



ASHESI UNIVERSITY COLLEGE

**TOWARDS THE PAPERLESS OFFICE: BEST PRACTICES AND
EXPLORATION OF ENTERPRISE RIGHTS MANAGEMENT SOLUTIONS
FOR GHANAIAN BUSINESS PROCESSES**

By

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Dissertation submitted to the Department of Computer Science,
In partial fulfillment of the requirements for the award of Bachelor of
Science degree in Management Information Systems

April 2010

Research Project



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This research project has been a challenging but worthwhile journey and I am grateful to all those who contributed in one way or the other to make this possible.

Mr. Aelaf Dafla, my supervisor, deserves a special thank you for the invaluable guidance, patience and the academic resources. I would like to thank all members of the Ashesi Computer Science faculty especially Dr. Nathan Amanquah for the inspiring ideas and to Mr. K. Osafo Maafo for allowing me access to his CD for evaluation.

I am indebted to all my respondents: Mr. Samuel F. Sagoe of White Oceans; Edem, Akua, Kofi, and Diabene of Genkey; and the admissions staff of Ashesi University College especially Anida Acquah, Mavis Djamena and Linda Ogbedei Laryea. I also thank Mr. Samuel Asumadu, Mr. Kwame Biney and Mr. Eric Nsarkoh for sharing their experiences and extensive insights into the subject area.

I dedicate this thesis to a great friend and brother Nana Aggrey-Essilfie whose memory is forever cherished and to my family for the tremendous support, motivation and prayers during the course of the research. Last but not the least; to him who I owe all of this, I say a BIG thank you.

Information technology continues to have a great impact on the way humans live and work. The business world is one of the aspects of life that has experienced this phenomenon. This advancement of technology has contributed to the growing use of paper in the office place which has had tremendous impact on the environment. However several new technologies have been developed to eliminate paper outright or at least reduce the amount of paper in the office environment. This phenomenon known as the 'paperless office' has become desirable but difficult objective to achieve.

The objective of this research is to suggest general best practices and guidelines for implementing paperless office solutions and secondly to find out whether enterprise rights management systems can contribute to the paperless office solution. The research uses a case study methodology to analyze data on business practices. The results of the study showed that stakeholder buy-in, availability and actual use of IT resources and paperless office implementation project leadership have a strong bearing on the success or otherwise of the implementation of paperless office solution. The research also confirms findings in the literature that enterprise rights management does not provide a direct paperless benefit but rather can serve as a security enhancement that allows electronic documents to be protected from unauthorized access throughout the documents lifecycle.

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BWA BUSINESS WORKFLOW ANALYSIS

EDI ELECTRONIC DATA INTERCHANGE

EDRM ENTERPRISE DIGITAL RIGHTS MANAGEMENT

ERM ENTERPRISE RIGHTS MANAGEMENT

ICR INTELLIGENT CHARACTER RECOGNITION

IdM IDENTITY MANAGEMENT

IRM INFORMATION RIGHTS MANAGEMENT

MICR MAGNETIC INK CHARACTER RECOGNITION

OCR OPTICAL CHARACTER RECOGNITION

OMR OPTICAL MARK READER

1.1 Introduction and Background

In today's fast growing world science and technology is continuously revolutionizing the way humans live and work. One of such areas of human lives experiencing radical change due to the advancement of science and technology is the use of paper. Several technologies have been developed to reduce the amount of or eliminate paper outright. This phenomenon, known as the 'paperless office'—a term coined by George E. Pake, the then head of Xerox's Palo Alto Research Center in 1975 [1]—has become a desirable but difficult objective to achieve. Enterprise rights management systems, Enterprise forms automation, Optical Mark Readers, screen input systems, document sharing software and a myriad of other technologies have been developed to make the paperless office concept realizable. The focus of this paper is to explore how enterprise rights management contributes to the achievement of a paperless office and how to implement a paperless office solution in the Ghanaian business context.

This study is motivated by the growing amount of cries from the global community on the need to tackle global warming. This is coupled with the fact that institutions in Ghana are moving towards the digital end of business operations by acquiring computers, printers and other IT solutions for their business operations. Many more are connected to the world-wide web to enhance their business operations. Historically, Corporations and business institutions globally have business processes that rely heavily on the use of

business (B2B) operations, Customer to business operations (C2B e.g. sales and marketing) as well as internal business operations (e.g. reports) depend on paper. For example, academic institutions provide paper admission forms to applicants who then fill these forms and return them physically to the institutions. The institutions in turn give a paper notification to the applicants. However, most of the technologies acquired to cut back on paper use are under-utilized for several reasons. Another important reason for this phenomenon is security concern .i.e. how to protect sensitive data from falling into the unintended recipients.

A case in point concerns a project that a Ghanaian IT firm was embarking on. The project was supposed to provide a system for clients of a local utility service provider to pay their bills through an online account. This account was to be linked to the clients' bank accounts at a certain commercial bank. Undoubtedly, this system would have relieved customers of the unnecessary plights faced when paying their bills. However, halfway through implementation, the bank decided not to go ahead with it because of their concern that new system lacks paper evidence of payments. This goes to show that despite the urge to go paperless, there are serious challenges that are discouraging Ghanaian businesses from doing so.

This research study is challenging for several reasons but it is particularly challenging for the reason that the study has various facets and implications namely technical, social, business and legal.

Paperless office concept is an enticing one looking at the sort of benefits it is suggested to provide. However if it is not well implemented, it may lead to costly disruptions of business operations. Moreover the cost and expertise needed to implement such a system is significant in the Ghanaian context and may be well without the reach of the some businesses in Ghana. The challenge here is: how can Ghanaian businesses deploy paperless office solutions efficiently and in the least difficult way.

Secondly, one important feature of digital documents which gives them an advantage over paper documents is the ease of movement. Digital documents can be moved across continents at the click of a mouse. This makes it easy for the collaboration and the sharing of information. It is "this key attribute of electronic documents that gives them the technological edge over paper leading to the support of the ultimate goal of the 'paperless office'" [3,4]. However this same feature hands digital documents its flaw as the 'freedom of movement' also means that extra measures need to be taken to ensure that data does not fall into the wrong hands. Enterprise rights management which is "a digital document-based security model that enforces access, usage, confidentiality, and storage policies" [4] aim at solving this defect. Enterprise rights management systems introduce another challenge, that is the maintenance of the inherent fluidity of movement of digital documents in the attempt to 'combat data leakage' [3]. The problem



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Other ERM can contribute to the deployment of paperless office solution.

1.3 Benefits of going paperless

Institutions stand the chance of benefiting from a paperless environment in several ways. This section discusses the benefits to be derived from running a paperless office.

1.3.1 Reduced storage space

First of all, the need for a physical storage space is eliminated. Paper, due to its bulky and easily destructible nature, when collected over a long period of time requires a significant amount of floor space and storage facilities like cabinets and drawers. A paperless office environment reduces this need [5].

1.3.2 Better Recovery

In addition, a paperless office environment provides better recovery protection. The data stored on storage devices in a paperless environment is easily backed up unlike in a paper based office environment.

1.3.3 Better security against data theft

A properly implemented paperless office environment provides better security against data theft. Most paperless office technologies provide a mechanism for ensuring that unauthorized users have access to the data.

management and enterprise rights management are able to tell when data has been stolen.

1.3.4 Efficient workflows and productive processes

There is also the benefit of increase in productivity when institutions go paperless [6]. With the help of information systems and databases, employees do not have to waste time searching through tons of data in paper files anymore [5]. Moreover workers are able to work remotely without having to be physically at the office in the case of enterprise content management and enterprise rights management. Also, a paperless office has the tendency to reduce overhead cost as a result of the cut in paper consumption and expenditure on printing, photocopying and storage.

1.3.5 Reduction of footprint on the environment

Companies can also benefit through the reduction of their environmental impact footprint. A paperless office environment also improves a firms' competitiveness [7] in the industry as customer service can easily be enhanced by reducing the number of processes that depend on paper. This in addition to the above can enhance business prospects and profitability.

There appears to be a disparity between the rate of technology acquisition and actual implementation of technology in Ghanaian institutions. Whereas companies and government institutions are in a rush to acquire computers for their offices, the actual use of computers in the business operation is mostly limited to basic computer tasks like word-processing. These under-utilized computers do not only become white elephants but also turn into cost drivers as hard-earned money is used to service and maintain them. Secondly, the international community's call for global action to curb climate change has made it imperative that every individual, institution and nation state be concerned and contribute their quota towards this agenda.

1.5 Objectives

The objective of this thesis is to explore Enterprise Rights Management and Identity Management systems and how both technologies can be used to reduce institutions' over-dependence on paper-based business processes. The focus is not on identifying technologies that will eliminate paper entirely but rather on identifying methods and processes which will use less paper and enhance business efficiency.

This study has two objectives namely,

- to find out how enterprise rights management solutions contribute to paperless office implementation in the Ghanaian business context



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practices for implementing a paperless office solution in Ghanaian business environment

1.6 Outline of paper

Chapter 1 is an introduction to the study. The introduction provides an overview of the paper. Chapter 2 presents a review of the available literature on paperless office concept and technologies for attaining a paperless office. Chapter 3 discusses the methodology that was chosen for the study.

REVIEW

This chapter examines the available literature on paperless office concept, enterprise rights management and identity management solutions.

2.2 What is the 'paperless office'?

There is no standard definition for the term paperless office. However several authors have attempted to explain the concept. In the "Myth of the paperless office", Sellen and Harper [8] explain it as the 'expectation that electronic technologies would make paper in the office a thing of the past' thereby suggesting the elimination of paper from the office environment. To the authors, 'to get rid of paper in an office is not always a question of getting rid of paper per se, but getting rid of whatever other problems paper signifies'. Similarly, a 2003 edition of Adobe Magazine [9] claims that the paperless office refers to the 'extinction' of the use of 'printers, faxes and pens'.

More recently, Yusoff and Sidhu [5] defines a paperless office system as 'a system designed to facilitate filing, faxing, word processing, document retrieval, analysis and even basic communication, all done efficiently using computers without the need to use paper.' This implies the similar work processes as a normal office environment in a paperless environment but without the paper aspect.

ss office

The literature indicates that there are several proposed technologies for attaining a paperless office with different degrees of success. These technologies include:

2.2.1 Electronic Data Interchange (EDI)

Electronic Data Interchange refers to the transmission of business data from computer to computer in a standard format. Typical applications would be electronic orders, invoicing. With this technology, trading partners (entities that exchange data) are able to communicate electronically in a standard format without having to rely on paper transactions. General Motors is said to have successfully used this technology extensively.

2.2.2 Enterprise Forms Automation

Forms automation makes it possible to put a corporate institution's forms on an intranet or internet system so that information that could have been entered on the paper forms can be stored directly on computer systems. This allows for easy search, processing and archiving. This technology, made possible by the internet, is widely used on web applications which can be accessed by computers and powerful hand-held devices.

Systems (CMS)

Content management systems make it possible to host digital information for easy searching, processing and archiving. Various forms of CMS are also used in different contexts for example for webhosting and for managing content for software development. With this technology, digital content such as electronic documents can be easily entered, edited, imported, exported, scheduled and managed [10]. It offers users greater ability to manipulate digital documents to suit their needs better than they can do with paper documents which can only be manipulated through annotation to a limit.

2.2.4 Other technologies

The following form part of the various technologies that can be used to implement some form of paperless office. The technologies are used alone or in combination with other technologies.

- Optical Mark Recognition
- Optical Character Recognition (OCR)
- Magnetic Ink Character Recognition (MICR)
- Intelligent Character Recognition (ICR)
- Audio/Video Conferences
- Electronic Document Conferencing
- Imaging / Scanning & Indexing
- Personal Digital Assistant (PDA)
- Screen Input System
- Document-Sharing Software

However, A Case Associates article categorizes paperless office tools into three complementary technologies namely electronic imaging, automated



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and automated workflow-management products

[11].

