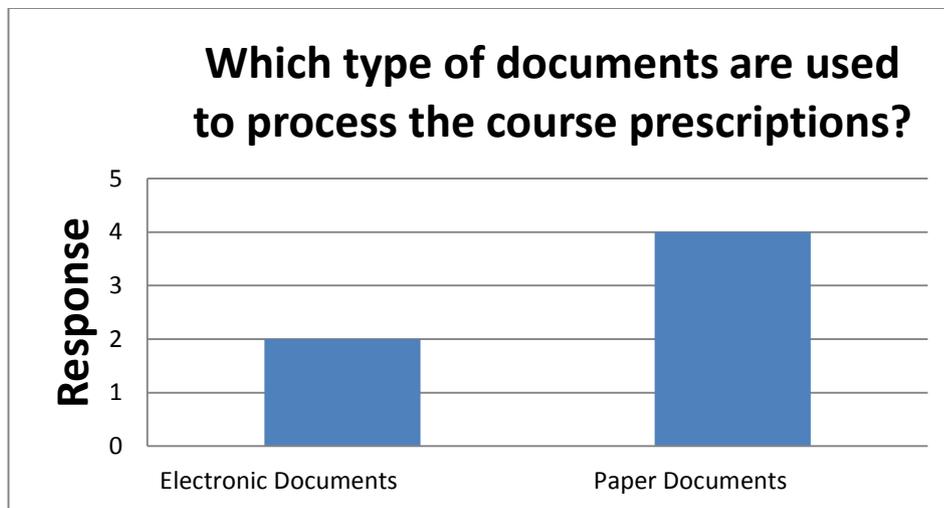


*Figure 5.4:* Paper documents are more commonly used that are electronic documents in the course prescription activity.

#### 5.4.2.2 Transmission of documents

Participants revealed that the most common way of sending the course prescriptions and related documents was on paper, via internal mail or in person. Sending initial templates was done through email. However, since there was no

way for staff to modify the electronic templates, they had to be printed for further processing.

### 5.4.2.3 Modifying the course prescription

Most participants agreed that the templates needed to be printed so that they could be annotated easily. One of the interviewees (a PhD and Master's Supervisor) said "*Firstly the changes are made on paper, and start to do it electronically when the Committee staff agrees*".

Three participants, an academic researcher, a manager and a supervisor, points out that it would be possible to directly modify the templates on screen as the prescription could be copied from the previous year, and might only need some information replaced or added. Another participant, an academic lecturer, said he would prefer to electronically complete and send templates to administration.

### 5.4.2.4 Use of annotations, highlighting and comments

Handling the documents for this activity requires the use of supportive functions such as annotations, highlighting and comments. Participants were asked whether they used any of these functions when working with templates. Figure 5.5 shows the responses.
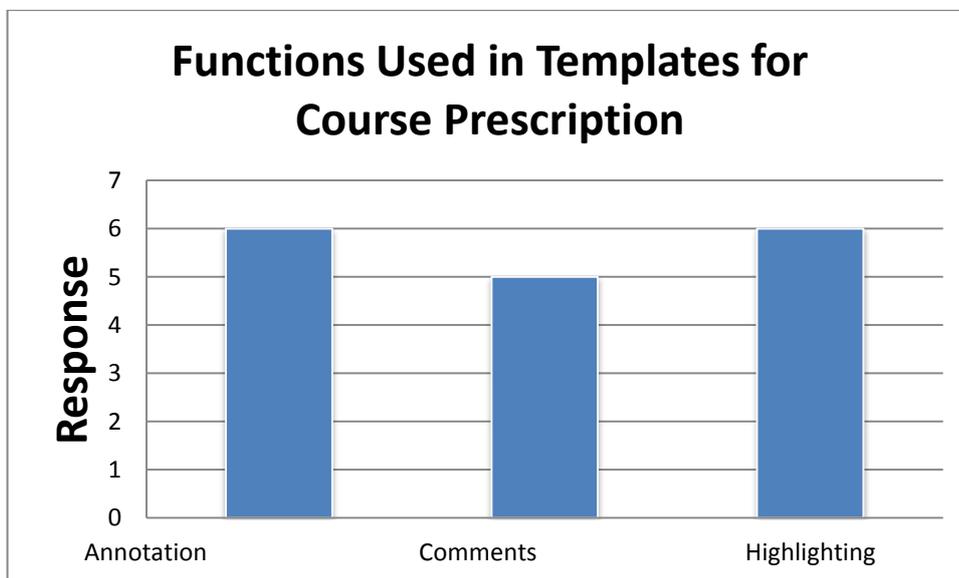


*Figure 5.5:* Use of annotations, comments and highlighting in editing templates for course prescriptions.

### 5.4.2.5 Tracking documents

Most of those interviewed used email for tracking the documents to know where they are . However, one respondent, a Chairperson, stated that tracking the

documents was almost impossible, so she often had to phone people to ask about whether they had the document.

### 5.4.2.6 Problems with course prescription

Some issues were identified by the interviewees regarding this task. Firstly, the paper-based, handwritten method of processing this activity caused delays because members of the university calendar committee occasionally faced difficulties understanding the handwritten comments. Further, transferring documents via mail around the university meant that delivery could be delayed by requisite staff not being on campus at the time of delivery or other problems related to mail systems such as delays in getting the document to the correct person.

A number of participants emphasised that the templates include minor, irrelevant details. One participant, a PhD and Master's Supervisor, described the process as tedious because the documents cannot be overloaded and staff work on this activity under pressure. An academic researcher and manager remarked that a great deal of time was wasted on discussing the course prescriptions and that this influenced the ability of staff to directly and electronically fill and update the templates. Another respondent agreed: *"the current procedure for producing the papers outline is tedious because of time consuming, error prove, difficult to carry over info from year to the next"* (Chairperson). The biggest problem, said on academic lecturer, is that there is no access to a central database.

### 5.4.2.7 Summary and recommendations

The most significant finding from this section of the study is that modifying the template using a paper-based system is not efficient as the process is time consuming, difficult to share and handwriting might not be clear. Tracking the templates by email or phone is also inconvenient, and does not ensure quick responses when these are needed. The current system allows only one person to work on the template, unless each person provides a separate physical version.

The university should create a database on which to store all relevant documents involved in this activity. This would allow staff to access and view the templates from their desktop. Further, the electronic software would provide staff with the capability to work on tasks simultaneously. The process would also be greatly improved if the documents were available online to be viewed anywhere

and at any time on different devices such as laptops, PCs, smart phones and tablet devices.

Adding changes electronically to forms would be easier overall. Staff could be provided a forum for quick comments and responses to posted comments, changes and updates. A notification feature would allow the user to browse what others have changed and they could be notified by email or text message when a new update has been done on a particular file. Such a facility could also track the people responsible for each change and keep a record of where the document is in the process so that it can be located quickly by anyone that needs to do so.

### 5.4.3 Meeting agenda

Meetings are frequently set in each department around the university, with each meeting requiring the writing of an agenda to be distributed to the participants in the meeting so that they can prepare for the discussion. The purpose of the section of the questionnaire focusing on this activity was to discover the problems encountered by persons attending meetings at the university in terms of how simple and convenient it is to receive, access, read, annotate and browse meeting agenda, especially during meetings. Six participants responded to this section of the questionnaire. Findings from the analysis of respondents' answers are provided below.

#### 5.4.3.1 Attending meetings

Respondents were asked how frequently they attended committee meetings at the university. Figure 5.6 presents the findings. It is clear that committee meetings are quite common at the university.
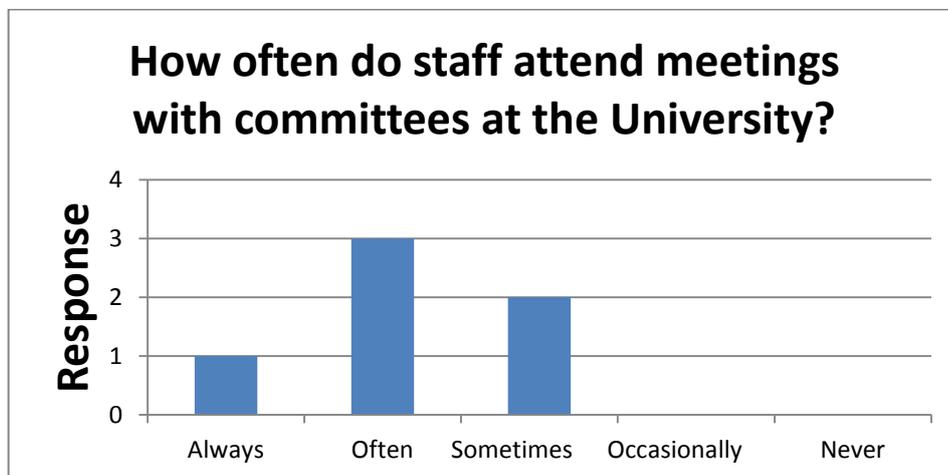


*Figure 5.6:* Meetings are commonly attended by the staff at the University.

### 5.4.3.2 Convenience of handling meeting agenda

Interviewees were asked about the convenience of handling the meeting agenda. Figure 5.7 depicts interviewees responses. Importantly, none of the respondents felt that the agenda was excellent in terms of convenience. Most of the respondents felt the convenience was either 'good' or 'satisfactory'. This indicates significant room for improvement.
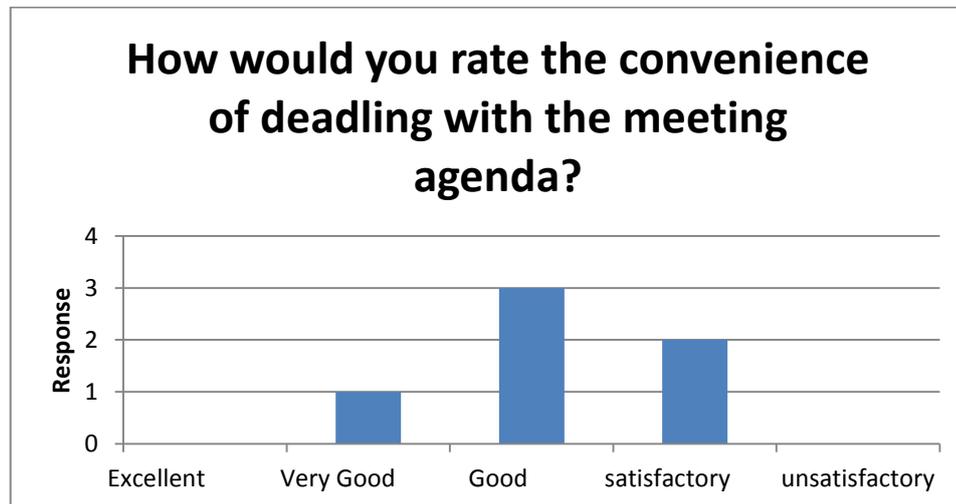


*Figure 5.7:* Attitude towards the convenience of the paper-based agendas.

Some of those interviewed indicated that they preferred to read the agenda electronically; they argued that there was no need to have the agendas printed. Others felt more comfortable receiving a hard copy of the agenda on which to take notes. None of the interviewees had used an electronic device such as a laptop or iPad to browse the agenda during the meeting time. One interviewee remarked that having the agenda electronically might cause disruptions with people browsing the Internet during meetings. However, having the agenda electronically allows meeting participants to view those agenda anywhere and at any time. Moreover, using electronic versions of the agenda in the meeting would allow for the writing of comments that could then be saved and possibly shared with others by email.

### 5.4.3.3 Transmission

Those interviewed said that meeting agenda are electronically received via email. However, for the purposes of portability, they were then printed and carried into the meeting. One respondent, a supervisor and lecturer noted that taking the electronic version of the agenda into the meeting was not done: You *"cannot take the agenda along electronically and have them during the meeting by laptop".*

However, some other participants, including an academic researcher and a manager, commented that if it were possible to have a device at the meeting, it would be better to use the agenda electronically and write comments on them. This would also mean that staff would be less likely to forget to bring their copy of the agenda.

### 5.4.3.4 Use of annotations, highlighting and comments

Preparing for a meeting requires the attendees to read the agenda and concentrate on the important points. Therefore, annotations and highlighting might be required. Interviewees were generally satisfied with taking notes on the paper agenda. Two interviewees commented that handwriting on paper was the best option. Conversely, one male PhD Student mentioned that he often used the note application on iPad to write comments related to topics discussed in meetings. Another participant, a Chairperson, said that she liked to make notes on 'to-do' items emerging at meetings; she highlighted that she was unable to annotate agenda sent in PDF format, and that she usually misplaced the paper printout. An academic lecturer shared his experience using an e-application called iAnnotate, which allowed him to make notes and highlight PDF files. He said, *"I transmit the meeting agenda from my iPad email to iAnnotate and store them in individual folders, and then I can annotate, highlight, and make change on these files, in addition to viewing them during the meeting"*.

### 5.4.3.5 Summary and recommendations

Paper-based agendas are not as convenient as electronic documents, which interviewees reported sometimes losing after printing, and even after taking notes in the meeting. To make the agenda more useful, one PDF could be compiled including all the documents needed for the meeting, rather than having these in several files as email attachments. Projecting the agenda on a screen during the meeting would assist the staff to clearly view and easily track the meeting discussion.

Meeting agendas could be more efficiently distributed and handled through an electronic filing system, in which the files could be organized for easy retrieval. This system would allow the meeting leader to add an agenda and share it with all meeting attendees. The staff then could directly obtain the latest update of the document and would not have a problem finding a specific file. In addition,

the documents of the agenda would be available online and could be accessed anywhere at any time.

Staff should be confident and attempt to use electronic devices such as laptops and tablet computers during meetings. They should make use of these devices for viewing meeting agenda either for current or previous meetings. As well, staffs are recommended to change their behaviour by highlighting and annotating electronic documents. This will encourage staff to embrace new technologies.

### 5.4.4 PhD student progress reports

This activity is quite different to the others, as the students mainly participate in processing this activity alongside supervisors and the engaged committee. Thus, including students among those interviewed will enhance the study to include different thinking and predictions regarding experiences in processing, sharing and tracking documents for this activity.

#### 5.4.4.1 Type of documents involved in PhD report

All interviewees who participate in this activity agree that paper documents are the only kind used for processing PhD progress reports. It seems that the current system definitely does not support electronic documents.

#### 5.4.4.2 Accessing documents of progress report documents

First, staff and students had no problem accessing the forms via the web as PDF files. However, the observation was made that accessing the report's documents was restricted to the person who had them; others are not able to access the documents at the same time. The interviewees commonly faced problem with accessing documents and being notified of updates and changes recently made to the reports. Likewise, sometimes they did not know exactly where the documents were, unless they checked with the administrator. One of the interviewees highlighted that it was convenient and simple to download the form through the Internet. However, the form cannot be completed and emailed electronically.

Misplacing and losing papers relevant to the report was also noted to be possible by three interviewees. Moreover, when either staff or students are away from the university, for example to attend conferences or do related works, the process cannot be continued and will take more time to be finalised. International students have problems with submitting the report, especially when they are on

holiday. Two of the students stressed that completing the process while overseas is complicated because the standard process requires the student to be on campus and handle the report manually. According to one participant, a Chairperson, the method of accessing the documents is also inconvenient and they are frequently lost or delayed in processing.

### 5.4.4.3 Transmission of progress report documents

The respondents involved in this practice highlighted that the form of the report is delivered to them via email as a PDF file or through the Internet. However, the way of conveying the report to other staff is traditional, as the students are responsible for passing and handling the report as a hardcopy to other supervisors. Currently, there is no useful mechanism to allow people involved in this task to share the documents in an electronic manner, even via email. Further, delivering the report requires the student's presence of campus. As a result, time is wasted and there are frequent delays in processing this activity.

### 5.4.4.4 Privacy with progress report documents

As revealed by Study 1, the report must pass through more than one supervisor and the faculty Chairperson and Dean before finally being transferred to the Postgraduate Committee. During this process, anyone who encounters the document can read the comments, which raises questions regarding the privacy afforded to student reports. Further, by reading the comments of other staff, the feedback provided later in the process might be influenced by those earlier judgments, such as those from the supervisors. Respondents were therefore asked for their views regarding privacy in the process.

Interestingly, the answers regarding this were opposite to what was expected. Most people involved in this activity were willing to allow all staff to view the comments. One PhD student said, "*Other staff members may view what others have written. In some cases, this is required. For example, Chairperson needs to see what the supervisor has written before making a judgment of progresses*".

Similarly, two other interviewees, a student and a supervisor, highlighted that it might be positive for students when supervisors can look at each other's reports and write good recommendations by obtaining idea from what others have written. Moreover, participants pointed out, it is beneficial for

the student to look at the supervisors' report and negotiate if there is something unsatisfactory.

### 5.4.4.5 Tracking documents for PhD progress reports

Regarding tracking, the progress report can be tracked by email or by asking the administration of a faculty or the Postgraduate Committee for the document's whereabouts. As a consequence, staff and students are not comfortable with the way the reports are tracked and often do not know where the documents are.

> *"Normally handing the documents to the relevant people, but sometimes staff members hand the documents around, and becomes difficult know where they are". (PhD student)*

Another participant, a PhD and Master's Supervisor, emphasized that tracking the PhD report is a huge problem, and that the current method for sending the document was not efficient and could result in papers being lost because they must be delivered to several people during the process. One PhD student discovered that the tracking of documents is the student's responsibility and that he or she should organize with supervisors.

### 5.4.4.6 Inconvenience of paper-based PhD progress reports

This section analyses the answers of interviewees about the convenience of handling the documents as part of this practice. Two of the interviewees observed that the process might take several weeks and might be more complicated when a person is away from the campus, for example for a conference. It was stressed by one of the interviewees that students face problems when supervisors are off campus. Similarly, when the student is away, they have no way to submit the report. One of the interviewees, a supervisor and lecturer, underlined that this process is not efficient. The process was also uncomfortable for students:

> *"Students are not comfortable in case of tracking the report and walk around to pass it to other supervisors; also students are embarrassed to push staff to complete their parts in specific time". (PhD Student)*

Another PhD student underlined that it is necessary to write the report electronically to have a copy. Then, it has to be printed and attached to the form of the report as a hardcopy.

### 5.4.4.7 Summary and recommendations

Some of the problems identified with the current process for submitting and processing PhD progress reports include delays caused by only one person being able to comment on a document at any one time, and problems in tracking the document to determine where it is in the process. Further, the need for all persons involved in the processing of the document to be on campus causes problems, especially when either the student or the supervisor is away for any reason.

Therefore, it would be better if staff and students were able to write on the form electronically because they could then easily transfer it by email. It is crucial to design a web-based program to allow staff and students to access the documents of this activity online from anywhere at any time. If such a program was available, PhD students and supervisors could receive, write on, send and submit the report electronically. Moreover, tracking the documents would be easier, allowing all people involved in this process to know where the document is and to identify the cause of any delays. A notification feature for changes or delays could also be included. Another useful feature would be an electronic signature, to ensure that the person who submits the report is the one that wrote it.

Through an electronic system, the Postgraduate Office, which is responsible for processing the report, would be able to follow up on all documents and set the rules for each student and supervisor. It would be even more efficient if this activity were available to be processed through a smartphone or tablet device. This would allow the people involved to view and access the reports from different devices, anywhere and at any time.

### 5.4.5 Managing staffs' documents, tasks and time

This section focuses on various aspects related to documents, and explores electronic systems or tools that allow staff to manage their documents, files, tasks and time. The data was gathered from interviewees' responses and divided into different categories. The following sections highlight the responses from interviewees in terms of keywords from the introduced questions.

### 5.4.5.1 Accessing documents within tasks

Documents need to be located in an appropriate place to be easily accessed by the user. This topic was discussed with the interviewees to generally discover how they were comfortable accessing documents for their work.

> *"Very easy: staff email them to me and I email documents to them when they need it. Then finally they can be printed out."(Office administrator)*

Two of those interviewed stressed that they have problems accessing documents unless they are printed out. Three interviewees stated that documents can be shared through email, Google Docs, Hotmail or Skydive. Accessing paper documents can be difficult; however, digital documents such as PDF and Word files are available on PCs, laptop, tablets and smartphones.

### 5.4.5.2 Facilities of currently used systems

This section explores whether interviewees use an electronic system and what facilities it provides and how efficiently it supports handling documents. Participants highlighted some of the facilities utilised within the current system, such as downloading the document template (PDF) to print, Google Docs, not having basically kind of system but efficiently supports group of people to access number of documents and share them online. Further, staff can browse some fields within iWaikato including policies, payments and parking spaces for visitors to the organisation. Another benefit from current systems involving computer devices is filing documents into folders and using searches to retrieve them.

### 5.4.5.3 Storing documents within tasks

Interviewees use similar ways to save documents. Paper copies are kept in physical folders in boxes or cabinets, while e-documents are stored on computers.

> *"E-documents are stored on laptops and desktops, and synchronised with the server at home. We also use Dropbox with phones and iPads." (PhD student)*

An academic lecturer highlighted that digital documents were easier to save on laptop hard drives, while paper documents occupy physical space and are stored in stacks in the office.

### 5.4.5.4 Retrieving documents

One of the most important features concerning information is searching and retrieving. Retrieving information and documents efficiently relies on the way they have been saved. On this theme, the questions asked interviewees attempted to discover whether the current system and infrastructure allowed users to easily find specific files or text among the collection of documents. Two interviewees stated that sometimes it was difficult to remember where specific files were, because some folders might have many sub-folders.

> *"Usually, trying to remember and logically find a particular e-file is similar to problems with a file cabinet." (Senior research management advisor)*

In three interviews, to organise documents for simple location, participants attempted to divide main folders into a number of sub-folders that could include sub-sub-folders as well. Four interviewees highlighted that it would be better if an electronic system allowed the users to share the same documents through one interface, directly facilitate the process of finding a specific file and show which have been changed.

> *"Emailed documents are easy to retrieve if the Mac search includes good terms; digital documents can be easily retrieved from search tools on PCs and laptops. However, retrieving paper documents is complicated as they often get lost or are not in the right place." (Chairperson)*

### 5.4.5.5 Delivering documents

All interviewees stressed that the most method to transmit documents was by email attachments, except when documents were in hardcopy. However, email is not completely efficient, as the user might receive over 10 emails on an average each day.

> *"Having lots of email every day is terrible ... some days I receive 30 to 40 emails." (Office administrator)*

One interviewee underlined that most documents were delivered within the organisation's email system, which required the user to the email daily and check if documents had been attached.

