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KNOWLEDGE MANAGEMENT SYSTEMS FOR THE KENYA POLICE SERVICE

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ABSTRACT

Police forces around the world engage in a variety of activities. Many of these activities, such as roadblocks, arrests, and increased police presence in problem areas, are reactive, but there are also many proactive measures involved in police work. Both reactive and proactive measures involve a large amount of information, and Kenya police officers need to understand vast amounts of knowledge to carry out their normal duties. This amount of information means that Kenya police officers also have to be proficient knowledge workers. Knowledge Management Systems in Law Enforcement: Technologies and Techniques present the latest research and trends in using knowledge management to aid police activities. The principles and practices presented in this report will help law enforcement professionals find ways to quickly bring vast amounts of knowledge to bear in law enforcement, but will also help prepare the next generation of police officers for a more knowledge-intensive field.

CHAPTER ONE: INTRODUCTION

1.0   Background Information

Knowledge management systems refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the KM process.

Knowledge is increasingly being recognized as the new strategic essential of various Police Service, so there is a need for a Police Service like the Kenya Police to have a repository that can be easily managed, with the capability to seamlessly share all the knowledge acquired through the course of their duties, such as any kind of criminal related cases and investigations. The Police pride themselves on being proactive with every citizen of the Republic of Kenya, however recently due to increases in population, crime and technological changes, the use of ICT is becomingly increasingly important to help them in their day to day operations. As such, knowledge management system is proposed as a solution during an interview with long-serving officers (more than 20 years) for them to gain an insight into how they could benefit from it, and the types of knowledge that could be managed, in order to develop a platform to support some of their ICT needs.

Moreover, historically solving crimes has been the prerogative of the criminal justice and law enforcement specialists. With the increasing use of the computerized systems to track crimes, computer data analysts have started helping the law enforcement officers and detectives to speed up the process of solving crimes. We will take an interdisciplinary approach to **computer science** and criminal justice to develop a **knowledge management support system** that can help solve crimes faster. More specifically, we will use clustering based models to help in identification of crime patterns.

It is no longer a controversy that we live in a globalised world characterized by fast information transfer across large geographic areas by means of the Internet. Nowadays, Police no longer compete solely on the basis of staff and strength, rather knowledge is the new competitive advantage in service. If the Knowledge Management (KM) is put in good practices it will improve Police effectiveness. There is a popular saying that knowledge is power. Based on this assertion, it can be said that the management of knowledge is the key to power.

Knowledge Management as a discipline has been a focal point of discussion over the past decades. In recent years, the importance of KM has been widely recognized as the foundations of industrialized economies shifted from natural resources to intellectual assets. Since 1995 there has been an explosion in the literature surrounding the developing concept of KM. Today, there is hardly a conference or published journal without seeing literature referring to the

concept, KM. The importance of KM as a critical tool in the organisation and the society can therefore not be overemphasised. As Desouza (2011) put it, KM has become a trendy buzzword. Much of the interest in KM came from the realization that organisations compete on their knowledge management assets. Even non-competitive organisations (e.g. governmental institutions and nonprofits organisations) succeed or fail based on their ability to leverage their knowledge management assets. It is stated by Teng and Song (2011) that the importance of KM is no longer restricted to knowledge intensive firms in the high-tech industries but to all sectors of the economy. Zack (2003) further says that even companies in the traditional industries, such as cement, can benefit greatly from KM. In essence, KM is beneficial to all sectors, be it educational, banking, telecommunications, production/manufacturing, and even the public sectors such as Police Service.

The management of knowledge has generated considerable interest in business and management circles due to its capability to deliver to organisations, strategic results relating to profitability, competitiveness and capacity enhancement (Chua, 2009; Jeon, Kim and Koh 2011). The management of knowledge is promoted as an important and necessary factor for organisational survival and maintenance of competitive strength. KM is identified as a framework for designing an organisation's strategy, structures, and processes so that the organisation can use what it knows to learn and to create economic and social value for its customers and community. Organisations need a good capacity to retain, develop, organise, and utilise their employees' capabilities in order to remain at the forefront and have an edge over competitors. Knowledge and the management of knowledge are regarded as important features for organisational survival; while the key to understanding the successes and failures of KM within organisations is the identification of resources that allow organisations to recognize, create, transform and distribute knowledge. Organisations that effectively manage and transfer their knowledge are more innovative and perform better (Riege, 2007).

Propose development of a knowledge management support system that profiles offenders based on the crimes committed will be characterized by five primary activities: problem finding and acquisition, problem solving, choice of solution to problem, execution of solution, and control and evaluation.

Problem finding and acquisition involves working with the complainant to determine the exact nature of the problem or need. It involves deciding on the overall plan of approaching the problem.

Problem solving is the actual generation of ideas and action (or investigation) plans.

Choice of solution represents the decision of choosing between alternatives. While it may be seen as the least important primary activity of operation in terms of time and effort, it is also the most important in terms of customer value.

Execution of solution represents communicating, organizing, and implementing the decision, or performing the operation.

Control and evaluation activities involve monitoring and measurement of how well the solution solved the original problem or met the original need. This may feed back into the first activity, problem finding and acquisition, for two reasons. First, if the proposed solution is inadequate or did not work, it feeds back into learning why it was inadequate, and begins the problem-solving phase anew. Second, if the problem solution was successful, the department might enlarge the scope of the problem-solving process to solve a bigger problem related to or dependent upon the first problem being solved.

The main focus shall be crimes of a serial nature. The user shall input the detailed investigations/recordings and the system recommends /outputs the judgments based on applicable Kenyan laws. It shall act as assistant to prosecutors and judges. It shall also increase knowledge about crime specifically of a serial nature. The system undertakes to assign scores to the nature of crimes, hence when an offender's data is input, it profiles based on the degree of risk attributed to the offender.

1.1   Problem Statement

Law enforcement agencies collect data and physical evidence when investigating a crime scene and mostly they are the prosecutor in our judicial institution and if they are not they relay the same to government prosecutors. At the moment, there is no systematic and detailed method for collecting the crime scene data. Consequently, the amount and which data the law enforcement agencies collect differ between crime scenes and investigations.

Another challenge for police service is how to surface information, make it into knowledge, and bring it to bear on the problems faced by police officers in a timely and effective manner.

These challenges and more in police service is the guiding factor that is helping to come up with knowledge management system.

Data collect support is not adequate enough, we also lack adequate of information communication technology support for collection and management of the data by the participating stakeholders in our area of duty.

1.2   Objectives

The research has the following objectives:-
1. To assess the accuracy of the different details in an offender description, and the overall reliability of the witness statements.
2. The generation of police knowledge, and the production of evidence.
3. To identify practices and experience-based knowledge of investigators on serial crime.
4. To develop a knowledge management support system

1.3 Scope of the Study

This study will focus on serial crime management within the Kenyan law enforcement in the capital city(Nairobi, Kenya) to examine and provide a potential solution on how to tackle investigation that are accurate and precise.

1.4 Significance of the Study

Why the need to manage knowledge in Police service? The important factors that are driving the need for knowledge management are organisational survival, competitive differentiation, effects of globalization in the information and communication industries and an aging workforce.

Another important factor that is driving the need for Knowledge management is the realization that an organisation must manage its knowledge if it is to survive in today's dynamic and competitive marketplace. Survival concerns are not limited to for-profit firms as nonprofits and even public agencies have all realized the value of KM. Desouza (2011)

CHAPTER TWO: LITERATURE REVIEW

There is already some of the work related to knowledge management support systems that are inspired by the need to improve criminal investigations, preservation of data and finally, the sentence meted on the offenders. This section seeks to review related literature; approaches and systems previously used and elaborate the possible paths this research endeavours to take. Starting with the general introduction, review of the knowledge management support systems, gap analysis and the contribution this work seeks to introduce and finally, chapter summary.

1.5 General Introduction

Serial crimes can be defined as multiple crime incidents committed by the same offender or group of offenders(Brown, 2003). To criminals evading being captured is one of the greatest intentions during the period of committing a crime. This thereby includes tampering with crime scenes to enable law enforcers to collect as limited information or data trail as possible. Law enforcement collects data and physical evidence when investigating a crime scene. However, no systematic and detailed method for collecting the crime scene information currently exists in Kenya. Thus, the amount of information and which information law enforcement collects differs between crime scenes investigations. Differences can exist not just between different agencies but also between crime scenes that the same law enforcement officers explore(Anton, 2014). Some studies, also link a large segment of crimes to a minority offenders. These studies suggest that behavioural case linkage can be used to assist the investigation, detection and prosecution of prolific and versatile serial offenders(M et al., 2012).

Furthermore, with the growth and expansion of several cities around the globe, public safety issues also increase, thereby presenting an urgent need to come up with counter solutions to the ever-evolving problem of crime.

Over the years, development of knowledge management systems to help alleviate this phenomenon has been of utmost importance to researchers. Several researchers have therefore focused their attention on the use of emerging technologies to ensure the efficient and effective development of knowledge management support systems.

1.6 Knowledge Management

The use of knowledge management has helped Police in coordinating their employees, processes and the structure of the Police. Several Polices' across the world are now implementing knowledge management system due to its benefits; the implementation of this system is also required by law enforcement agencies such as the Police service, considering that the officers, carrying out both proactive and responsive measures, need to also to be aware

of the latest information (e.g. crime patterns), and also comparing information about the discovery and prevention of crime. Knowledge is an important asset of a Police; it is also said that knowledge is power, however, hoarding of knowledge often leads to negative consequences such as empire building, the reinvention of the wheel, feelings of isolation, and resistance to ideas from outside a Police. Most individuals tend to hoard their knowledge because it makes them valuable to the Police. Nevertheless, for a Police to grow knowledge needs to be passed on to one another. Research has shown that Police that pass knowledge to one another have a competitive edge and their growth is usually rapid; in other words, the ability to share knowledge is at the heart of knowledge management. Knowledge can be grouped into two types which are tacit knowledge and the explicit knowledge.

i). **Tacit knowledge** can be described as a knowledge that dwells in the head of the person that has it.

ii). **Explicit knowledge** can be described as a type of knowledge that can be stored in systems, services, products and facilities.