2.3 Paperless office: a myth?

In the available literature there are conflicting claims as to whether the computer has increased or decreased the usage of paper and others have disputed the possibility of a 'paperless office'. Sellen and Harper's book *The Myth of the Paperless Office* [8] one of the most referenced research publication on the paperless office concept. History is replete with media hypes that fuelled what was to become a myth—the impending doom of paper. The authors provide a historical trajectory of the paperless office idea. The book suggests that the various technologies developed—from personal computer through the Internet to pen-based computing—with the aim of achieving a 'paperless office' had done little to 'kill' paper [6].

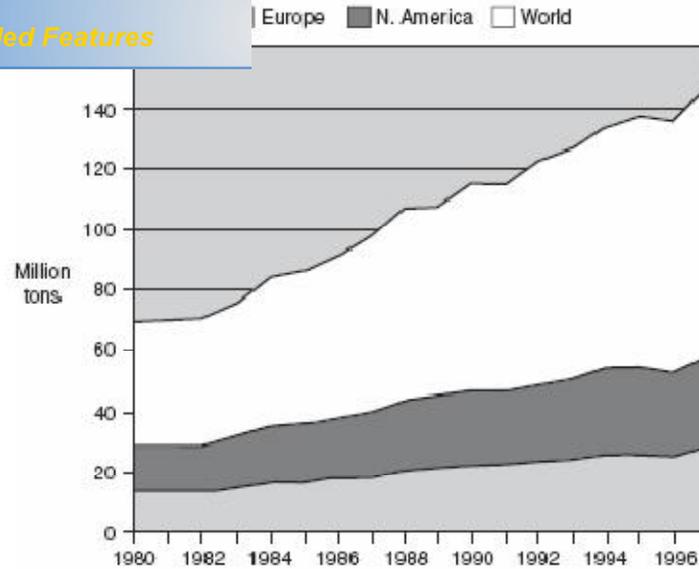


Figure 1: Office paper consumption in Europe, the United States, and the world, 1980-1997¹

As Figure 1 shows the world’s consumption of office paper rose from 60 million tons, in 1980, to 160 million tons in just over 16 years; the same period as the personal computer and the Internet was experiencing a boom.

The authors also realized that paper provide the following affordances [8]:

- people mark up documents as they read, especially when that reading is intense and reflective
- flexible navigation and manipulation of paper documents for a variety of reading activities
- laying out paper in space for reading, in order to read and write across documents

Paper is also used [8]:

- As a tool for managing and coordinating action among co-workers in a shared environment
- As a medium for information gathering and exchange
- As an artefact in support of discussion
- As a means of archiving information for groups of co-workers

¹ Cited in [8] from *Pulp & Paper International*, July issues 1981–1998

recently that technologies have been developed to provide similar advantages and tools such as document sharing software for group collaboration, annotatable Portable Document Format (PDF) documents, and content management solutions for storing/archiving and managing documents. In addition, some researchers have linked the use of paper to a generational phenomenon or mere human preference instead of a technical issue [5]. Interestingly there is a growing new generation of computer users who are comfortable with reading and working onscreen [12].

Kamel and Wesolkowski, in recognition of the difficulty of achieving a fully-fledged paperless office agreed that "the aim of creating a perfectly paperless office seems to be far away... and a new trend has taken its place which is to make the efficient and integrative flow of both electronic and paper documents" [13]. Smart [6] suggests that a "less" paper office serves as a more realistic goal than the "paperless" office'. Obviously, the paperless office may seem futuristic but with the advent of better technologies the concept looks more realistic than ever before.

2.4 The 'Paperless Office' in Ghana

The literature on 'paperless office' idea in Ghana is scanty. The most evident materials are two unrelated news articles. One calls for the digitizing of

es [14]: this was at the heels of ravaging fire outbreak that consumed parts of the country's foreign ministry building leading to the loss of property and important documents. The other article talks about the entry of a European company that provides paperless office solutions into the Ghanaian market. Albeit relatively small, Ghana has had her own share of the 'paperless' office phenomenon as more businesses acquire technologies for running their business operations. Some businesses have adopted different kinds of technologies that provide some sort of paperless benefits. Several automated services like e-Banking, point of sale terminal services (not entirely paperless) and ATM banking. It is evident that most of the efforts at attaining a less-paper office environment are made by the financial institutions. Apart from that, the bulk of both business to business (B2B) and business to customer (B2C) interaction remains paper based. This may be attributed to the businesses and customers desire for signatures on paper. The Ghana Electronic Transactions Bill passed by Parliament in 2008 will facilitate the electronic transactions and thereby support the paperless office agenda.

However, the use of digital documents raises the question of legality; whether or not there are legal implications of transaction businesses with other parties based on digital documents which in this case cannot be physically signed. Nonetheless, with the increase in pressure on institutions to adopt ICT for efficient business operations, digital documents is making a strong impact in business operations, from accounting, through law,

The way to zoology, the impact of technology and digital information on how businesses are being run is overwhelming. Reversal of this trend is not foreseeable but whether digital documents will be able to 'kill' paper documents outright is another question. What is evident is that some Ghanaian businesses have many of the basic tools needed for attaining paperless office and as such with a few components and technologies a paperless office environment would be attainable by these organizations.

2.5 Enterprise Rights Management (ERM)

2.5.1 Digital Rights Management

Digital Rights Management "refers to technology for protecting files via encryption and allowing access to them only after the entity desiring access (a user or a device) has had its identity authenticated and its rights to that specific type of access verified" [15]. This definition applies to the general mechanisms used to persistently protect any digital content such as multimedia content on CDs and other media. It is mostly meant for monetization purposes whereby the authors apply control policies to content so that customers will have to purchase the rights to access the content [16].



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The literature available shows that there is a general consensus as to what ERM is and what it does although the definitions are not standardized. One of the major research publications from the research company Gilbane Group provides major insights into ERM deployments. *Enterprise Rights Management* as defined by the Enterprise consulting group is “a digital document-based security model that enforces access, usage, confidentiality, and storage policies” [4]. The technology is used to protect documents throughout their lifecycle, that is, the document stays protected no matter where it resides. ERM is an enterprise ‘version’ of the mainstream Digital Rights Management technology [17,18]. As a matter of fact one of its earlier names was Enterprise Document Rights Management (EDRM). A more current name Information Rights Management has been adopted for the technology by others [17].

Although most enterprise based technologies (ERM/IRM/E-DRM) are based on existing DRM technology ‘or at least from the same ideals and methods’ [18], the two are different in several ways. Whereas DRM is aimed at protecting rich media such as audio and video, ERM is targeted at documents and artefacts found in the office environment. In addition, DRM is meant for consumer consumption as against enterprise purposes in the case of ERM.



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suggests that ERM started of as a complement to content management systems and other IT security technologies. However, there are new ERM solutions that are standalone.

2.5.3 ERM and the paperless office

Information security (integrity and confidentiality) is a big concern when it comes to the generation and transfer of electronic documents for a paperless office. ERM reduces the risk of security breaches during the transfer of sensitive electronic data from one station to another. A white paper on ERM architectures from Avoco Secure [3] claims that this encourages the use of digital technology for a paperless environment.

2.5.4 Enterprise rights management architectures

The Avoco Secure paper [3] claims that the reference architecture for Enterprise Rights management systems can be categorized into two main groups, namely tethered and un-tethered. The tethered architecture is based on the client-server model while the un-tethered is standalone or peer-to-peer with a clear preference for the latter.

Overview of tethered ERM System

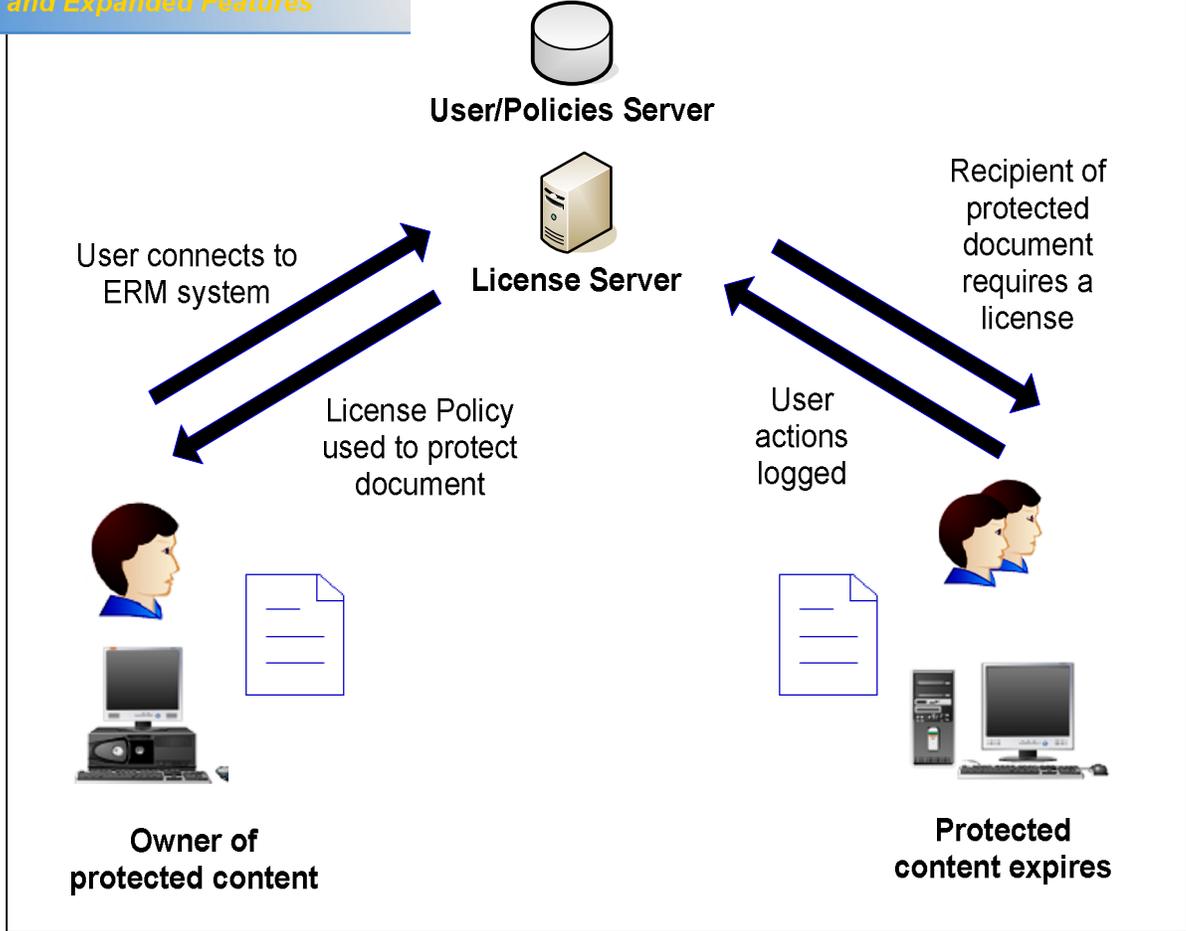


Figure 2: Overview of tethered ERM (adapted from Avoco 2007)

In a tethered ERM the owner of a copyright content the system via a license server which provides license policy based on the user rights and policies hosted on the User/Policy server. A recipient must have a license from the license server in order to access this document whose policy determines what access rights the recipient has on the document. The recipient’s actions are then logged onto the license server for auditing.