*"Reminders of email tasks are necessary; sometimes I need to print an email out and put it on the desk to remember it, otherwise I will completely forget." (PhD student)*

Academic researcher, manager and supervisor stated that in future they will attempt to use electronic tools or web applications such as Google Docs to share documents with colleagues and students.

### 5.4.5.6 Annotating documents within tasks

In practice, people feel more comfortable when able to annotate and write comments on documents in order to enhance and support precise idea by examples, summarise a paragraph or a number of sentences in a few words and write questions to be discussed later on. The interviewees were asked whether they normally annotate documents and what method they use.

*"I use sticky notes for the hard copy, while making the changes on the e-paper immediately." (Office administrator)*

Three interviewees stated that when documents are PDFs they use Acrobat to annotate, while using track changes for a Word file.

*"The files can be printed out to be annotated, then the update can be made electronically." (PhD student)*

One PhD student stated that digital annotation is very easy, and they usually used a different colour font or highlighting to indicate changes. The chairperson prefers to make annotations on paper documents rather than PDF files.
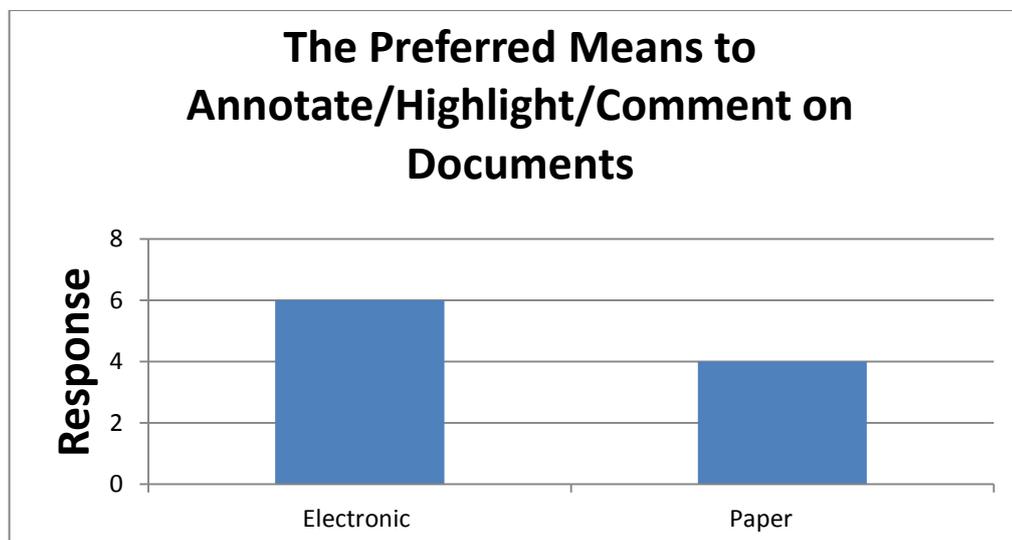


*Figure 5.8:* Electronic annotation is preferred to paper annotation.

Participants were asked whether they prefer to annotate, highlight and comment on paper or electronic documents. Figure 5.8 illustrates that six interviewees preferred to use these functions electronically, while four preferred paper.

### 5.4.5.7 Convenience, portability, look and feel

Figure 5.9 shows the number of participants who felt more at ease with handling either paper or electronic documents in terms of portability, look and feel. Seven participants preferred e-documents, while three preferred paper documents.
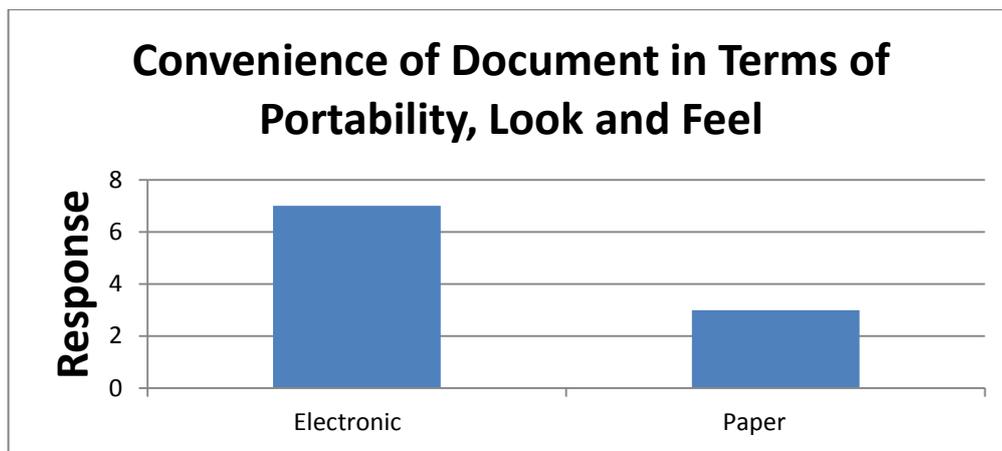


*Figure 5.9:* Electronic documents are preferred to paper in look, feel and portability.

### 5.4.5.8 Transmitting the documents

Figure 5.10 shows that all interviewees used email to transfer documents. Four of the participants used Dropbox for transmitting documents, and Google Docs was utilised by three of the interviewees.
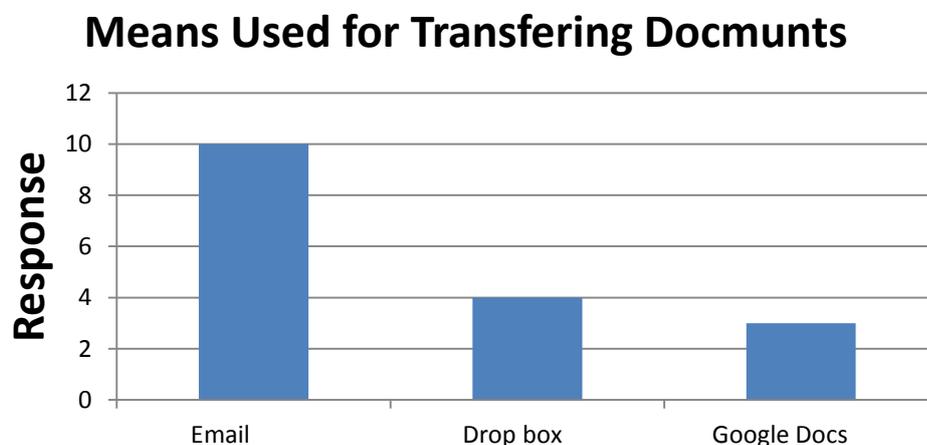


*Figure 5.10:* Email is preferred when transferring documents.

### 5.4.5.9 Multiple copies

This section distinguishes the differences between paper and electronic documents in terms of multiple copies. Most interviewees preferred to have the documents electronic, which allowed them to easily keep several versions of one document. This provided the opportunity to the user to update and make changes on additional versions while keeping the original safe.

> *"Electronic documents can be simply updated by having several copies, and they can be numbered." (PhD and Masters supervisor)*

Additionally, electronic documents allow users to share and browse documents at the same time. Conversely, physical copies are sometimes not allowed to be annotated because they need to be returned to a private entity or they are formal. Further, physical copies cannot be browsed more than one person, unless many versions of the hard copy have been provided. The supervisor and lecturer underlined that in the case of long-term documents, physical copies were preferred, but for small and personal documents it was preferred to keep the documents electronically to be easily updated and saved as several copies.

### 5.4.5.10 Security of documents

In any organisation there is sensitive information and documents that need to be secured and viewed only by authorised people. The questions in this section attempted to discover if the interviewees had dealt with such documents and how they were adequately secured. Most of the participants did not indicate that there were problems with security.

> *"Documents are mostly secure. Google Docs allow good control over who can access the documents." (PhD student)*

However, the office administrator found that paper document confidence was not reliable in some cases. For example, staff had to know the exact location of the printer used to print the documents, because important documents such as exams might be read by someone else.

### 5.4.5.11 Tools for diaries and calendars

Figure 5.11 shows the distribution of tools used for diary keeping by participants. The most used tools was a reminder application used by six people. The lowest used tools were sticky notes and physical calendars, used by two

people. Three interviewees used a mobile calendar. Three of the tools were individually used by five interviewees; these tools are web calendars, note applications and iPad Calendar and notes. In contrast, nobody used the iCal Calendar.
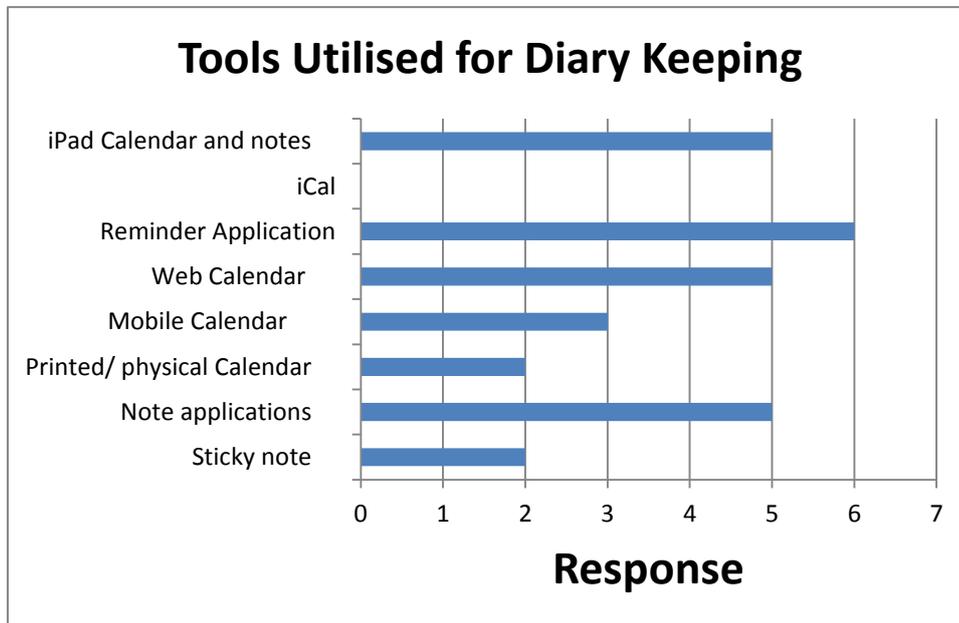


*Figure 5.11:* Electronic tools are utilized more for diary tasks than physical tools.

### 5.4.5.12 Sharing documents

One of the most significant tasks that positively affects the processes of any activity and supports communication between staff is sharing documents. This can be observed through social networking, where people from around the world attempt to identify each other by sharing their interests, pictures and knowledge. Four participants stated that documents were shared by email and sometimes might be scanned as well. One of the interviewees believed that Google Docs are an efficient manner to share the documents with others as they are available online; however, they generally used email. Another interviewee added more tools to the email system, using Dropbox to provide a space that could be electronically accessed via the Internet using different electronic devices.

Figure 5.12 illustrates the tools used by interviewees for sharing documents during work at the university. Six interviewees use Google Docs for sharing documents, five use Dropbox and four use Hotmail Skydrive.
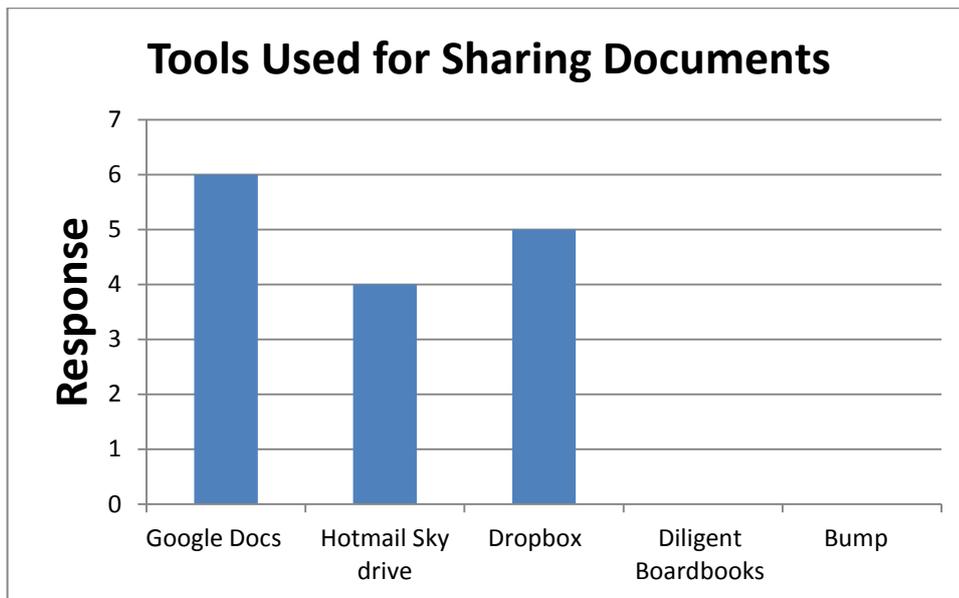
*Figure 5.12:* Documents are shared by using electronic tools.

### 5.4.5.13 Sharing calendars

In terms of managing and scheduling time and appointments, staff might need to share their own calendars with other staff and students to notify them of times they will be busy or available. Also, users can link all their own calendars to be shown on one calendar with different colours. Two interviewees had not used an electronic calendar and still worked on a physical one. This allowed staff to view the calendar only while they were in the office; when they left the office it was impossible to know what kind of commitments they were involved in unless it was noted on a piece of paper or notebook. The PhD student stated that sharing calendars during work was necessary and that they share the CS Calendar; he also used an application called Remember the Milk. Another interviewee identified that Google Calendar and iPad Calendar were efficient for both personal and work-related tasks.

### 5.4.5.14 Summary

E-documents overcome the drawbacks of using paper documents. Staff are more comfortable with accessing e-documents than physical papers. Digital documents can be stored in small devices with large capacities, while physical copies cost time and require space. It is recommended that individual tasks should have a database for storing the whole relevant documents. Moreover, sharing and delivering paper documents is impossible unless they are handled manually. In contrast, staff have the opportunity to deliver e-documents via email and can share other staff documents through web applications. Employing file systems allows

staff to directly and easily locate a certain file from the DB. Annotation and highlighting are preferred to be made on paper documents, while utilizing these functions electronically better in the case of tracking student work.

It was emphasised that e-documents are more efficient in terms of pluralism of versions. It enhances the ability to view the current updated version as well as to share the files with others by sending a copy to them. In addition, e-documents are more secure than traditional paper. Printing physical papers requires privacy and vigilance of the printer used. Also, paper documents have to be reproduced to make a new update, and they are not convenient to share with others unless there are several printed versions, which costs money and wastes paper.

Calendars are used to manage staff time and set up appointments to be alerted to later. E-calendars allow staff to view a calendar from different devices at any time. They are also able to be shared online, whereas physical calendars are not portable and can only be viewed in the office.

## 5.5 Discussion

This chapter covered several aspects of different activities through interviewing a number of individual people. The activities were chosen as representative of other activities around the university. Some interviewees took part in all of the chosen activities, some were involved in a few of them and others contributed in just one activity. However, most of those interviewed were involved in several practices around the university that assisted them to obtain more information according to their experience.

Section 5.4.1 discussed the current method used for processing tasks within regular work. Section 5.4.2 discussed staff insights and views on the way of handling documents for producing course prescriptions. Section 5.4.3 highlighted the mechanisms and issues encountered by staff in terms of distributing meeting agenda. In Section 5.4.4, Students shared staff feedback, views about their attitudes and feelings and experiences about the current strategy utilised for processing the PhD student progress report. Finally, section 5.4.5 explored the capability and facility of the current system in terms of managing staff time and work.

It has been observed that there were a various number of drawbacks in the current system in terms of handling and processing the documents used within these activities. This section discusses the drawbacks in general and attempt to provide some useful solutions. According to the interviewees' views and perceptions, we cannot state that paper documents have been completely replaced by e-documents. Using paper documents is beneficial in different aspects. Most respondents highlighted that paper documents are more convenient for some tasks. Most staff preferred to read important documents through physical copies, such as scientific research, reports, students' thesis and assignments. Papers can be rolled and allow comparing and linking between sections and contexts across different pages. Also, reading on paper does not affect vision, while reading on screen might cause eyes to tire. Further, the majority of staff desired to annotate, comment and highlight using paper documents. Staff could easily and manually draw and write comments on any part of the page. Administration work also involves many documents. In some cases, it becomes important to have documents printed out to read comfortably, to update and change large sections, to make analyses and prototypes.

Conversely, there are substantial limitations when using paper documents. The functionality of paper documents is restricted and not efficient for several tasks. Improving the limitation of paper documents can be applied by alternatively using electronic documents.

### 5.5.1 Drawbacks of paper documents in this study

This section outlines obstacles and drawbacks related to the use of paper documents that are highlighted in this chapter. In terms of sharing documents, people encounter major problems with Microsoft Word files as other departments have different versions of the program. Using paper documents is not efficient for working on specific tasks with multiple people. If a task is divided into many sections, it is not possible for multiple people to work on their relevant sections at the same time. This causes delays in the progress of the tasks involved. Further, tracking the documents to view the progress of any task is an issue. Current systems are not efficient in terms of allowing people to follow up who is currently working on the document and who has completed their part. Another drawback is that storing paper documents is complicated because they have to be kept in a physical place. Paper documents can be lost because they are not in the right

place. Therefore, staffs encounter difficulty when attempting to retrieve paper documents.

Modifying paper documents requires having them physically. The changes and updates cannot be viewed by other staff unless handled manually. It was observed that making changes on paper documents causes difficulty in reading, because some handwriting is not clear to read. Also, annotating physical paper is not efficient in some ways, because some papers are official and are not allowed to be changed. Annotations and comments cannot be shared simultaneously with other people through paper documents.

Printing paper documents around the university is not secure. The printers are often located in different places. Staff might need to print some private documents, such as examination papers, results of papers and sensitive and crucial documents for administration work. The current system does not ensure the privacy and security of such documents. Besides, most of these documents are initially transmitted through email. Receiving several number of documents attached to email is not convenient in terms of search and retrieve functions, and might be mislabelled as spam mail and moved to junk. Hard copies are not available to be accessed from anywhere. Staff and students have to be on the campus to pass physical documents to others, which causes delays in progress if anyone is not able to attend for any reason. Also, they are complicated to update, because that requires reproducing the current version and again providing a number of versions. Some activities still involve producing many numbers of hard copies every year, even though documents are changed throughout the whole year. Having multiple versions of paper documents costs money and wastes paper.

### 5.5.2 Solutions to drawbacks

The use of e-documents is recommended to overcome the disadvantages of using paper documents. There are some suggestions aimed to solve and improve the current system to sufficiently handle the documents. First, it is recommended to apply file systems through professional software or web applications to save all documents in one database. This will increase the capacity of the device memory and hard drive, and people can easily search and retrieve a document from the database. Old documents can be safely archived through a file system and can be retrieved at any time. Employing provisional software allows staff to process templates and forms at the same time.

Activities around the university could be greatly improved by using e-documents. Using documents electronically allows multiple people to work on their relevant sections at the same time and would speed up the process. Creating multiple versions of e-documents is easy. Multiple versions can include different aspects, styles and outlines while the official copy is saved separately. Students and lecturers prefer to make changes on documents electronically, and using the track changes function through Word is very important for reports and thesis because changes and updates can be sent to others through email. Annotating documents and taking notes electronically during activities such as meetings, conferences and lectures allows simultaneously sharing with the user's devices, such as smartphones, PCs, laptops and tablets, and with other people.

E-documents can be easily and efficiently tracked. Notifications are helpful to let people know when they have work to complete. Software has the potential ability to indicate the current progress of any task and can quickly indicate reasons for delay. E-documents can be shared from anywhere and anytime by wireless and 3G. This avoids the necessity of being physically on campus. Staff can work on documents and send them through different types of web applications and installed application on smartphones and devices. It would be better if all university staff had the same version of Microsoft Word.

> *"Recently, I had a problem with another secretary from another college because we both work on different versions of Microsoft Word Office." (Office administrator)*

## 5.6 Conclusion

This chapter examined the methods currently used for processing documents within everyday works. Furthermore, the considerable drawbacks caused by current system and the use of paper for producing and distributing documents, and organizing tasks and time in different practices were highlighted by individuals. In general, the functionality of current paper-based system is not efficient in terms of sharing, modifying, updating, maintain availability, and transmitting documents and managing time and tasks as it would be e-paper through electronic  software and tablet device.

# Chapter 6: Potential Benefits of Using Tablet Devices

## 6.1 Introduction

Technology is changing rapidly and all attempt to use and control the available technology to enhance the current system and the staff experience and to provide a collaborative working environment. Over the last 10 years, many mobile digital devices have been released following the iPod. Mobile devices began to be used primarily as a platform for audio-visual media, including music, games, applications and web content after the release of the iPhone in 2007. Three years later, the iPad was released to wide popularity and became the highest selling product among electronic devices. Thus, tablet devices have come to be used in various fields of the workplace. This chapter highlights the use of iPads as an example of tablet devices in education, and includes an examination of the potential capability of using iPads for potentially developing the currently used system.

## 6.2 Tablets in Education

Advanced computing hardware has fundamentally helped our educational system and has provided a new era in teaching and learning. In recent years, many educational institutions have used interactive whiteboards to teach and deliver content by readily amalgamating an extensive variety of material into a tutorial, such as a portrait, graph or text. This type of teaching has been improved and developed recently through the use of tablet devices, which are a mobile, easy-to-use educational tool that helps learners directly engage and interact (*The use of tablets in education*, 2011).

As new market area, tablet devices have become popular for general use as well as within specialist areas like learning, teaching and education; they will likely continue to grow further. Tablet devices are extremely portable and increasingly more powerful and flexible. The ability to take email, calendars and other work with you is now possible and the ability to continue working and receive notifications is simplified. Tablets devices within learning and teaching environment are a convenient, useful and flexible tool for assessment purposes and to record progress. In addition, mobile and non-mobile learning experiences

become real through using tablet devices, because they allow continuing access and engagement in activities anywhere.

Tablets can be used in all sectors of education, such as primary, secondary, post-16 or any workplace learning.Writing and drawing on the surface, printing and saving the image in a computer or disseminating it over the internet can be easily done by the students. Also, tablets can be useful in a variety of different contexts to integrate the learning theme and deliver ideas to be used as a guide. For example, some e-books contain interactive features, like demonstration animations and video which are fully immersed and more interactive than a traditional book. Typically, these devices allow learners to interact in lectures or classroom environments to make learning more fun, relevant and memorable (Massey, 2011).