Over the years productivity of workers with knowledge needs a different approach in carrying out activities, and technology has played a major role in enabling communication, collaboration and accessing high volume of Information.Tacit and explicit knowledge can be achieved through interaction or innovations; both types of knowledge can be used in the day to day activities of the Police Service and it will help in achieving the objectives of the Police. Police Service normally have a challenge with tacit knowledge - the first issue is trying to identify the tacit knowledge that will be useful to the Police Service.

1.7 The Use of Knowledge in the Police Service

The officers normally come in contact with a lot of Information, when carrying out their day to day activities. So this requires that the officers need to be proficient knowledge workers, as this will help the officers in accessing, assimilating and using the knowledge effectively whilst discharging their duties. Currently, knowledge and information are acquired in the service through various means; the service uses explicit knowledge in making decisions, actions, and guidance because they could capture knowledge in various document formats such as standard operating procedures. Documented or explicit knowledge is being used in the service as their daily routine in recording the official documents. These documents Include records of the criminal, trends of crime, criminal threats and any other information related to incidents or crises. On the other hand, the service also makes use of tacit knowledge, which includes the skill of the officers, experience, and competence. Some concerns have been raised as with regards to the use of tacit knowledge in the service in the area of sharing and creating knowledge. The ability and willingness of officers to create and share knowledge among

themselves is a major Issue. Thus it is required that the officers recognize the essence of knowledge sharing to boost efficiency. Law enforcement agencies like the Police service need knowledge as an intensive affair; research shows that the use of technologies in the service has helped the service to acquire the necessary information at the right time that has helped in analyzing evidence. The use of technologies has also helped in terms of organizing and distributing important information among the officers especially where they are investigating crime related issues. Knowledge management support system can be used in service processes which Include maintenance and allocating the knowledge of the officers correctly by enabling the collaboration between them; in the customer care and welfare desk, the use of service processes will be used in different units. Moreover, in the expert Police where services are being provided in a client and operational process, the way experts will coordinate the knowledge is crucial to the delivery of the service chains. In the law enforcement sector, knowledge management can be used in the service in the area of investigations, apprehending criminals, and by also putting all the evidence that has been collated from Investigations together (Gottschalk, 2006). Investigations can be divided into two categories - preliminary investigations and the follow-up investigations. The Police service carries out follow-up Investigations by using officers that have been trained in the field to investigate these types of cases; the preliminary investigations are done by the officers during a patrol. Knowledge management support systems will enable knowledge sharing to occur between these two categories of activity which can enable decisions to be made more efficiently and effectively. There are some short-comings however that have been raised through the use of technology; some employees have raised some concerns that too much structure with the help of technology will make them add little autonomy in their work. The challenge, therefore, is being able to demonstrate the benefits that technology can bring and the advantages of maintaining a knowledge management system.

1.8 Knowledge Management Systems and Technology in the Kenya Police Service

Knowledge management can be described as a means where Police identify, acquire and maintain knowledge that will be useful to the government and Police can also yield benefits from the acquired knowledge (Uriarte, 2008).Carrying out investigations is the major part of the activity, considering that they are concerned with the apprehension of suspects. Gathering of data leading to the arrest of the suspects are used often for the purpose of attaining convictions; most times investigations are usually carried out through the help of trained officers with the potential of some Investigative techniques. It was identified that knowledge management can be used in four stages of Investigations such as officer to technology (Stage 1) officer to officer (Stage 2) officer to information (Stage 3) and officer to the application (Stage 4).These stages aid in the understanding of the requirements of the system. Stage 1 deal with

the way information technology is being used by workers with knowledge, including using email, excel spreadsheets, and word processing. Using these basic tools, the service can keep records of crimes or any form of activities that they need to report at any point in time. Some of the issues however with these types of methods are the maintenance and compatibility across different software packages and operating systems.

Stage 2 refers to the ability for internal communications to be in place for the exchange of knowledge. This often takes the form of Intranet networked systems. Some of the challenges of deploying such a system include facilitating a broadband connection to the wider Internet, whilst maintaining an adequate level of security. Stage 2 also requires the use of communication technology for what is tacit to tacit knowledge transfer, which can be difficult to formalize and be made explicit for what is an essentially dynamic and unlimited amount of information about anything and everything.

The sharing of information during this stage enables superior teamwork. Stage 3 encompasses Information which has been documented in a searchable database format. The use of a database management system will play a very important role in the service as it can also enable the officers to work efficiently in their services like in crime-related Issues, sexual crimes, assaulter, and any crime. COPLINK can be used as a very good case study of this; it was used by the department in Tucson for capturing crime-related cases. Stage 4 finally deals with the aspect of application use. An Important application used by the officers in this continuum is data mining. Due to the massive size of datasets, the computerized approach is highly essential to the workers with knowledge as it helps them to understand the association between data elements (Gottschalk, 2006). Expert systems can be used to aid in this regard because it will enable the staffs that require the knowledge to have access to the knowledge that the experts have provided. Otherwise, decision support systems can aid in providing several options as part of a decision-making process. These types of systems will be discussed in the following sections.

1.8.1 Expert Systems in Applications

An expert system can be used to make choices that would normally be performed by a domain expert. They have a wide range of collective knowledge, which could be classified as an artificial intelligence that could be saved in a computer containing knowledge that would be useful to the officers. The use of an expert system in the service would help in resolving crime related cases, and considering that it has an artificial Intelligence potential, with the help of an expert system officers across the world can also be able to have access to any crime related databases from any location. The expert system can be used to support investigations, especially since the increase of crime-related data is becoming overwhelming sometimes leading to frustration when carrying out investigations. The use of expert systems in the

service has helped in retrieving information when carrying out investigations, as seen In the case of the AICAMS a system which was built to Identify suspects (Gottschalk, 2006). The AICAMS system was built with a facial recognition capability, which gives an ability to accumulate a varying number of conceivable facial composites by changing the size of the components - furthermore, the AICAMS also has a mapping Interface called geo-mapping. Expert Systems can be categorized further into two types of system - Rule and Case-based.

Rule-Based:

Some computer programs utilize an orthodox approach to problem-solving by making use of structured algorithms and data structures in discovering solutions, while conventional rule-based expert systems utilize human intelligence; knowledge exhibited by experts are most times based on rules or data that is stored in the computer. Thus for problems to be resolved, rules and data are required by the experts. For example, the type of expert system used to provide legal advice is known, as a rule-based legal expert system, this type of rule-based expert system was used to fight crime against women in the India judicial system.

Case-Based:

Case-based reasoning frameworks are a method of demonstrating knowledge application through explicit historic cases in policing. This methodology is not the same as the rule-based approach in light of the fact that the knowledge is not ordered and deciphered by an expert; rather, the experiences that formed the experts' knowledge are specifically utilized as a part of making decisions. Notwithstanding, the 'Issue with the case-based reasoning is learning, in light 'of the fact that with the insignificant expansion of new cases to an Information Repository. Officers are continually searching for comparative cases to figure out how they were taken care of in the past, and this approach makes case-based reasoning systems an appealing application in policing. The use of this system in the service has been found very helpful. However before the fourth stage (officer to application) can be productive, It has to be built upon a grounded knowledge of the service. Regardless, to resolve issues using this system a substantial level and size of knowledge repository must be provided to support the related problems.

1.8.2 Decision support systems

Decision support systems can also be described as a predictive patrolling; it is used in order to reduce any form of criminal acts, and this system was created by the Spanish national corps. Since instinct is a major part of their duty, the use of knowledge by the superintendent in the law enforcement sector has been proven to be a proficient tool in fighting crime. Decision support systems are used by the officers in making decisions, and particularly in the case of an emergency, having those decisions available at the right time could help in resolving issues immediately. However these decisions may sometimes have a negative impact, therefore,

making a wrong decision may sometimes lead to a deadly outcome, however, considering that decision-making is a sensitive and time-consuming process and the impact it could have on the quality of their response to services, it is sometimes required for the officers to utilize a decision support system. The use of this system by the Indian, for example, has been in existence since 1986, where they implemented this system In order to help in investigations by providing the officers with extensive details on crime and criminal data within the state. The San Francisco Departmental implemented decision support systems in order to deploy officers for patrol - this system is used to forecasts hourly needs, and helps In scheduling officers to take full advantage of their coverage and also helps to satisfy human needs. The processes help in the evaluation plan and sometimes suggest an alternative, the system has the ability to evaluate options for deployment strategy.

1.9   Related/Similar System in Police Force in other part of the world

Examples includes :- HOLMES system in the UK, where the police officer can enter information on the location of incident, date and time of incident, victim(s), senior investigating officer, and date enquiry commenced (Home Office, 2005a). The police officer can use the system as an end-user tool at various phases of the investigation. At each phase, the officer uses the system to write a report on the status of the investigation. As an end-user tool, the HOLMES system provides support for entry of different information elements and work on electronic information.

Another interesting example is the COPLINK system in the U.S., where the user accesses the system through a Web browser (Chen et al., 2003). In addition to end-user tools for information entry and retrieval, statistical techniques such as co-occurrence analysis and clustering functions are available to weight relationships between all possible pairs of concept.

A final example is the Basic Solutions toolbox available to police officers in Norway. Basic Solutions includes not only word processing, spreadsheet, and presentation graphics, but also tools to work on a case, to produce standard documents, and to write individual reports with desired layouts.

COPLINK, described by Chen et al. (2002; Chen, Zheng, Atabakhsh, Wyzga, & Schroeder, 2003), the second is geocomputation, described by Ashby and Longley (2005), the third is SPIKE, described by ComputerWeekly (2002), and the fourth and final example is closed-circuit television, described by Surette (2005).

COPLINK Connect is an application for information and knowledge sharing in law enforcement. The system uses a three-tiered architecture. The user accesses the system through a Web browser. The middle tier connects the user interface and the backend databases, and implements the work logic.

COPLINK Detect is targeted for detectives and crime analysts. The system shares the same incident record information as the Connect module, and utilizes the database indexes it generates. However, the Detect system has a completely redesigned user interface, and employs a new set of intelligence analysis tools to meet its users' needs.

1.10 Overall architecture of the study

1.10.1 Architecture for Knowledge Management Process

Proposed Knowledge Management Model

The proposed and development of an architecture and coherent model of KM depends mostly on a thorough investigation of various models presented in the investigation process.The main emphasis was placed upon the concept of goal definition review, validation, and knowledge training processes. The model is represented in Figure 1.