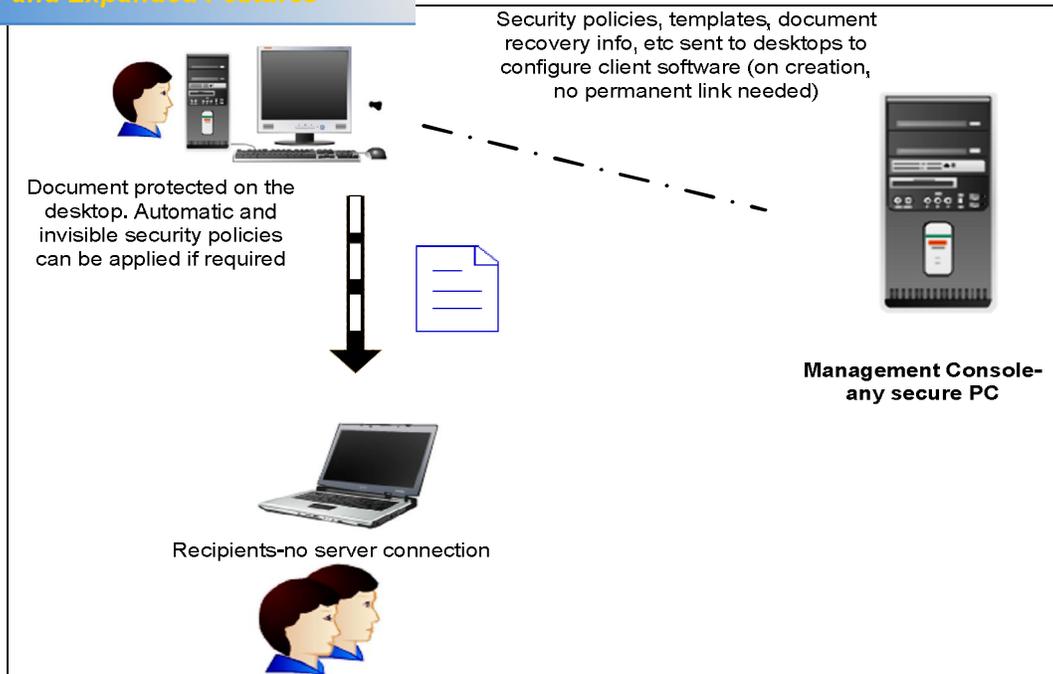


Figure 3: Overview of un-tethered ERM system (adapted from Avoco 2007)

For an un-tethered system, there is no need for a license server as the key is distributed within the document. Thus the recipient also does not need to connect to a license server for a decryption key. In order to configure client desktops a management console is needed to send security policies, templates, document recovery info to the desktop although after this no permanent link between the two systems is required.

The white paper further compares the two as content management systems in terms of:

1. Closed or Open Systems: Affect on Sharing of Protected Content
2. Installation and Setup Implications
3. Integration with third party products
4. Usability and Transparency
5. Audit and Dynamic Changes to Rights Restrictions
6. Encryption Key protection

Metric	Tethered ERM	Un-tethered ERM
Closed/Open System(Content sharing)	Closed: users need to be added to license server list	Open: No need for a centralized method of maintaining users
Installation and Setup	Installation and configuration of license/policy server and that of relational database for the server are complex + management console	Installation of management console + client installation
Integration with 3 rd party applications	Requires additional layers	Seamless integration if API is strong
Usability and Transparency	Connectivity requirement, Secondary logons reduce transparency and usability	No connectivity required.
Audit and Dynamic changes to rights Restrictions	Ability to track document change. Can dynamically change/revoke use rights	Attempt to do this tethers the document to server; main disadvantage
Encryption Key protection	Stored on license server	Stored within protected document

It is obvious that un-tethered model possess desirable attributes that make it more attractive than the tethered model as shown in Table 1. It is easier to set up, install and integrate with third party applications. The openness of the system (no need of central method of maintaining users) makes un-tethered documents more fluid than their tethered counterparts thus making it more scalable. However the un-tethered model is disadvantaged when it comes to audit and dynamic changes to rights and restrictions. This can although be done locally and uploaded to the server when the system goes online [3].

2.6.1 What is Identity Management?

A digital identity according the landmark book [19] on the subject, 'contains data that uniquely describes a person or thing (called the subject or entity in the language of digital identity) but also contains information about the subject's relationships to other entities.' Similarly, a white paper on by the Open Group [20] argues that 'Identity is the fundamental concept of uniquely identifying an object (person, computer, etc.) within a context.'

2.6.2 Identity Management (IdM) and the Paperless Office

Identify Management provides technologies and policies to manage digital identities as well as how these identities access the resources in the environment [21]. A critical solution that IdM provides is the management of digital signatures which makes it possible to replicate the signing of physical documents on digital ones. This important solution supports the automation of business processes thereby eliminating paper processes and hence paper.

2.7 ERM and IdM

A technology writer [22] argues that 'to work properly, ERM must fit into a broader security infrastructure that likely includes physical access systems such as smart cards and logical security, including digital certificates.' Identity Management systems do not only provide the infrastructure that

implement but also complements its security functionality. IAM provides authentication which 'guarantees who a user is, while ERM controls what each user can do with the data' [22].

2.8 Best practices from secondary sources

A study conducted by Berkowitz raises the following issues for consideration when setting up a paperless office [23]:

- Ease of integration with firm's primary service applications
- Understanding of current process and the needed process (gap evaluation)
- Designing of controls into process automatically
- Quantification of business process operations and production processes
- Change of mindset from going "paperless" to going "digital"
- Carefully managed process reengineering

Mckinnon and Wasserman [24] outlines 6 critical success factors for implementing electronic medical records, a form of health records management system:

- Csf1: business case, i.e. resource requirements vs market opportunities
- Csf2: physician support
- Csf3: project champion
- Csf4: planning
- Csf5: project management
- Csf6: process reengineering

Central to these success factors is the business case which weighs the market opportunities the new system provides against the resource required for implementation of the system. They also claim that 'change in the existing process is inevitable, but if managed correctly, it will result in little or no disruption' to the business [24]. Contrary to this, a case study of the



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governance system in an Indian state suggests otherwise [23].

In a case study document, from Thompson and Taylor on a firm that implemented a paperless office, accounts for that approach as follows:

A Brainstorm session with all partners of the firm was held.

The group in charge of implementation identified which firm documents would be stored in a proprietary document management system called *FileCabinet CS*. The group created a list of documents and then removed extraneous documents from the list.

The group in charge of implementation decided on firm data locations: Members of each department determined their respective drawer and folder Structures.

Office manager and each professional staff member will eventually have scanners at their workstations decided to add a separate 40 gigabyte (GB) hard drive for storing the firm's FileCabinet CS data.

This is followed by a 4 year plan

Year one

- Printed all CS Professional Suite reports and documents exclusively to FileCabinet CS for tax, bookkeeping, and payroll
- One staff member from each department scanned documents to test scanners and develop scanning procedures CS Professional Suite applications automatically
- create their own folder structure. The firm organizes documents in a custom folder structure that suits their document storage needs.
- The firm uses dated nesting of folders to organize documents by year. You can also organize documents by month.

Year two

- Continued printing all CS Professional Suite reports and documents exclusively to FileCabinet CS
- Purchased scanners for remaining staff
- Scanned all supporting documentation
- Printed necessary documents for paper reviews and then shredded the documents

Year three

- Continued all steps listed under "Year Two"
- Purchased dual monitors for each staff member for viewing documents stored in FileCabinet CS and working in other applications simultaneously
- Began completing all reviews electronically rather than in hardcopy
- Tax department hired temporary employees to scan previous years' tax information

vided not to scan prior information)

ed under "Year Two" and "Year Three"

Partners began storing personnel documentation in secure, password-protected

Human Resources data location

Conducted internal review of processes to ensure effectiveness

2.8 Outstanding issues from literature on best practices

Although the authors have different voices on the subject, the literature has some outstanding themes and patterns running through the recommendations made by the authors. These issues are discussed below but most importantly the form the basis of underlying issues that the research seeks to find.

1. Human factor i.e culture, individual tastes and preferences
2. Organizational restructuring
3. Well thought out implementation Planning
4. Leadership and project championing
5. Process modeling and reengineering
6. Document storage management

There is less mention of security mechanism for the new system. The ones that did focused on backups rather than a full-fledged security evaluation and implementation system. Due to these strong issues, the research was designed to explore these issues further in the cases.



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From the literature enterprise rights management, an off-shoot of digital rights management, has become one of the new areas of information management technology that is rapidly getting recognition. Enterprise rights management systems depend on identity management systems to function properly. Whereas identity management makes sure people are who they claim they are whereas rights management systems enforce the rights policies on electronic documents.

The research methodology was designed to explore these issues in the case studies.

This section explains the methodology used in the study and justifies the tools used for analysis. The underlying factors for the choice of methodology were the nature and purpose of the study and the time frame for conducting the study.

3.1 Best practices from literature

The study begins with a search of current and relevant literature on the subject area. First, the study progressed from a broad overview of the area to a finer detailed analysis. Although Wikipedia lacks the depth of quality required of academic sources, it served as an important pointer to more reliable sources on the subjects 'paperless office', enterprise rights management (or information rights management), enterprise data interchange, enterprise forms automaton and identity management systems. The keyword search was done across three search platforms namely, IEEE Xplore, Google scholar search engine and the Google search engine.

3.2 Case Studies

Due to the complex nature of the thesis topic which, from the literature, is not very well explored academically, a case study methodology was used. This is to allow the complexity of the issues to be critically and intensively examined. Case studies used real event to provide the needed insight into issues that may need to be explored in greater detail. It also ability to

into a case helps in the development of a descriptive picture which can facilitate explanation and predictions [26].

The instruments for the case studies are participant observation, interviews, and a survey. The admissions department of Ashesi University College was selected as the main case study. Two other organizations were selected as supportive cases studies in order to enhance the generalizability of the outcome of the findings. The Ashesi admissions office was chosen because of 1) the level of manual transactions that the admissions process goes through despite the availability of IT infrastructure in the department and 2) the proximity of the office to the researcher. The structure, nature of business operations of the three organizations are further explained in the appendix 3.

A survey was administered to study the posture of applicants towards the current admissions process and how they would respond to an electronic version. Another objective of the survey was also to profile the applicants in order to would point out the level of readiness of prospective applicants to use an automated paperless admissions process. 30 survey questions were administered at the admissions office out of which 24 responses were received. Some applicants had asked to take the questionnaire away in order to have some time to fill it and return it later. Continuing students and successful applicants were allowed to fill the questionnaires in order to capture the full. In the case of continuing students, preference was given to first year students because they are the group who had most recently



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process apart from successful applicants for the current round of admissions.

The survey addressed issues such as place of resident and school at the time of application; tasks performed with the computer; source of internet at the time of application, the applicant's source of admissions forms; the mode of communication applicants would want the admissions office use to contact them; the means of sending them admissions letter and package. Others include amount of help needed when using a computer; the level of convenience an electronic admissions process would give them and why, as well as their recommendations for a making the admissions process better.

Business workflow analysis was used to analyze the various processes and sub-processes identified for admissions. This choice was made because of the ability of business workflow analysis to streamline and improve the efficiency of business procedures [27]. User responses were then collected using semi-structured interviews.

3.2.1 Interviews

Interviews of stakeholders from each of the organizations study was conducted with semi-structured questions to provide a clear and in-depth knowledge into the design of work processes as well as the flow of documents in these organizations.



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The other part of the cases involved visiting the organizations and observing the workers in their natural working environment as they conducted their business.

Particular attention was given to the observation of the business processes that each organization uses, if any. The observations involved on-site direct observations of business processes and participant observation. Physical artifacts like instruments, devices and tools were observed and noted.

3.3 Product Evaluation:-Information Rights Management and Identity Management

Three information rights management solutions from different providers were selected for review: Oracle IRM, Windows IRM and E-lock Prosigner.

There is the option of using open source identity management solutions like SimpleSAMLphp or Sun's OpenSSO/OpenDS solution. Some proprietary solutions also provide evaluation copies that can be used for the case study. However Microsoft's Identity and Access management solution (bundled with Windows Server) that comes with Windows Server is preferred because of the system's comprehensive nature. Moreover, it comes with a well established API for customization.