Using tablets adds a number of advantages for education in comparison to laptops or notebooks. First, tablets are lighter weight and have orientation flexibility, which makes them far superior to traditional digital reading and accessing of content. Second, the capability to be instantly on and to switch quickly between applications makes tablets proceed with less delay. Third, users interactivity become accustomed to the touchscreen interface of the tablet. Fourth, the mobility of the tablets is a greater than notebooks because there is no need to close and reopen the screen. Finally, tablets have a very limited battery life that makes them suitable for a school day (Warschauer, 2011).

### 6.2.1 iPads in education

The iPad is an example of a tablet device that has created a strong connection with users due to touch interface, light weight, mobility and a variety of applications. The iPad has provided a real opportunity for innovative instruction that will likely surpass laptops and notebooks usage in the classroom. Tablets are undoubtedly an exciting way to interact with technology, especially when they are touchscreen enabled.

The iPad has thousands of applications that provide an almost unlimited collection of learning experiences through the touchscreen tablet form. From simple acts such as counting numbers and recognising letters to reading interactive books and connecting with social media, the iPad has a diversity of digital content that keeps both teachers and students engaged (Vota, 2011).

A recent study suggested that using iPads was particularly helpful for laboratory work, because students carried the devices to input data on the move. The study trialled iPads in a kindergarten to year 12 private school in California. During a science classes, it was observed that students unanimously preferred to use iPads to the laptops due to reasons including light weight, mobility, touchscreen and applications. The iPads helped the students to read a free open-source Earth sciences textbook, investigate the elements and the composition of the Earth and galaxy via interactive applications, access the school's e-learning platform, log and analyse lab data and produce lab reports (Warschauer, 2011).

Using iPads in education can assist students to flip through e-books by sliding their finger along thumbnail images of the pages; with one tap, they can know the definition of any word through the iBook application, which allows easy highlighting and annotation. Further, with textbooks on iPad, both schools and students are able to electronically acquire brand-new versions each year without paying for multiple paper books. They can also download iBook textbooks from the textbook section of the iBookstore directly to iPad. Students can flick through a photo gallery, explore an image with interactive captions or use a finger to rotate a 3D object to show the object from every angle.

There are three iWork productivity applications that are used to help students and teachers compose professional-looking documents, presentations and spreadsheets.

- Pages: a powerful word processor with simple-to-use layout tools and a large on-screen keyboard
- Keynote: a simple application used to produce presentations with stunning animations and effects
- Numbers: assists students and teachers build compelling, attractive spreadsheets in minutes, including tables and charts.

With the iTunes U application, students can carry everything they need for the course wherever they go. They can listen to lectures, read new iBook textbooks, watch videos and manage assignments. When a teacher posts an update or sends a message to the class, the students receive a push notification with the new information (*iPad in Education*, n.d.).

There are many features in iPads that make learning easier and motivating. Most of the applications that are used in educational purposes have the ability to

display full-colour, interactive, multimedia content, audio, video and 3D diagrams and can be touched, rotated and explored. Not only is it students and learners who benefit from the available applications on iPads, but teachers can also update their textbooks in real time and publish their content and distribute it in the iBookstore. Some free applications are easy to be monitored and supervised by teachers and they can also edit and adjust the contents (Meyer, 2012). Figure 6.1 illustrates some of the iPad's functions created by the researcher.



*Figure 6.1:* iPad Functions

### 6.2.2 E-books and paper books

From current trends, it has been shown that e-book popularity is growing and most people may switch over to this format in future. Many publishers and booksellers have reported that e-book sales have increased four or five times over the previous year. Table 6.1 includes descriptions of the differences between paper books and digital books in terms of functionality.

Table 6.1

*Comparison between paper and digital books*

| Digital Books | Paper Books |
| --- | --- |
| Easily readable; most devices offer zoom functions and text resizing. | Easily obtainable (bookstores are everywhere). |
| Easily portable; multiple books carried on one device. | Easily portable. |
| More environmentally friendly. | Does not normally cause significant eye strain. |
| Note taking more powerful; notes can be found, referenced quickly and easily and can be emailed and synchronised with other devices; notes do not have to be permanent. | Cheap. |
| Lighting conditions unimportant. | Can be read anywhere with sufficient light. |
| Potential for eye strain. | Paper books are bulky and heavy. |
| Power; battery life a concern. | |
| Software bugs in devices can cause freezing. | No software upgrades. |
| You can search for topics or keywords inside your e-book. | |
| Books can be stored online. | Requires storage space. |
| Imaginary or virtual. | Real and tangible. |

(Source: Middleton Thrall Library Reference Department, n.d.).

Using iPads for education purposes and the digitisation of textbooks has improved learner engagement. With the help of tablet devices, teachers and educational institutions are able to add real and interactive context to learning.

## 6.3 Study of iPad Facilities

Chapter 4 and Chapter 5 concentrated on the analysis of current practice and identification of target process and people, and also the analysis of the activities of a small range of people. These two chapters examined ways of processing and handling documents in different activities around the university

and surveyed the most common obstacles encountered by staff and students associated with many tasks involving meetings, administration, documents and people.

This chapter examines how the current system can be developed by using tablets, identify how people are using tablets in their work, potentially discover the ability of tablet devices to create an appropriate environment for people to use documents in different ways, identify the vital features that might effectively integrate tablets in organizations and discover the drawbacks of using these tablets.

The iPad was selected as an example of tablet devices because of valuable information on the benefits of the iPad in education highlighted in Section 6.2. In addition, several organisations, and educational organisations in particular, have experience using iPads in their workplaces. Moreover, the iPad device is more common used by university staff alongside the iPhone as a smartphone device, and they share many of the same features.

## 6.4 Procedure of the Study and the Subjects

The study concentrated on devices such as the iPad, iPhone and Android (similar devices), and explored how they might change the behaviour of staff when dealing with documents in university activities. It has been taken into account that tablet devices have not been formally used by the staff to achieve some tasks within the designed applications. Some staff at the university was provided with iPads to work on some projects and could participate in experiments and user studies relevant to tablet devices. The researcher attempted to interview a number of staff who had already experienced using tablet devices for personal purposes or in the workplace. The maximum time spent for each interview session was 45 minutes. More explanation of the research method and approach utilized for collecting data can be found in Chapter 3.

This study was conducted using eight participants, most of whom participated in Study 1 and 2. They were selected because they were users of tablet and smartphone devices within their various roles in the university.

## 6.5 Analysis of Specialist Facilities in iPad

Data from the interviewees was accumulated and examined by the researcher. The questions were open-ended because the interviewees varied

according to experience, behaviour, applications they used, problems they faced and versions of devices they had. In general, the questions attempted to cover aspects such as the type of devices used, the main uses of the tablets in the workplace and for personal work, the most important applications used, issues encountered, ways of reading, writing on, sharing, managing, storing and modifying documents and how tablets efficiently affect the behaviour of staff by managing their time and tasks using specific applications. The answers provided by the interviewees are explained in detail under a number of categories in the following sections.

### 6.5.1 Experience

The differences between people's experiences provides a variety of answers, thoughts and reactions. As was previously highlighted, the interviewees had not used the tablets for working on particular tasks in the workplace. That means that tablet device use refers to how people feel about them and benefit from the provided features. According to the interviewees' answers, most are familiar with using common items such as browsing email, Internet, entertainment and reading. Some of those interviewed experienced different types of tablets with different operating systems, such as Android, and used them to accomplish special tasks instead of using a laptop or PC.

> "*I used to use a tablet PC for up to three years before the iPad, and used it lots of time for meetings, in particular [so there was] no need to have papers. Also, the tablet PC has a styles, which was relatively easy to write with. I am looking to do something similar with the iPad.*" *(Academic researcher and supervisor)*

The PhD student is a new user and trying to be more confident in using the iPad in the workplace. He emphasised that generally the iPad is used for email, reading the paper, calendars and note taking during meetings. The manager and academic administrator indicated that she had used the iPad for a couple of years for personal work, as it small and portable so can be taken to meetings, used for email, to-do lists and listening to the radio. Also, the iPad allowed her to be more efficient socialising with organisation staff.

> *"The Waikato Yama application allows the staff to communicate with each other and post comments on Facebook and Twitter." (Manager, academic administrator)*

The supervisor and lecturer worked on a different operating system, Android, than iOS for iPad and iPhone. In addition to the use of the device as a phone, it can be used for email, calendar and as a reminder of things to do. The Chairperson had been experienced in using the iPad for one and half years, and had the iPod Touch as well. The most significant use for the iPad—besides the common tasks such as surfing the web, email and games—was taking it into meetings and conferences because the iPad is lighter, has 3G and longer battery life than the laptop.

> *"The laptop is still heavy. The iPad is convenient and I mainly use it for Skype, email and browsing the web." (Academic researcher and supervisor)*

> *'When I go to coffee and am travelling, I prefer using my iPad rather than laptop.' (Supervisor and lecturer)*

The Head of Student and Academic Services shared the same common uses of the iPad tablet and used an application for documents relevant to meetings and presentations.

### 6.5.2 Reading

The interviewees discussed whether tablet devices were efficient in terms of reading or changed the behaviour of reading due to features in installed applications. The academic researcher and supervisor noted that with the iPad the user can read in the dark, so there is no need to turn on a light. He used the iBook application to read e-books, and said, "My son's PhD thesis is digital and I can read it via the iBook."

The PhD student highlighted that PDF files are easier to be read and modify directly via iAnnotate application than Word files, which can only be saved and read within Dropbox and otherwise have to be initially opened from a PC, then converted to PDF files to be sent via mail and saved to iAnnotate for modification.

Three of the interviewees identified that e-documents were more easily read at anytime and anywhere through the iPad because the device is light and can

be simply carried. They discovered that PDF files could be read anytime as the Android smartphone is connected to the Internet via 3G.

There are applications that are useful for reading and writing text. The Chairperson recommended the Pages application for reading PDF files, which has auto-correction when writing text. One person uses the Kindle reader, which has its own dictionary that helps the reader to understand some vague vocabularies. Users can use the resize function to read small details. Resizing the content of a PDF file via Kindle reader is helpful, stated two of the interviewees. However, one of these interviewees said that it is difficult to read when trying track information by zooming in on the text: 'I am using the Android smartphone and the zoom function is not active and sometimes it returns back to the file itself.'

### 6.5.3 Annotation

This function were discussed in previous studies, so the researcher tried to discover how easily tablets support the users to annotate documents and how comfortable they feel when annotating using specific applications and explored changes in behaviour with annotating through tablets.

One of the interviewees explained that he used some applications to help him annotate documents, especially those related to meetings, such as agenda. It was identified that that the application he used was very useful for this function and helped him to electronically annotate the documents without the need for paper. He said that the "iAnnotate application is really good and allows me to easily deal with and annotate the e-documents as normal paper. They are easy to comment on, highlight, draw by hand on screen and it has file system that helps the users to save the documents in different folders." As was mentioned in the second interview, before going to meetings, the iAnnotate was used to apply similar functions to those made by hand on physical paper, such as typewriter, highlighter, pen stamps, notes and underline.

In contrast, other interviewees had opposite views to those who prefer to annotate documents within a tablet application. The supervisor and lecturer was not satisfied to annotate documents on her smartphone because it was tedious. She preferred to make annotations and comments on hardcopy.

Four of the interviewees highlight that e-documents were usually read by using the iBook application, which does not have functions for highlighting, commenting or annotating the documents. They did not attempt to annotate

documents via tablets, and the best way was to use Word functionality in laptop and PC. Similarly, PDF readers allow users to open and read PDF files, but have no functionality to modify and annotate them. The PDF files could be better annotated and changed, by using iPad , than Word files that might need to be converted to PDF.

### 6.5.4 Note taking

Note taking is used to remember something later on. Students in lectures need to write down notes, while meetings and conferences also require attendees to take notes about specific ideas, even when there is a voice recorder. The participants were asked whether they used electronic applications for note taking, about facilities they provided and cons and pros the participants encountered.

As indicated by the academic researcher and supervisor, using the built-in Notes application for iPad helped to write notes and could also be browsed from other devices, such as an iPhone and iMac: "They can talk to each other," he said. The notes could also be automatically shown in his email. In interview two, it was indicated that the iPad was a reasonable size to be taken to any place, replacing a notebook and pen: "I usually use the built-in Notes application for iPad to help me to write notes, especially in meetings, presentations and conferences."

One of those interviewed stressed that using the note application ensured the sustainability of notes and they can be emailed to anyone. Alternatively, when a user wrote a note on a piece of paper or notebook, they might lose it and the user needed to carry them to other places; instead, they should be rewritten electronically to be emailed. Interviewee four noted that there was the possibility to write on the iPad by using a wireless keyboard, but that she preferred to write a short note using the on-screen keyboard and one hand, while others could use two hands. The short notes were written as tasks to be remembered using the Remember the Milk reminder.

The built-in Notes in iPad have been used by the Chairperson for several tasks: to note interesting points in meetings and conferences, write references for some articles and write down ideas for teaching. She highlighted some features that encouraged her to write the notes in that application, such as the title of each note page being the first line of the text, the iPad keyboard being touch and that the notes would be kept and backed up. Two applications allowed the Head of

Student and Academic Services to write notes: Docs To Go and Easy Note, which helps to put notes in a folder that can be automatically emailed to the user email.

Some of the interviewees were not adequately confident to take notes on the tablet, especially during meetings.

> *"I do not use the smartphone for writing a note in a meeting; I still prefer papers." (Supervisor and lecturer)*

> *"I am not confident enough to write the note electronically; I still take paper and pen in meeting." (Head of Student and Academic Services)*

> *"Sticky notes are still my favourite tool for taking a note, and it can be placed on a desktop or wall." (Supervisor and lecturer)*

### 6.5.5 Spreadsheets and presentation documents

Spreadsheet files are important in the education field as staff and students need these documents to examine and analyse data. Staff might need to show some spreadsheets in meetings or presentations via tablets. In addition, a user might receive spreadsheet files. This was discussed during the interviews to discover how proficiently these types of documents could be browsed and modified.

Academic Researcher and Supervisor said that "spread sheet files can be browsed as Excel documents and I have never tried to modify them." Participant two made the observation that spreadsheet files were initially shared within Google Docs, and tried to open and browse these files through the iPad.

> *"Google Docs files do not work very well with the iPad; it looks good for browsing but not good for changing." (PhD student)*

The Chairperson agreed that Google Docs did not support real formatting for a conference. However, it was underlined by Academic researcher and Supervisor that a spreadsheet could be nicely browsed and modified in iPad using an application called Numbers, which allows the users to flexibly move tables, graphics, charts and text anywhere on the page. Numbers allows the user to import Excel files and modify them, and also save the user spreadsheet as an Excel file. Moreover, these spreadsheets could be shared with others via mail. He said, "When I receive a spreadsheet file, I can immediately view it via iPad anywhere and anytime without the need for a laptop or PC."

In terms of presenting documents and how it is efficient to create, view and modify them through tablets, some participants tried applications designed for these types of documents. Four of those interviewed stated sufficient ability to view and modify a presentation file through the iPad, and the files were not restricted to PowerPoint or Google Docs. Keynote was one of the preferred applications in iPad to create a presentation and move the slides simply by hand, arranging objects easily by dragging them to the slides.

Also, two interviewees preferred to read different types of documents, such as Word, Excel, PowerPoint, PDF, Apple iWork and other files and attachments through the iPad by using Documents To Go. This application is supports mainly Microsoft documents and provides the ability for the user to create and view these type of documents and use several functions for making changes, such as copy, cut, paste, alignment, text selection— double tap (single word), triple tap (paragraph)—auto bullets and numbers and multiple undo/redo.

### 6.5.6 Filing documents

One of the most important functions of tablet devices is the ability to store the documents in files and folders to manage and easily find any document. This theme was discussed in the interviews to explore the potential efficiency of the file systems in the tablets, identify how simple a user stores and manages files and examine the convenience of downloading files attached in emails.

In interview one, it was observed that Dropbox could be opened from anywhere and from different devices through the web application. However, participant one prefers to store the PDF files on the iAnnotate application that supports some file system functions, because he is able to manage the documents in different folders. For example, all documents relevant to a conference or meeting can be in one folder. "Yesterday I received 10 PDF files through one email for one task (meeting), and I easily downloaded them to the iAnnotate in a special file."

One of the interviewees identified that the iPad had no clear file system to manage files, except that applications could be put together in different groups. However, two of the respondents stated that iBook has folders for the collection of documents (PDF files).

Most of the respondents often use Dropbox, which provides the ability to store documents such as PDF and Word files and transfers the documents to

another application. They highlighted that this application was fantastic and could be opened from a tablet, smartphone, laptop and PC using the Internet.

### 6.5.7 Managing time

Most devices include a number of tools that allow the user to arrange and manage their time for meetings, commitments and appointments. In the recent years, people move from using physical tools such as calendar to benefit from using web applications or application for smart phones and tablets. Electronic calendars have more functions than the physical calendars and participants discussed whether they efficiently used e-calendars and what facilities these applications provided.

One of the interviewees used Google Calendar for a long period and linked it automatically with iCal Calendar. He mentioned that through the iCal Calendar interface, the user is able to browse all their calendars in different colours.

The majority of the participants shared calendars with others to manage their time and set up joint appointments and meetings. Two of the respondents shared Google Calendar with students and colleagues so they were able to view them anytime and know whether someone was available or busy. Some other participants noted that the built-in calendar in iPad could be shared with friends, students and other staff.

> *"I prefer to use the iPad Calendar, which provides the opportunity for me to share a calendar with my supervisor and other friends." (PhD student)*

> *"IPad Calendar allows me to share my time schedule with my wife and staff." (Academic researcher and supervisor)*

In terms of privacy, one interviewee did not share their iPhone Calendar and so it was private. The supervisor mentioned a small drawback: the function of accepting an invitation sent by an email calendar is not active through iPad Mail.

### 6.5.8 Managing tasks

People organise and manage their daily tasks by using applications similar to calendars but more efficient, because they monitor all tasks the users have to accomplish. This category was discussed in the interviews to examine how beneficially these application support the users to manage their tasks, including

tasks from home, work and social activities, and view them in one convenient location.

Three interviewees stated that the task manager application was one of the most important tools to have an instant list of all tasks, jobs or projects that could be organised into different categories.

*"Using Task Chrome for iPad assists me to list tasks due a specific day." (Academic researcher)*

Two of those interviewed identified a benefit of using a manager task application was to improve the efficiency of office work and prevent missed deadlines. It was stressed that applications organise the user's tasks by showing them on a calendar, so it is possible to browse tasks on a specific day or all tasks in a whole month.

*"Google Task is used to remind me later to do some task at a specific time. Indeed, it is so beneficial as it saves my time and organises my work to avoid missing some tasks." (PhD student)*

The manager and academic administrator also used task manager software, which allowed them to avoid carrying a notebook or using sticky notes and a pen to manually write list of tasks (these physicals tools are usually forgotten and easy to lose). Moreover, the built-in reminder in iPad, called Task PRO, supports full sub-tasking: each task can include a sub-task that can also have its own sub-tasks and so on.

In the fourth interview, the supervisor and lecturer was a user of the Android smartphone and was familiar with the application called Remember the Milk, which has the same main functions as the Reminder application on iPad. She used it for many tasks, like note taking and to-do lists, and this application allowed her to prioritise the tasks according to the way she wanted: due dates, time estimates, repeating, lists and tags. In addition, Remember the Milk allows the user to see related tasks and devise the best ways to achieve things. In contrast, two interviewees did not use any types of task managers or reminder applications. Academic Researcher said, "I am not that disciplined to use a reminder application."

### 6.5.9 Email

People usually browse their emails via websites such as Hotmail, Yahoo and Gmail. Tablets have many features that might effectively provide users more functions than exist in desktop and laptop devices. The questions about these features were introduced to investigate how people usually browsed their email through tablets and how they wrote emails, received emails and handled attachments.

In interview one, it was emphasised that most of time the interviewee read and only wrote short emails through the iPad rather than browsing an email webpage. Two other interviewees stated that through the iPad tablet more than one email could be shown in the Mail application.

> *"I do not need to browse each email separately through the web, Mail application allows me to view my emails in one place." (Manager, academic administration)*

The supervisor and lecturer indicated that with the Underbid smartphone, it was more efficient to synchronise the Gmail email with the Gmail application, so there was no need to browse Gmail from the web. Academic researcher was happy to use the mail applications that allowed the user to open a PDF, iWork or Microsoft Office file in Mail. He also saved PDFs to iBooks and opened them from the Bookshelf. He said, "It is awesome when you browse a message that includes images and photos through Mail." However, a PhD student realised that some functionalities in the Mail application were not active, such as adding labels like in Gmail and accepting meeting requests.

### 6.5.10 Synchronization

Documents can be automatically synchronised and available on other devices. Users do not need to transfer documents to other devices by email, flash memory or removable hard disks. The academic researcher and supervisor stated that through iCloud, all updates made on any application immediately appears on other devices. He said, "When I add a new picture to my iPad photos, that directly is updated on my iPhone and Mac desktop, too."

The PhD Student stated that the iPad allowed the user to sync different applications and provide the same functionalities, such as Gmail Calendar, Google Calendar, Hotmail Calendar and iCal Calendar. He said "using the iPad allows me to synchronise the build-Calendar with the Gmail one."

*"All my Hotmail contacts are automatically synchronised and added to my iPhone contacts.' (Chairperson)*

*"iCloud is a fantastic feature, as it syncs all e-books in my Kindle account to my iPad to read documents."(Supervisor and lecturer)*

## 6.6 Discussion

This chapter discussed the potential capability of using tablet devices for handling documents and managing tasks and appointments. Participants' answers were classified into different categories. It was observed that tablet devices have been commonly used by the interviewees more for work tasks and documents than personal ones. The devices provided the ability and capacity for installing large numbers of documents and applications. There are some small drawbacks related to the use of the iPad device in terms of design, functionality, filing documents and navigation. In general, tablet devices have multiple positive ways of efficiently handling documents and managing staff work time and tasks.

### 6.6.1 Problems

The most common problems highlighted by respondents are discussed in this section. Interviewees varied in their purpose of using tablet devices, familiarity of using them and the type of applications they used. However, they provided critical information and feedback on the limitation of tablet devices. We can emphasise that the iPad still did not work reliably with some types of documents, such as Microsoft Word. When opening Word files through iPad, the formatting is not appropriate, there are some problems with the numbering and the characteristic is not right. The ability to use multiple applications simultaneously also causes problems, as sometimes when the users opened new applications the previous one would stop working.

Moreover, file names have to be short to be identified, especially for those documents and files involved in meetings and other tasks, because long names cannot be read fully on the devices. The undo function is not activated when writing, and sometimes users delete or change sentences and want to go back to the previous version. Getting access to documents via some applications requires an Internet connection; for example, documents in the Dropbox are not available except when tablets have 3G or are connected to wireless.