Need for Knowledge Management

In this conceptual framework, the first element is the need for KM which addresses the necessity for the Police to implement KM processes. The department must explicitly define the importance of KM to their stakeholders to contribute in identifying all knowledge associated with department objectives.

Goal Definition Review

The goal definition states the department goals, clearly defines the constraints and explicit goals and analyzes the goals of the stakeholders in order to clearly output the objectives, expectation and constraints. Additionally, during the goal definition review, the departmental mission and vision are defined.

The formulation of knowledge goals is the starting point of KM on an individual as well as on a department level. The process of knowledge evaluation can be seen as the end of the KM processes. There is a feedback look from assessment to goals in that the results of the assessment may lead to changes in the knowledge goals. A wide range of possible tasks and processes are relevant between goal setting and assessment. These can be grouped into four kinds of processes that are closely connected and interactive: knowledge representation, knowledge communication, use of knowledge, and development of knowledge. These categories describe the KM processes on an individual as well as on a departmental level.
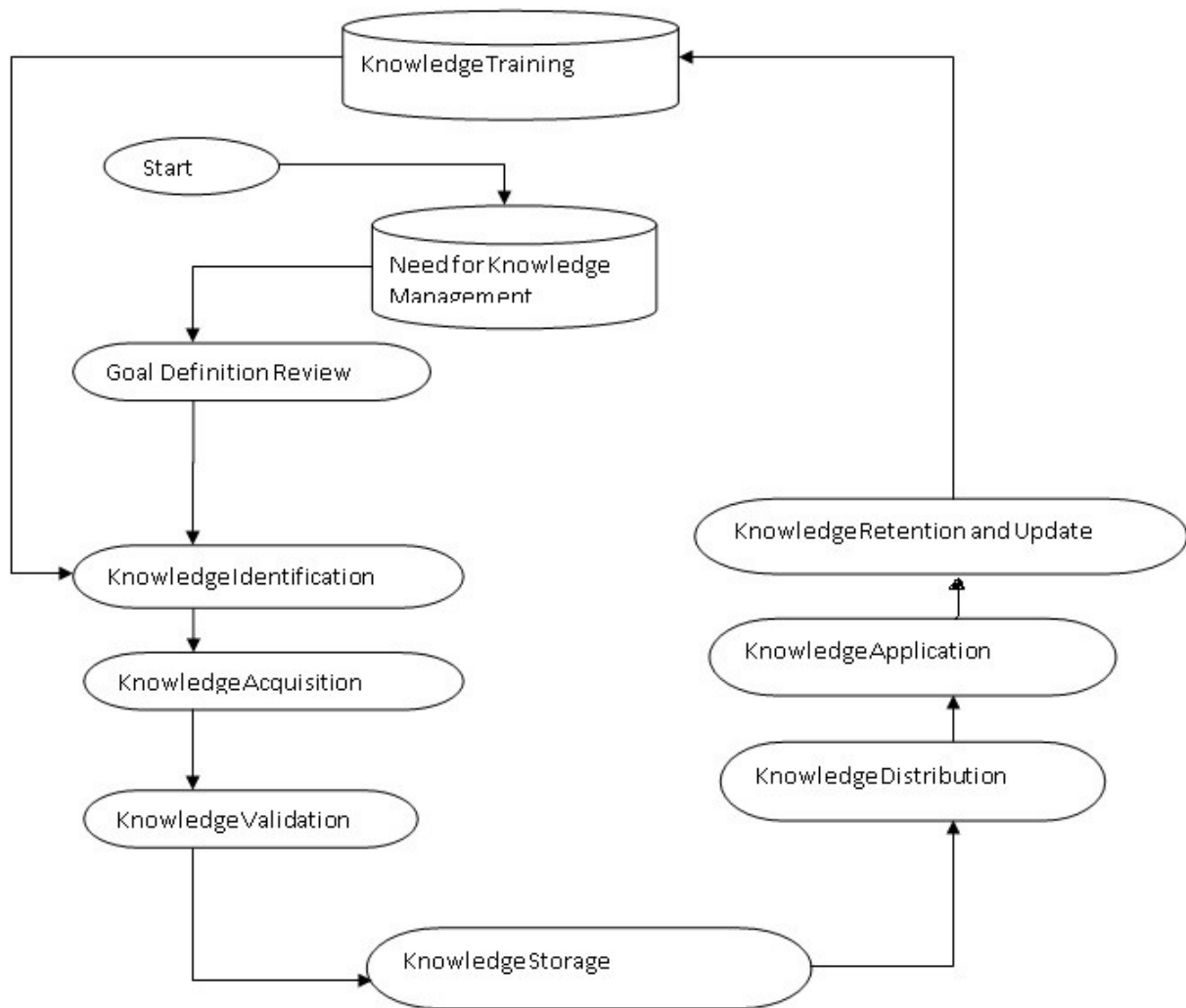
Figure 1: Knowledge management development processes.

Knowledge Identification

The formulation and identification of knowledge goals is necessary to provide the initial direction for the knowledge management activities. Carefully planned KM processes are the basis of knowledge goals on an individual as well as on departmental level.

Knowledge identification starts with the realization or discovery that a particular knowledge is of importance or of relative value to the department which if utilized or deployed has an added value. This knowledge can exist in various formats or obtained from many sources like documents, reports, books, media, artefacts and internet or generated through the exchange of ideas. All these examples are based on two types of knowledge; tacit and explicit knowledge. Tacit knowledge is stored deeply in the minds of people based on their experience and know-how. Explicit knowledge is codified in different forms and can be accessed (Nonaka & Konno, 1998) through reading, research and media. Also, Abdullah et al. (2005) stated that knowledge needs to determine sources and types of knowledge.

Knowledge Acquisition

Acquisition of knowledge where a deliberate effort is extended to the collection of data, research into various sources or even knowledge generation via means of exchange of ideas, questionnaire or even commissioning research. It is also a proactive stage where search could go into identifying what knowledge exists in the Police service, who owns it, and who are the thought leaders, or gather and importing knowledge from outside or learning from existing knowledge (Alryalat & Alhawarii, 2008).

It describes the process of knowledge identification, preparation, documentation and actualization. The main goal of this category is to transform knowledge into a format which enhances the distribution and exchange of knowledge.

It is also a process where the effort calls for converting all tacit knowledge into explicit knowledge which can be stored or shared as per the requirements of later stages.

Knowledge Validation

On both an individual as well as on a Police's service level it is necessary for evaluation to estimate if the knowledge goals have been reached within this context. This requires an effort to validate the knowledge sources and the information obtained. Any incorrect information could spread between people based on certain assumptions or sources, which become fact and reality.

Knowledge Storage

As previously indicated, there are three external factors affecting KM. These are people, resources and technology. The latter has now clearly become the most important factor in view of the enormous technological advances allowing better Police, easier storage or capturing of information and with the right methodology, easier access and distribution. This clearly needs resources and people to finance this important process and at the same time be involved in all kinds of activities such as coding, categorizing, classifying, designing work-flow and so on. All of which will serve towards ensuring effective later recovery, and capturing it (Alavi & Leidner, 2001). In other words, this is an infrastructural process that will underpin all the later stages and therefore will require some conceptual and long-term thinking to ensure further accumulation and renewal of knowledge.

Knowledge Distribution

Processes are combined to ensure the distribution of information and knowledge, the mediation of knowledge, knowledge sharing, and the co-construction of knowledge, as well as knowledge cooperation.

By knowledge distribution we mean the existence of several systems, procedures and protocols that will ensure that all stored knowledge is shared, distributed, broadcasted or made accessible to all those who need knowledge or must know of its existence through any number of means from regular reports or updates to bulletins and publications down to reminders and e-mails. The nature of the knowledge in question will ultimately determine the best means of its distribution, frequency of distribution and the target audience.

Knowledge Application

Use of knowledge focuses on the de facto transformation of knowledge to products and services. This category is of special interest because this is perhaps the most critical process in KM whereby the proactive and direct involvement or intervention of management will be detrimental to the success of any KM program to be matched by full responsiveness from all those involved or targeted. Besides this, monitoring or measuring the usage or application of this knowledge will be another important component of this process to assess all the previous stages and will determine the viability of the KM program being implemented. In all cases, the monitoring or measurement components of this process will also need to be supplemented with improvement programs reflecting on all the previous stages in terms of the type of knowledge being acquired or how it is stored or distributed. Finally, application or usage will need time to take effect or become an integral part of the working procedures and may involve training, coaching or even incentives.

Knowledge Retention and Update

Finally, the process knowledge retention and Update will need to be integrated to keep knowledge management system in an up-to-date condition (Stollberg et al., 2004). We can imagine that there is a loop that goes from this stage to the second stage (acquisition) ensuring that new sources, references and knowledge is continuously fed back into the system and all obsolete knowledge is over-written or at least archived. At the same time, all feedback from the application processor stage can also be fed into this stage as another means of updating current Knowledge, assessing its usefulness or relative value.

Knowledge Training

KM can be used in different fields, ranging from training, project management, customer relation, and more. In training, the goal of information-based training is to realize the optimization of teaching and studying which means to communicate the knowledge through the best way. The objective of knowledge training is to convey appropriate knowledge to the right person by a best method in the suitable time.