Cases used in the study have not specifically undergone any paperless office deployment process. Two of the organizations, Ashesi admissions office and White Oceans have intentions of automating major parts of their business processes. This therefore may not provide the needed post-implementation results. However, all three organizations have some degree of 'paperlessness' as they use IT resources for some of their current processes.

Furthermore, the survey conducted for the Ashesi admissions department case study to find out about the posture of applicants and continuing students towards an electronic paperless admissions process also has its own limitations. Respondents were conveniently selected by way of administering questionnaires to those who enter the admissions office on a particular day. Due to time constraints external stakeholders for the two supporting cases, namely, Genkey Africa and White Oceans were not studied. This could have provided more insights on how external stakeholders would respond to paperless solutions deployment efforts.

FINDINGS AND ANALYSIS

4.1.0 Introduction

This chapter examines the findings of the research based on the methodology discussed above. The findings on best practices for implementing paperless office solutions are themed on:

- a. The need for paperless office solutions
- b. Paperless office implementation leadership
- c. IT resource: availability, knowledge and usage
- d. Legal acceptance of electronic documents

In terms of the contributions of enterprise rights management to paperless office implementations, the findings are themed on:

- a. Applicable areas of the business operation where document rights policy enforcement is necessary.

The succeeding subsections discuss these findings in the context of each case organization. At the end of the discussion, the outstanding issues that permeate the findings are further condensed into categories that aid in propositions for the best practices.

4.2 Need for paperless office solutions

The research found that the organizations' need for a paperless office solution could be determined by the amount of paper usage, the expenditure made on pre-printed material, operational issues the organizations face with their current manual processes.



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below, show the extent to which their current business processes give the organizations more an upper hand or otherwise as compared to paperless alternatives.

The three case organizations showed different levels of need for a paperless office solution. As per these metrics, the need for a paperless office solution is strongest in Ashesi admissions office followed by White Oceans Co. Ltd. Both organizations have shown a strong interest in automating parts of their business processes due to issues they are experiencing with the current manual process; the Ashesi admissions office shows the strongest efforts at achieving this objective. In the case of Genkey Africa, majority of the business operations are not based on paper. This is due to the fact that the team, client base, suppliers, and service providers are small and manageable unlike Ashesi admissions office and White Oceans². Moreover they have systems that support internal operations which they communicate with via email, telephone and instant messaging. However they might face similar challenges when the organization grows and when there are more clients, service providers and employees.

The outstanding issues the admissions office faces include labor hours lost on manual processes, huge paper usage, spending of important labor hours for sorting, filing and cross-checking of applications for missing documents and items.

² All three case organizations have small team sizes but apart from Genkey Africa, the number of service providers, suppliers and client base are large.

The admissions process for Ashesi is entirely paper-based except for a provision that allows applicants to download forms from the school's website for printing out. The print outs are then filled and submitted to the admissions office by applicants.

This has proven to be an ineffective way of conducting the recruitment process. The work study assistants and receptionists who receive and file the application forms have to cross-check each admission forms. A work study assistant for the admissions office had spent used a whole day (morning till 6) to search through a stack of 180 files in order to tally applications received with the signed sheet for submissions³.

In a related issue, the front desk assistants report all fee payments, made to the school by students, on behalf of the Accounts departments .The Accounts office had nursed plans of automating this process so that the records can be automatically reflected in the Accounts department's workflow systems. The head of the Accounts department, Mr. David Kadeh, had detailed that the process had many challenges. First of all the department does not get the records on time in order to make the necessary accounting decisions. Secondly, labor hours are lost to typing what has already been written in the receipt books and to double cross-checking of entries which have already been cross-checked at the front-desk. He also said that the department's

³ A proof of submission, application might have been submitted on applicant's behalf by some proxy.

succeeded because they did not have the needed resources, technology and the know-how.

White Oceans on the other hand, wants to move the paper based sales order processing, receivables and inventory management to an electronic version where they can have up-to-date figures on the how many receivables are outstanding. With the current paper based process, the manager has to manually go through the

- i. list of credit sales whose payments are outstanding
- ii. list of credit purchases whose payments are outstanding
- iii. inventory list to know what products are available and which ones are short.

4.2.2 Cost of Paper usage

The need for paperless office automation is also seen in the amount of paper used by the organizations. Paper documents are a manifestation and end result of the business processes. White oceans uses an average of 200 sheets of paper a month for printing out mainly invoices and pro-forma. Ashesi admissions department consumes averagely 1000 sheets (2 reams) of paper every month for printing admissions materials (during the admissions peak season, the numbers is higher) whereas Genkey Africa uses less than 1 half a ream per month.

g the average amount of paper used in a month

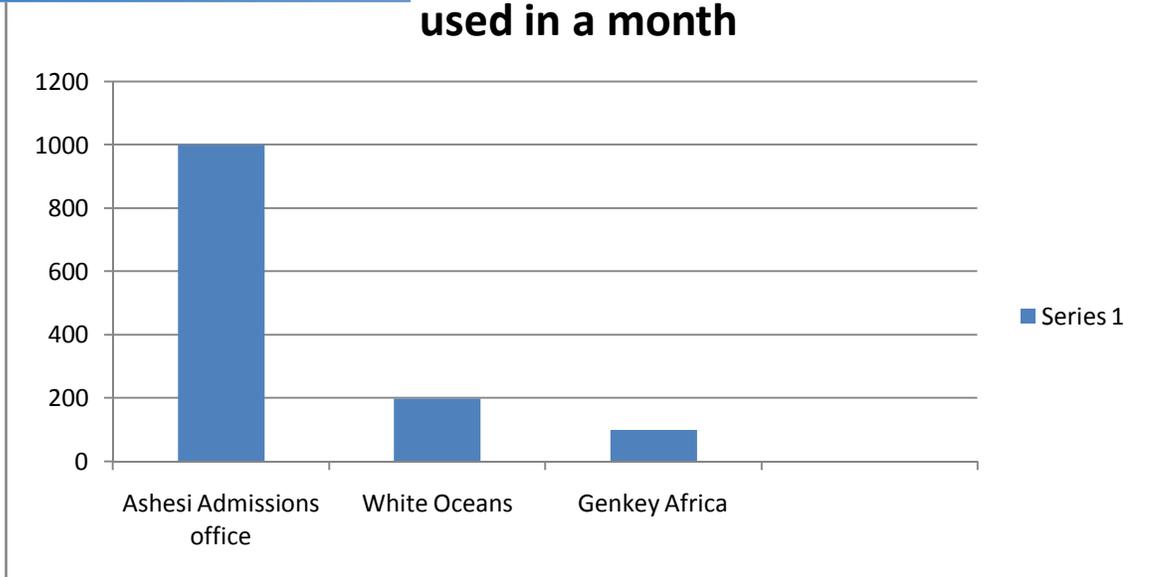


Figure 4: Average amount of paper used per month in the three case organizations

4.2.3 Cost of Pre-printed material

The cost of pre-printed materials also serves as a justification for going paperless. The Ashesi admissions office, for instance uses 500 sheets of preprinted admissions forms while White Oceans use printed materials for receipts and invoicing. Genkey uses no pre-printed materials.

4.2.4 Double entry of data

At the Ashesi Admissions office, after successful applicants have been admitted, their details are entered into an excel datasheet (certain portions of the data sheet are sent to different departments for various purposes such

Students, IT department and Accounts office). A lot of labor hours are spent in entering of more an average of 100 successful applicants every admission season. This double entry of records sometimes introduces human errors into the records. This challenge has forced to look for an electronic solution that would store the applicants' details as at the point when the applicants are entering their own details for the application.

For Genkey Africa, details of receipts and invoices from utility service providers are re-entered into a workbook for administration and accounting/auditing purposes. However, due to the limited number of service providers, this does not pose a serious challenge currently.

4.3 Paperless office implementation project leadership

This section considers the leadership/team responsible for the implementation of the paperless office solution in the organization. The literature suggests that a strong project leadership will give the project better chances of success. It also suggests that the leadership requires a champion to lead the project with a team comprised of staff from all relevant and critical aspects of the organization.

Both Ashesi admissions office and white oceans have a one-man in charge of the implementation project. The Ashesi admissions department has a technical person from the school that is in charge of the requirements gathering, system development and implementation. Other members of the

(and admissions officers) have some amount of involvement in the project implementation.

There are two business application implementation instances at Ashesi that provide some noteworthy insights. A school management system was implemented to manage the school's grading, course registration, student fees etc. Although representatives of the vendor were on site to do the implementation, an internal champion (teaching staff) was picked to lead implementation. With the project champion leading the implementation, a clear implementation plan was drawn, end users were taken through workshops and feedback was collected from them. Despite the issues that were faced, the system was successfully implemented and currently everything related to grades and course registration is managed by the system. This success is largely attributable to the appointment of the project champion who acts as a go-to-person for users to direct their issues. The project champion keeps contact with the system providers in order to better the system and also make necessary fixes.

On the extreme end, in the same organization, another resource sharing and collaboration system, Microsoft SharePoint was implemented with a different approach. In this case there is no clear project leader. The IT department manages the implementation and the administration of the system. Although this application is versatile and has flexible collaborative and resource sharing capacities that can aid users in the execution of their functions, it has not received the needed adoption by the target users. Unlike the



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ident management system, there is no person serving as a focal point and orchestrator to provide end-user support.

In the case of White Oceans, the CEO of White oceans asked a technical person from outside the company to lead the implementation project. There was no internal champion for the implementation project. This presented another challenge. The project leader's lack of full breadth of knowledge of the organization posed some difficulties in eliciting the requirements in order to select the most suitable systems.

Genkey Africa on the other hand, although has no laid out plans to implement paperless office solutions, the history of implementations made shows that a singular person is charged to evaluate the product and take responsibility for the implementation.

4.3 Stakeholder buy-in

The literature as discussed on previous sections strongly recommends that all stakeholders of the firm need to buy into the implementation plan of the paperless solution. Stakeholders can be internal or external to the organization. Internal stakeholders include the employees, shareholders, managers etc whereas external stakeholders include clients, suppliers, service providers, external auditors, industry regulators etc. These stakeholders may have individual needs and or requirements. The implementation of new systems should consider these stakeholders' needs

Africa, for instance, keeps some accounting information on paper documents. According to Samuel Asumadu, a systems administrator for Fidelity Bank's E-banking department, financial institutions are required by the Bank of Ghana(as a stakeholder) to maintain paper records of transactions. Any dispute resolution process may require paper evidence. This requirement may affect an organizations decision to go fully paperless.

An interview with Eric Nsarkoh, an IT specialist and lecturer revealed that implementation of business applications are largely dependent on human factors. He cited the Accra Institute of Technology as an example where efforts at automating some of the school's functions and processes faced challenges from some high authorities in the school due to the belief that their style of working would be disrupted by the new system. Similarly, Mr. Asumadu added that even at Fidelity bank, paper memos are seen as superior documents compared to digital ones. The old fashioned style of printing memos and passing them around for recipients to sign off as confirmation of receipt of the document is still preferred to the emailing memos. The fact that recipients can be asked to confirm receipt of the emailed memo does not convince people to use email. Another interviewee from Genkey, Diabene, confirms the issue about human factor by saying that the 'willingness to use [the paperless] tools and the general acceptance' by target users is essential parts of the success factors for businesses to go paperless. A survey conducted to determine the posture of applicants and

As Aheri's electronic paperless admission process showed that applicants will bear further credence to this issue. In this case respondents were strongly in favor of the system. The survey also reveals some important insights.

4.3.1 Positive posture towards the paperless admissions

First of all applicants (main users of the electronic admissions system) showed a positive posture towards the implementation of an electronic admissions process as the chart below shows. While 9% of the respondents felt that an electronic admission process was going to cause an inconvenience to them, 35% felt indifferent however more than 50% were in support of the system. In addition, 81% were in favor of receipts in one electronic format or the other. This informs project team that they have this groups' support in implementing such a solution.