There are minor issues related to the functionality of devices using the Android system. PDF documents are not appropriate within the Gmail application, scrolling is tedious, it is not flexible for reading or finding specific information such as table and the zoom is not effective.

In meetings, paper documents are easier to locate, while using tablets might disrupt the user by them opening the screen and trying to find the file, possibly requiring them to browse the Internet.

### 6.6.2 Suggestions

This section provides some general suggestion for improving the usability of tablet devices and some solutions for the problems highlighted in the previous section. Users should be confident and attempt to write everything on tablet devices rather than on paper. Making meeting agenda available on Dropbox would be better than using email; research committees could share e-documents within iCloud, and the best method to distribute e-documents is through Dropbox and iCloud. Syncing e-documents is very useful, because the documents are synced immediately with other devices such as the iPhone, iPod and iMac.

It would be more efficient if there was a function that enabled the collection of PDFs on the Android smartphone. Also, an undo function is needed for emailing, note taking and writing text in some applications. Tablets devices should be reliable In terms of using Ward file as same as PDF files. There are a number of alternative applications to Dropbox, and a number of applications—such as Keynote, Numbers and Documents To Go — for spreadsheets, presentations and Word files.

In terms of multiple tasks, the latest version of iPad allows multiple taps and tasks, but some applications cannot continue working while minimised. Tablet devices should support multiple applications working at the same time. iOS 5 allows the user to work on multiple tasks at the same time and can swap between opened applications.

Users should attempt to use alternative applications, such as iAnnotate and Pages, that allow viewing of files at any time without the need for Internet, such as with Dropbox. With the Kindle, there is no need for WiFi or expensive 3G because Kindle provides its own 3G that allows its visitors to browse whole books online. The zoom in devices such as iPad, iPhone and Galaxy is more efficient

than that of Android. This function has to be improved in Android devices to allow people to read and locate small details in tables and diagrams comfortably.

The university should develop professional applications for tablet devices that will allow all staff to view documents and process them. Students would also benefit from a tablet application. Enrolment could be undertaken using a tablet application, so the student could view the offered courses for the current semester and select what they need. After the student submits the form, they would be pre-enrolled until they paid the course fees.

It would be more efficient to allow students to view all course material through tablet devices and allow them to be accessed anytime from different devices. For example, the literature review revealed that students at the Yale School of Medicine are provided iPads to be used for the medical curriculum and in hospitals to replace paper charts and records (Mathis, 2011).

Tablet devices can be used for checking student attendance during lectures. The lecturer could pass the tablet to the students to check their names. Students could also be able to check their names off from their devices. It would be better if an application allowed student and staff to post comments and receive rapid responses similar to Twitter and Facebook. Staff and students could use their tablet devices when they had some documents to present, and lecturers could show the lecture slides using a tablet device.

Tablet devices could be used in examinations, with all class can using the same devices at different times. The questions could be set on an application, and students would be able to access the test form, answer the questions and then submit when finish. Each student would log in with their username, and the duration of the exam can be set automatically, with the exam page becoming inactive when the time is up. Students' answers could be sent directly to the database and easily accessed to obtain the test mark. Students at the University of King Khaled felt more comfortable and less under pressure when utilising a system like this as opposed to conducting traditional exams using paper (Moria, n.d.).

## 6.7 Conclusion

The potential efficiency of using the tablet devices ( iPad as an example) in general and particular in education has been covered . Section 6.2 highlights the advantages and functionalities of iPad and distinguishes between e-book and paper books. In addition, according to the responses obtained by eight interviewees in Section 6.5, and the information included in the literature review, there is a substantial potential to use tablet devices in the university. Tablet devices provide the ability for the user to store PDF files and read, modify, annotate, comment on and highlight them. These devices have applications that support different types of files, such as Word, PDF, PowerPoint and Excel.

Tablet devices are alternatives to paper documents for tasks such as note taking, reading, reminders and lists of things to do. Sharing documents through tablet devices is one of their most attractive features, because documents can be synced automatically between different devices. Through tablet devices, staff can share notes, calendars, pictures and diagrams with others. The iPad email system allows the user to show all emails for multiple accounts on the one screen. Also, the iPad Calendar allows multiple calendars on one interface. In addition, tablet devices can be used for a different number of administrative and educational tasks, such as enrolment, examinations, attendance, curricula and meeting agenda.

To sum up, iPad as an example of tablet device has many advantages in terms of high functionality, large storage capacity and light weight. This allows managing tasks and time and reducing the use of paper documents by handling a huge number of e-files within different applications and software designed for iPad and Web. This leads the research to go further and examine the effectiveness of using e-documents rather than papers in the following chapter.

# Chapter 7: Prototype Demonstration

## 7.1 Introduction

The research analysed different types of activities around the university, discussed the drawbacks and provided recommendations for improvements to the traditional system's methods of handling documents. This chapter evaluates a prototype of software, called the higher degree candidates' progress report (HDCPR), and shows how the overall system could be improved. The software attempts to make activity electronic and facilitate users in processing documents within many functions. The activity of the PhD student progress report was chosen to represent other activities and be implemented electronically. HDCPR is not designed to be a perfect product but provides essential features that allow users to process the report simply.

## 7.2 Software Design

This section illustrates how HDCPR is an example of developing a currently used system into an electronic system.

### 7.2.1 Scenario

Majed is a PhD student in computer science required to write a progress report every six months. This report is processed by multiple staff who write their own reports on separate sections, then the student hands the document to the Postgraduate Office Committee. Majed is responsible for passing the report to all staff and encounters a problem. It becomes difficult for him to ensure that staff complete the report to a specific deadline; sometimes he is not able to meet the staff member because they are travelling or at conferences. Majed and the Postgraduate Office Committee frequently face other problems with tracking the documents involved and reading handwritten comments.

Majed and other staff need to be on campus to complete their work. Majed has decided to design an electronic system with several functions and motivations. Majed introduced the prototype demonstration to the Postgraduate Office Committee because they are the main persons responsible for managing this activity. The roles have been set for the supervisors and students, and they are authorised to benefit from the software facilities.

Majed, his colleagues and staff are happy using the software and have observed improvements on the traditional system, in paper wastage and saving time and money. They are able to access and work on documents synchronously, view reports anytime and write and modify comments electronically.

### 7.2.2 System architecture

The following diagram describes the architecture of the software.
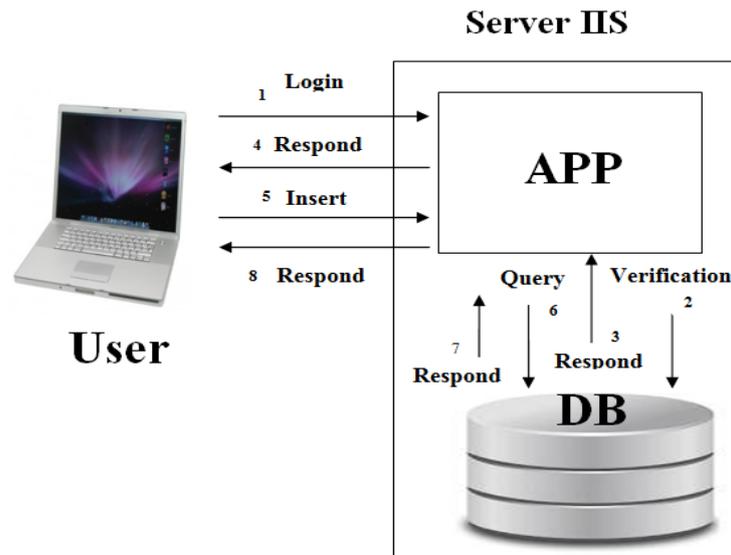


*Figure 7.1:* System architecture.

The graph above (see Figure 7.1) illustrates that the system consists of various components including the user browser and the server IIS, which includes the application and the database. The following list describes the interaction between these components by explaining the steps numbered in the graph.

1.  The user logs in through the browser.
2.  Through the Server IIS, the application (ASP.NET) verifies the provided information by connecting to the database.
3.  The response is sent back from the database to ASP.NET.
4.  The user receives the response through the browser; they can either enter the application, or re-login if the provided information was not accurate.
5.  The user enters the application and applies some actions.
6.  ASP.NET sends the query to the database for execution.
7.  The database sends back the response to ASP.NET.
8.  ASP.NET shows the response to the user.

## 7.3 User Interfaces

This section describes the main interfaces of the system by including screenshots with a brief explanation. The first interface is the log-on page, which allows the users to access the internal interfaces. If the user types the wrong username or password, a message of information validation informs the user to check the provided details (see Figure 7.2).



*Figure 7.2:* Log-on page.

The second interface (see Figure 7.3) is the control panel for the administrator (Postgraduate Office Committee). The administrator is able to view the users by different tabs such as Supervisor List, Student List and Thesis List for the whole reports.



*Figure 7.3:* Control panel for the administrator.

The supervisors', chairpersons' and nominees' accounts are set by the administrator through the administrator control panel by clicking the Create User tab. The following figure (see Figure 7.4) illustrates the interface for creating new

users, and the administrator can set the role for the user in the last field. These roles include Chief Supervisor, Second Supervisor and Third Supervisor.



*Figure 7.4:* Creating a supervisors' account and setting the roles.

After a student logs in and accesses the system, the application navigates them to another interface to complete information by filling fields such as Student ID, Type of Study, Contact Details and selecting the department name from the list. The first and family name and email are provided by the database in this interface, and validation messages are shown when some fields are missing (see Figure 7.5).



*Figure 7.5:* Interface for completing student registration.

A student is navigated to the interface of creating his section of the report. The title should be typed by the student, and the start date of the current progress report can be set by the Calendar feature, while the end date will be automatically set by the system to six months for the progress report period. After the student

95

fills the comment boxes, they need to click the create button to submit their section (see Figure 7.6).



*Figure 7.6:* Filling the student section of the progress report.

If the student clicks the create button, they will navigate to the main interface (see Figure 7.6), which includes all section tabs for staff additional to the Introduction Tab. This includes the instructions for the process of the progress report and the overview tab showing all sections in one view. If the student submitted the form without filling the comment box at the previous step, they will be navigated directly to their section through the main interface and the notification feature will indicate to the users that the student has yet to complete their section. In this case, the percentage of the progress bar, which represents the current progress of the report, will be zero (see Figure 7.7).



*Figure 7.7:* Student section.

Any person with the role to fill the section should click the edit button to fill the boxes, then they can submit their section. In the below figure (see Figure 7.8), a message is shown when the user clicks the comment box; it explains that if the user has the role to work on the report as shown in the notification feature,

then the user can click the edit button to complete their section of the report by filling the boxes in a separate interface called the Edit Section (see Figure 7.9). Otherwise, the edit button is hidden because the role is for someone else.
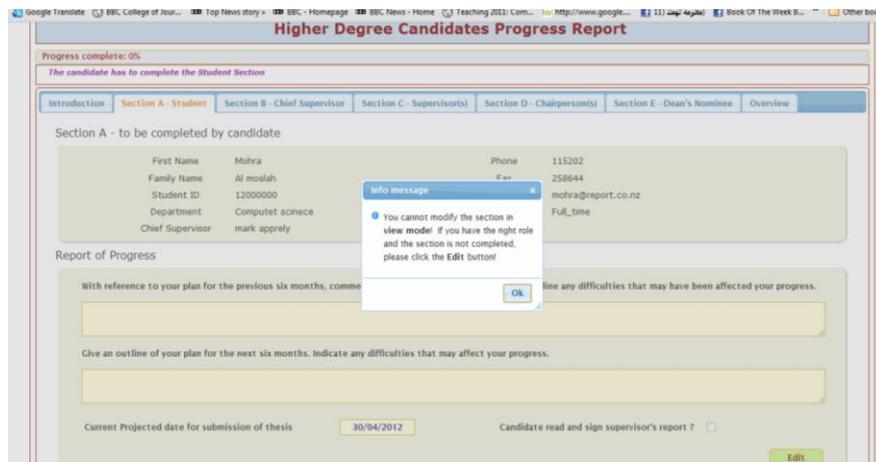


*Figure 7.8:* Alert message when the user tries to write a report.



*Figure 7.9:* Edit interface, which allows all users to post their reports.

After the student completes their section, some changes occur in the main interface, such as the notification feature, progress bar and the edit button, which is now hidden from the student section because the role is authorised to the Chief Supervisor, as indicated in the notification feature (see Figure 7.10).

*Figure 7.10:* Changes to the main interface after a student finishes their section.

When staff log on, the system will directly navigate them to their control panel. For example, the Chief Supervisor has the role after the student and they should log on to work on their section of the student progress report. The Chief Supervisor is able to view their students through the List of Students tab (see Figure 7.11). They can also view the reports they are involved in through the List of Theses tab (see Figure 7.12). After the supervisor clicks view report link, the system will navigate them directly to their section to view the selected student.



*Figure 7.11:* Example of a staff control panel.

Through the List of Theses tab, any member of staff can view all reports they are associated with and can identify whether the report is completely finished and which fields are completed.



*Figure 7.12:* View of all student reports belonging to one staff member.

In addition, the progress bar becomes completely yellow and indicates that students, supervisors, chief persons and nominees have completed their works (see Figure 7.13).



*Figure 7.13:* Completion of all sections belonging to the student and faculty staff.

At this stage, the Committee of the Postgraduate Office should comment on their section of the student progress report. The notification feature informs all users that all sections have progressed except the committee section. As we can see from the following figure (see Figure 7.14), the Is Completed field remains 'No'.

*Figure 7.14:* The progress report is not yet completed.

However, after the Committee adds the comment to the related section, that notification will be updated and informs all users that the report is registered by the Committee (see Figure 7.15). As well the data for the Is Completed field becomes 'Yes' (see Figure 7.16).



*Figure 7.15:* Notification indicates completion by the Postgraduate Office.



*Figure 7.16:* Indication of completed report is through the completed section.

All users can view the sections anytime and can see each other's work by navigating between tabs. The Overview tab allows the user to view all sections on one page (see Figure 7.17), so that the user does not need to view each section separately. This page can be printed through the print feature (see Figure 7.18).
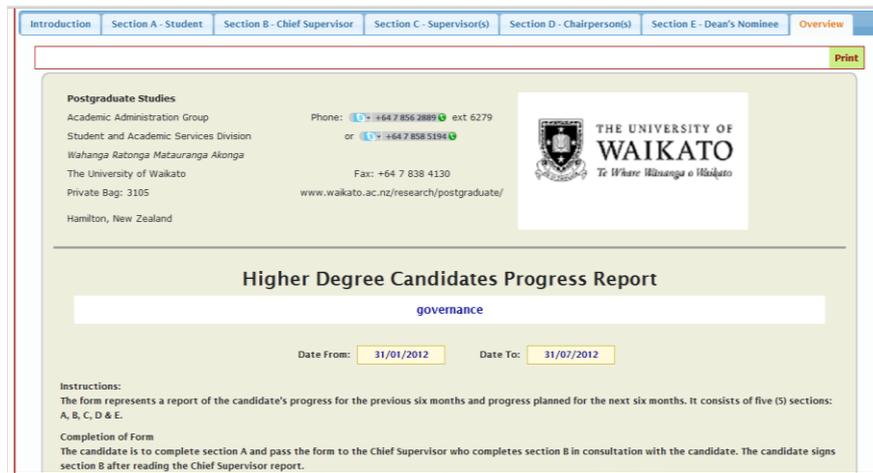
*Figure 7.17:* The overview tab and print feature.
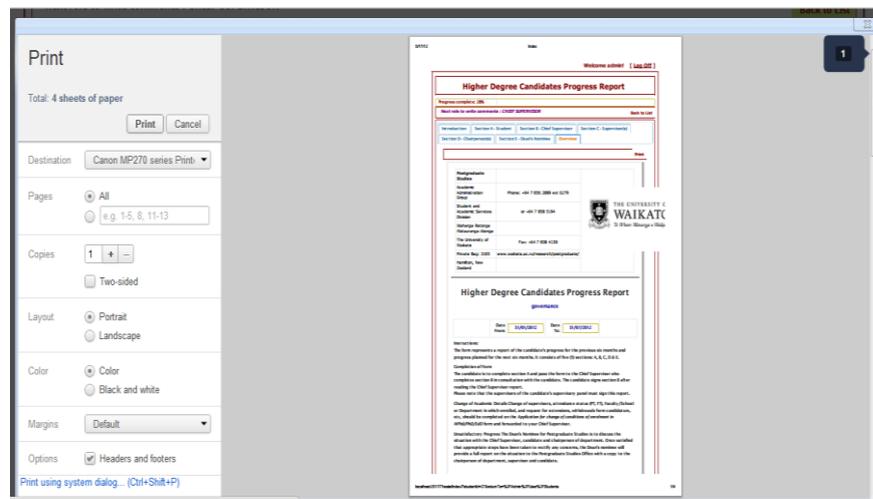


*Figure 7.18:* Print feature for the overview tab.

## 7.4 Flow of Control

The previous section explained the functionalities and features of the interfaces. This section aims to describe the progress flow of the system. The following diagram (see Figure 7.19) shows an overview of the flow control for processing the progress report through the interaction between the users and the system.
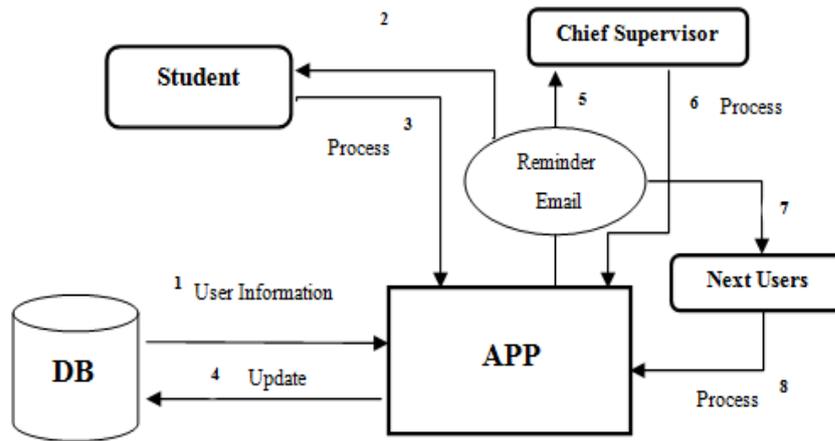
*Figure 7.19:* Flow of control for the electronic system.

The flow of control is the way of carrying out the processes as numerically numbered in the diagram. The explanation does not rely on the sequence of the numerical numbers but rather the way of applying the different processes described in following. Process one is carried out by the database, which sends the information, such as email and username, for the person who should work on the progress report to the system. Then the system performs process two by sending a reminder email to the student, the first user who should work on the progress report, to work on their part. Process three is performed by the student who completes their report. Process four involves updating the database according to the last modifications and actions made on the system.

Process one is repeated to inform the system of the information of the next person who has the work role. In process five, the Chief Supervisor receives an email from the system to work on his part. Process six is carried out by the Chief Supervisor, who modifies his part of the report. Process four is repeated to update the database and record the new input. Process one is repeated to send the information for the following users in sequence from the database to the system. The system then performs process number seven each time to remind the user individually to work on their work. All changes on the report are updated in the database to set the role for the next user to work on the report until completed.

## 7.5 User Study

### 7.5.1 Purpose of the user study

The purpose of this study was not to concentrate on the software itself as a complete product but rather to distinguish the differences between the currently

used systems at the university and the electronic software in terms of processing documents across several activities. The software was designed for the PhD student progress report activity as an example of other activities in the university. The participants provided their perception and feedback by comparing the way of producing documents in both the traditional and electronic system in terms of simplicity, writing, tracking and saving time and effort.

### 7.5.2 Procedure

This study was conducted using 11 participants, either PhD students or staff, who were involved in the PhD student progress report activity. The participants were invited by email and mobile message to take part in the study, and were informed of the purpose of the study. The sessions were carried out in either the staff's office or in the researcher lab, and lasted approximately 40 minutes. At the beginning of the session, a Participant Workbook o was introduced to the participant. The contents of the Workbook (see Appendix G) included an introduction to the study that explained the purpose and the procedure of the study and a Participant Information Sheet with the title of the research, the purpose of the study, the participants' rights during the session time and contact details for both the researcher and his supervisor. In addition, a Consent Form needed to be read by the participant and signed by both the participant and the researcher.

The participant was then asked to answer the initial questionnaire regarding their personal information and experiences in using computer devices and tablets in particular. Both PhD students and staff were individually asked to perform two tasks using the software. They also answered questions after completing each task to give their experiences and feelings about the tasks. In the final step of the study, the participants were asked to answer the questionnaire on the whole system and compare it with the traditional system of processing the documents by using physical copies.

### 7.5.3 Participants

The user study was conducted using 11 participants. Table 7.1 shows the demographic information of the participants in the study. The researcher's approach was to find a set of people that represented most groups involved in the PhD progress report practice. PhD students and staff members—such as supervisors, chairpersons and deans, nominees and Postgraduate Office

Committee members—took part. The participants were experienced with the way of processing documents in the traditional system and the majority had already participated in the study of support for individuals (see Chapter 5).

Table 7.1

*Demographic Characteristics of Respondents in the User Study*

|  | Age | Sex | Working position | Ethnicity | Native language |
|---|---|---|---|---|---|
| Participant 1 | 30–39 | Male | PhD student | Middle East | Arabic |
| Participant 2 | 50–60 | Male | Academic researcher and supervisor | European | English |
| Participant 3 | 20–29 | Male | PhD student | European | English |
| Participant 4 | 30–39 | Male | PhD student | Middle East | Arabic |
| Participant 5 | 40–49 | Female | Academic lecturer and supervisor | European | English |
| Participant 6 | 50–60 | Female | Chairperson | European | English |
| Participant 7 | 20–29 | Female | Postgraduate studies coordinator | European | English |
| Participant 8 | 20–29 | Male | PhD student | Chinese | Chinese |
| Participant 9 | 50–60 | Male | Academic researcher and supervisor | European | English |
| Participant 10 | 30–39 | Female | PhD student | Indian | English |
| Participant 11 | 30–39 | Male | PhD student | Vietnamese | Vietnamese |

### 7.5.4 Analysis of the system's evolution

The two tasks for each PhD student and staff tasks were similar; however, the staff members had a control panel allowing them to view all the students belonging to each member separately.