1.10.2 System Architecture

A system architecture or systems architecture is the conceptual model that defines the structure, behaviour, and more views of a system.
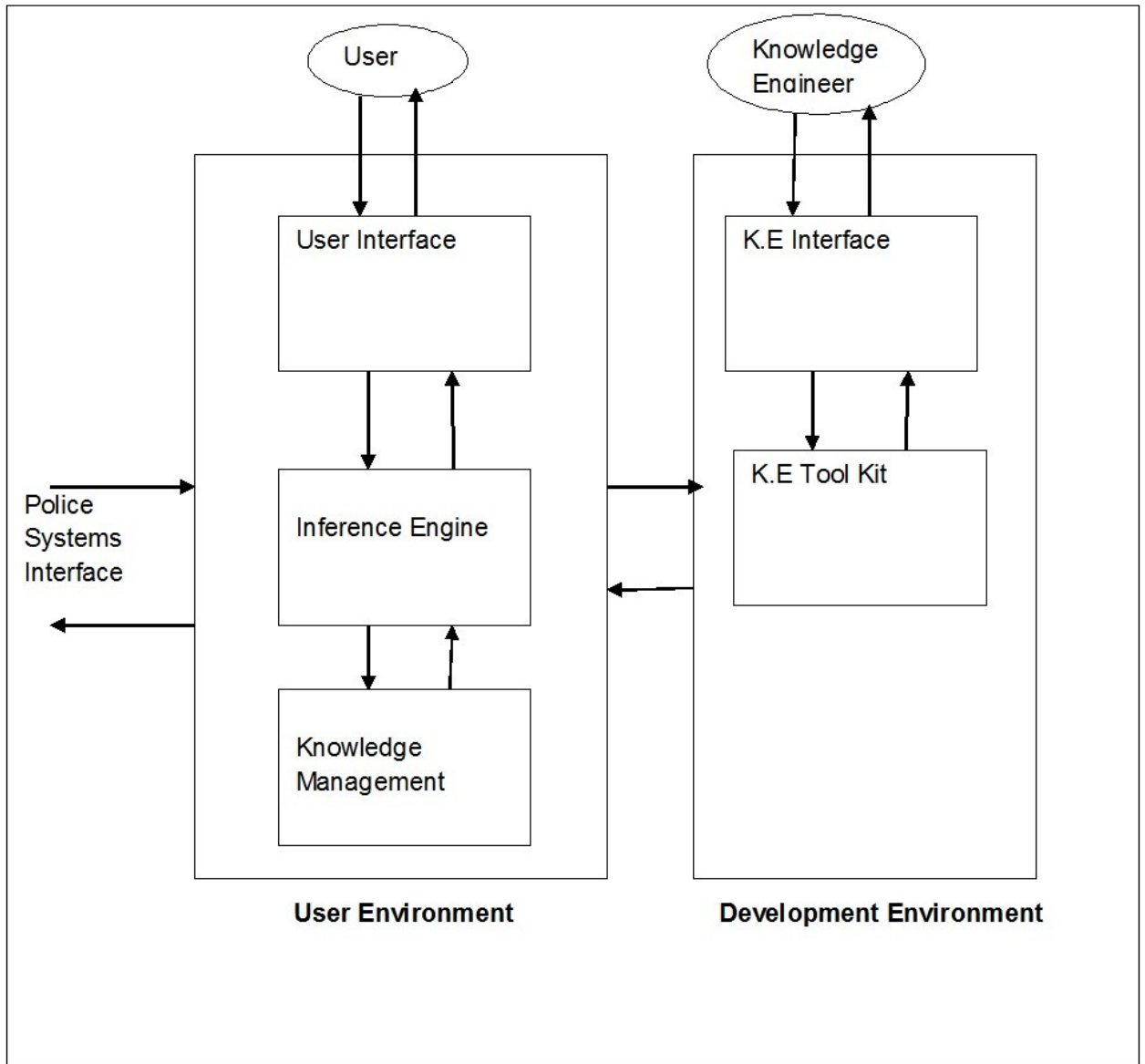

Figure 2: System Architecture

CHAPTER THREE: METHODOLOGY

1.11 OVERVIEW

In order to build a Knowledge Management System for the Kenya Poice service, interviews are to be carried with officers to gather system requirements. The following samples of questions are to be asked. Does the service have a way of exchanging information? Does the service encourage officers to exchange and share knowledge? 3) How does the service currently manage information gathered during the course of duty? 4) What kind of information is being captured when storing criminal records? 5) What type of Information is being captured when storing penalty details? 6) What kind of Information is being captured during patrols? 7) Would you like a feature that would enable the citizens, to post Information about any issues or suspicion of any form of criminal activities? Based on the findings, it helps to uncover if they would like to adopt the approach of having a system which could enable them to gain access to information on the move, whilst also be simple to use at the station.

In response to that, will know if the officers in the service were against mobile-based systems as presented in, considering that if there is a case of an attack, it could lead to a breach of privacy once the attackers gain access to any form of information. This would imply they may require a system with privacy by design. Also, ask the officers if they would like a feature that would enable the citizens to post information about any issues, or suspicion of any form of criminal activities will also discover whether this type of knowledge sharing would be paramount.

The main consideration is to make sure that any information collected is done in a way and for a purpose that is consistent with the Code and complies with freedom of information and privacy protection legislation. In the interest of effectiveness and efficiency, it is recommended that efforts be made to collect data that will shed light on issues or opportunities. To protect the credibility and reliability of data, information should be gathered using accepted data collection techniques.

1.11.1 System Planning

Step 1: Identify issues and/or opportunities for collecting data

The first step is to identify issues and/or opportunities for collecting data and to decide what next steps to take. To do this, it may be helpful to conduct an internal and external assessment to understand what is happening inside and outside of the Police.

Considering this to be a security institution officers, are given specific direction on what issues should be explored and how data must be collected. Other Police may have more flexibility to decide when and how to collect information to achieve certain goals

Step 2: Select issue(s) and/or opportunity (ies) and set goals

The focus of Step 2 is choosing a priority issue(s) and/or opportunity (ies) for collecting data, and then setting goals and objectives.

The department reviews the issues and/or opportunities identified from the internal and external assessment, and picks one or more specific issues and/or opportunities for starting a data collection exercise from among the list of priorities. Some of the questions that can be considered when deciding to prioritize an issue and/or opportunity for gathering data includes:

1.11.2 Goal-setting

While the department may intend to collect data relating to multiple issues and/or opportunities at the same time, the next steps, including goal-setting, should be individualized for each issue and/or opportunity.

The specific goal(s) defined for each issue and/or opportunity may depend on a hypothesis or guess about what is happening that can be tested using data collection techniques and analysis.

Example: A downtown Toronto hotel receives complaints from guests, who self-identify as being gay, about the unwelcome treatment they received from the staff. A hypothesis might be that hotel staffs lack sufficient awareness and training about how to deal respectfully with guests who are gay or are perceived to be from the larger LGBT community. The goal is to get enough evidence to test this hypothesis.

Step 2 can also involve police brainstorming a smaller set of questions that may be answered by collecting data. Rather than asking a general question like, "Is there any evidence of discrimination on the basis of sexual orientation or gender identity in this hotel?" one might ask, "What percentage of hotel guests self-identify as being part of the LGBT community?" and "What are the perceptions of the service received by self-identified LGBT patrons?" Ultimately, data that is collected should be rationally connected to the goals set and the overall purpose for collecting the data.

Step 3: Plan an approach and methods

In Step 3, will make decisions about who will be surveyed, how data will be collected, the sources of data that will be used, and the duration of the data collection exercise, among other questions. These decisions may be made in consultation with an expert. The methods and approaches will flow from the goals set in Step 2 and will vary significantly depending on a

number of factors, including the Police's context, size, resources, and the purpose and complexity of the issue(s) or opportunity(ies) selected.

Some of the questions to consider at this stage include:

What will the data be collected about?

The "group of interest" (e.g. youth service users of a local community centre who cannot read/write and speak English as a second language) will be the focus of the study, and the data collection methods used will refer to this group, or the persons within it, depending on the goals of the project.

Understanding discrimination

When thinking about what the data will be collected, it is important to consider who you think will be most affected by, for example, the discrimination or inequities that you wish to measure. Is it a broad category (e.g. all service users who cannot read/write), or a subset of that category (e.g. *elderly* service users who cannot read/write)? The italicized words refer to a unique characteristic of a broader group that Police may wish to gather information about.

Who will the group of interest be compared to?

The "comparator group" should be persons who share one or more characteristics with the persons in the group of interest, but differ in the key characteristic(s) being studied (e.g. youth service users who cannot read/write but can speak English fluently). The experiences of youth service users who cannot read/write and who speak English as a second language can then be compared to youth service users who cannot read/write but can speak English fluently.

What locations or geographical areas will the data be gathered from?

Some data collection initiatives require gathering data from multiple sizes, groups or communities located in different locations and geographical areas. When determining where to collect information from, key factors to consider include what the data will be collected and who the data will be compared to.

Step 4: Collect data

When planning on how best to collect data in Step 4, it is important to be aware of the practical considerations and best practices for addressing logistical challenges Police often face at this stage of the process. Implementing a data collection plan requires attention to matters such as:

Getting goodwill from senior leadership and key stakeholders, in or outside of the Police service. This group could include: - senior officers, junior officers boards of directors, management committees, commission representatives, employees, community groups, well-wishers, whistleblowers, and service users.

Establishing a steering committee or selecting a person(s) to be consulted and held accountable for all major decisions about the data collection process, such as design, logistics, communication management, coordination and finances.

Determining who will collect the data (e.g., experts or trained employees).

Identifying the logistics, resources, technology and people needed to develop and implement a data collection initiative.

Anticipating and addressing key stakeholder concerns and questions about the project.