Respondents' response towards electronic admissions process

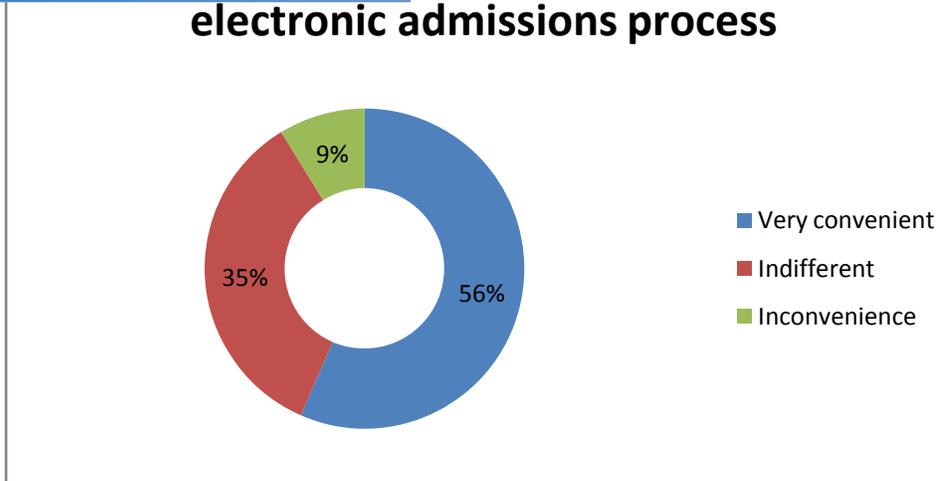


Figure 5: Respondents' response towards electronic admissions process

It was also realized that different users have different levels of IT proficiency. This suggests that the application should cater for this variation in IT proficiencies. For example, the application to be implemented must have a provision for help for specific functions and tasks.

Another interesting finding was that when respondents were asked about why they chose between downloading the applications from the school website and buying of forms from the front the admissions office, 30% of those who used bought forms said they were not aware that applications forms were available online for downloading. This is an indication of the low level of user awareness of available systems. These issues underscore the importance of knowing all stakeholders posture towards the implementation of a paperless solution in an office environment as the literature suggested.

4.4 Availability, knowledge and usage of IT resources in the organization

The availability of IT resources such as network infrastructure is critical to the deployment of paperless office solutions. One would expect that, the availability of such resources may cut down the cost and time spent on implementation if the paperless system depends on such infrastructure and motivate an organization to go paperless. However, Ashesi Admissions office has not going fully paperless. This can be attributed to the small number of applicants⁴ in the early years of the office which made the admissions process more manageable than today.

The findings show that in all three cases, the use of computers forms some aspect of their business process. While Genkey Africa uses its systems for software development, data sharing, communication and collaboration between departments, White Oceans uses its computer systems for invoicing, word processing and collating the records of sales and purchases which for administration and accounting purposes. Ashesi admissions department also uses their computer systems for emailing, generation of admission forms and admission packages. All three organizations have scanners—majority of the literature suggests that scanners are essential resources for transitioning from paper-based paper to electronic based—installed in their offices. Ashesi

⁴ The number of applicants were as low as 60 in 2005 compared to 500 in 2009.



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connected to the school network and Genkey Africa also has a network installed on its premises. Genkey Africa and Ashesi Admissions both have internet connectivity.

Therefore, these institutions have the foundation technologies that are needed for transitioning their paper-based business processes to electronic except for the business applications that are missing. Ashesi admissions office requires just an online admissions application whereas White Oceans need a network infrastructure and a business application that can provide receivables, purchases and inventory management solutions. Genkey Africa only needs to redefine their communication and collaboration needs in order to utilize the current technologies existing in the environment.

Thus with the cost and time needed for implementing a paperless office solution for Ashesi admissions office would be relatively lower than doing so for White Oceans. In addition, an institution that has a history of using some form of Information technology in its business process stands a better chance of easily adopting paperless office solution and hence a better chance of successfully implementing a paperless office. This shows that these institutions are very much ready to go paperless except for a few components and policies needed.

Moreover how well these available IT resources are used matters a lot. For instance, although there is an information rights management tool

department's shared drive (shared folder on a network storage device) the Admissions officers are not aware of the information rights policy enforcement tools that is implemented on the department's shared drive storage. Although they showed a strong need for such a technology (this is discussed further on in the paper). Due to this lack of awareness the department enforces a policy that restricts all data in the shared drive to the admissions officers only thereby unduly hampering the easy flow of information that other members of the department need to do their work (other members can only access data from the shared driver through the admissions officers which gives the recipients full control of that particular set of data—a big security concern). In addition, other members of the department apart from the admissions officers (admissions office work study assistants and front desk assistants) are not aware of the datasheet that contains student records because of the security policy that gives access to top level members of the admissions office only.

4.5 Process engineering and efficiency

Electronic workflow can either mimic manual work processes or lead to the reengineering of the work processes into new ones. While the IT professionals, Mr. Nsarkoh, Mr. Asumadu and Mr. K Biney agreed that with some part of the literature claimed that mostly the manual workflow will need to be reengineered, they also maintained that manually are broken down into sub-steps and critically analyzed, collapsible sub-processes may

sumadu also said that businesses would have to find creative ways to reengineer their work processes in a way that will make them efficient and productive by making the information flow fluid and unhindered.

4.6 Organization's need for rights policy enforcement on documents

All but one organization has some of security mechanism for protecting their assets. The need for business document rights policy was determined by looking at:

1. the areas of the business in which sensitive information is shared
2. past occurrences of data thefts
3. the security policies enforced, if any, to protect sensitive information
4. and whether the organization retains any employee, customer, or member information that can be used for data theft

Business functions and areas involving sensitive information

Ashesi admissions office considers every piece of data collected on each data confidential and sensitive. However information can be shared with other members of the department or the school administration only if the admissions officers provide the data upon request. After the data is shared, the recipient has full control of the data because there are no security controls applied to the document; the recipient is trusted to use the data for its intended legitimate purpose. This poses a security concern.



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Genkey Africa also shares sensitive information in the organization. Other administrative information related to employee remuneration history are not shared neither do they have any security controls applied to them but rather kept on. Some other sensitive data are kept on external hard disks which are secured in a safe.

4.7 Contribution of ERM to paperless office solution

According to the interviews with the IT professionals ERM is not a paperless solution. ERM gives the needed confidence for going paperless in some situations where the sensitive information needs to be protected especially when they are digital and can be easily shared.

4.7. 1 Document right policy enforcement in the three organizations

White oceans: not exactly for now but as the company gets large; assets do not have high value that needs protection.

The situation at Genkey Africa presents 2 issues.

- 1) Some form of protection needed for sensitive information. However number and value of sensitive information is not that huge to guarantee a business case for deploying an ERM system.
- 2) The code base for the proprietary software designed and developed in-house is stored on a server and backed up on the drives that are stored away in security safes.

In the Ashesi admissions office there is a high need for ERM as every piece of information is considered confidential. In addition as the number of



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the management of the application process will become more complex. The amount of data that is will be shared among all the parties involved in the process will increase and therefore will require airtight security that will prevent data theft/leakage through accidental or malicious means. There will be the need to set up controls that define who has access to what data and who has the right to change data in that situation.

A typical use case for document rights policy enforcement in the Ashesi admission process is the conduction of interviews. The admissions interviews are conducted in such a way that the interviewers can only have access to the questions (on paper) just immediately before the interview is conducted. For interviewers who are outside the school, the questions are sent to them through email. The questions which need to be protected can have certain rights policies applied to them with ERM to prevent unauthorized recipients from accessing the document. The policy may also define whether authorized recipients have the rights to forward, print or copy the document or not. It may also define that the document self-destructs at a particular time.

All the ERM products evaluated integrate easily with Microsoft Office applications, Portable Document Format (PDF) documents and other custom document formats thus making it easy for end users to quickly assign access policies on a document. They also tend to allow for flexible use of different identity management systems mostly based on the Light Directory Access

directory. Most businesses that operate under a networked environment that administers users centrally can therefore make use of their own identity management system in the implementation of the ERM solution.

Microsoft IRM and Oracle IRM, as per the evaluation, adopt some form of closed client- server architecture. Thus clients would have to receive license from the license server over a network. For internal purposes, it may be easy to deploy such a solution unlike external-wise where network reliability may not be ensured hence forming a constraint. With the advancement in network connectivity in Ghana these challenges may be overcome to some extent.

Subsequent to the initial licensing users can access the document in offline mode where rights are cached on the client side but this also introduces another challenge; administrator or license server might not be able to perform revocation or change of rights where needed.

However some ERM solutions like Microsoft IRM and E-Lock Prosigner provide sealing and signing features which make it possible for end users to sign documents digitally. Thus the need for signing paper documents is removed. The authenticity and integrity of digitally signed documents can be verified by the recipient with the ERM application. It can also be used to ensure non-repudiation in order to prove the origin of the signed document. The interface of this feature is built directly into the Microsoft office products. In order for

ent they need to have a digital signature, an associated valid certificate issued by a reputable certificate authority (CA). In the Ghanaian context, these requirements will be relatively difficult for individuals, compared to businesses, to meet and so businesses may not be able to take advantage of this feature in their interactions with their clients. Therefore this will be more ideal in business to business transactions. This may be ideal for a business like Genkey and White Oceans whose clients are all corporate organizations. Nevertheless, Windows IRM makes a provision for Hotmail account users to use the digital signing feature. This may have its own challenges as not many customers may have hotmail accounts. For example the survey on Ashesi admissions applicants' posture and readiness towards the automation of the application process showed that 43% of respondents have and use their hotmail accounts at least once a week. Moreover, some ERM products require certain dependencies to function. Oracle IRM for example requires the Oracle 10g database to run. This comes at an extra cost to the company thereby heightening the constraint to adoption of such technology.

From the above, ERM solutions have a better promise of success in a business to business situation. Business to customer use is also possible depending on the context of use. Therefore, ERM may not be ideal for every organization at every point in time. The size of the organization, the need for sharing the data, quantity and sensitivity of data in the environment and the value placed on these sensitive data. The higher the value placed on the data



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of the data and hence the higher the need to protect that data. As previously discussed, inherent protection (ERM) gives better security than the protection of the perimeter within which the data exists.

This chapter provides a conclusion of all research and makes suggest best practices for implementing paperless office solutions after considering the findings discussed above.

5.1 Suggested Best Practices

This paper adapts the OCTAVE method as a template for the purpose of organizing the suggested best practices. These suggested best practices and guidelines take into consideration the key findings discussed above. The best practices address human factor, stakeholder buy-in, project leadership and business case issues.

In addition to a *preparation* stage, the suggested approach 5 phases in all: organizational view, technological view, strategy and plan development, implementation and post-implementation as described by Fig. 4. All the phases relate to and address the human factor and business case issues relevant to that phase for implementing a business solution. There are two key factors that the "Five Plus One" phases depend on namely, *Business case* and *human factor*. The *business case* represents how much market opportunities and benefits the solution provides as against the resource requirements needed for implementing the solution [24]. Human Factor represents all the human capital related issues that influences the implementation. It also covers the buy-ins and support from all the levels of the organization. These two are important in the Ghanaian context due to

human related concerns and effect of cost of implementation on the organization's bottom line. A perfect solution can fail simply because rejection from concerned personnel or may not start at all due to the cost of implementing the system.

Like the OCTAVE method, the suggested approach is led by an interdisciplinary team and takes the form of a series of workshops. A particular difference is that the suggested approach is more flexible in that teams can iterate previous phases to effect changes in the current phase they are in.