The student participants were asked to complete two tasks. The students' first task required the student to log in and read the instructions of the progress report. They had to find the student section and write comments, then submit it. The students' second task asked the student user to observe the changes that occurred in the application, such as the notification feature and the progress bar, after they wrote their section of the report in the first task. Additionally, they were

asked to modify their submitted section and view the whole report on one page, then sign and agree to the Chief Supervisor's work. This task had a trick question that required the students to edit other sections.

The student participants were asked to complete two tasks. The staff's first task was to view the list of student reports through the control panel and read the instructions of the progress report. They had to view the students' submitted reports and attempt to edit and modify other sections and observe the progress of the report so far. The second task required the staff members to view the current indicated section through the notification feature and attempt to modify the section they submitted. In addition, they were to identify the position of the next person who should work on the report in current time, and then finally check the progress of the report and observe any changes.

The participants were asked to scale these two tasks (one to 10) as difficult, easy or in between. They were also asked to comment on elements that made a task easier or harder to complete. The tasks and all questionnaires are included in the Workbook (see Appendix 7).

The researcher updated the design of the software following feedback from the first six participants. The revised version of the system was evaluated by the remaining five participants. Therefore, the participants' responses are divided into two groups based on the version of the system they tested.

### 7.5.4.1 Responses with to the initial version of the system
#### 7.5.4.1.1 Responses to student task one.

> 'Easy language, clear steps and good instruction*s for* processing
> the report. I did not find any hard task*s.' (Participant one)*

> '*The s*eparated section for each part of the form kept everything
> in a logical order.' *(Participant three)*

> '*It is paperless and helps save time.' (Participant four)*

> '*The system should not directly navigate me to my section*
> *before viewing the introduction page and the instructions for*
> *processing the report.' (Participant four)*

*7.5.4.1.2 Responses to student task two.*

'I don't think the software *was* very hard to understand*;* however, at the beginning it *was* confusing because of the new experience *of* see*ing* the report*.' (Participant one)*

'The tabbed interface makes it easy to change views; however, the progress bar does not show the sections are complete*.' (Participant three)*

'Seeing the supervisor's comment in another tab is better than retuning to the Student tab.' (Participant four)*

*7.5.4.1.3 Responses to staff task one.*

'It was clearly presented as each part is clearly* labelled*;* however, the instructions *are not* clear *on* what can be done *with* this software*,* which require*s* other forms or other software*.' (Participant two)*

'The tabs are mostly clearly labelled. For example, Section A: Student makes it obvious where to find the students' reports.' (Participant five)*

'I was not sure if the instruction of the report was on the first* page I started on (section B) or on the introduction page. However*,* after experienc*ing* it, it would be clear and easy to understand*.' (Participant five)*

'I like the tab display and it was easy to see the steps.' (Participant six)*

'The calendar component needs to be clearly labelled; for example, the label Start Date should be Start Date of Current Progress Report.' (Participant six)*

*7.5.4.1.4 Responses to staff task two.*

'It was clearly presented and easy to write the comment and submit it. The notification feature is good and tells me who next should work on the report.' (Participant two)*

*'I didn't find the edit button—it was not visible, why is it there? And the save button needs to be different from submit so I can edit more than once.' (Participant two)*

*'It was efficient to* view all tabs separately or all together in one page through Summary Tab*;* however, the Summary Tab should be labelled *with a* suitable name*.' (Participant five)*

*'I still like the tabs; easy to see the various steps and their order.' (Participant six)*

*'The edit button was a surprise!' (Participant six)*

### 7.5.4.2 Responses with to the revised system

According to the participants' experience of and feedback on the first version of the software, the system was revised and updated. The changes made on the initial version of the system are outlined in Section 7.5.5.1.

#### 7.5.4.2.1 Responses to student task one (revised system).

*'It was easy to write the report and it* was *an* efficient way of navigation and viewing all section*s.' (Participant eight)*

*'*Writing my section is the easiest, because *it* follow*s the* ordinary pattern*.' (Participant ten)*

*'The system allows me to simply and easily log in as a student and effectively fill my section immediately.' (Participant 11)*

#### 7.5.4.2.2 Responses to student task two (revised system).

*'*Using a red colour for the notification feature would *be* much better and clear for sight*.' (Participant eight)*

*'*I like the message box that appears and remind*s* me, when I trying to write or edit, that the person who has the role as shown in the notification needs to click the edit button. So, if the role not assigned *to* me, *the edit button becomes invisible.' (Participant 10)*

*'It is friendly to use; however, the size of the font of the notification needs to be larger.' (Participant 11)*

*'Viewing the whole report and attempting to modify other sections is more user friendly.' (Participant 11)*

*7.5.4.2.3 Responses to staff task one (revised system).*

    *'Improves the previous procedure of processing the progress report.' (Participant seven)*

    *'The notification feature is good and indicates the person who has the role to work on the report in the current time.' (Participant seven)*

    *'The edit buttons disappear when I view other sections that do not belong to me because the role is set for another user.' (Participant nine)*

*7.5.4.2.4 Responses to staff task two (revised system).*

    *'The idea of the progress bar tool is fantastic and it would be better if it visualised and indicated the sections that have been completed.' (Participant seven)*

    *'The check box for student agreement on the Chief Supervisor report would be better at the top of the page or in a separate section with a textbox to write some comments.' (Participant seven)*

    *'The edit buttons are only there when usable and the user has the role. Otherwise the sections are read only.' (Participant nine)*

    *'Maybe begin automatically in edit mode, or else place the edit button higher on the page so it is always visible.' (Participant nine)*

### 7.5.5 Evaluation

This section describes how the researcher applied various techniques in their evaluation of the usability of the HDCPR system. The user study was conducted to evaluate the efficiency of using the system as a way to improve manual processing of the PhD student progress report. The researcher used thinking aloud and observation techniques, as well as questionnaires. The observation and thinking aloud techniques gathered mainly qualitative information and a small amount of quantitative data, while the questionnaire gathered mainly quantitative data and some qualitative information.

The researcher recruited 11 participants of various age groups, genders, ethnicities and native languages. These variations help to provide different views on the system. The range of the participants' ages is shown in the following graph (see Figure 7.20). The participants ranged in age from mid-teens to late-50s, although most (37 per cent) fell between the 30 to 39 age bracket. However, the percentage of participants who fell in both age ranges between 50 to 59 and 20 to 29 was similar, at 27 per cent. Only 9 per cent fell in age range 40 to 49.
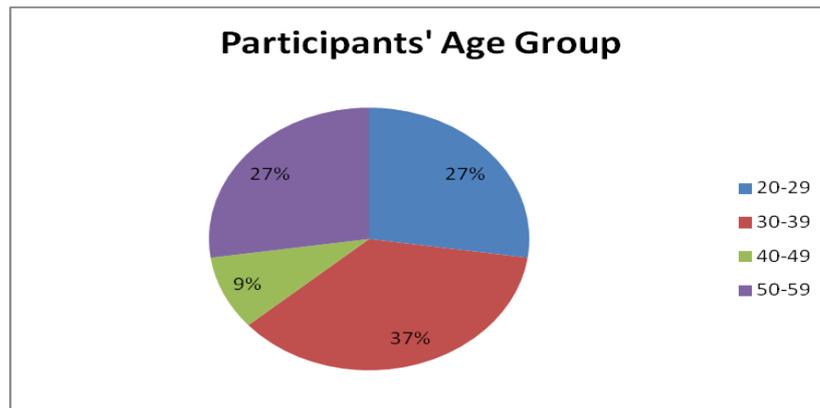


*Figure 7.20:* Participants' age group in the user study.

The following graph (see Figure 7.21) shows the gender split of participants. Sixty-four per cent of the participants were male and 36 per cent were female.
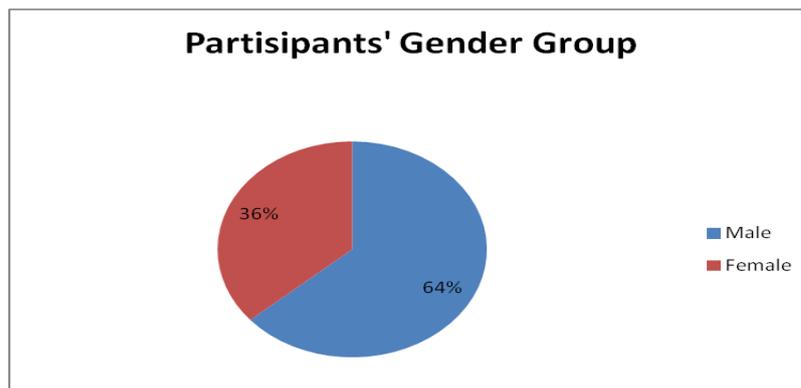


*Figure 7.21:* Participants' gender group in the user study.

### 7.5.5.1 Problems and recommendations

This section highlights the most significant problems encountered by the participants and observed by the researcher during the sessions in the user study. Recommendations are made by the researcher for future work.

There are some problems related to the design and functionality of the system. It was observed that a student may not have a third supervisor or a second

Chairperson. Therefore, when any staff member who occupies one of these positions is not assigned to work on a report of specific student, the system should allocate the role to the following person. Participants three and four were surprised when the system had already assigned the third supervisor and the second Chairperson for their reports.

There was a problem with the edit button in the student section. Two supervisors and PhD student noted that the student should not be able to edit their section after the submission of the Chief Supervisor section. They agreed that after the student submitted their section, their comments should be read only and they should only sign and agree to the work of the Chief Supervisor. Another problem was that nothing reminded the user to click the edit button to write the report in the Edit Form. For example, Chairperson and PhD student were confused when they tried to write their comments and did not realise that the edit button should be clicked. Participant six ( Chairperson ) said that the Edit Form should have save and submit buttons. The student participants were not sure how to check the checkbox to sign the Chief Supervisor's work, because it appeared inactive unless the user clicked the edit button. For example, a PhD student and a supervisor were confused and attempted to click the checkbox many times; they later realised that the checkbox becomes active after pressing the edit button.

Several participants did not observe and view the instructions at the beginning because the Introduction page was not shown as the first page after logging on to the application. For example, participant four was not sure about the instructions and suggested that the Introduction Tab should be the first page viewed before the student fills their section. Participant five, who is Female and worked as academic lecturer and supervisor, was confused whether the instruction that one in the top of her section page or that one in the Introduction page.

Some of the participants faced problems concerning language and expression aspects. The first issue was that the instructions in the Introduction needed to be revised to match the electronic system process rather than the physical one, as was noted by three of the participants. Also, the Summary Tab was not clear to the participants before they viewed it, because they believed the word 'summary' had another meaning than viewing the whole report in one page.

Most of the first group participants thought that this tab would show a brief summary of the whole process of the progress report.

The researcher attempted to update the system and solve some of the common and crucial problems that had been highlighted by the participants examined in the first version. Changes was made to the software so an alert message appeared to the user when trying to write or edit on either their own or anyone else's section. The message informed the user that if their role was shown in the notification feature, they should click the edit button in their section. Otherwise, the edit button would not appear and the role was for someone else.

The system was also updated to assign roles to staff who occupy positions only set for the students' progress report. If one of these positions, such as third supervisor or additional Chairperson, were not associated with the student report, the system will skip them and set the role for the next position. Another change was that the percentage in the progress bar moved to the left side and came after the text 'Progress Complete' for clarity. In addition, the Summary Tab was relabelled 'Overview' to clearly indicate to the users that all sections could be viewed on one page.

The interactions of participants who tested the revised system varied from the first group of participants. They were happy using the system, while the changes and updates allowed them to complete tasks in a convenient and efficient way. The system provided the participants a quick respond by messages and notifications when they attempt to do any action.

It would be more effective if users received an email, as highlighted in Section 7.4, to alert them to any updates and progress on the report, because the user may not be logged on to view their report for several days. Also, this feature would remind people of when they need to log on to complete their section. Further, reminders after X days if they do not complete. The system should also navigate the user to the Introduction page to read the instructions before they work on their section. The system could also immediately navigate the user to their work section, but should show a message at the top of the section asking the user to view the instructions first before filling their section.

Overall, although there some improvements are needed before the prototype can be completed, the participants' experiences using the electronic system supports the possibility of a 'paperless university'. The participants

insisted that the system provided many benefits to increase the efficiency of processing the report compared to the paper-based system. Benefits include that it helps to save time and effort, ability to track the report, everyone can view what stage the report is at, less worry about delay, it can be accessed from anywhere, students do not have to find people, paper cannot get lost and tasks are kept organised. The participants wish to use the complete electronic system and other similar systems for different practices around the university. The system overcomes the obstacles and drawbacks of using a paper-based system and can be efficiently processed from anywhere, rather than requiring physical presence at the university.

## 7.6 Conclusion

This chapter examined the effectiveness of processing e-documents rather than paper documents through prototype software. Eleven of students and staff individually participated in a trail study by evaluating the e-system comparing with the paper-based system. The findings of this user study emphasize the efficiency and advantages of utilizing e-system overcoming the drawbacks of using paper documents within the current system. Employing software and tools that can be available either online through the web or install in tablet devices, will reduce the use of paper and increase the effectiveness of productivity in organization.

# Chapter 8: Applications and Tools for Managing Tasks and Time

## 8.1 Introduction

Paper usage does not help documents being accessed and read from different places unless the user holds them. Further, tracking where documents are is often not easy. Sharing paper documents through traditional ways, such as by mailbox and manually, causes a delay in progress and viewing the current updated version is complicated. More issues and drawbacks relating to the use of paper documents within the current system at the university were discussed in the literature review Chapter 2, and in first two studies discussed in chapters 4 and 5.

In contrast, the potential ability of using tablet devices for handling documents and efficiently managing staff tasks was discussed in Chapter 6. These tablets are supported by beneficial features that affect user behaviour when accessing, reading, writing, sharing, annotating and highlighting documents. They also assist to simply and efficiently manage time and tasks and share them with others. That motivated the research described in Chapter 7 to evaluate a prototype system for handling PhD progress reports electronically.

Several electronic tools and applications are designed for devices such as laptops, PCs, tablets and smartphones, and others are available as web applications. These applications have the potential to efficiently allow users to handle documents in an enjoyable way while organising work time and tasks. This chapter will outline some of the most commonly used application. These applications could possibly replace paper documents and are categorised in terms of their main purposes.

## 8.2 Applications and Tools for Sharing Documents

This section includes various applications and tools mainly used for storing and sharing documents. And individually discusses the facilities and drawbacks of and comparison between these tools.

### 8.2.1 Diligent Boardbooks



*Figure 8.1:* The Diligent Boardbooks interface—the developed system for meetings.

#### 8.2.1.1 Overview

Diligent Boardbooks was developed in 2001 and is currently a global leader in board portals. The system is a virtual book and feels and appears like a paper book. It has tabs and page numbers, and the pages can be easily flipped. Users can meet their needs through built-in flexibilities and documents and materials can be viewed online or offline. Text can be projected in a meeting and helps businesses to go paperless (Sodi, n.d.).

The Diligent Boardbooks portal appears and works like a book, so it is easy to use and intuitive. Through the interface, the user can easily transmit rather than traditional books. Additionally, this system allows the administrator to prepare the board meeting and provides instant online access to meeting records so the director can review the material early. As highlighted by the Boardbooks website, the Diligent Boardbooks system has a variety of flexibilities, as listed below (Diligent, n.d.).

Easy To Use this is the essence of Boardbooks an interface that is simple and intuitive that it requires very little training for Directors—making it an easy, smooth transition for Directors.

Powerful Features a complete 3rd generation feature set with powerful tools for both the board and the administrative staff.

Supported like no other personalised individual training and an expert support group available 24/7/365 to answer any question and assist with any need. We truly believe the level of service you receive from Diligent is unsurpassed.

Proven for Over 9 Years when you choose Diligent, not only are you getting a beautifully designed, easy-to-use board portal, you have the assurance knowing it has been tried, tested and proven by large and small corporations around the globe. Boardbooks is a superb choice and a safe choice.

World's Most Used Board Portal with over 12,000 users worldwide, Diligent Boardbooks is the choice of some of the largest corporations in the world.

### 8.2.1.2 Discussion of Boardbooks

There are several benefits and drawbacks to using Boardbooks. Pages move right to left like a book, rather than up and down like a traditional PDF reader. The books can be available offline, and documents do not crash. Documents are always secured and up-to-date. The user can use a stylus to annotate documents; however, annotations will be lost if the book is updated. Boardbooks also supports bookmarks and document outlines for navigation within the document, and shows which pages contain annotations. However, the system does not support split-screen to display more than one document at once (or different pages of the same document), although documents can refer to other (including archived) documents. Searching is also possible: within a book, within current books and within all (including archived) books. Further, if a book is updated, only changed pages are sent again to the user, although the system needs to produce a new version to update any book.

One point worth noting is that the system does not track who has read what and so avoids liability issues (e.g., if a director claims to have read a document, but has not). Also, data is stored on Diligent's servers, but encrypted and not available to employees. This application is not built on third-party software, so they have full control. The administrator has the authority to hide some documents from being visible to Committee members.

One issue with this system is that users need to be trained to understand the features of the application. There are financial issues too, as each product is approximately US$500, so a committee consisting of several members may not be able to afford the cost. APC (see Section 4.5.2) could use this system to manage

and share the agenda between its members in a convenient way; however, this Committee consists of 12 members, which makes it difficult to employ this system because of the cost problem. In summary, employing the functionality of this system for managing meetings of a committee would significantly increase the interaction and collaboration between members and the effectiveness of productivity.

### 8.2.2 Google groups and documents

Creating an account with Google, either through Hotmail or Gmail, allows the user to share different kinds of documents with groups of people and open and browse documents from mobiles, desktops, laptops and other devices. Additionally, Google Docs works on browsers used by many operating systems, such as PC, iMac and Linux, and supports popular formats such as .doc, .xl, .ppt and .pdf. Users can always access and back-up online the stored files in Google Docs.

The researcher engaged with groups of students and lecturers during this study through Gmail. This allowed the group's members to share documents and so the collaboration between group members involved effective communication between members, because all members could read the updated files and post their comments. Using Google Docs helped the group save time and work as a team in the same digital place, rather than needing to work individually and then meet in a physical place.

### 8.2.3 iCloud



*Figure 8.2:* iCloud logo.

### 8.2.3.1 What is iCloud?

iCloud is produced by Apple and was introduced on June 6, 2011 at the Apple Worldwide Developers Conference. It allows the user to store online different kinds of documents, such as photos, calendars and applications, and documents can be distributed from iCloud to all devices. Thus, the user can manage and browse documents from different devices and are not restricted to work on one device (*What is iCloud?* n.d.).

### 8.2.3.2 Content and your various devices

iCloud is not a hard drive to store documents but rather helps users to access and view the content from all the devices through a cloud. That means it is accessible from iPad, iPhone, iPad touch, iMac or PC. It provides you the opportunity to instantly access your, music, latest photo. Will keep you track your email, contacts and calendars up to date across all your devices. With iCal there is no any kind of requirements.

(CNET News, 2011) Steve Jobs introduced iCloud and explained that Apple attempt to demote the PC in iMac to just be a device like iPhone, iPad, iPod touch. In addition, move the digital hops the centre of digital life in the cloud. All the devices have communication spilt in them; they can talk to the cloud whenever they want. "Some people think the cloud is just a hard disk in the sky", Steve Jobs Said. Content can be stored in cloud then can be wirelessly pushed to all devices. iCloud is integrated with Applications, so everything happens automatically 'it just works'. For instance, if the user has a calendar in iPhone, they can push it to all devices. Therefore, calendar stored in cloud and changes on any devices pushed to all user's devices.

Faculties and committees at the university could be more efficient by creating one iCloud account for many devices so that all the involved documents could be synchronously shared between staff. This would allow staff to post new and updated documents and that could be immediately viewed by others.

### 8.2.4 Bump



*Figure 8.3:* The method of sharing files through Bump.

Bump is one of the most download applications from the Apple App Store. It aims to help users exchange information by bumping an iPhone or iPad with another user's device (see Figure 8.3). Users need to add friends inside of Bump and can then share applications, messages, music, locations, calendar events, contacts and become friends on Facebook. Users can use Bump for free texting and send messages anytime, complete with instant push notifications. Bump works cross-platform between the iPhone, iPad and iPod and many other phones.

Staff can benefit from this application by easily sharing documents. When two or more staff meet they can share documents through this application rather than email, and the additional ability to share applications could be beneficial. It would be better if this application enabled Bluetooth to enhance the ability of sending documents from a distance, rather than requiring physical closeness.

### 8.2.5 Mail

Email is considered indispensable in both the private and business world. Employers have emails addresses for their employees and universities have them for staff and students. Many people rely on email as a communication tool that allows instantaneously sending of messages and sharing documents with anyone in the world.

Emails, not including internal business accounts, are mostly delivered over the Internet through two protocols: Post Office Protocol (POP) and Internet Mail Access Protocol (IMPA). Messages are routed to the user server that can be

located anywhere in the world through the internet's control server. The message will sit until the user downloads it into mail, unless there is an email server in a home or cubicle. These two steps give the user mail server a chance to get rid of spam and junk mail. However, the outbound mail is quite different as the user types a message, address it and clicks send. The message can be directly sent out to a destination through the Simple Mail Transfer Protocol (SMTP) sever. The SMTP server checks the address sent by the user and ensures at the other end that the other mail server is ready to receive message. The SMTP server immediately bounces a message back to mail when a username in the address is incorrect or the receiver no longer has an account (Proffitt, 2010, p. 82).

The iPad has a built-in email application called Mail. This application allows the user to join all mail from Windows, OSX and Linux. The user just only need to set up his own emails information then will be able to browse them from the Mail application. For example, this application provides the opportunity for me to set up my own emails such Gmail and Hotmail. So, it just required very simple information such as the username and password for the POP server and the Internet address for both POP server and STMP server. The thing is that, via the POP server, the user can set the email to be automatically downloaded at a certain interval. For instance, 15 minutes is counted as the fastest interval that prevents the user's POP server from overload.

To browse email, the user can select a certain email or all inboxes for all emails and will immediately be able to read all the messages, except spam and junk mail, through the Message List. Users are able to reply and see if an email was sent to other people as well. The application allows the user to browse the contact tools on the iPad and open all contact lists and tap the addresses needed. Additionally, mailbox organisation is provided by the application. Although the Mail cannot create or change mailboxes, which has to be done directly within the user account, it supports the user to in moving messages into folders; for example, folders such as books, commerce, family, friends, Google alerts and meetings.