Designing a communication and consultation strategy that will explain the data collection initiative and encourage the highest possible participation rate.
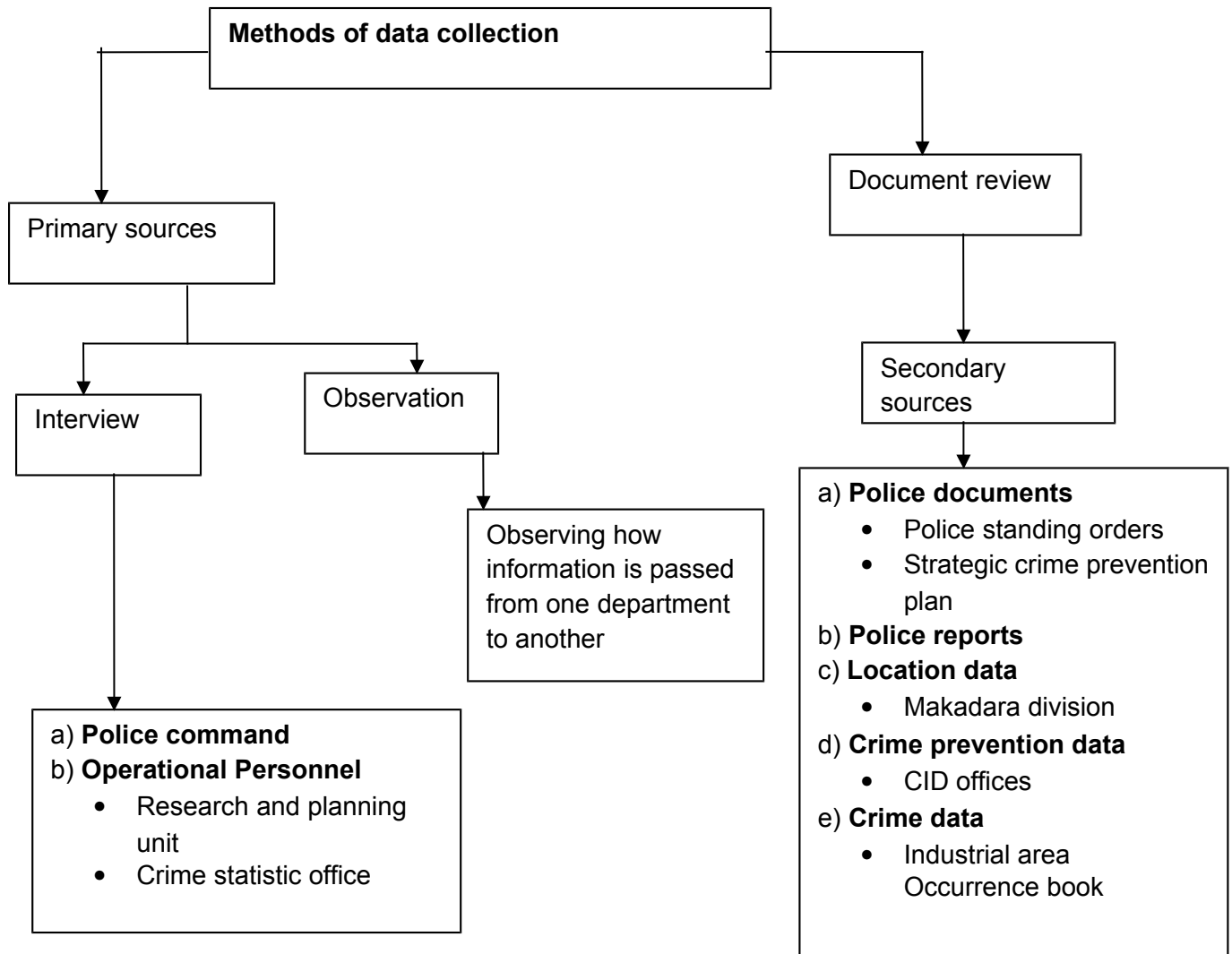
Protecting privacy and personal information by using carefully controlled procedures for collecting, storing and accessing data that comply with privacy, human rights and other legislation. Dignity and confidentiality must be respected.

Minimizing the impact and inconvenience for the people affected in the workplace or service environment, which includes choosing the best time to collect the data.

Aiming for flexibility to allow for changes without great expense or inconvenience.

Considering a test period or a pilot phase to allow improve and modify data collection methods, as may be needed.

Methods of Data Collection and Data Sources

```
                    ┌─────────────────────────────────┐
                    │   Methods of data collection     │
                    └─────────────────────────────────┘
                        │                         │
              ┌─────────────────┐          ┌──────────────────┐
              │ Primary sources │          │ Document review  │
              └─────────────────┘          └──────────────────┘
                   │                               │
         ┌──────────────┐  ┌──────────────┐  ┌──────────────┐
         │  Interview   │  │ Observation  │  │  Secondary   │
         └──────────────┘  └──────────────┘  │   sources    │
                                             └──────────────┘
```

Observing how information is passed from one department to another

a) **Police command**
b) **Operational Personnel**
- Research and planning unit
- Crime statistic office

a) **Police documents**
- Police standing orders
- Strategic crime prevention plan

b) **Police reports**

c) **Location data**
- Makadara division

d) **Crime prevention data**
- CID offices

e) **Crime data**
- Industrial area Occurrence book

Step 5: Analyse and interpret data

Step 5 involves analyzing and interpreting the data collected. Whether quantitative and/or qualitative methods of gathering data are used, the analysis can be complex, or less so, depending on the methods used and the amount of data collected.

Explaining the technical steps involved in analyzing and interpreting data is beyond the scope of this guide. Police will have to determine whether it has the internal capacity and expertise to analyze and interpret data itself, or whether it will need the help of an external consultant

1.11.3   The System Analysis

External Analysis

Society expects the police to be proactive within its defined scope of implementing effective crime prevention measures. In discharging its demanding task of crime prevention, The Kenya Police Service (KPS) is expected to work in collaboration, consultation, close liaison and cooperation with various stakeholders whose concerns, views and opinions may be variance with those of police (Police Reforms, October 9, 2015)

The poor performance of the economy has resulted into reduced revenue for government. This with government's failure to make adjustments in levels of public expenditure has curtailed government institutions capacity to deliver. The Kenya Police Service is not an exception. The economic malaise has an impact on the overall quality of crime prevention measures put in place. The Kenya Police Service can no longer attract and worse still retain adequate numbers of qualified, skilled and competent professionals due lack of proper knowledge management support system. (Kenya Police Reforms, October 9, 2015/Article)

Unemployed rate in Kenya in Kenya is above 50% and about 80% of the population's income is below the poverty datum line (World Bank, Wednesday, 9 Match 2016).The crime rate is high.

However, the Kenya Police Service can exploit some opportunities such as government support, Potential donor support, support from business community, international recognition and democratization process the country is undergoing and all this can be achieved well by use of knowledge management system.

Internal Analysis

Apart from understanding the external environment the Kenya police service operates in, it also needs to have clear understanding of its internal environment. An analysis of internal environment conducted by the inspector general's working group reveals that high command(top management) is committed to reform the police in accordance with what is obtain in other countries, for instance south Africa where knowledge management has proved to be integral part of police operations; the focus vision of provision of quality service to its

clients; team work is also prevailing as command has realizes that it needs all officers on board if it is to realize its vision(Kenya Police ,2016/Article)

The drawbacks as highlighted by the working group are lack of material resources, lack of collaboration and coordination with major stakeholders and lack of financial resources. For any organization to successfully realize its mission and objectives as well as satisfy the needs of its clients there is need for adequate and timely provision of material resources and logistical support.

Currently the Kenya police service does not have enough material resources which includes; ICT infrastructures and accessories, transport and radio communication equipment. As for coordination, the Kenya police service is now a community service oriented department (Nyumba Kumi initiative) and therefore, needs stakeholders in order to enable a coordinated approach to crime prevention which may result in the police being able to monitor impact of crime prevention measures.

Having the above background in mind, it is imperative for the Kenya police service to focus its operation by setting targets within current government policy in order to meet the current challenges of crime prevention. In order to do this effectively, the Kenya police service has to have a clear understanding of different communities it serves and their needs. The second strategic development plan2015-2017 has identified information, collaboration, networking with other organizations, civil education on crime prevention and research as some of the major needs of its internal and external environment.

Information is not only a need for society but also for the Kenya police service itself. For this to make proper decisions on crime prevention measures and evaluate the impact of this measures quality information and easy accessibility to information are required.

The General Information flow for Kenya Police Service

There is knowledge management system in the police though it is manual and bureaucratic. It is also slow especially that there is a lot of data which passes though it and has to pass though many offices before reaching its intended target. It has however, faithfully served the department from its inception; it has stood the test of time. Figure 3 shows the communication channels. This channel shows how information is passed on from the lowest level to police administration. which is a police post to headquarters the area of concern for this research.
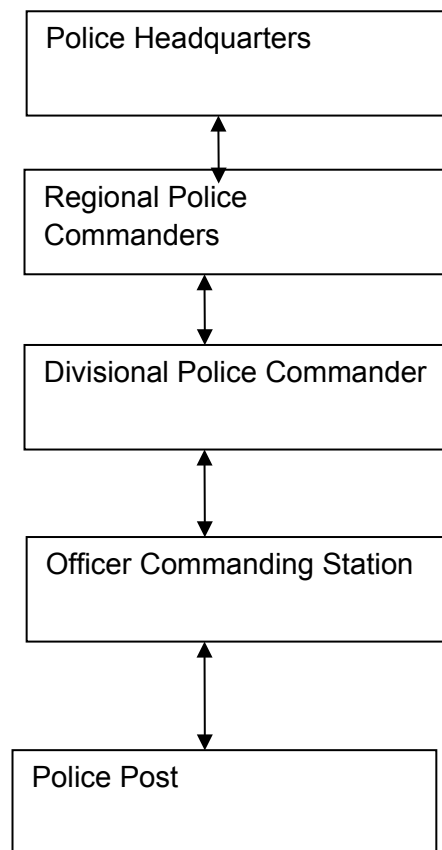
Figure 3: General Communication channel

Process and procedure:

This phase involved gathering information about how information of cases is stored and shared in the Police service. The information collected involved:

1. Case reporting
2. Storing and updating information about a case
3. Allocation of cases among officers
4. Sharing of information among officers

1. **Case Reporting**
   Currently, cases are reported either physically at the police station, or through calls to the Police hotline numbers. Some of these cases might not be followed up because of cases of corruption.

2. **Storing and updating information about a case**
   The information about the case is stored in hard copy. When a case is reported it is recorded in the Occurrence Book. If evidence is available, it is labelled and stored at the police station. Further investigations are done and the collected information about the case is updated.

3. **Allocation of cases among officers**

The reported case is allocated to departments according to the type of crime committed. For example, traffic offences are assigned to the Traffic department while murder cases are allocated to the Directorate of Criminal Investigation (CID) department.

4. **Sharing of information about the case among officers**
   If the information about the case has to be shared between officers/ departments, then they have to share the notes in hard copy form. Some of this information gets lost or tampered with in the process. Some of the findings of the investigation is shared verbally, leading to distortion of information.

The type of activity investigators engage in and the material gathered varies depending on whether investigations use the reactive or proactive method. However, they all go through similar stages, as shown in the process of investigation diagram.

Every investigation is different and may require a different route through the process, example in some cases the identity of the offender is known from the outset and the investigation quickly enters the suspect management phase. In others, the identity of the offender may never be known or is discovered only after further investigation.