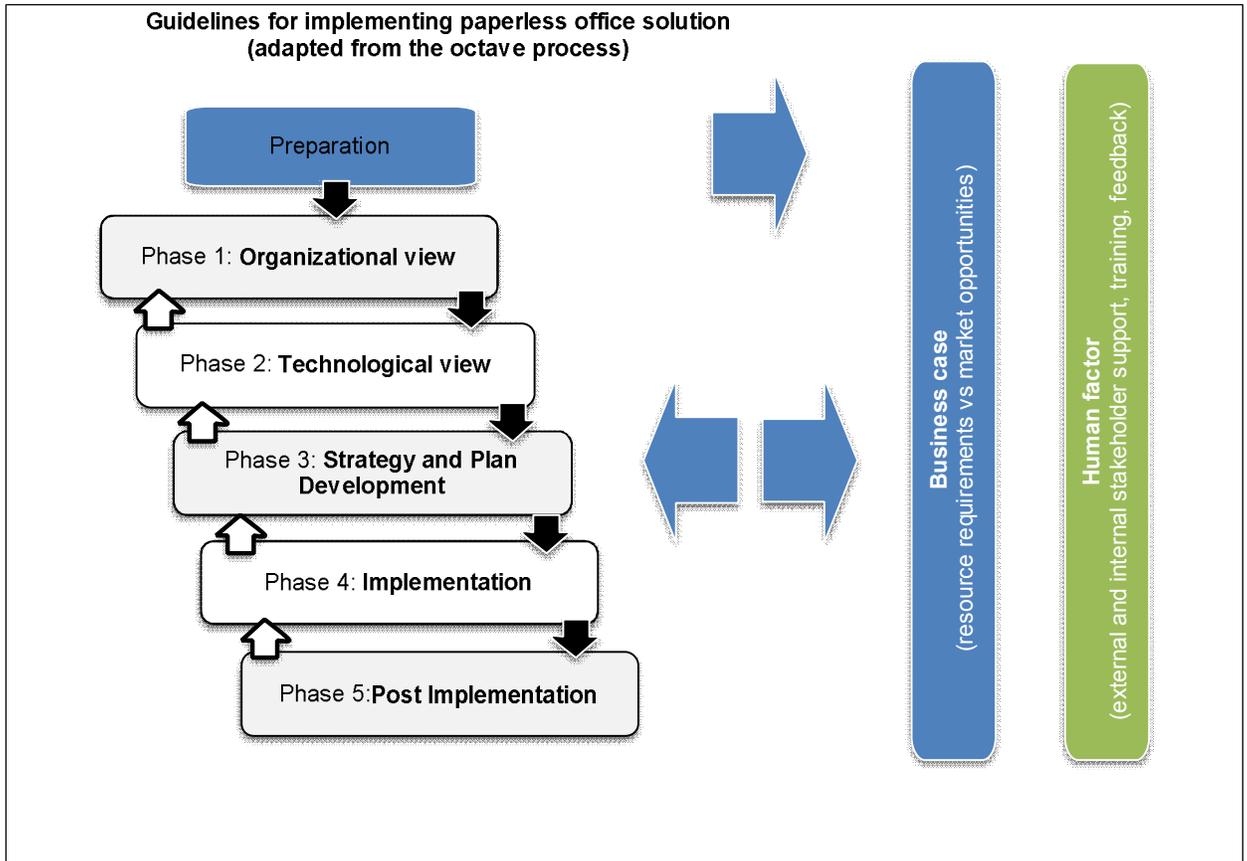


Figure 6: Guidelines for implementing paperless office solutions (adapted from OCTAVE method)

5.1.2.1 Organizing the team

Include variety of internal stakeholders in the planning team. The more inclusive the team is the more likely there will be a higher buy-in from all members of the organization. Moreover a more comprehensive team ensures that all the needs of the various departments and functions are captured in order to choose and design the best solutions. However too big a team will cause undue distractions, disorganizations and prolonged decision making that will slow the project.

5.1.2.2 Selecting a Project champion

The team then selects a project champion to lead the team. A champion should be, preferably, of IT or project management background. A champion should also have the passion to see through the project through planning to post-implementation stage. After every phase, the team is expected to address the relevant human factor and business case issues.

It is also essential that the team members have most or all of the following:

1. Breadth of knowledge of the organization
2. Facilitation experience
3. Broad perspectives
4. Pragmatic viewpoints
5. Communication skills

The business case issue here is the justification of the need of the paperless office guided by broad analysis of what opportunities the solution can bring the organization as against the requirements for doing so.



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5.1.3 Phase 1: Organizational view

5.1.3.1 Process 1: identity and analyze objectives

The team analyses the current objectives of the organization and the objectives for going paperless. The objectives for going paperless must be in line with the organization objectives.

A disparity between these objectives will cause the project to be delineated from the functions of the business functions and therefore lead to its strangulation.

5.1.3.2 Process 2: identify roles, functions, knowledge and posture of internal and external stakeholders

Management, shareholders and workers form the internal stakeholders to the project. The team identifies the above attributes of each group for specific reasons. The management and shareholders are important here because of the required support needed from them in terms of funding for the project. Without management's buy-in the project may not start at all. Special attention should be given to needs of direct users of the solution but the team must not lose sight of indirect users as well. The end user group may overlap both internal and external stakeholders. A different study of the requirements from this group (and its sub-groupings) is critical. Also, by identifying and consulting with regulatory and compliance stakeholders such as the Bank of Ghana, Standards Board and the organization's auditors, legal



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the effect of the implementation of paperless solutions on compliance to regulations may be addressed.

5.1.3.3 Process 3: Define, model and cost business processes

The team defines the existing business processes and models them. Specific processes that are the producers or users of large numbers of paper are then identified for collapsing or reengineering in later phases. Model intra and inter departmental communications as well as inter-function interactions. Quantify and cost current business processes including costs related to searching, mailing, storage of documents etc. Customer service issues that arise due to missing, illegible or destroyed documents are worthy of notice. This quantification gives a better understanding of the costs involved in running the current business process and therefore feed into arriving at a clearer business case for implementing a paperless solution.

5.1.4 Phase 2: Technological view

5.1.4.1 Process 4: Inventory of Available technology

The team takes inventory of all the available information technology and information systems in the business environment.

5.1.4.2 Process 5: Identify and assess required technological resources and knowhow

Based on the objectives of the needed solution, the team identifies all required technological resources and know-how for fully implementing the

assigned to each of the resources and value of the expertise identified. *Business case:* Now the team conducts a more thorough analysis of the business case using outputs from the previous processes. This gives a clearer economic justification for pursuing the project.

5.1.5 Phase 3: Strategy and plan development

This forms the crux of the project. A solid implementation plan can guarantee successful implementation. The team determines whether the organizations business processes need to be reengineered in order to implement the new system or not.

5.1.5.1 Process 6: Document storage planning

The team determines the storage plan and makes provisions for this by estimating storage needs of the organization under the new system.

5.1.5.2 Process 7: Organizational planning

The team makes plans for the parts of the organization that will experience changes that will need to undergo changes and how these changes will be managed.

The team in conducts research into products that meet the current needs of the organization. Alternatives products are picked from different categories namely, generic, proprietary or open source. Systems with architectures that follow a generic or industry standard are preferred in order to insulate the organization from proprietary systems that cannot be modified and adapted to specific organizational needs. A general business case issue in this phase is to find out what are the cost implications of each alternative solution?

5.1.5.4 Process 9: Migration plan: converting from manual to automation

The team sets a time frame for migrating the current manual processes and documents to the new system.

5.1.6 Phase 4: Implementation

As a human factor issue the team makes plans to provide training and re-training plans that will get users to be able to use the new system. Workshop based training programs where users can have a try the new system are more ideal.

5.1.6.1 Phased deployment and controlled parallel runs

As specified in the migration plan, the team determines which parts of the business processes can be used to conduct controlled parallel runs with specific users for specific tasks and for a specific period.



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5.1.6.2 Full deployment

Based on the results of the previous process, actual deployment made.

5.1.7 Phase 5: Post implementation

5.1.7.1 Process: Evaluation of application against objectives

The team backtracks to objectives to see if they are being achieved after the implementation of the paperless solution.

5.1.7.2 System Maintenance

The team ensures that system maintenance plans are followed through. As a human factor issue, the team should collect feedback, concerns and issues from users through the feedback collection system.

CONCLUSION AND FUTURE WORK

This chapter concludes the research project and makes suggestions for future work on the research topic.

6.1 Conclusion

Ghanaian businesses and organizations today are gradually acquiring Information Technology tools such as computers and internet in the workplace. Unfortunately this increase in the acquisition does not seem to match the actual usage as these computers are underutilized in the work place. The IT tools have not been harnessed to turn the paper-based business processes into paperless electronic versions which according to the discussions above have greater benefits in terms of security of information, portability, storage etc. An important issue with the use of digital documents is the possibility of data leakage/theft which happens when data falls into the hands of unintended persons either by accident or otherwise. Enterprise rights management solutions have been developed to attempt to prevent data leakage/theft by enforcing rights policies on documents throughout the lifecycle of the document within and without the security perimeter of the authoring organization. According to the literature, a critical technology that enterprise rights management depends on for success is identity management systems.

This paper's objective was to find out how enterprise rights management solutions can contribute to the rolling out of paperless office in Ghanaian

Some of the findings confirmed the claims and best practice recommendations made by previous authors. The findings made by the study were that: there are a lot of benefits to be enjoyed from paperless office however a solid implementation process must be followed in order to achieve this success. This process, according to the findings, is dependent on some critical factors such as the consideration of human factors and a justifiable business case.

Based on the findings, a 'Five Plus One' phased model of general best practices and guidelines for implementing paperless office solutions in Ghanaian businesses were proposed using the OCTAVE risk evaluation method as a template for organizing these propositions.

6.2 Future work

The researcher hopes that providing the above theoretical background propositions will help facilitate further studies into implementation of paperless office solutions for Ghanaian businesses. This should provide a basis for conducting more detailed empirical studies in the subject area. For example, further studies of the suggested guidelines and best practices in variety of business environments to determine the robustness of the propositions for these business environments. This would help business application providers to tailor their products to meet the needs of these businesses and therefore increase the adoption of electronic business applications for automating business processes.



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In addition, researchers should look into whether the passage of the electronic transactions bill will give individuals and organizations the confidence to transact business with other entities electronically? Will this confidence be attributable to the make provision for admissibility of electronic evidence in the court of law?

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Appendix 1: Interview Questions

Interview Questions-- Anida Acquah, Ashesi Admissions Officer Structure

What are your organization's business objectives?
How is your organization structured?

Processes

What are the major tasks that are performed in your organization?
Can you walk me through a usual admission process (one that involves financial aid)?
How many people are involved in assessing a particular application?
Does any part of the process involve comparing notes?
How long should it take an applicant/officer/interviewer to complete such a process?
Which parts of the country and the world do applications generally come from?
How do you communicate with prospective students?
What other departments do you interact with and what format do these interactions take? What kinds of documents are involved? Are they required to be of a particular format (paper or electronic)? Do you depend on these documents in order to fully conduct your work?
How do you share digital documents?
Do you need to access documents remotely?
Why is a copy of the admission forms published on the school website?

Volume

How are payments authorized? By phone? txt? email?
How much space do you have for archiving?
How much paper do you acquire/use every month/admission season?
Do you make use of special pre-printed material?
How long do you keep an archive? Is this an NAB requirement?
How much time do you spend when searching for an archive?

Security

Where do you secure confidential information?
How do you mark such documents?
How do you make sure no one tampers with admissions information?
Do you place any controls on electronic documents you generate?
In case of non-face to face interaction with other colleagues, is verification of the source of a document required?

Knowledge about Paperless systems

What are the IT tools and systems in terms of hardware and software used to make your work easy?
Were these tools specifically chosen to make your work paperless?

When do you use paper?
What are the reasons for executing these tasks? What are the advantages for using paper in these situations?
Would you entertain applicants emailing their applications or just their essays to you? Do certificates have to be paper copies?
How would you respond to an applicant who signs a financial aid form and emails it to you? Would you trust this document?
Is there any provision for interviewers to send in their assessment of an applicant by email?
What would it take to put the application on the school website to allow applicants to fill the forms online?