## 8.3 Tools for Managing Tasks and Time

There are different kinds of applications that help the user organise their work schedule. Staff at the university are involved in many meetings, workshops, lectures and supervision of students and may have multiple appointments for different tasks on the same day. Some applications show all appointments for a specific day in one style or colour, which makes recognising each appointment quite difficult. However, other applications help the users to divide the diary into each activity and task and show multiple diaries in one application. This section gives an overview of such applications and explains how these applications may benefit staff.

### 8.3.1 iCal



*Figure 8.4:* iCal calendar.

The iCal application allows the user to easily track various kinds of tasks in one calendar. The user can create a calendar for each task and activity; for example home, work, friends and events. These different calendars are shown in a single window with diverse colours to help the user to easily recognise each task appointment on a specific day. iCal also allows the user to subscribe to friends' calendars and users are able to send invitations to their friends through the contact information from the Address Book, update guest lists and track the responses, and receive the latest status information. All received invitations to iCal users are automatically added to iCal. The issue with this application is that it requires iMac OSX, which is not available to all users like Google Calendar, which is much simpler from a user's perspective.

### 8.3.2 iPad Calendar and Contacts
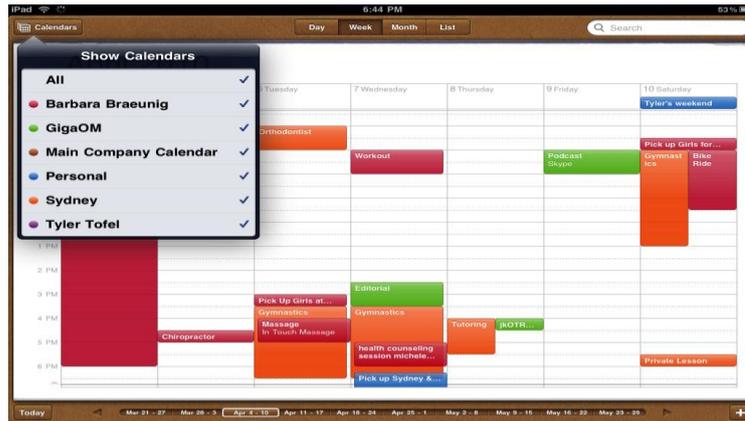


*Figure 8.5:* Single iPad calendar containing multiple calendars.

Through the iPad, the user can benefit from two built-in applications to manage calendars and contacts. These two applications allow the user to synchronise other applications, such as MobileMe, iCal or Microsoft Exchange Outline, with these two built-in applications. If users have more than one calendar—such as a home calendar, a friend's calendar and work schedule—iPad Calendar can organise events by type through the creation of multiple calendars (see Figure 8.5). The user can create separate calendars from these types of events and decide which of them to display.

However, it is not possible to create a new calendar on iPad, so if the user does not have a calendar on his computer the only option is to use the iPad Calendar. This issue may be solved by Apple in the future (Hess, 2010, p. 191).

### 8.3.3 Google Calendar
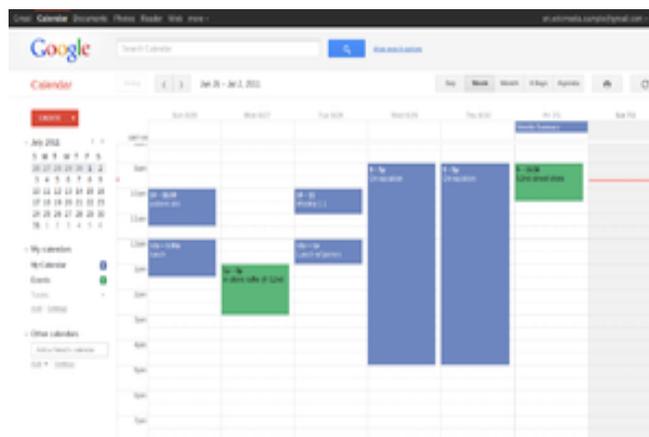


*Figure 8.6:* Single Google Calendar containing multiple calendars.

Google calendar is a web application freely offered by Google since April 13, 2006. The requirement of using this software is having a Google account.

There are a number of features, such as reminders, shared calendars, synchronisation with other applications and accessibility anytime. These features are explained in detail below.

### 8.3.3.1 Reminders

Customisable reminders remind the user not to forget appointment, meeting, exams, assignments or specific tasks. The user can choose to receive reminders by email, SMS message or popups within Google calendar itself.

### 8.3.3.2 Share calendars

Multiple calendars can be created via Google Calendar (see Figure 8.6). All individual calendars can be shared either with specified persons or with everyone (public calendar) and can be either read only or have full edit control. It is more efficient to give permission to your colleagues, students, classmates or friends to browse and see your calendar.

### 8.3.3.3 Synchronisation

Google Calendar does not only synchronise the user with others, it further allows synchronisation with other computers and electronic devices, such as the iPhone, Palm Pilot, iPad or BlackBerry, and with applications such as Microsoft Outlook, iCal and Mozilla Sunbird.

### 8.3.3.4 Access anytime

Google calendar allows the user to view schedules even when there is no available access to the Internet. This means the user can browse the calendar with offline access and be able to view read-only versions of their calendar regardless of location.

### 8.3.4 Notes and lists

Notes are important for managing time and remembering things. Carrying a small notebook and pen is inconvenient and may be lost or forgotten. Keeping notes electronically allows the user to browse them from a device with a larger screen and keyboard. In the iPad, the Notes application allows users to synchronise notes wirelessly.

**8.3.5 iAnnotate**
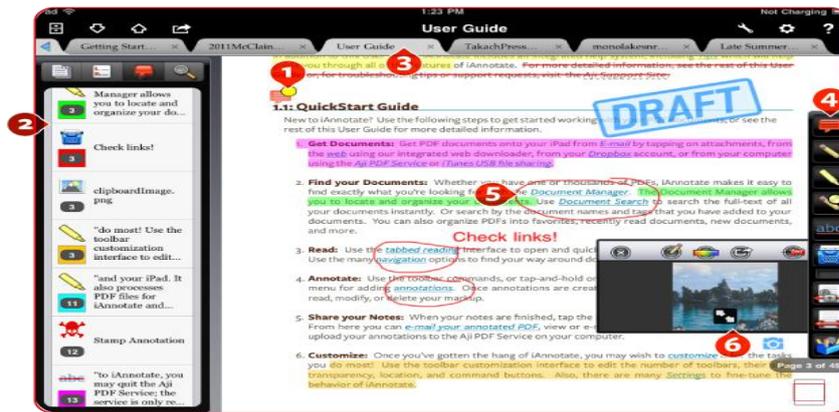


*Figure 8.7:* Many features provided in iAnnotate (source: iAnnotate PDF for iPad, n.d.).

iAnnotate is one of the most used applications on portable and PC devices. It allows the users to read, annotate and share PDF files. iAnnotate is a paper eliminator and has many features, such as notes and bookmarks, navigation panel, tabbed PDF reading, customisable toolbars, annotation system and photo annotations. The features are detailed in this section (see Figure 8.7).

*8.3.5.1 Notes and bookmarks*

This function allows the user to inform colleagues of opinions and decisions by writing text. Bookmarks enable navigation to the relevant information, passages and annotations (see Figure 8.8).
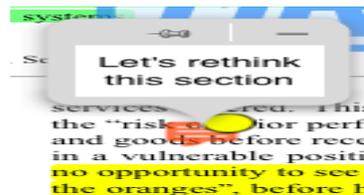


*Figure 8.8:* Adding details on annotation.

*8.3.5.2 Navigation panel*

The user can navigate via a panel to bookmarks or outlines and list-based documents, search with context and see a thumbnail view and search annotations (see Figure 8.9).
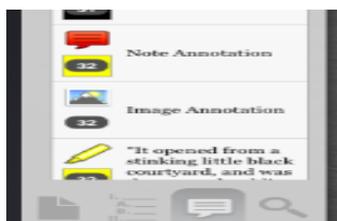
*Figure 8.9:* Navigation panel.

### 8.3.5.3 Tabbed PDF reading

Browsing multiple open documents is possible through this application. Tab setups and page locations can be remembered when the user switches tabs or quits and returns to the application. In addition, this application supports continuous-scrolling page display with standard scroll/zoom gestures, continuous-scrolling zoom or single page and full screen reading mode (see Figure 8.10).
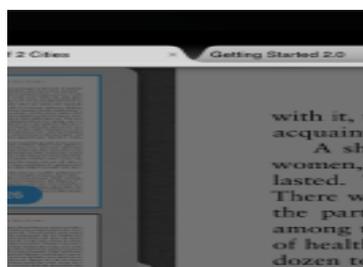


*Figure 8.10:* Multiple tabs in iAnnotate.

### 8.3.5.4 Customisable toolbars

This application assists the user to drag and drop exact tools to the user toolbar. The user is able to customise the tools by repositioning and resizing them (see Figure 8.11).



*Figure 8.11:* Customise the toolbars.

### 8.3.5.5 Annotation systems

Annotation tools on iAnnotate include typewriter, highlighter, pen stamps, notes, underline, straight line, photos, strikethrough, voice recording and date stamp (see Figure 8.12). They are similar to and as efficient as physical mark-up. This application allows users to customise tools: set a custom typewriter, import own stamps and create a set of custom highlighters.
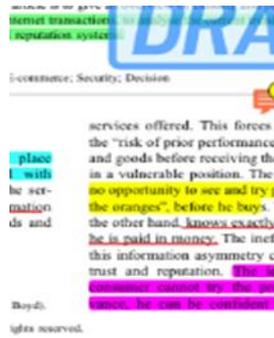
*Figure 8.12:* Annotation tools in iAnnotate.

### 8.3.5.6 Photo annotations

Sometimes using pictures to express a specific idea saves the time of having to write words; photos can be added to a document using iAnnotate's photo tools (see Figure 8.13). Photos can be included using a device's camera or from the photo library.
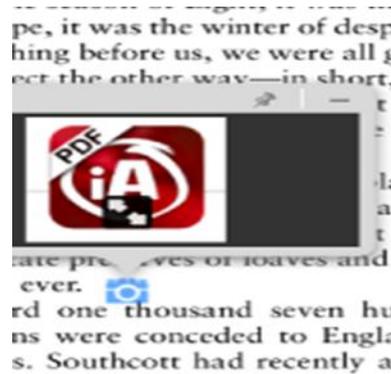


*Figure 8.13:* Using pictures in iAnnotate.

### 8.3.6 Reminders



*Figure 8.14:* Interface of reminder views the events in different way.

This application allows the staff to record anything that needs to be remembered; it can be used on the iPad, iPhone or iPod. Reminders allows the user to create a list of categories with sub-lists, including events with different days and dates. The user can browse the events by date. Figure 8.14 illustrates various ways of browsing events, either by list or day. Reminders can be synced with Outlook and iCloud, so changes can be automatically updated on all devices and calendars. Reminders can be location based; the user can receive an alert as soon as they leave or reach a specific location.

## 8.4 Conclusion

The efficiency of different electronic applications and tools, are used for handling documents and organizing time and tasks by several computing devices, were explored in this chapter. These applications and tools are commonly used by people and examined by participants involved in this investigation. The facility and functionality of these tools and applications support the tablet devices to significantly reduce the use of papers. Furthermore, allow staff of an organization to synchronously share documents, and manage tasks and time, in electronic way.

# Chapter 9: Discussion

This chapter aims to underline the crucial aspects and outcomes of the study through a discussion. This chapter also includes brief answers to the research questions highlighted in Chapter 1.

In the literature review, the research identified the definition of the documents in different aspects. Documents can be defined as evidence and proof, writing conveying information and a material substance and as information provided to customers and users in industry fields. They can be used for conventions based on similar or previous documents. The term e-documents is more comprehensive. In terms of functionality and features, it can include graphs, links for navigation to other topics, can be used in different forms, is easy to archive in a file system and in various kinds of storage devices, is easy to share with other people and can be processed at the same time by several users. Some documents are described as multimedia because of their ability to include video and voices.

The literature review clearly illustrated the drawbacks of using paper documents in several tasks—such as bulk, access, retrieval, portability and security—and shows the efficiency of using e-papers as a way to overcome these drawbacks. It was highlighted that the e-documents reduces the storage, makes the retrieval process more flexible, can be easily and quickly searched, allows control of the distribution of documents and can be recovered and re-sorted after a backup.

The use of paper documents is preferred in some cases. People sometimes prefer to read long documents on paper, while others prefer to revise grammar, structure or spelling on a physical copy. However, the research clearly distinguishes the different capabilities between using the e-document and physical documents. The overuse of paper affects our environment, causing pollution as consequence of the paper industry, and forest desertification because of trees being cut down to produce papers. Also, the use of paper reduces the efficiency of productivity in organisations because of many reasons, such as delays when

completing tasks manually, difficulty when accessing paper from different places, difficulty in sharing and transmitting, wasting paper and money for multiple versions and difficulty in updating unless producing a new version.

The research extended the information included in the literature review on the functionality of using paper and electronic documents by exploring the way of processing documents at the university. The research identified the methods used in the university through conducting two studies in Chapter 4 and Chapter 5. The study in Chapter 4 was conducted by a small number of participants who were representative of committees around the university. Participants were interviewed to provide essential information to identify activities. This study explained the flow of producing, distributing and processing documents in various practices. It also initially highlighted some of the obstacles and drawbacks of the current system and the use of paper documents. The second study in Chapter 5 was conducted using 10 persons mainly involved in the activities discovered in the first study. The second study was larger and aimed to obtain further information about the current system in terms of handling documents in general, either electronic or paper, and certain activities in particular.

These two studies concentrated on the current strategies and methods utilised for processing documents. In reality, the infrastructure for most activities was not supported by sufficient technical equipment to process the tasks in an efficient way. The majority of activities were still processed manually. The university website introduced essential information for both staff and students and allowed them to view papers and the outline of each semester, but this functionality was not enough to process most of the important tasks in the university. As discussed in the literature review, the current system suffered from several obstacles as result of using paper documents as the main tools for processing practices.

The most significant issues identified in Study 1 and Study 2 were that accessing documents was not easy and that they can be electronically accessed when sent by mail. Also, paper documents cannot be viewed from different places by different people at the same time. Tracking the documents is complicated and needs to be followed up through email or telephone. The current system is not secure as most of the documents are paper and stored in cabinets.

Annotating, highlighting and commenting is more convenient on paper documents. However, they cannot be shared and updated quickly. Modifying the currently used documents in the chosen activities was only possible by handwriting. This caused difficulty in reading and the update was restricted to the person who had the paper. Transmitting the documents needed to be handled manually, except those files that were created electronically, such as student reports. This caused delay in progress, because each staff needed to be on campus to handle them. The current system did not support functional research and retrieval of documents.

Staff and students faced challenges using paper documents in particular tasks. Tasks were not effectively processed due to the insufficient functionality of paper documents. These documents were not located in a fixed place to access easily and most were received by email, which was complicated and required checking of email every day. This way of accessing documents was not convenient because of the large numbers of emails received. Papers had to be stored in cabinets or physical folders to avoid being lost. Paper documents prohibited staff or students to work simultaneously on one task and there was no possible way to share these documents with others, because they had to be manually handled. Work on paper documents required staff to be physically at the workplace, which caused considerable delay in progress. When tasks were sequentially processed, it was complicated to track documents and know who worked on them at the current time. Moreover, other staff were not able to view the documents unless they personally had them.

The research found that large amount of paper was consumed in the staff offices every day. Chapter 5 concluded that paper was always used by 70 per cent of the participants, while 30 per cent often used papers in their daily office work. In addition, paper wastage at the university was considerable because of the reliance on the use of paper. The study also showed that 40 per cent of participants stated that they always wasted paper. Further, 40 per cent said they often wasted paper documents, whereas only 20 per cent of participants aimed to reuse and not waste paper.

In the first two studies, the outcomes stressed that a huge amount of paper was still used for producing and distributing documents within various activities. If we consider the number of physical versions and copies that are produced every

year, we can imagine the amount of money spent on printing these copies. For example, every year the university prints and distributes 2,100 copies of the university calendar. However, these copies are not easy to update, share with other people or access and are not available on the Internet. Why are these copies still printed when they are not efficient after the production time? People preferred to view updated electronic versions of documents in current time and accessed at anytime from anywhere. In terms of convenience, portability, sharing, updating and modification, we can say that paper documents are not an essential means for processing practices around the university due to the lack of functionality.

The current university electronic system is not sufficient to accomplish tasks. It provides only basic applications for writing text, presentation and graphics; for example, JadeSMS, Framemaker and Dreamweaver. The current system is not supported by a functional file system to keep all documents in one place to be easily accessed and shared. There are some suggestions to overcome the drawbacks. The university can solve these problems by using e-documents to improve the limitations of using paper documents. E-documents can be handled electronically and read from anywhere by multiple people concurrently. The university should create electronic file system that allows storage of large amounts of files and accessing, retrieval, tracking and sharing of the documents anytime. Moreover, the university needs to train its staff to use electronic applications for note taking, reminders, annotations rather than physical tools. Also, the university should develop professional software that provides helpful features and functions for these tasks.

Tablet devices have become more commonly used for multiple purposes. The literature review in Section 6.2 shows the desire for educational organisations to use tablets in general and the iPad in particular, and illustrates the potential capabilities and advantages of using and iPad. Many universities are moving towards digitising their materials to be browsed from anywhere through tablet devices. These organisations create an application for staff and students that allows them to view all relevant information through an iPad, iPhone or Galaxy. Many studies and experiments have been conducted in different educational organisations and show the efficiency of using iPads to fulfil some tasks.

A third study, discussed in Chapter 6, was conducted using eight participants, most of who had participated in the previous study. Corresponding to

the suggestion of both studies and the literature review in relation to the iPad in education, the research examined the potential of tablets to handle documents across many applications. Although there were some small technical problems with using the iPad, the functionality potentially allowed the participants to overcome some of the issues of using paper documents within the current system.

The study showed that participants used their iPads for personal and work tasks. The participants benefitted from the built-in features of installed applications. The study showed that browsing file documents—such as Word, Excel and PowerPoint—could be achieved easily through the iPad, and participants began to use applications as alternative tools for physical copies. Information recorded in these applications became easily accessible, could be emailed, shared with others and synchronised with other devices for the same user. Some of the applications had a file system that allowed saving of files in separated folders. Participants preferred to use an iPad than a laptop, PC or notebook device in terms of weight and the ability to carry a large number of programs. Most participants stressed that tablet devices were more convenient in lectures, conferences, meetings and exams. The participants emphasised the specialties and features of the iPad, such as file synchronisation, email, video recorder, camera, and writing and modification applications. The participants stated that the use of iPads helped save on the printing of paper, and they could read documents in the iPad e-reader from anywhere. Participants found that the iPad was a useful tool for note taking as notes could be read anytime and shared with others by email without fear of losing them. Some participants had used applications in iPad for highlighting and annotating PDF documents with different colours, underlining, drawings and notes. They felt comfortable using an iPad for this task; however, the majority of participants agreed that paper was still the better tool for overall annotation.

iCloud computing could be gradually employed in the university using an iPad device. iCloud computing positively affects the university in several ways. The iCloud feature is available on the Internet and used across different devices such as the iPhone, iPod and iMac, so staff and students could share and access files saved by other devices. In addition, users do not need to install or update applications on their computers, because they would be installed by the university. Storage space would be increased and no hardware would be needed for storing

applications and documents. Also, using the iCloud feature would reduce the number of computers used, the cost of IT and energy consumption. With iCloud computing, the university could easily communicate with local and remote people. Students and teacher would understand the worth of utilising this technology when they accessed the universal workforce.

The research proposed a prototype demonstration of an electronic system to improve the current paper-based system. The details of this user study are included in Chapter 7. Eleven participants evaluated the efficiency of using this system and compared it with the traditional system. The outcomes of this study showed that the electronic system overcomes the obstacles and drawbacks of using the paper-based system, and could efficiently be processed from anywhere rather than being physically at the university. The study highlighted that electronic systems provide many benefits and increase the efficiency of processing PhD student progress reports. Examples of these advantages include saving time and effort, tracking reports, allowing all to view what stage the report was at, less worrying over delays, accessibility from anywhere, not having to find people, inability of e-documents to be lost and keeping the tasks organised.

Chapter 8 outlined some useful applications of iPad tablets, several of which were noted by the participants in the third study. The iPad has useful applications for managing time and tasks, taking notes, annotating, emailing, file sharing and calendars that were not available in software. Tablets have special applications for specific tasks and additional applications that allow the handling of different forms of documents.

# Chapter 10: Conclusion

Moving towards a paperless environment requires an appropriate plan and strategy. An organisation should understand and identify the problems; for example, crucial documents should be digitised, the current system should be restructured and new technologies should be employed. The purpose is to not just be paperless but to improve and develop the whole currents system, including paper documents, staff cooperation and behaviours and tasks to increase the efficiency of processing documents

There are examples of changing and altering underlying systems by employing new technology using electronic systems. Sellen and Harper (2003) discussed cases for two organisations, DanTech and UKCom, who attempted to change the traditional system by involving technologies. Three types of problems were considered by both organisations when making changes to the work process. The problems were the symbolic, the cost and the interactional. Both cases were notable because each company utilised different approaches.

In the first case, DanTech, the notion of 'going paperless' was recognized as symbol of change rather than a cause of change. Although the organisation failed in some aspects to make the changes, they identified what should be leveraged by moving to a paperless environment. This was a consequence of their concentrating on changing the underlying work process through ways such as process restriction, changes in the physical environment or alteration of the technology supporting the process. The most crucial advantage of this attempt was the reduction in the use of paper by breaking the use of the filing cabinet system with an alternative electronic system. On the other hand, the company in the second case, UKCom, did not understand the changes required to go paperless. The organization focused on the cost and interactional benefits rather than first altering the underlying work practices. They concentrated on the international limitation of paper and attempted to motivate staff by advertising 'going paperless' around the organization.

From the above two examples we can draw that organizations should enhance staffs to recognize the sign of alteration toward electronic system rather

than waste time on advertisings 'moving toward paperless'. As well, the organizations must not concentrate on developing the infrastructures such as material, equipment and technology used for enhancing the current system. The drawback from the current system should be determined by the staffs' experience and perceptions in order to logically and gradually outline the possible and appropriate solutions through technology.

The research highlighted many problems in the efficiency of productivity of various tasks due to the use of paper documents. Employing technology in the right place significantly reduced the use of paper and increased the success of processing documents in reasonable time and with less cost. The research proposed employing electronic file systems, using e-documents and significantly emphasised the positive effect of tablet devices such as the iPad.