Figure 4: Process of Investigation

Light blue sections represent activities from investigative strategies, the dark blue sections represent the main decision points and the white sections are the outcomes that can be achieved.
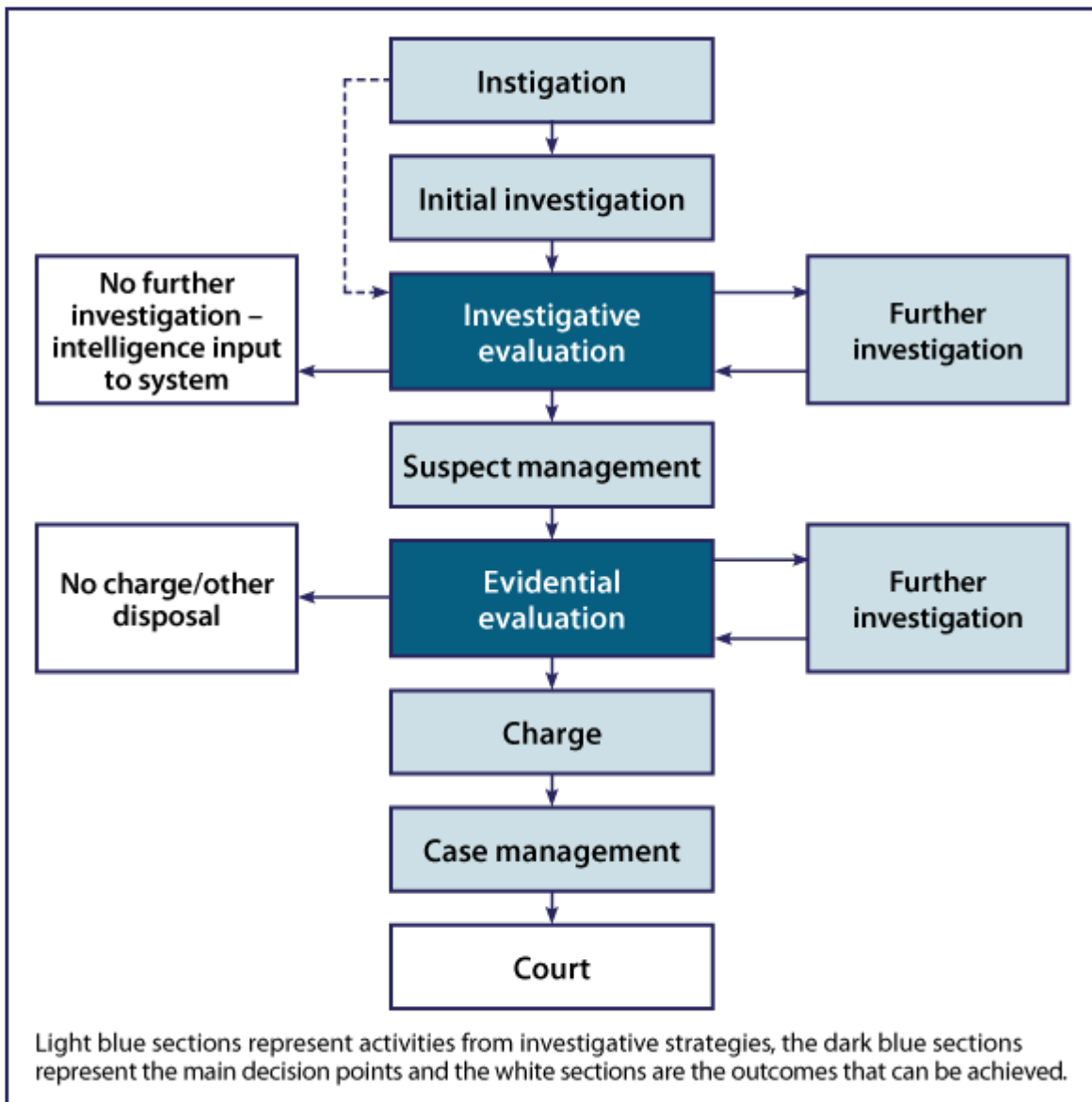
Instigation

A criminal investigation can be instigated using either a reactive or proactive approach.

Reactive investigations can start with:

- Reports from the general public
- Referral by other agencies
- Intelligence links to other crimes (linked series)
- Re-investigation as a result of new information
- A consequence of other police actions.

Proactive investigations can start from an intelligence package identifying groups or individuals who are assessed as being involved in ongoing criminal activity. They are often

generated as a result of the tasking and coordination (T&C) process, and allocated for further investigation. Intelligence packages may include:

- crime pattern analysis
- network analysis
- operational intelligence assessment
- problem profiles
- market profiles
- subject analysis
- tactical assessment
- criminal business analysis
- tactical profiles

Figure 5: Alternative process to be used in knowledge management support system
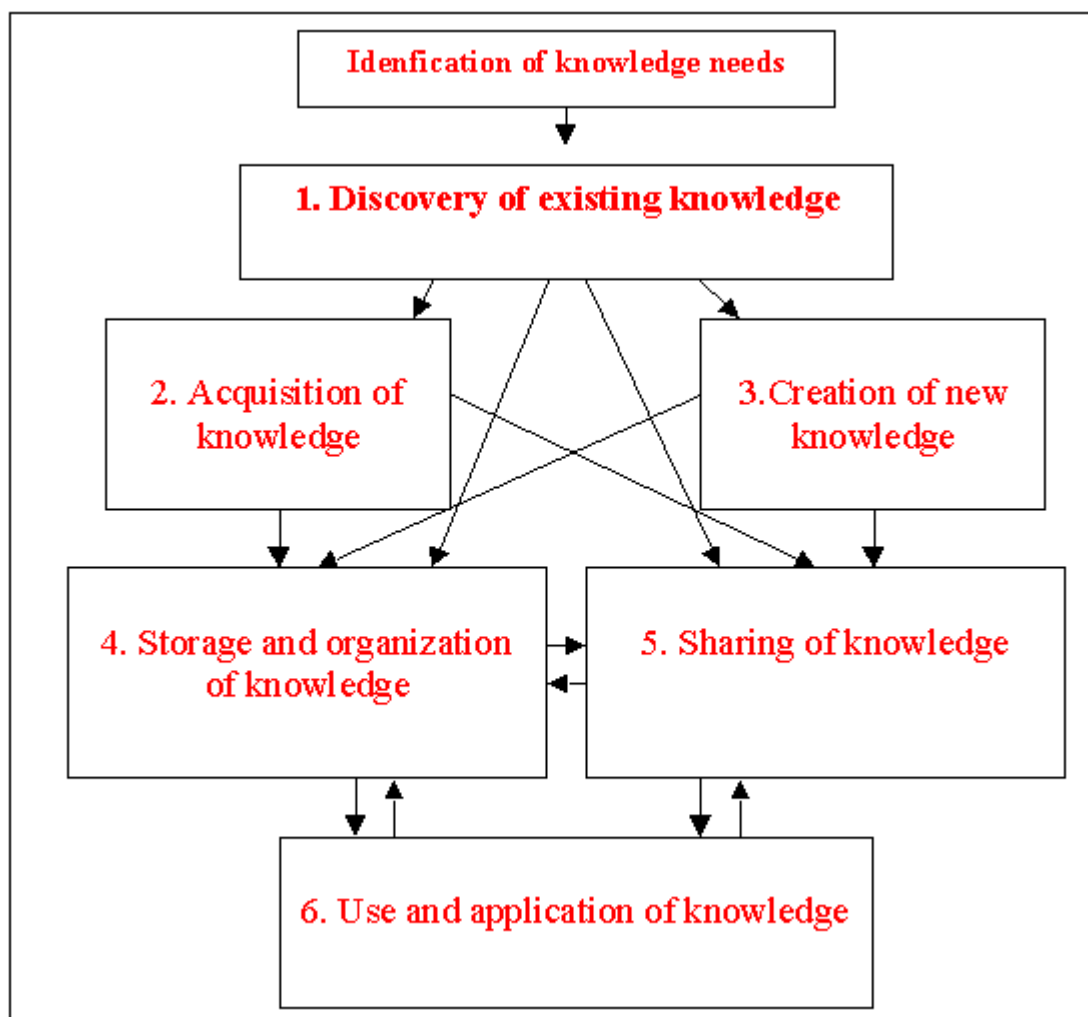
This study was structured around the knowledge management process. Before starting the discussion around this process, it is noteworthy that the definition and classification of knowledge are extremely important. Knowledge should not be mistaken with information or

data. In fact, knowledge is the final result of an evolutionary cycle, which requires observation, evaluation, reflection, and experience, i.e., knowledge, unlike data and information, only materializes with human activity (Kakabadse et al., 2003).

Other important characteristics that must be considered are its classification. Knowledge can be tacit or explicit, i.e., inherent in human skills and competencies, or codifiable respectively. Each of these portions of knowledge (tacit and explicit) has a different perspective regarding the management (Tsoukas, 1996). While explicit knowledge can be easily stored and disseminated through procedures and the very organizational structure, using IT as a facilitator of its retention and distribution, tacit knowledge, in turn, requires organizational development to create a culture that encourages sharing (Martins & Meyer, 2012), in addition to a structure that facilitates the integration of individuals and knowledge.

The models that address KM process are structured preliminarily around this classificatory concept of knowledge. You can divide the contributions of these perspectives into two main groups. The first suggests that KM is a matter related to IT, which, according Boisot (1998), provides conditions for that knowledge to become an industrial commodity that provides profits. Gao et al. (2008) call this predominance of IT on the KM process as "Hard Track", which emphasis is on explicit knowledge.

The second group proposes that KM is more focused on human resource development, emphasizing the importance of culture and the formation of working groups. A "positive" organizational culture is key to promote learning and sharing skills and knowledge (Irani et al., 2009; Boh et al., 2013). Gao et al. (2008) and Schultze & Leidner (2002) also emphasize the need to create a socialization space that fosters the creation and sharing of knowledge, such as the "Ba-Space" (Nonaka & Takeuchi, 1995), communities of practice (Brown & Duguid, 2001), and the culture geared to sharing knowledge (Sveiby, 1997), with a "Soft Track" view (Gao et al., 2008).

The IT must be understood as a KM support tool. Therefore, organizations should work towards the construction of an organizational environment that fosters continuous improvement of individuals, the exchange of knowledge, and stimulating trial and error process, encouraging knowledge use. IT must act as a mechanism facilitating knowledge storage and distribution processes, increasing the flow of information between individuals, and aiding in the retention and institutionalization of knowledge.

Deepening on the characterization of the KM process, the article defined it through four stages: acquisition, storage, distribution, and use of knowledge. Because it is a large, multidisciplinary process, every step of KM can be studied from different perspectives. The theoretical framework of this article raised the main approaches featuring the four stages of the KM process, listing the main associated articles.