Interview questions –Samuel Asumadu Manager Astrient Foundation & Systems Administrator Fidelity Bank E-banking

1. What has been Astrient's experience in its Paperless nation initiative
2. How paperless is the paperless office?
3. In businesses' attempt to implement a paperless office, through process automation, should they mimic the existing manual process?
4. How should companies protect themselves against non-repudiation in the case where they go paperless?

Interview Questions –Linda ,Work-study admissions assitant

1. What is your role in the admission office?
2. What does this involve? What are the tasks you are expected to perform?
3. Can you walk me through a typical admission process?
4. How are compilations done?
5. Can an applicant email their application?
6. Who conducts interviews?
7. What happens when an application is incomplete?
8. How do they submit the missing parts?
9. Are they allowed to use other means like email?
10. Do you have people putting any restrictions on the documents they email?
11. Where are the files kept?
12. Who has access to these files?
13. What IT tools do you use?
14. What are the specific problems that you face in the conduct of your duties?
15. Are there any other means of communication tried?

Interview Questions ---Mavis and Pedel Oppong, Admissions front desk manager and former work-study admissions assistant

1. How much paper is used per month?

3. How many admissions assistants do you have?
4. Do you have an example of specific issues you face in the conduct of your duties?

Interview – Eric Nsarkoh, Lecturer and IT consultant

How different should the process of deploying IT solutions for large enterprises from that of small and medium sized businesses?

Aside all the arguments against paperless office solutions, should enterprises follow the same principles as we've discussed for Deploying paperless solutions?

From your experience does document right policy enforcement contribute in any way to reduce this challenge?

Does rights management ability to prevent digital document leak or documents falling into the wrong hands convince organizations to go paperless?

How do you profile the people in the organization?

Are Parallel runs during deployment advisable?

Interview- Akua Dompoo, Product Manager Genkey Africa

1. Can tell me what the business objectives of Genkey are?
2. What is your role in the achievement of these objectives?
3. Can you explain this role entails and the processes involved?
4. What would be a classic example of an interaction you have with other departments of Genkey?
5. Do you make use of any pre-printed material such as invoice books?
6. On a scale of 1-5, with 5 being the highest how would you rate the level of confidentiality you attach to the digital documents you deal with?
7. How do you store your documents?
8. What formats are these documents in?

go completely paperless? If not should there be

10. Do you have any concluding remarks especially with regards to the implementation of paperless

Appendix 2: Survey Questions

ACADEMIC SURVEY APPLICANTS/STUDENTS PERCEPTIONS ON ELECTRONIC ADMISSIONS (March 2010)

This survey is meant for academic purposes only. This is a survey directed at finding out the perceptions of applicants to a paperless electronic admissions process. *Any information provided will be treated with the highest level of confidentiality. If you have any questions kindly contact me via roaning@ashesi.edu.gh*

1. I am a: (a) prospective student (b) successful applicant (c) Continuing student

2. Gender: Male Female

3. Place of residence at the time of your application to Ashesi (Place/Region):.....

4. Last school attended (Name/Location):.....

5. Nationality:.....

6. Which of the following tasks do you use a computer for most frequently at the time of your application?

(Please order from 1 to 5. 1 being the lowest frequency and 5 being the highest)

- (a) Academic work
- (b) For watching movies and listening to music
- (c) For browsing the internet
- (d) For work related purposes
- (e) Other:

7. Which of the following describes you best at the time of your application to Ashesi?

- (a) Can do everything I want with the computer and don't need any help
- (b) Can do most of the things I want to do with a computer without any help
- (c) Can do some of the things I want to do with the computer with some guided assistance
- (d) A complete novice when it comes to computers

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your use/familiarity of or with each the following at the time of

(0=not familiar, 1=have heard about it but never used it, 2=have used it at least twice, 3= at least once a week, 4=at least once a day, 5=More than once a day)

- | | | |
|---|--|-----------------------------------|
| <input type="checkbox"/> Microsoft Word | <input type="checkbox"/> Microsoft Excel | <input type="checkbox"/> Facebook |
| <input type="checkbox"/> Adobe Reader (PDF) | <input type="checkbox"/> OpenOffice | <input type="checkbox"/> Internet |
| <input type="checkbox"/> Hotmail | <input type="checkbox"/> Microsoft outlook | |
| <input type="checkbox"/> Yahoo mail | <input type="checkbox"/> Gmail | |

9. Which of the following is your best source of internet access at the time of your application?

- My phone Internet cafe Mobile broadband School network Office Home
 None

10. How did you obtain the Ashesi admissions forms?

- (a) Admissions office (b) School website (skip next question)

11. What accounted for this decision?.....

.....

.....

12. During the admissions process how did the admissions office contact you if they did? (as many as applicable)

- (a)SMS (b) Email (c) Cell phone (d) Telephone (e)Snail mail (post office)
 (f) Other:.....

Note for successful applicants and continuing students: your responses to the following questions **should** be as applicable to the period of your application as possible.

13. What means of communication would you prefer the admissions office use to contact you? (Order from 1-5, 5 being the highest preference)

- (a)SMS (b) Email (c) Cell phone (d) Telephone (e) Snail mail (post office) (f) Other.....

14. Would you accept an electronic receipt in replacement of the paper receipt acknowledgement for payment of admissions forms and fees?

15. If yes what formats would you prefer? (Order from 1-5, 5 being the highest preference)

- (a)SMS (b) Email (c) Cell phone (d) Telephone (e) Other.....

16. How do you prefer admission letter and package to be sent to you? (Order from 1-5, 5 being the highest preference)

- (a) Email (b) Snail mail (post office) (c) Courier service (f) Other.....



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process have been to you if it was electronic (you were to fill the

forms online)

- (a) Very convenient
- (b) Not much of a difference
- (c) inconvenient

18. Reason.....

19. If you had answered **A** in **17**, how would you want the online system to be?

- (a) Allow me to download the forms, fill electronically and then email it back.
- (b) Allow me to fill online at once and submit
- (c) Allow me to fill online but save and update periodically

20. What recommendations do you have for making the admissions process better?

.....

.....

.....

.....

.....

.....

Thank you for your time.

ASHESI ADMISSIONS

The Ashesi Admissions Office is the department of the Ashesi University that is in charge of recruitment of students. The following sections reports on the objectives and structure of the department, the admission processes, internal and external communication/interactions. The research also co

4.2.2.1 Organizational Objectives and structure

The recruitment process involves marketing of the school and the programs it offers; and actual applicant selection, interview and testing and then subsequent admission of selected students. The department is headed by the Registrar/Admissions Director. There are two admissions directors and a front desk assistant. Two work study assistants are also available part time to help in certain aspects of the admissions process.

4.2.2.2 The admissions process

There are three rounds of admissions. The first round starts from Jan The year-long admissions process starts with marketing campaign which starts in October-November. The campaign involves school visits around the country where talks are held to inform prospective students about Ashesi.

Step 1: Application forms are prepared.

Step 2: Applications are made available online and front desks of the school

Applicants access the forms online, print and fill then submit and pay the application fee at the school. Or they come to the pick up a form and pay the application fee; after which they fill and return the forms to the school's front desk. For assessment, applicants are required to submit valid proof (signed and stamped) of either:

- Secondary School Certificate Examination (SSCE) scores;
- A-Level examination scores;
- International Baccalaureate (IB) examination scores; or
- Scholastic Assessment Test (SAT) scores
- TOEFL examination scores (for international students for whom English is a second language must demonstrate English language proficiency by submitting.

Step 4: The office starts receiving applications which are filed

Step 5: The applications are reviewed and shortlisted

Step 6: Successful applicants are then invited for interviews or to take Math and or English tests depending on the grades.

admissions decision committee sits to decide on each

Step 8: Applicants receive notifications either by phone call to pick up their admission package when they are successful or by snail mail if they are not successful. Then the next round of applications are received and assessed until the third round is completed. When all the rounds are completed the f

Communication

Internal communications is done using emails, or in person.

Interactions with other departments

The Admissions department interacts with the IT department, accounts department, office of the Dean of students and community affairs, office of the president, assistant registrar's office. It also interacts with individuals in the Ashesi community who conduct recruitment interviews on behalf of the department.

Communications with these departments are done using emails. The department also interacts with alumni, business executives, who interviews applicant on behalf of the department.

Interactions with external entities

The admissions office interacts with various external entities for different purposes. Some of these entities are more

Survey on applicants' and continuing posture toward paperless electronic admission process

Profile of respondents

52 percent of the respondents were male and the rest female. 66.7% of respondents were new applicants. 60% of respondents live in the greater Accra region. All the respondents were Ghanaians and had schooled in Ghana except for one respondent who had schooled in Nigeria.

Selected Statistics

According to the survey, all the respondents had one form of access to the internet as is shown in Fig.x. Only 5% of respondents said their mobile phones are the main source of internet. Whereas 30% said that the best source of internet for them was home. The best source of internet for most respondents was internet café (60%).

source of internet

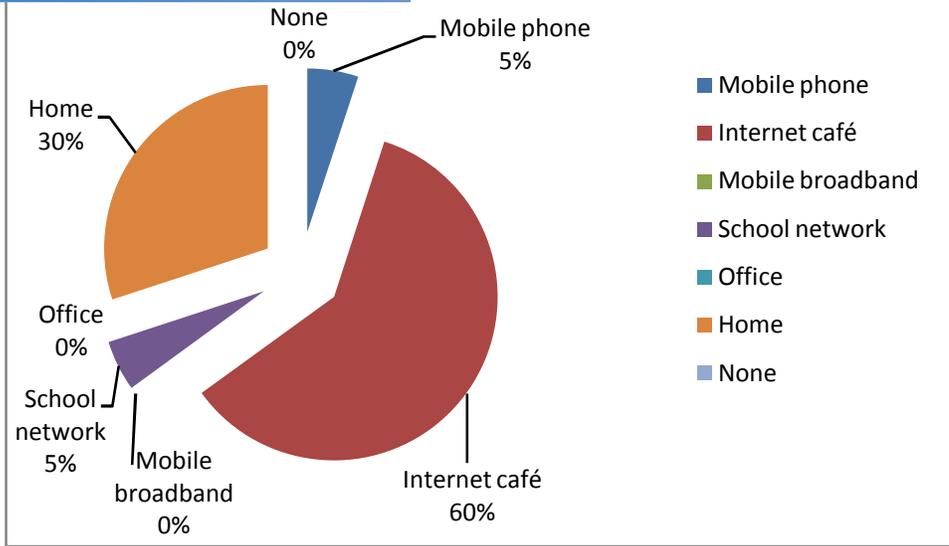


Figure 7: Respondents best source of internet

Source of application forms

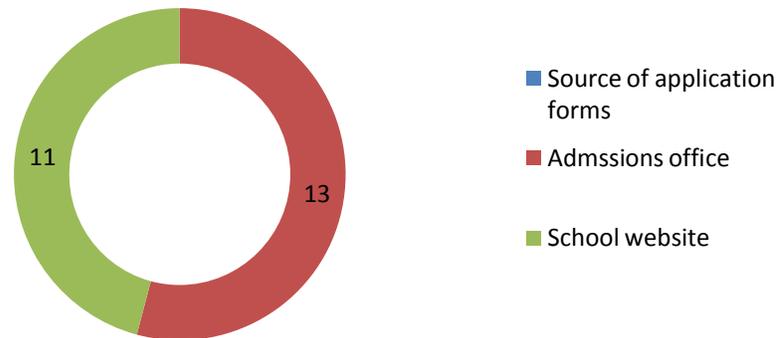


Figure 8: Respondents' mode of acquisition of application forms

Respondents' Familiarity/Use of IT tools(weighted)