Tablet devices, and the iPad in particular, have potential facilities and functionality to positively affect the work environment. Initially, utilising iPads protects our environment by reducing the use of paper. Organisationally, iPads potentially assist businesses to improve paper-based systems and mainly use e-documents to process documents. Training staff to use iPads functionally will improve their skills and cooperation. As a result, organisation will significantly increase the efficiency of production and electronic reliability and save time, effort and money.

Future work requires organisations to solve the problems in the current system and use e-documents so that documents are available anytime and anywhere. Organisations should create electronic systems, such as the one evaluated for the PhD progress reports, and should trial these with customers and staff. Further, organisations should provide staff with iPads and train them to use the fundamental applications and tools to manage their time and tasks, and use their suggestions to build iPad applications for organization activities. All staff can work from the same iCloud account, allowing them to synchronously share documents, work on them simultaneously and be immediately informed of the latest update.

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# Appendices

## Appendix A

**Application for Approval**
*Outline of Research or Related Activity*
**Ethics Committee, School of Computing and Mathematical Sciences**

THE UNIVERSITY OF
**WAIKATO**
*Te Whare Wānanga o Waikato*

## Details of Proposed Activity

**1. Identify the project**

1.1 Title of project:

The paperless university: improved processes and reduction in paper usage through wider use of electronic documents and notepad technology.

1.2 Researchers:

Saeed Al-Qahtani

Emails: shs9999@hotmail.com , sha4@waikato.ac.nz

Mobile: 0064211798625

1.3 Supervisor:

Professor Mark Apperley

Tel: 07 838 4528 Ext 4528

Fax: 07 858 5095

Email: m.apperley@cs.waikato.ac.nz

1.4 Anticipated date to begin data collection

The expected date to begin data collection is 12 October 2011.

1.5 Does your application involve issues of health or disability with human participants? If so, please refer to the guidelines as whether your application submitted to the Northern Y Regional Ethics Committee

There is no any kind of health or handicap issues concerning the participants.

## 2. Describe the research or related activity

2.1 Briefly outline what the project is about including your goals and anticipated benefits. Include links with a research program, if relevant.

Reducing the usage of paper in the workplace and using contemporary technology lead to saving and improved efficiency. At university as educational organisation, many different daily activities and tasks are managed by people in term of process, paperwork, procedure, rules. These activities involve meetings, enrolment, exams, required applications, advertisements, lecture notes.

The purpose of this study is for the researcher to acquisition how to conduct study to evaluate some activities at the university in term of paper usage involving people paperwork and process. Also, come up with a convenient electronic system alternatively.

2.2 Briefly outline your methods

This study will be conducted by 10 participants from the Waikato University and might involve other universities' staffs in New Zealand and overseas. Staff members may be interviewed in their own workplace offices, or in the laboratory area where the researcher is based. While, overseas participants will contribute through communication tools like Skype, MSN, Phone. These tools will help us to write to each other, share documents, and make voice calling too.

For an individual, the study might be spread over several days. The participants will be informed of the main purpose of the study and all their rights during the study .photos may be taken and the voice recorder will be used as well. As well, notes will be taken during the course of the study.

In addition, participants will have the opportunity to review and reject any kind of their information such as records, photographs and notes taking, at any time. Also, they are able to withdraw any time during the study if they change their minds. Secondly, the participant information sheet, which requests personal information about the participants, will be introduced to the participants to complete. This information will be kept confidential and anonymously.

Initially, the study will focus on discussion about the routine of the work and how the participant deals with the documents. The researcher will identify the process and procedure of the activity and try to get the whole picture about the current system. The interviewee will be asked some questions varying from one

interview to another. The questionnaires help the researcher to discover the current process and the problems and the way of modifying, sharing documents at a university. The first part of the questionnaires is generally about the participant's regular work. Then, the other parts of questionnaires will concentrate on individual activities around the university, and finally about managing staff work time.

At the end of the interview the participant will be thanked again and some sweets will be provided as well to show them my appreciation of their contributions. Finally, I will read the completed forms and go over the main points and include them in my report.

## 2.3 Describe plans to give participants information about the goals of the research or related activity.

In the beginning, the participants will receive email includes a brief description of the research and the goal of conducting the interview regards the activities around university. As well, the participants will be individually informed the aspects and points are going to be discussed during the interview. In the beginning of the interview, the participants' information sheet will be given to the participant allowing them to understand the study's purpose and stages.

## 2.4 Identify the expected outputs of this research or related activity (e.g., reports, publications, presentations).

On complete of the study, the final outcome will be a report containing suggestions, comments, and recommendations to modify and improve current practices to reduce the volume of paper, and to improve the efficiency of the processes.

## 2.5 Identify who is likely to see or hear reports or presentations arising from this research or related activity.

All the documents about the study will be included in my master thesis. It is possible some of the outcomes may be more widely published.

## 2.6 Identify the physical location(s) for the research or related activity, the group or community to which your potential participants belong, and any private data or documents you will seek to access. Describe how you have access to the site, participants and data/documents. Identify how you obtain(ed) permission

from relevant authorities/gatekeepers if appropriate and any conditions associated with access.

The interview will be conducted with number of academic and general staffs worked in different departments around the universities. The staffs who will contribute are lecturer, PhD student, administrator, research management advisor, Postgraduate Studies Officer. the interview will take place in the staff's offices or in the laboratory area (G.B.04) where the researcher is based and will use Skype, MSN, and Phone to contact with overseas people. There is no kind of site or data need to be accessed.

### 3. Obtain participants' informed consent without coercion

3.1 Describe how you will select participants (e.g., special criteria or characteristics) and how many will be involved.

About 10 of people will participate in this study. As mentioned previously, the study will concentrate on a variety of activities running at university. Therefore, it will take into account people who work on these activities. Number of academic and general staffs worked in different departments around the universities will participate in the interview. The staffs who will contribute are lecturer, PhD student, administrator, research management advisor, Postgraduate Studies Officer. Age is not relevant in this study. The participants will be chosen and asked if they are happy to contribute to the study. The time of the interview will be discussed with each participant to find the appropriate time for him/her and for me as well.

3.2 State clearly whether this is an application under section 10 of the Ethical Conduct in Human Research and Related Activities Regulations: Large Random Sample Surveys.

No, the application is not under section 10 of the Ethical Conduct.

3.3 Describe how you will invite them to participate.

Some of the participants will be initially introduced to me and invited by my supervisor. Other participants will be invited either verbally or by email. Then, I will be on contact with them by mail or cell phone.

3.4 Show how you provide prospective participants with all information relevant to their decision to participate. Attach your participant information sheet, cover letter, or introduction script. See document on informed consent for recommended content. Information should include, but is not limited to:

- what you will ask them to do;
- The context in which information sheets and consent sheets will be used. When (e.g. just before the study, a week before etc), where (e.g. in a laboratory environment, in a field setting etc) and in what form (e.g. paper, email etc) information will be provided to prospective participants.
- how to refuse to answer any particular question, or withdraw any information they have provided at any time before completion of data collection;
- how and when to ask any further questions about the study or get more information.
- the form in which the findings will be disseminated and how participants can access a summary of the findings from the study when it is concluded.

The interview will be placed in appropriate place for both interviewer and participant. At the beginning of the interview I will firstly thank the participant for accepting my invitation. After that, the participant information sheet will be giving to the participant to read, to help him/her understand the purpose of the study and know the study conduct procedure. Also, the participant needs to consent his/her willing to conduct the study through consent form.

Afterward, the participant will be asked to answers a survey including personal and general questions. If the participant rejects to answer any specific question, he/she will be informed that we can immediately jump to the following question.

As well, if the participants withdraw any information they have provided at any time before completion of data collection, I will remove it immediately.Participant can learn about the result of study by contacting me after the completion of study either by mail or cell phone.

## 4. Minimize deception

There will not be any deception in the study.

- Participant's information such as gender, occupation, age etc will be kept confidential.

- All the report details will be anonymous.

The previous information will be outlined to the participants by the consent form. No identity and information about participant will be disclosed to unauthorised persons. It will be reachable only by the researcher and the supervisor.

## 5. Respect privacy and confidentiality

5.1    Explain how any publications and/or reports will have the participants' consent.

The participants will be informed through the participant information sheet that some of outcome of this study and report may be widely published. Also, that will be restated in the agreement part and in the consent form that the participants agree to participate in the study and understand their rights and the outcome of this report. As well, the participants will sign the consent form for the participation.

5.2    Explain how you will protect participants' identities (or why you will not).
The study includes participants who are involved in activities around the universities. It might be necessary to mention in the report a name of a participant who works for a certain job or task. For example, identify a name of a person doing a particular activity through the footnote.

5.3    Describe who will have access to the information/data collected from participants. Explain how you will protect or secure confidential information.

Collecting the data from the participants will be confidential. The data will be only accessible by the researcher and the supervisor. No one else can access the collected data. Also, data will be kept securely stored in SCMS data archive and will be destroyed by February 22th 2012.

## 6. Minimize harm to participants

6.1 'Harm' includes pain, stress, emotional distress, fatigue, embarrassment and exploitation.

There is no risk to the participants during the study. But I will take into account the emotion of the participants and I will endeavour to get them out from their formal environment and explain to them if they become embarrassed or confused about particular issue.

6.2 Describe any way you are associated with participants that might influence the ethical appropriateness of you conducting this research or related activity – either favourably (e.g., same language or culture) or unfavourably (e.g., dependent relationships such as employer/employee, supervisor/worker, lecturer/student).  As appropriate, describe the steps you will take to protect the participants.

To be associated with the participants needs to take into account the influences might affect the result of my research. As the participants are staffs and PhD students from Waikato University and might from other local and overseas universities. I will inform them that the purpose of the research is to improve the

current process in their works through an alternative electronic ways. Also, the collecting data from their participations and experiences is really crucial for the analysis part in this research.

6.3    Describe any possible conflicts of interest and explain how you will protect participants' interests and maintain your objectivity.

No conflicts of interest are foreseen. The researcher is not connected to the activity.

## 7. Exercise social and cultural sensitivity

7.1    Identify any areas in your research or related activity that are potentially sensitive, especially from participants' perspectives. Explain what you do to ensure your research or related activity procedures are sensitive (unlikely to be insensitive). Demonstrate familiarity with the culture as appropriate.

There are no cultural sensitivities to be considered. But there are some issues that should be thought of such as participants are different in term of their language or accent.To avoid this problem notes will be taken and recorder will be used.

7.2    If the participants as a group differ from the researcher in ways relevant to the research or related activity, describe your procedures to ensure the research or related activity is culturally safe and non-offensive for the participants.

The participants are not divided to groups to conduct this study. Some of the participants might not English native speaker, so I will help them by asking the questions by their own languages to involve them in the study.

**Appendix B**

This Information sheet is only part of the process informed consent. It should give you the basic idea of what the research about and what your participation will involve. Please take the time to read it carefully and to understand any accompanying information.

**Project Title**

Reduce the usage of papers at the University of Waikato

**Purpose**

The purpose of this study is for the researcher to acquisition how to conduct study to evaluate some activities at the university in term of paper usage involving people paperwork and process. Also, come up with a convenient electronic system alternatively.

**Description**

The research will involves study about the usage of paper in some activities in the university and try to find alternative solution in order to get what is called "paperless university".

**Participant Recruitment and Selection**

10 participants will be chosen to partake. People chosen are should be involved in these activities and understand its work natural.

**Procedure**

This study will take up more than one interview to complete. Initially, you will be asked to complete a questionnaire covering details such as age, gender, experience with computers and how frequently you use the electronic system in you work.

At the beginning, will try to get adequate information (such as process, problems, documents transmission) related to the use of documents in an activity and current used system. After that, according to the obtained details will introduce questionnaire covering details how easy/tough you find the usage of paper, search and your experience related to this.

**Data collection**

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I will gather data about your experience in a number of ways. As stated above notes will be taken during the study, photos may be taken and the voice recorder will be used as well. Then, later on the questionnaire will be used to learn about your pre- and post-product experiences.

### Data archiving / Destruction

Data will be kept securely stored in SCMS data archive. The recommendation(s) made by participants will be anonymised. Data will be destroyed by February 22th 2012.

### Evaluation outcome

This research is a part of my research for the Master thesis. Comp 594 faculty is the only authority for any further enquiry.

### Likelihood of discomfort

There is no likelihood of discomfort or risk associated with participation.

Finding out about results: participant can learn about the result of study by contacting me after the completion of study.

### Declaration

Your signature on the research consent form indicates that you have understood the information about the study and represent your satisfaction regarding participation in this study and that you agree to contribute as a participant. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to not answer specific questions or category in interview or on questionnaires. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. It might be necessary to mention your identity at the report regarding to a particular work. If you have further questions concerning matters related to this research, please contact the searcher or Mark Apperley as listed above.

### Researcher's Name and contact information:

If you have any questions or concerns about the project, either now or in the future, please feel free to contact either:

Researcher: Saeed Al-Qahtani (sha4@waikato.ac.nz, shs9999@hotmail.com)

Supervisor: Mark Apperley (Professor) (m.apperley@cs.waikato.ac.nz)

## Appendix C

**Research Consent Form**

THE UNIVERSITY OF
**WAIKATO**
*Te Whare Wānanga o Waikato*

**Ethics Committee, School of Computing and Mathematical Sciences**

*(Paperless University)*

**Consent Form for Participants**

I have read the **Participant Information Sheet** for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study before 30 January 2012, or to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researchers under the conditions of confidentiality set out on the **Participant Information Sheet**.

I agree to participate in this study under the conditions set out in the **Participant Information Sheet**.

Signed:       _____

Name:        _____

Date:         _____

**Additional Consent as Required**

Examples:

I agree / do not agree to my responses to be tape recorded.

I agree / do not agree to my images, voice being used

Signed:       _____

Name:        _____

Date:         _____

Researcher's Name and contact information:
Saeed Al-Qahtani (sha4@waikato.ac.nz, shs9999@hotmail.com)

Supervisor's Name and contact information: (if applicable)
Mark Apperley (Professor) (m.apperley@cs.waikato.ac.nz

## Appendix D

## Questionnaires

The reduction of use of paper documents around the university and allowing the documents to be electronic in the university activities involves process, people, and systems. To establish the requirements, the research will involve interviews with a range of people engaged in these activities. The following questions are examples of the sorts of questions they will be asked, but the questions will vary from one interview to another. The questionnaires help the researcher to discover the current process and the problems and the way of modifying, sharing documents at the university. The first part of the questionnaires is generally about the participant's regular work. Then, the following parts of questionnaires will concentrate on individual activities around the university, and finally about managing staff work time.

**Regular work**

1- Which kind of activity do you work on?

2- How often you using papers for this kind of activity?

☐ Always ☐ Often ☐ Sometimes ☐ Occasionally ☐ Never

3- How often you waste papers at your work every day?

☐ Always ☐ Often ☐ Sometimes ☐ Occasionally
☐ Never

4- How is it important to deal with documents through paper? And Why?

☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 (5: Most important, 1: less important)

5- Could you please list some of the documents or tasks that achieved by papers?

6- Could you please list some of the documents or tasks that electronically achieved?

7- Which kinds of difficulties you encounter with using paper documents?

8- Do you recommend replacing papers documents to be electronic? Which kinds of documents?

9- Could you please give some suggestions to efficiently use these documents in electronic system?

10- If there is electronic system, what kinds of facilities it does provide?

11- Which kind of process/Activity have you involved in around the university
( please check all applicable)

☐ Meetings        ☐ Enrolment        ☐ Exams    ☐ Lectures

☐    PhD student  progress report        ☐ Finance

☐ University Calendar (Prescription around)

☐ Other:
_____
_____
_____

**Courses prescription**

12- Have you been involved in the process of producing the University Calendar / Prescription, if yes, what kinds of issue face you? ( If no go to Question 20)

13- Which type of document is used in this process?

☐ Electronic Documents        ☐ Paper documents    ☐ both

14- Have you face a problem with writing / sending / receiving the prescription of papers, and template for new papers.

15- Which kind of modifying/ changes you need on prescription and template of university papers?

☐ Annotation ☐ comments ☐ highlighted

16- Do you make the changes on the courses prescriptions and the templates manually or through electronic system? Why?

17- How is it easy to track the documents and knowing where they are, why?

18- Generally, which problems face you during the process of University Calendar / courses prescription? Any more suggestions please provide?

**Meeting Agenda**

19- How often you attend meetings with committees at the university?

☐ Always ☐ Often ☐ Sometimes ☐ Occasionally ☐ Never

20- How it is convenient to deal with meeting agenda?

☐ Excellent ☐ Very Good ☐ Good ☐ satisfactory ☐ unsatisfactory

21- Do you prefer to receive and read the meeting agenda during the meeting electronically or as a hard copy?

22- Which kinds of difficulties you encounter with using meeting agenda?

23- Do you prefer making annotation / comment / highlight on meeting agenda manually or electronically, why?

24- Have you and do you recommend experience browsing and make annotation on agenda during the meeting time?

25- Any suggestion you would like to provide about the meeting agenda in term of usage, transmission, and accessing.

## PhD Student progress report

26- Are the PhD student progress report documents used electronically or manually?

27- Is the way of accessing these documents and items convenient? Why?

28- How do you usually receive and send these documents to other staffs?

29- Is the current used process supports the privacy for each staff's report? Why?

30- How is it easy to track the documents and knowing where they are?

31- Is there any kind of inconvenience face you during the process of the PhD student progress report?

32- Do you have any suggestions about this process, please provide?

## Manage staff work and documents

33- How is it simple to access and retrieve the documents in your work?

34- Where do you save / archive the documents?

35- How is it simple to annotate, comment on, and highlight the documents? Which kind of way do you use?

36- Do you prefer to make these changes (annotation / comment / highlight) on documents manually or electronically? Why?

37- In term of handing, portability, and looks and feel, do you prefer to deal with the document manually or electronically? Why?

38- Which way do you use to transfer the documents? And what kinds of difficulties face you when send and receive them?

39- If you have multiple copy for one documents either paper or electronic, how to save them?

40- How is it secure to use these documents through the current system ?

41- Which tools to do usually use for your diary? (Please check all the applicable).

☐ Sticky note          ☐ Note applications     ☐ Printed Calendar

☐ Mobile Calendar     ☐ Web Calendar         ☐ Reminder Application

☐ Google Calendar     ☐ iCal                 ☐ iPad Calendar and
   notes

☐ Others:

   _____

      _____

      _____

42- Have you tried to link many calendars with each other? Why?

43- How do you usually share your documents with other staffs?

44- Is there electronic system helps the staffs to share the documents and support different types of documents such as Power Point, Word, Excel and help the staff modify and change this document as well? If yes, please list the application name and its functions.

45- Which kinds of systems or applications have you used to share documents with others? ( please check applicable )

    ☐ Google documents   ☐ Hotmail Sky drive   ☐ Dropbox

    ☐ Bump            ☐ Diligent Boardbooks

    ☐ Others:

        _____

        _____

        _____

46- Do you have any suggestion for the whole current system around the organisation to efficiently use the documents in electronic manner?

## Appendix E

**Programming method for prototype software** (HDCPR)

The programming and designing parts based on using the ASP.Net web application framework. . The framework required to utilise three models, which are ASP.NET Web Forms and ASP.NET MVC framework models beside the ASP.NET Web Pages, for creating the web application HDCPR by using C# programming language. The Visual Studio was used as free web development environment provides libraries and methods, and allows establishing the codes and connecting to the database SQL Server and retrieving the information.

ASP.Net Web Form platform was mainly used as it has many features such as adding GridView in order to get tabular demonstration better rather than worrying about the way of rendering the Mark up. Additionally, provides valuable interaction in the stage of designing the graphic that dealing with HTML nodes and CSS (Creating Style sheets).

Another pattern has been mainly used which is MVC (Model-View-Controller). This pattern includes the main classes for creating the web application and these classes are created under three components:

**Model** : This component storages the data and helps to represents all the information that need to be send back to the user. The common form for this information is .Net Classes

**View:** This component is in charge of rendering the Model into HTML and includes the logic needed for this mission.

**Controller**: The controller works as a link between the previous two components. This component responsible for inspect and validate the requests sending from the browser, and generate the response by establishing the models and then forwarded it to the proper view.

**System database**

The type of database used is SQL Server Express 2005 which is produced by Microsoft. The SQL Server is designed to simply use a database platform based on SQL Server 2005. The good with SQL Server is that it offers

superior ease of use begin with simple and strong Graphical User Interface, allowing speedy deployments for the target scenario.

**Database Diagram**

   The database includes many tables known as entities and there is a relationship allows connecting these entities. These entities consist of attributes with specific type. Each entity has primary key as the indicator for each and foreign key too. The relationship between the entities database is represented in the diagram, see Figure E.1.
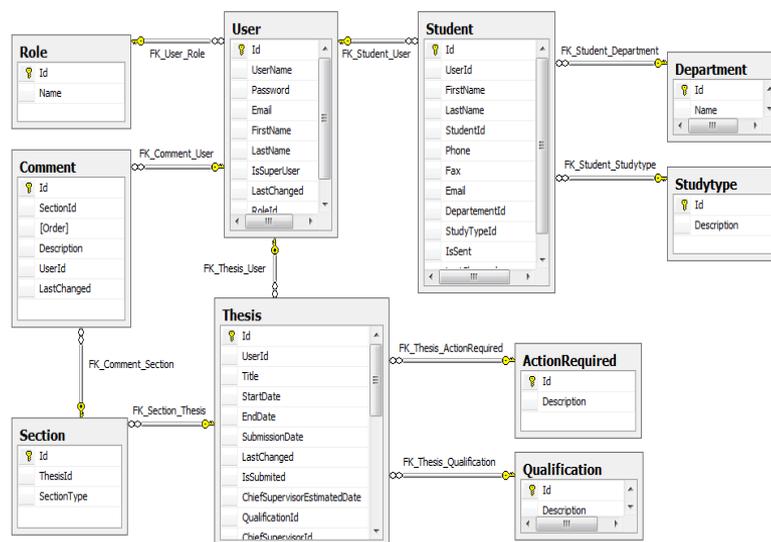


*Figure E.1:* Database diagram.

It can be seen that the database of HDCPR includes ten entities. In fallowing, the main tables including and the relationship between them are briefly described.

    **User** table has many attributes related to the user information such as username , first and family name , email. the key attributes in this table is Id, also this table includes one foreign key which is RoleIde refers to Id attributes in Role table.

    **Student** table contains attributes are related to the student information such name and contact details. The primary key for this table is the attribute Id as it includes three foreign keys which are UserId refers to Id attribute in User table, DepartmentId refers to Id attribute in Department table, and StudyTypeId refres to Id attributes in Studytype.