Thus, the publications dealing with the knowledge acquisition process are focused on four main themes. The first refers to organizational learning, which deals with the acquisition as a

process of reconfiguration of internal routines. The second deals with the ability of the organization in absorbing knowledge. This capability depends on the presence of primary knowledge that facilitates the absorption of new knowledge (Augier & Teece, 2009; Liao et al., 2010). The third part deals with the creative process, which depends on the organizational stimulus for the development of human resources and teamwork that results in improvements and innovations. And finally, the transformation of knowledge, mainly approached by Nonaka & Takeuchi (1995), states that the acquisition of knowledge is expressed by a transformation process in which knowledge migrates from explicit state to implied, a context called "knowledge spiral", which depends on creating an organizational context that encourages interaction between individuals and hence the sharing of knowledge.

The second stage of the KM process is the storage of knowledge. This step aims to retrieve learned lessons and best practices, forming the organizational memory (Madsen et al., 2003; Levy, 2011). Organizations that have difficulty in knowledge retention lose part of their institutional assets, making them less competitive, since it will occur the loss of primary knowledge, hindering the absorption of new knowledge and its dynamic capability. Thus, publications dealing with knowledge storage are focused on three main factors. The first refers to the human being, and the organization must develop its individuals constantly to improve their respective capacities to absorb new knowledge. The organization is the second important means of knowledge retention. At this point, the interest is primarily focused on organizational culture, which carries the values, beliefs, and ways of acting of its individuals, and organizational structure that defines how decision-making, hierarchy, and organizational assignments are carried out (Martins & Meyer, 2012; Gonzalez et al., 2014). Information technology is the third important factor in publications on knowledge storage, focusing mainly on technological tools to facilitate the retention of explicit knowledge (El Louadi & Tounsi, 2008).

The third stage of the KM process refers to the distribution of knowledge. At this stage, the focus is around the sharing and distribution of knowledge between individuals and groups within the organization. As in the retention phase, the difference between implicit and explicit knowledge becomes important for distributing knowledge. Tacit knowledge is essentially shared by the interactions and social contact, which is the first major theme of this stage. The second theme in publications dealing with the knowledge distribution refers to the formation of communities of practice. The first factor, social contact, is more closely related to the development of working groups that allow the flow of knowledge between individuals (Levine & Prietula, 2012). On the other hand, the communities of practice are focused on the formation of groups of individuals who may be physically distant, but who share primary knowledge, identity, and goals (Brown & Duguid 2001; Dijk et al., 2016). The third relevant factor to knowledge distribution is the use of IT. At this point, as well as in relation to

knowledge storage, its contribution is related to the dissemination of the explicit knowledge stored, and as a facilitator to the communication of communities of practice.

Finally, the fourth stage of the KM process is knowledge use. At this stage, interest is focused on forms of location and access to knowledge created and stored. It is through the use of retained knowledge that the organization closes the cycle of knowledge transformation, since knowledge was created under certain conditions, stored and distributed among individuals and, at this point, used for another purpose, promoting its transformation and the creation of new knowledge (Ganzaroli et al., 2016). The first topic addressed in publications refers to the form of use, i.e., if the organization exploited acquired knowledge in a reactive manner, usually related to solving problems presented by processes; or considers an exploitative view of knowledge in which the organization innovates from the consolidated knowledge basis (Cohen & Levinthal, 1990). The dynamic capability, related to the organizational capacity to rebuild its skills, is the second important issue dealt with in the use of publications. In this context, the interest is related to the ability of the firm to use the knowledge in order to be internally modified and respond to new market demands (Ganzaroli et al., 2016). And finally, retrieval and transformation of knowledge is the third aspect studied in the literature. Authors who preliminarily dealt with the use of this perspective were Walsh & Ungson (1991), whose main concern is around the way how retrieval and transformation occur: automatic or controlled. Automatic retrieval occurs through the current procedures and organizational structure, i.e., through organizational routines. In this context, the authors consider that the routines compose the knowledge automatically used by the organization. The controlled retrieval occurs when there is the transformation of routines, i.e., knowledge is processed to achieve superior performance.

Use Case Diagram

There are four primary actors that have been identified as potential users of the system at the police stations. These are the Enquiries Officer, Records Officer, Criminal Investigation Detective, and the Criminal Investigation Officer.
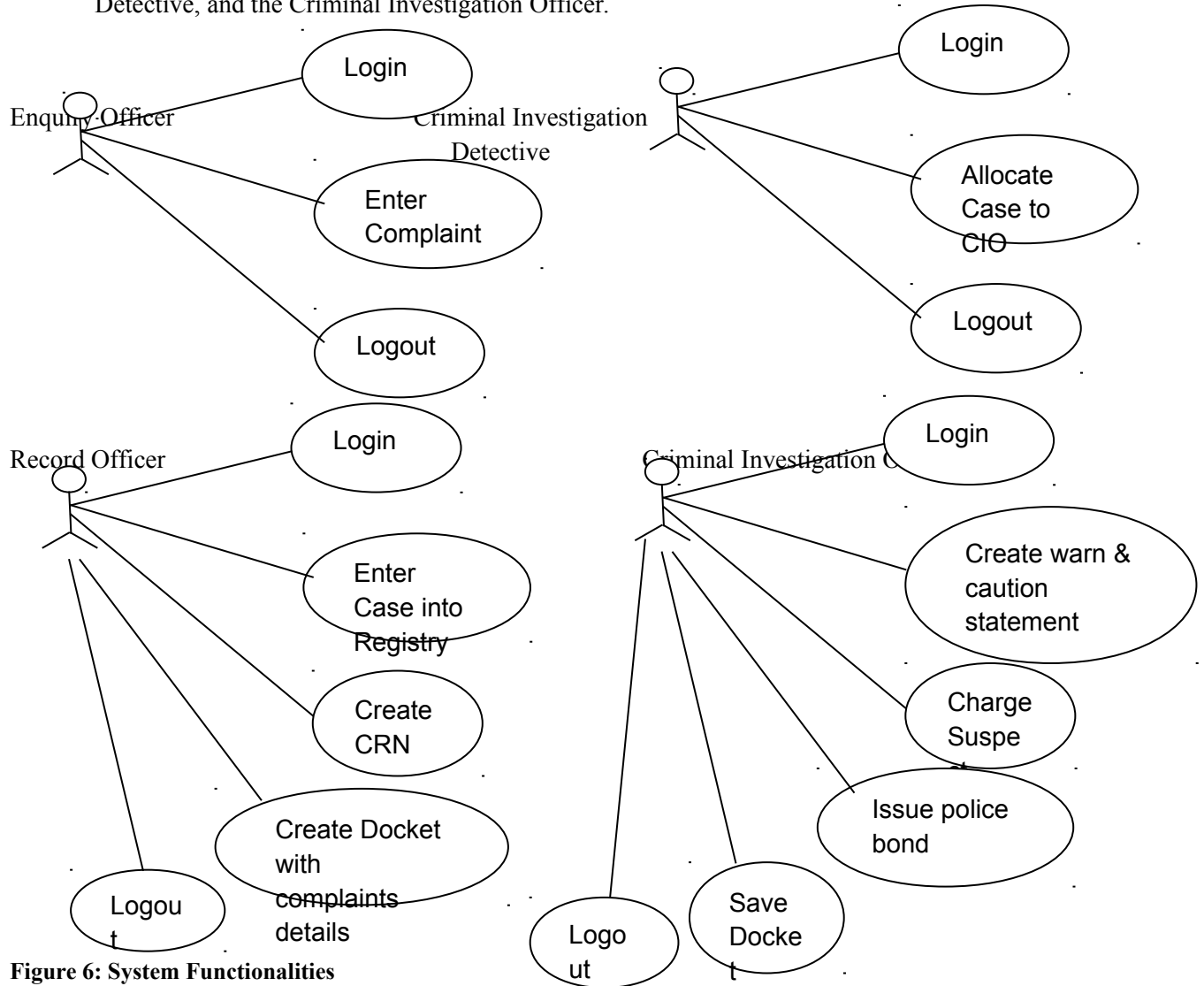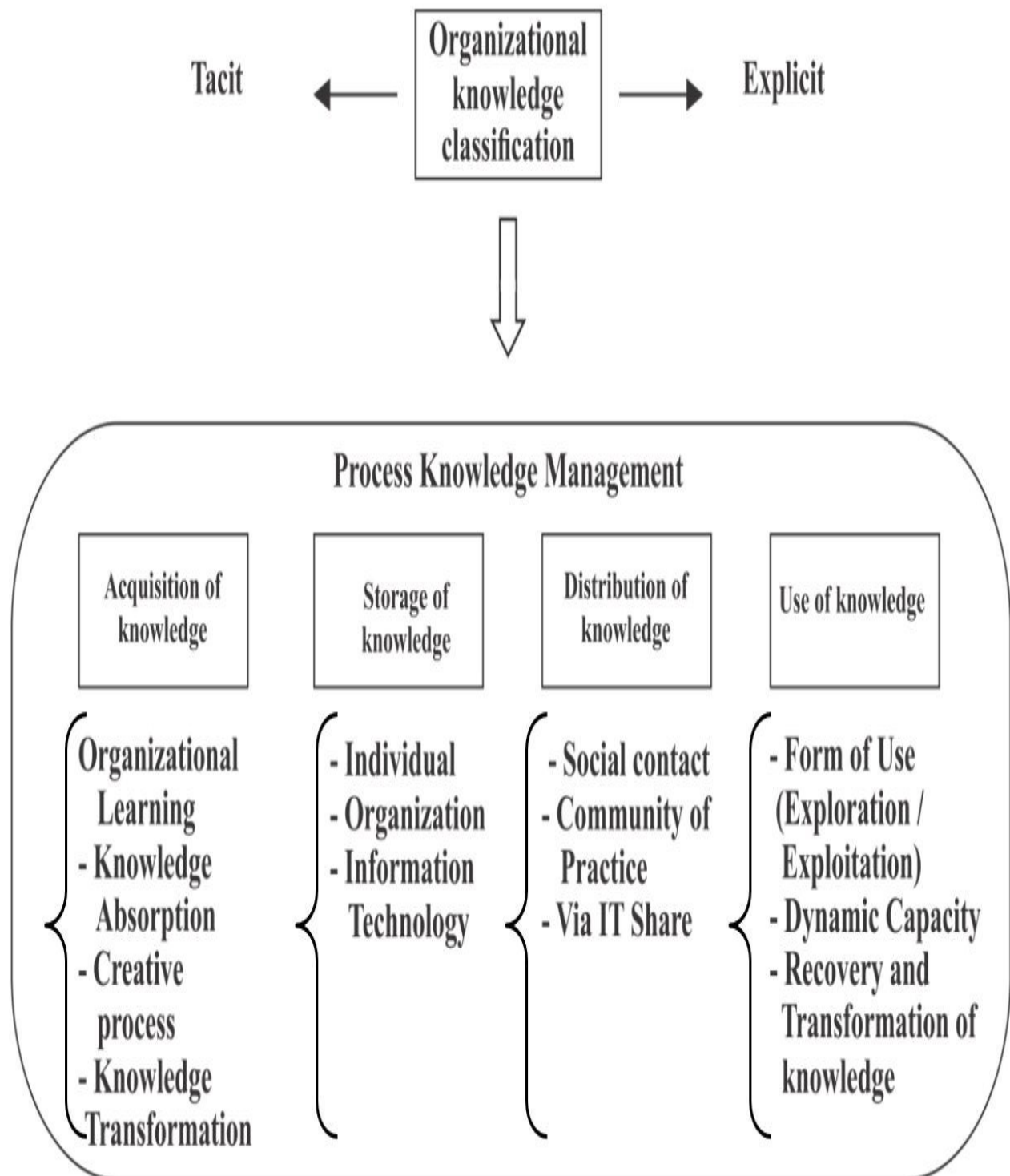