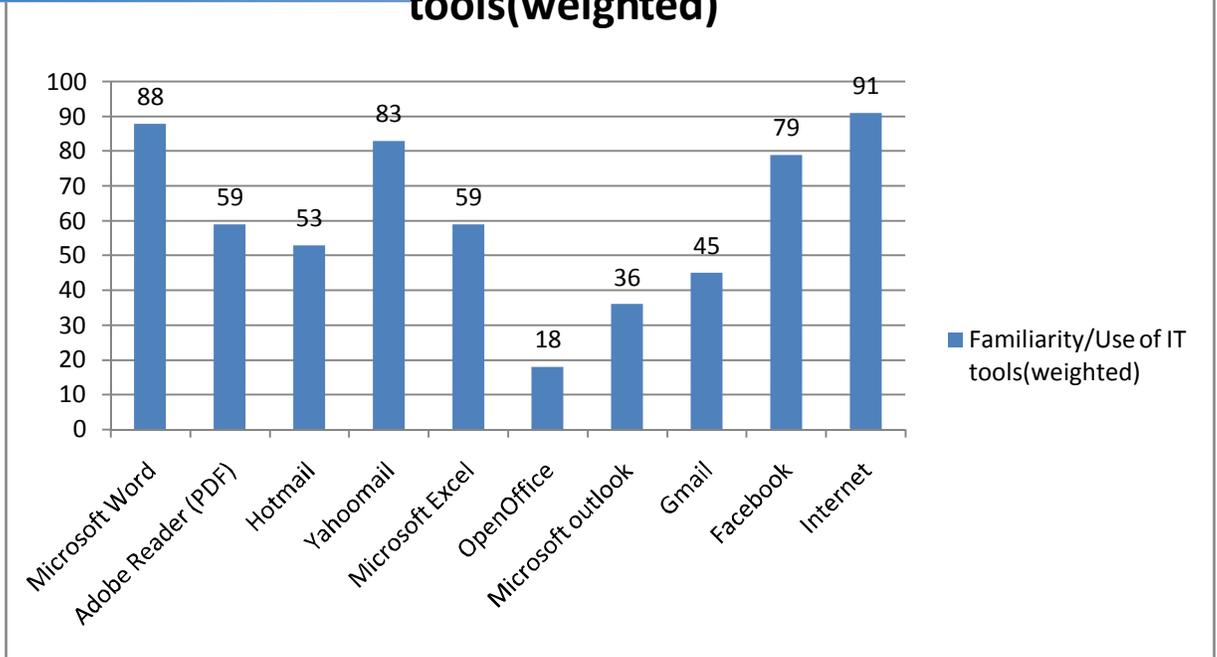


Figure 9: Respondents' Familiarity/Use of IT tools(weighted)

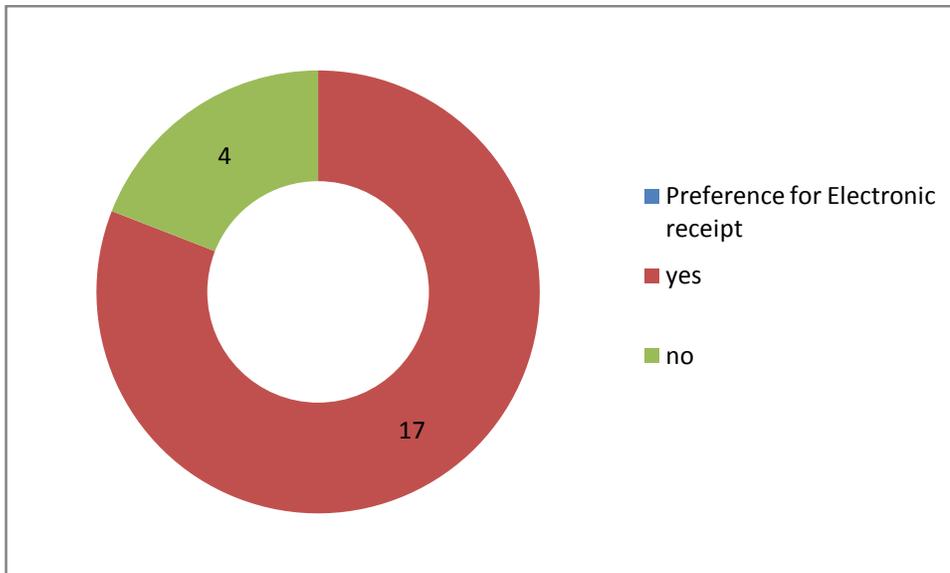


Figure 10: Respondents preferring electronic receipts.

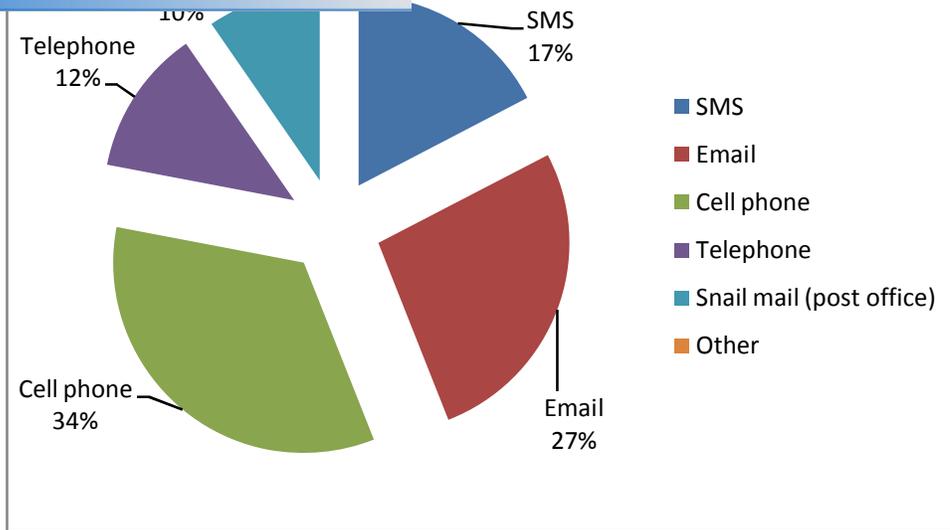


Figure 11:

4.2.3 Genkey Africa

Genkey, a member of the Meltwater group of companies, is a multinational software development firm specialized in biocryptic identification management systems. There is an office in the USA, UK, Ghana, The Netherlands, Norway, Ghana and India. The Ghana office, which forms the unit of analysis in this case study, is made up of 6 permanent employees: a product/project manager, 2 lead developers, a developer, Quality Assurance manager and the Software Architect/Technical director and a product/project manager. There are two temporary support staff for the Quality Assurance department. Their proprietary product BIDs is mostly developed by the Ghana office. The company’s products are deployed in different environments for clients across the globe. These clients also receive support from the firm as and when needed. Members of staff, once in a while, travel to other



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of the mother company and its country offices also visit frequently. They also prospect for clients by following up on leads in their home countries where they can get to demo their software products.

The main activity at the Genkey Africa office is software development.

Development Procedure

Steps:

Requirements development

Collaboration and Internal Communication

Collaboration and Internal communications are done using Skype, word of mouth, company email, phone, internal resource sharing and collaboration wiki(confluence), Meeting +White board

all workers are informally required to sign on to the Skype network where most of communication is held between more than two people. Documents are shared this way as well. Feedback is immediate depending on network speed and the amount of traffic on the network.

4.2.4 White Oceans

White Oceans is pharmaceutical products wholesaler. The company is a startup that has been able to penetrate the pharmaceuticals market by offering quality drugs at low prices and with good terms of payment. The

There are four permanent employees and an accountant, internal auditor hired on contract.

The main activities of the firm are centered on sales and purchases.

Sales

The sales person visits a number of clients and takes orders from them by recording in their orders book. The return to the office and the orders are checked against the inventory to see if the order can be served. If the orders this is so, the order is prepared and an invoice is prepared. The invoice is prepared with a template designed in Microsoft word. The two copies of the invoice are printed out; one is filed and the other added to the order for delivery. In an order, the terms of payment are set mostly for a 30 day period.

On a daily basis, the manager goes through the file of outstanding debts. A client may have several outstanding debts at a period and payments may be made in installments. Therefore the standing balance of a client needs to be known at every point in time while tracking when each payment is due. This is done manually.

Once in a while clients return goods they have purchased and as such their account balances and inventory need to reflect this. Sometimes when the

deliveries, clients make adjustments to some of the order items or redraw them altogether.

At the end of the day the sales people report back to the office with all the orders they have received. There are different invoice books for Monday, Wednesday and Thursday. The sales administrator collates the day's transactions in the excel sheet for each sales agent per month.

Purchases

For purchases, orders may be made to suppliers or suppliers' agents call at the office with a list of available drugs from which orders can be made.

The accountant takes these records in the excel sheet and enters them individually into his pastel accounting application. He generates reports periodically (monthly) for management.

4.3 Cross-Case Report

Cross analysis of the cases

	Ashesi Admissions	Genkey Africa	White Oceans
Objective	Student recruitments and marketing of the school	To serve as the Software development arm of Genkey Corp	Wholesale of Pharmaceutical products
Structure	4 permanent employees with two temporary assistants	6 permanent employees with two temporary supporting staff	4 permanent employees with a accountant/auditor hired on contract
IT inventory	5 demo laptops, Network, broadband internet, Shared network folder (s-drive)	4 desktop computers, broadband connection with backups	2 dual core laptops and a P4 desktop
IS inventory	Admissions records	Bug tracking application	Excel workbooks, Pastel

		(Bugzilla),software Testing management platform (Testlink)	accounting software (used by the accountant)
Collaboration/ Communication tools	Corporate mailserver	Internal wiki(confluence), skype, corporate mailserver	
Solutions needed	Electronic admissions system with customer relations management capabilities		Receivables,purchases, inventory and invoicing management application package (mini Enterprise resource planning system)

Issues common to case organizations

Double entry of data

Availability and usage of IT resources

Storage of digital content on the edge

Cost of implementation of paperless solutions

Appendix 4: ERM product evaluations

Chart of features

	Prosigner	Microsoft IRM	Oracle IRM
Company	Frontier Technologies	Microsoft	Oracle
License	Proprietary	Proprietary	Proprietary
Architecture	standalone		Oracle IRM Server,Oracle IRM Desktop, Oracle IRM Management Console, Oracle IRM Standard Rights Model
Supported Platforms	Microsoft		Server and standard Rights

		ms only	model run on Microsoft Windows Server 2003 and the latter requires an IIS 6.0 server, Microsoft Windows 2000, Windows XP or Windows Vista for IRM desktop etc.
Database,Dependencies		MSSQL	Oracle Database, Microsoft SQL or MySQL
integration	Microsoft Office products, PDF	Microsoft Office products, PDF	Microsoft Office products, PDF SOAP/WSDL available for configuring integration into
Id management		Active directory	LDAP, Oracle ID management, possibility of OpenSSL in the pipeline
Offline working		Possible through Rights caching	Possible through Rights caching but revocation possible in this situation
Audit trail/log tracking			
Plus/differentiator	Digital Sign and seal feature	Digital Sign and seal feature	Provides online working and revocability. Competitors need to cache rights on desktops in order to allow offline working mode
Connectivity requirements	Network not a requirement	Network required	Network required
Automation of the protection process			Partly possible through context and profile management
Ease of integration into third party enterprise systems (e.g. content management systems, collaboration portals, etc.)		Possible	Possible

ERM applicable scenarios

Ashesi



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Admissions test results

Data on applicants

Genkey Africa

Software program algorithms

Software code

Staff remuneration records

White Oceans

Accounting records

Inventory

Method

The process is made up of a preparation stage and three phases as is shown below.

Phase 1 Build Asset-Based Threat Profiles (organizational view)

Process 1 Identify Senior Management Knowledge

Process 2 Identify Operational Area Management Knowledge

Process 3 Identify Staff Knowledge

Process 4 Create Threat Profile

Phase 2 Identify Infrastructure (technological view)

Process 5 Identify Key Components

Process 6 Evaluate Selected Components

Phase 3 Develop Security Strategy and Plans

Process 7 Conduct Risk Analysis

Process 8 (A & B) Develop Protection Strategy

octave[®] Process