**Thesis** is counted as the core table in the database because it has the most attributes related to the actions mad by the user during interacting with the main interfaces allowing processing the report. For example title of the thesis, start and end date of the current progress report.

The primary key of this table is Id attributes, and it has three foreign key which are UserId refers to the User table, ActionRequiredId refers to Action required table, QulificationId refers to the Qualification table.

The following tables are linked to some of the main tables; a brief description for these tables is included below.

**Role** allows setting the role for the user, so from the relationship between the two tables (*, 1) we can say that many users can get one role such as admin, student, Chief Supervisor, Second Supervisor.

**Department** table has the attributes need to be selected from the Student. The relationship between the student table and this table is (*, 1), Many students can select a department. The primary key is Id.

**Studytype** table has the primary key Id, and the description attribute for the study type such as PhD/EdD, MPhil, Full-time , and Part- time. The relationship between the student table and this table is (*, 1), many students has the possibility to select one type of study.

**Section** table has the primary key Id, and the foreign key is ThesisId refer to the Thesis table. The description attribute contains name of sections such as A, B, C, D, E, and. Each thesis has many sections and each section has many comments.

**Comments** this table has the primary key Id, and it has two foreign keys which are UserId refers to User table and sectionedId refers to the Section table. So each user can comment in specific section for a certin thesis

**ActionRequired** table has the primary key Id, and the description attributes allows the admin (committee representative) to select of the options which are referred to PCS, letter, and Other in the Thesis part. The relationship between the Thesis table and this table is (*, 1), many thesis can includes ActionRequired.

**Qualifiction** table has primary key Id, and the Chief Supervisor should select they qualification within the thesis table. Example of the qualifications is excellent, satisfactory, unsatisfactory, progress not known, not progressing. The relationship between the Thesis table and this table is (*, 1), many thesis can includes a qualification.

**Appendix F**

## Details of Proposed Activity

1. Identify the project

1.1 Title of project:

The paperless university: improved processes and reduction in paper usage through wider use of electronic documents and notepad technology.

1.2 Researchers:

Saeed Al-Qahtani

Emails: shs9999@hotmail.com , sha4@waikato.ac.nz

Mobile: 0064211798625

1.3 Supervisor:

Professor Mark Apperley

Tel: 07 838 4528 Ext 4528

Fax: 07 858 5095

Email: m.apperley@cs.waikato.ac.nz

1.4 Anticipated date to begin data collection

It is anticipated that relevant data to the study will be collected before the 15 March 2012

1.5 Does your application involve issues of health or disability with human participants? If so, please refer to the guidelines as whether your application submitted to the Northern Y Regional Ethics Committee

No health or disability issues are involved with human participants.

## 2. Describe the research or related activity

2.1 Briefly outline what the project is about including your goals and anticipated benefits. Include links with a research program, if relevant.

The research investigates the current approaches and methods are used in various activities around the university in term of using the documents involving people, process, procedure, modification, meetings, paperwork. The research aims to improve the contemporary technologies, strategies in the workplace in order to increase the efficiency of distributing and processing the documents and to reduce the use of paper documents by handling them electronically.

The main goal of this study is to test the efficiency of using the PhD Student Progress Report Application which is designed by the researcher as correspondence to the recommendations and the findings from previous studies that discussed the drawback of the traditional procedure of distributing the documents within many activities. The study precisely concentrates on PhD Student Progress Report activity as a sample of other activities and seeks to examine the effectiveness and the productivity of processing the involved documents within this activity by electronic software. In addition, identify the participants' behaviours, feeling, feedback and recommendations about the designed application and compare that with the responses from the previous study.

## 2.2 Briefly outline your methods

The study will take place in the participants' offices and may be in the laboratory where the interviewer is based. The project will involve some methods to conduct the study. Initially, participants will be invited by email to take place in the study sessions and will be informed the main purpose of the study. The participants will be asked some personal information that will be anonymous. Additionally, the participants will be informed that their personal information will be useful for the study overall, however they are not compelled if not willing. The researcher will explain to participant the tasks involved in the study. The participants' information sheet, which provides the purpose of the project and the study, as well the agreement information, will be introduced to the participants in the beginning of the study.

Moreover a pre-questionnaire will be filled out by the users. After that, the participant will be given a certain amount of time to be more familiarized with the application design. Afterward, predefined tasks will be performed by the

participants in order to test the functionality and the efficiency of the application. The researcher will take notes during the participants' performance on the given tasks. Participants will be asked on their opinion of the application at the end of the study, and will fill out a post questionnaire. The participants are able to review, reject any part of the given tasks. As well, the participant can ask and able to withdraw any time during the study if they change their minds.

As was mentioned, the researcher will outline to a participant the main goals of the study, and they will be told that the purpose of the study is to demonstrate and measure the usability of PhD Students Progress Report Application and examine the efficiency of processing the involve documents in electronic manner rather than traditional one. All the collecting data will be analyzed and included as a part of the thesis, where the supervisor will have access to it.

## 2.3 Describe plans to give participants information about the goals of the research or related activity.

Initially, an invitation will be sent to the participants by email and will include a brief explanation of the research and the purpose of conducting this study. In the start of each user study the researcher will primarily illustrate the purpose, tasks, and the outline of the study as well as that will be demonstrated by the participants' information sheet. Participants will be informed all their rights, what is expected of them in terms of the study, that they can refuse to participate if they change their mind and that voice recording of their responses will be involved.

In order to show participants that the researchers appreciate their time in helping and participating in the study, they will be given a small reward at the end.

## 2.4 Identify the expected outputs of this research or related activity (e.g., reports, publications, presentations).

On complete of the study, the final outputs will be included as a report enclosing suggestions, comments, and recommendations about the application functionalities and facilities as electronic system comparing to the use of paper documents.

2.5 Identify who is likely to see or hear reports or presentations arising from this research or related activity

All the documents about the study will be included in my master thesis. It is possible some of the outcomes may be more widely published.

2.6 Identify the physical location(s) for the research or related activity, the group or community to which your potential participants belong, and any private data or documents you will seek to access. Describe how you have access to the site, participants and data/documents. Identify how you obtain(ed) permission from relevant authorities/gatekeepers if appropriate and any conditions associated with access.

The study will be conducted with number of academic, general staffs, students involve in the process of PhD Student Progress Report documents. The staffs who will contribute are Supervisors, PhD student, Postgraduate Studies Officer. The study will take place in the staff's offices or in the laboratory area (G.B.04) where the researcher is based.

## 3. Obtain participants' informed consent without coercion

3.1 Describe how you will select participants (e.g., special criteria or characteristics) and how many will be involved.

About 8 of people will participate in this study. As mentioned previously, the study will concentrate on PhD Student Progress Report activity. Therefore, it will take into account people who work and involve in this activity. The staffs who will contribute are lecturer, PhD student, Postgraduate Studies Officer. Age is not relevant in this study. The participants will be chosen and asked if they are happy to contribute to the study. The time of the study will be discussed with each participant to find the appropriate time for him/her and for the researcher as well.

3.2 State clearly whether this is an application under section 10 of the Ethical Conduct in Human Research and Related Activities Regulations: Large Random Sample Surveys.

No, the application is not under section 10 of the Ethical Conduct.

3.3 Describe how you will invite them to participate.

Participants will be invited either verbally or by email. Then, they will be on contact by mail or cell phone.

3.4 Show how you provide prospective participants with all information relevant to their decision to participate. Attach your participant information sheet, cover letter, or introduction script. See document on informed consent for recommended content. Information should include, but is not limited to:

- what you will ask them to do;
- The context in which information sheets and consent sheets will be used. When (e.g. just before the study, a week before etc), where (e.g. in a laboratory environment, in a field setting etc) and in what form (e.g. paper, email etc) information will be provided to prospective participants.
- how to refuse to answer any particular question, or withdraw any information they have provided at any time before completion of data collection;
- how and when to ask any further questions about the study or get more information.
- the form in which the findings will be disseminated and how participants can access a summary of the findings from the study when it is concluded.

The study will be placed in appropriate place for both researcher and participant. At the beginning of the study the participants will be thanked for accepting the invitation. Then, the participant information sheet will be giving to the participants to read, and understand the purpose of the study and know all their rights, what is expected of them in terms of the study that they can refuse to participate if they change their mind. After that, the participant needs to consent his/her willing to conduct the study through consent form as the voice recorder will be used. Afterward, the participant will be asked to answers a survey including personal and general questions. If the participant rejects to answer any specific question, he/she will be informed that we can immediately jump to the following question. As well, if the participants withdraw any information they have provided at any time before completion of data collection, that information will be removed immediately. Participant can learn about the result of study by contacting me after the completion of study either by mail or cell phone.

## 4. Minimize deception

If your research or related activity involves deception – this includes incomplete information to participants -- explain the rationale. Describe how and when you will provide full information or reveal the complete truth about the research or related activity including reasons for the deception.

The study does not involve any deception.

All the information in the report will be anonymous, and this includes:

- gender
- age group
- occupation

The consent form will outline this information to the participants. The researchers and supervisor will have access to this anonymous data.

## 5. Respect privacy and confidentiality

5.1 Explain how any publications and/or reports will have the participants' consent.

The participants will be informed through the participant information sheet that some of outcome of this study and report may be widely published. As well, that will be restated in the agreement part and in the consent form that the participants agree to participate in the study and understand their rights and the outcome of this report. Additionally, the participants will sign the consent form for the participation.

5.2 Explain how you will protect participants' identities (or why you will not).

The study includes participants who are involved in PhD Student Progress report activity. All the participants' identities will be kept confidentially and the researcher will number the participants individually and will include these numbers in the report to indicate the identities of participant.

5.3 Describe who will have access to the information/data collected from participants. Explain how you will protect or secure confidential information.

Researcher will confidently keep the collecting data from the participants. The data will be only accessable by the researcher and the supervisor. Researcher and supervisor are the only authorized to access the collected data. As well, data will be kept securely stored in SCMS data archive and will be destroyed by April 5th 2013.

## 6. Minimize harm to participants

6.1 'Harm' includes pain, stress, emotional distress, fatigue, embarrassment and exploitation.

The study does not involve any risk to the participants, however the researcher will take into account the feeling and emotion of the participants during the study and attempt to make the environment of the study informal in order to help the users when they become embarrass and confuse regard particular issue.

6.2 Describe any way you are associated with participants that might influence the ethical appropriateness of you conducting this research or related activity – either favourably (e.g., same language or culture) or unfavourably (e.g., dependent relationships such as employer/employee, supervisor/worker, lecturer/student).  As appropriate, describe the steps you will take to protect the participants.

To be associated with the participants needs to take into account the influences might affect the result of my research. As the participants are staffs and PhD students from they will be informed the purpose of the study is that to examine and investigate the efficiency of using alternative electronic ways to the using paper documents in the chosen activity. As well, their experiences in and feeling about both either electronic methods and traditional method will be beneficial for evaluating the application.

6.3 Describe any possible conflicts of interest and explain how you will protect participants' interests and maintain your objectivity.

No conflicts of interest are foreseen. The researcher is not connected to the activity.

## 7. Exercise social and cultural sensitivity

7.1 Identify any areas in your research or related activity that are potentially sensitive, especially from participants' perspectives. Explain what you do to ensure your research or related activity procedures are sensitive (unlikely to be insensitive). Demonstrate familiarity with the culture as appropriate.

There are no cultural sensitivities to be considered. But there are some issues that should be thought of such as participants are different in term of their language or accent. To avoid this problem notes will be taken and recorder will be used.

7.2 If the participants as a group differ from the researcher in ways relevant to the research or related activity, describe your procedures to ensure the research or related activity is culturally safe and non-offensive for the participants.

The participants are not divided to groups in order to conduct this study. Some of the participants might not be English native speakers, so I will help them by asking the questions by their own languages in order to involve them in the study. There are no potential sensitivities in the study. Participants are aware of what is expected of them before the study is conducted, however if they come across anything sensitive to them then an apology will be in order to them. All steps have been taken by the researchers to ensure no sensitivities are involved in the study. Nevertheless, the researchers are not aware of all that is insensitive from culture to culture.

**Participant Workbook**

# User study for evaluation of the PhD Student Progress Report software

# Introduction

Firstly, thank you for agreeing to participate in this user study, your time is greatly appreciated. The purpose of this user study is to evaluate (in terms of processing the documents) PhD Student Progress Report software. It should take about 30 minutes to complete.

Please note, during the session voice recording will be used for the purpose of the study only. The researcher encourages any comments you may wish to make, and during some tasks I will ask require you to think out loud.

**The process involves:**

### Consent

First, you will be asked to read the 'Participant Information Sheet' and the 'Research Consent Form.' This covers your participation in this one session only. If you still choose to participate in this study, you will be required to sign the 'Research Consent Form.' The researcher, who conducts the study, will also sign the form.

### Initial questionnaire

Next, you will be asked to complete an initial questionnaire. This will be used to gather some background information about your personal information and your experience with computers.

### Tasks that involve using the software

The study will involve completing typical tasks that a potential user of PhD Student Progress Report software may wish to do. As said earlier, sometimes you will be asked to think out loud and some tasks have additional questionnaires to complete regarding the tasks.

**Participant Information Sheet**

THE UNIVERSITY OF
**WAIKATO**
*Te Whare Wānanga o Waikato*

## Ethics Committee, School of Computing and Mathematical Sciences

This Information sheet is only part of the process informed consent. It should give you the basic idea of what the research about and what your participation will involve.

Please take the time to read it carefully and to understand any accompanying information.

**Project Title**

The paperless university: improved processes and reduction in paper usage through wider use of electronic documents and notepad technology.

**Purpose**

The main goal of this study is to examine and test the efficiency and functionality of the designed electronic application and compare that with the previous experience involving paper documents within the process of distributing and completing the PhD Students Progress Report at the university.

**Description**

According to the participants' participation in the study, the research will evaluate the designed application in term of processing the documents electronically as alternative manner to the traditional method involving paper documents. As well, the analysis will highlight the recommendations and the significant observations comparing to the responds from previous study was focusing on the affect of using paper documents in this activity.

**Participant Recruitment and Selection**

8 participants will be chosen to partake. People chosen are should be involved in this practice and understand its work natural.

**Procedure**

This session will take about 30 minutes to complete. Initially you will be asked to complete a questionnaire covering background details about yourself such as age, gender, and occupation and about your computer/website browsing experience. Following this you will be asked to perform a number of tasks within the software. The session will then conclude with a debriefing to discuss specific issues through a questionnaire covering details how easy/tough you find this task to search, your impressions, and experience related to the software. Your performance in the study will be critique. It is important to the researcher you work in a way that is typical and comfortable for you.

**Data collection**

Researcher will gather data about your experience in a number of ways. As stated above the researcher will be using the questionnaire to learn about your post and pre-study experience. Also, will take a note during the study and the voice recorder will be used as well.

**Data archiving / Destruction**

Data will be kept securely stored in SCMS data archive. The recommendation(s) made by participants will be anonymised. Data will be destroyed by February 5th 2012.

**Evaluation outcome**

This research is a part of my research for the Master thesis. Comp 594 faculty is the only authority for any further enquiry. The results of this study will be used (anonymously) to evaluate the PhD Student Progress Report software and to be included in researcher Master thesis.

**Likelihood of discomfort**

There is no likelihood of discomfort or risk associated with participation.

Finding out about results:

Participant can learn about the result of the study by contacting the researcher after the completion of study.

**Declaration**

Your signature on the research consent form indicates that you have understood the information about the study and represent your satisfaction regarding participation in this study and that you agree to contribute as a participant. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to not or doing specific task and answer specific questions. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. If you have further questions concerning matters related to this research, please contact the searcher or Mark Apperley as listed below.

**Researcher's Name and contact information:**

If you have any questions or concerns about the project, either now or in the future, please feel free to contact either:

Researcher

 Saeed Al-Qahtani (sha4@waikato.ac.nz, shs9999@hotmail.com)

Supervisor

 Mark Apperley (Professor) (m.apperley@cs.waikato.ac.nz)

## Research Consent Form

THE UNIVERSITY OF
# WAIKATO
*Te Whare Wānanga o Waikato*

## Ethics Committee, School of Computing and Mathematical Sciences

**Consent Form for Participants**

*I have read the* Participant Information Sheet *for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.*

*I also understand that I am free to withdraw from the study before 30 March 2012, or to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researchers under the conditions of confidentiality set out on the* Participant Information Sheet*.*

*I agree to participate in this study under the conditions set out in the* Participant Information Sheet.

*Signed:* _____
*Name:* _____
*Date:* _____

Additional Consent as Required

**Examples:**
**I agree / do not agree to my responses to be tape recorded.**
*Signed:* _____
*Name:* _____
*Date:* _____

**Researcher's Name and contact information:**
   Saeed Al-Qahtani (sha4@waikato.ac.nz, shs9999@hotmail.com)
   **Supervisor's Name and contact information: (if applicable)**
   Mark Apperley (Professor) (m.apperley@cs.waikato.ac.nz)

# Initial questionnaire

Before going further with this session, it would be beneficial for the researcher to learn more about your experiences with computers and electronic system. Please answer the questions below to the best of your ability.

1. In which age range do you fall?

  A. Under20　　　　B. 20 - 29　　　C. 30 - 39　D. 40 - 49　E. Over 50

2. Gender
   A. male　B. female.

3. How long have you been using a computer for?

   A. less than one year　B. 1-5 year　C. 6-10 years　D. more than 10 years

4. For how long do you use a computer on a typical day?

   A. less than one hour　B. 1 - 3 hours　C. 4 - 8 hours　D. more than 8 hours

5. For how long do you use specialist facilities such as tablets on typical day?

   A. less than one hour　B. 1 - 3 hours　C. 4 - 8 hours　D. more than 8 hours

6. For what activities do you use a computer? (Circle as many as you like)

   e-mail　　　browsing the web　　　read/write programs

   chatting　　　Play computer games　　read/write documents

   Others:

7. For what activities do you use the internet? (Circle as many as you like)

   e-mail　　　　online gaming　　　　online shopping

   chatting　　　　browsing website　　　research/searching

   blogging　　　　Social networking sites

   Others:

# User Tasks

There are many tasks to complete; each task is expected to be something a typical user of the PhD Student Progress Report software may wish to do. Each task involves using the software to find and successfully do something. In the fallowing the tasks, questionnaire will be introduced to fill and tell us about how you felt performing the task. Feel free to use any feature of the software to complete the tasks.

# Student's task 1

You are asked to use the features of software as potential PhD student:

1. register as new student
2. complete the personal information
3. Fill your section of the report
4. Submit the form.

As you perform the task please think aloud (i.e. tell the interviewer exactly what you are thinking and doing as you do it).

Before completing this questionnaire for this task, I would like to understand how you view your experiences. Please answer the questions below to the best of your ability, basing your answers on the tasks that you were just asked to complete.

a. On a scale of 1-10 (1 being very difficult, 10 being very easy) what was the level of difficulty for completing the above tasks:

1: _____ 2: _____ 3: _____ 4: _____

b. Which elements of the software made this task easier to complete, and why?

*c.* **Which elements of the software made this task harder to complete, and why?**

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# Student's task 2

You are asked to use the features of software as potential PhD student:

    1.       Try to update and edit your previous writing.

    2.       Track the report notification and determine who should work in the report.

    3.       Check the progress of the report so far.

    4.       View the whole report.

    5.       Try to modify other section.

As you perform the task please think aloud (i.e. tell the interviewer exactly what you are thinking and doing as you do it).

Before completing this questionnaire for this task, I would like to understand how you view your experiences. Please answer the questions below to the best of your ability, basing your answers on the tasks that you were just asked to complete.

a. On a scale of 1-10 (1 being very difficult, 10 being very easy) what was the level of difficulty for completing the above tasks:

1: _____ 2: _____ 3: _____ 4: _____ 5: _____

b. Which elements of the software made this task easier to complete, and why?

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┌─────────────────────────────────────────────────────────┐
│                                                         │
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*c.* ***Which elements of the software made this task harder to complete, and why?***

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# Staff Task1

You are asked to use the features of software as potential real supervisor, chairperson dean, dean, or member of Postgraduate Studies Officer:

1. View report of a student.
2. Read the instruction of the PhD student Progress Report.
3. View the student's submitted report
4. try to edit and modify other staffs' sections
5. Observe the progress of the report so far.

As you perform the task please think aloud (i.e. tell the interviewer exactly what you are thinking and doing as you do it).

Before completing this questionnaire for this task, I would like to understand how you view your experiences. Please answer the questions below to the best of your ability, basing your answers on the tasks that you were just asked to complete.

a. On a scale of 1-10 (1 being very difficult, 10 being very easy) what was the level of difficulty for completing the above tasks:

1: _____   2: _____   3: _____   4: _____

b. Which elements of the software made this task easier to complete, and why?

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*c.* **Which elements of the software made this task harder to complete, and why?**

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# Staff Task 2

You are asked to use the features of software as potential real supervisor, chairperson dean, dean, or a member of Postgraduate Studies Officer:

1. Views the current indicated section, fill the form and submit it.
2. Make an update and modification on the section you submitted.
3. View the whole report.
4. Indentify the position of next person who should work on the report.
5. Check the progress of the report so far. What do you observe?

As you perform the task please think aloud (i.e. tell the interviewer exactly what you are thinking and doing as you do it).

Before completing this questionnaire for this task, I would like to understand how you view your experiences. Please answer the questions below to the best of your ability, basing your answers on the tasks that you were just asked to complete.

a. On a scale of 1-10 (1 being very difficult, 10 being very easy) what was the level of difficulty for completing the above tasks:

1: _____ 2: _____ 3: _____ 4: _____ 5: _____

b. Which elements of the software made this task easier to complete, and why?

|  |
|---|
|  |

*c*. **Which elements of the software made this task harder to complete, and why?**

|  |
|---|
|  |

# Summary Questionnaires

The researcher would like to comprehend your sight according to your experiences, please answer the fallowing questions to the best of your ability.

1-    Please show how you found the system by checking the best choice for you

|  | excellent | good | average | poor |
|---|---|---|---|---|
| Relevant and valuable |  |  |  |  |
| Easy to use |  |  |  |  |
| Easy to navigate. |  |  |  |  |
| Pleasant involvement. |  |  |  |  |

2- Overall, what did you like about the software (please provide reasons)?

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3- Which things confused you or were unclear in the software?

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4- What were the difficulties have you encountered in the Software? Which features you did not like?

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5- In term of efficiency, tasks sequence, saving time, documents tracking and simplicity, please write the most significant differences between using this application as an electronic system and the traditional system which relays on using paper documents.

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6- **Thank you for your participation.** Please use the box below if you wish to make any further comments regarding the study or the software

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