Figure 6: System Functionalities

Figure 7: Research design. Source: Kakabadse et al. (2003).

Knowledge in the organizational context

Due to its intangible and directly related to the human mind nature, it is difficult to precisely define knowledge. According to Kakabadse et al. (2003), the terms "knowledge" and "information" are used interchangeably, however, it is useful to distinguish them. The chain of knowledge is a flow consisted of data-information-realization-action/reflection-wisdom (Figure 8).
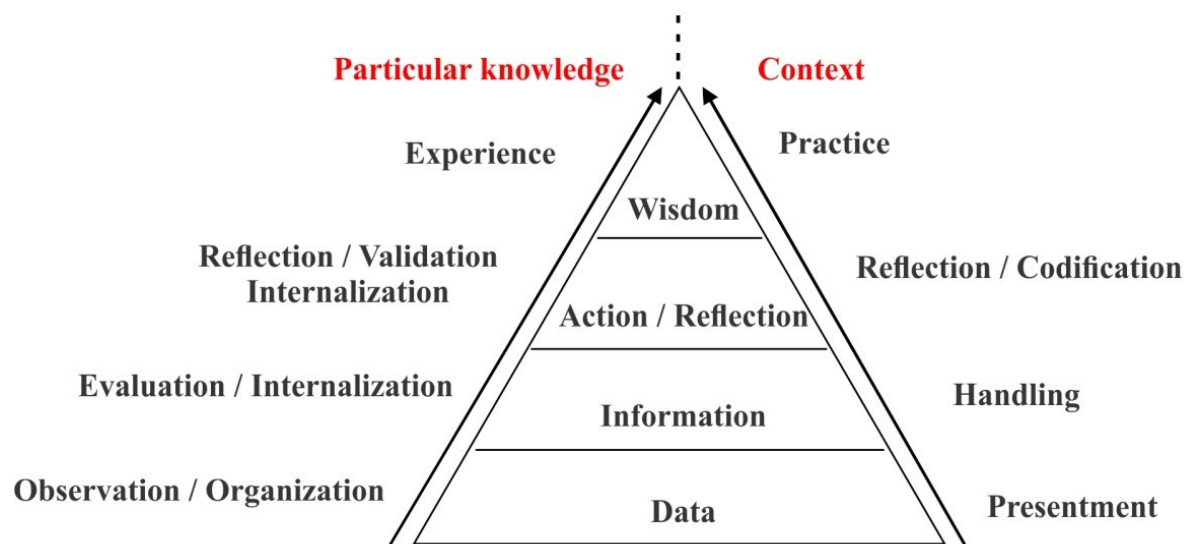
Figure 8: Stages and evolution of the knowledge dimension. Source: Magnier-Watanable & Senoo (2008).

Summary of Knowledge Management System Analysis

The first step of this stage is to understand current police system. The purpose of this is to analyse department's documents and interview some officers' and resident. The analysis produces 2 things: the required or generated knowledge and the knowledge management processes that exist and technologies that will support the process.

Next is to formulate the functional requirements. These requirements are explored into functional, structural, and behavioural model of the system.

The followings are the functional requirements of the knowledge management system

- Provides knowledge portal to display all stakeholders' knowledge assets and facilities available for knowledge transfer in the department.
- Provides collaboration facilities which enable corresponding parties to prepare system's specification document.
- Provides document versioning control facility to archive all documents inserted to the system.
- Provides forum to facilitate discussion and idea exchange among members involved in the system.
- Provides email facility as a communication tool between users and to forward important notifications to users involved in the system.
- Provides system management facility to manage various activities in the development process.
- Provides search facility that enables users to search source of knowledge quickly.

In addition to functional requirements, there are also non-functional requirements of the system. The non-functional requirement is a list of characteristics which are required by the

system. These characteristics have indirect influence when users interact with the system. The following list is non-functional requirements of the knowledge management system to be constructed:

    i).   The system connects all computers in the department.

    ii).   The system is easy to use by users from either technical or non technical background.

    iii).   The system is accessible through web browser.

    iv).   The system guarantees the security of knowledge.

    v).   The system uses language translator to facilitate users who are not fluent in English using the system.

From the information gathered, there was an evident need to develop a Knowledge Management System to improve the way knowledge is stored and shared in the department. This is aimed to prevent loss and distortion of information about cases and to also enhance sharing of information on cases between departments.

1.11.4 System Design

After analysing user requirements, dealing with the problems of Information integration and ease of access, Now is the creation of the database application, employing a consistent and intuitive interface which Integrates different data sources, such that the multiplicity of data sources remains completely transparent to the user, allowing law enforcement personnel to learn a single, easy-to-use interface. In addition to the interface design, development of a model that allows for information sharing both within and between law enforcement organizations and the public.

Design Criteria
The main design criteria considered for the KMS project includes:

- **Platform independence:** Because not all police departments utilize the same hardware or software operating systems, platform independence was critical.

- **Stability and scalability:** The system also had to offer room for system growth and expansion.

- **Intuitive and ease of use:** The front-end user interface should be intuitive and easy to use, yet flexible enough to meet the equally demanding investigative needs of detectives and officers.
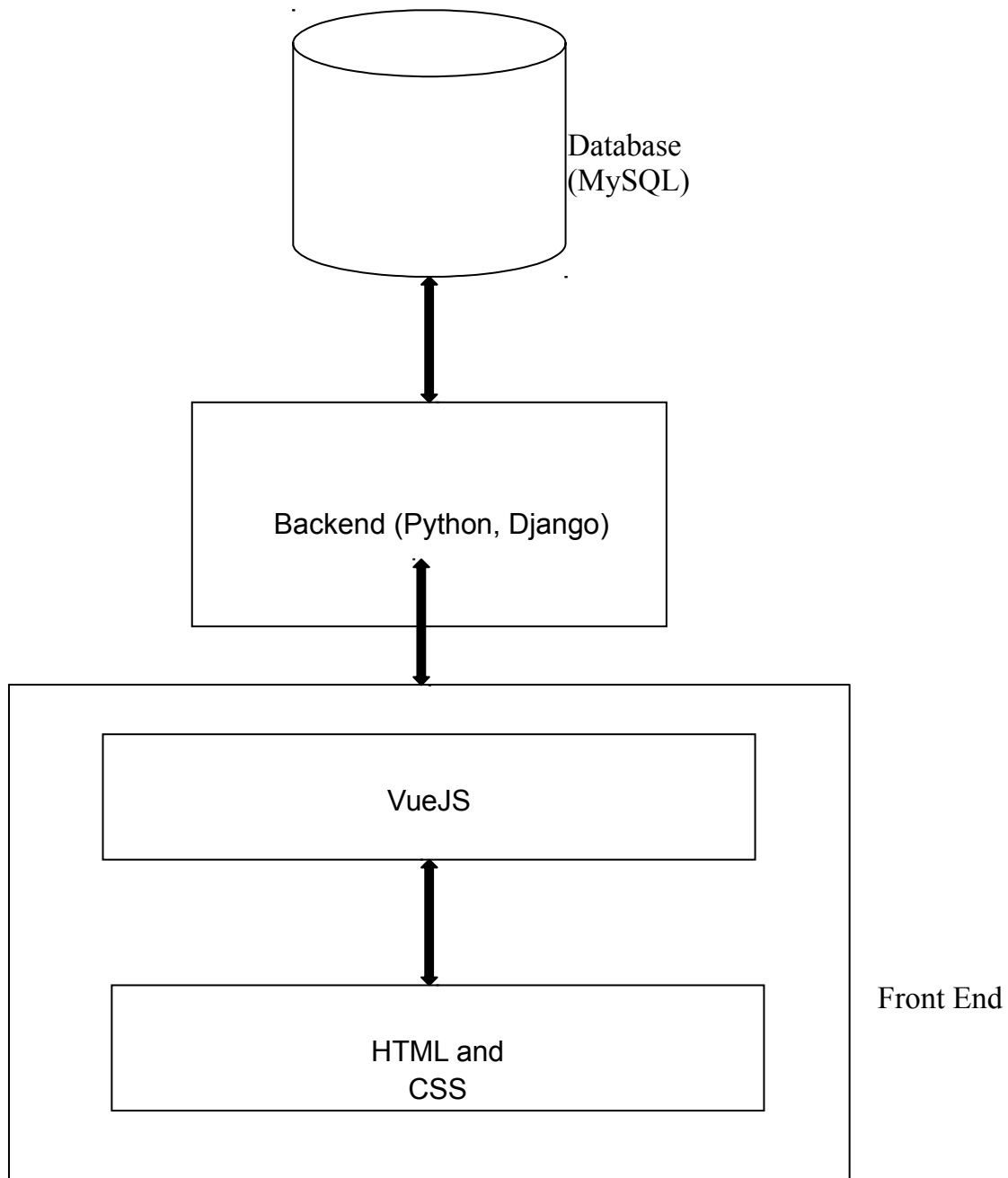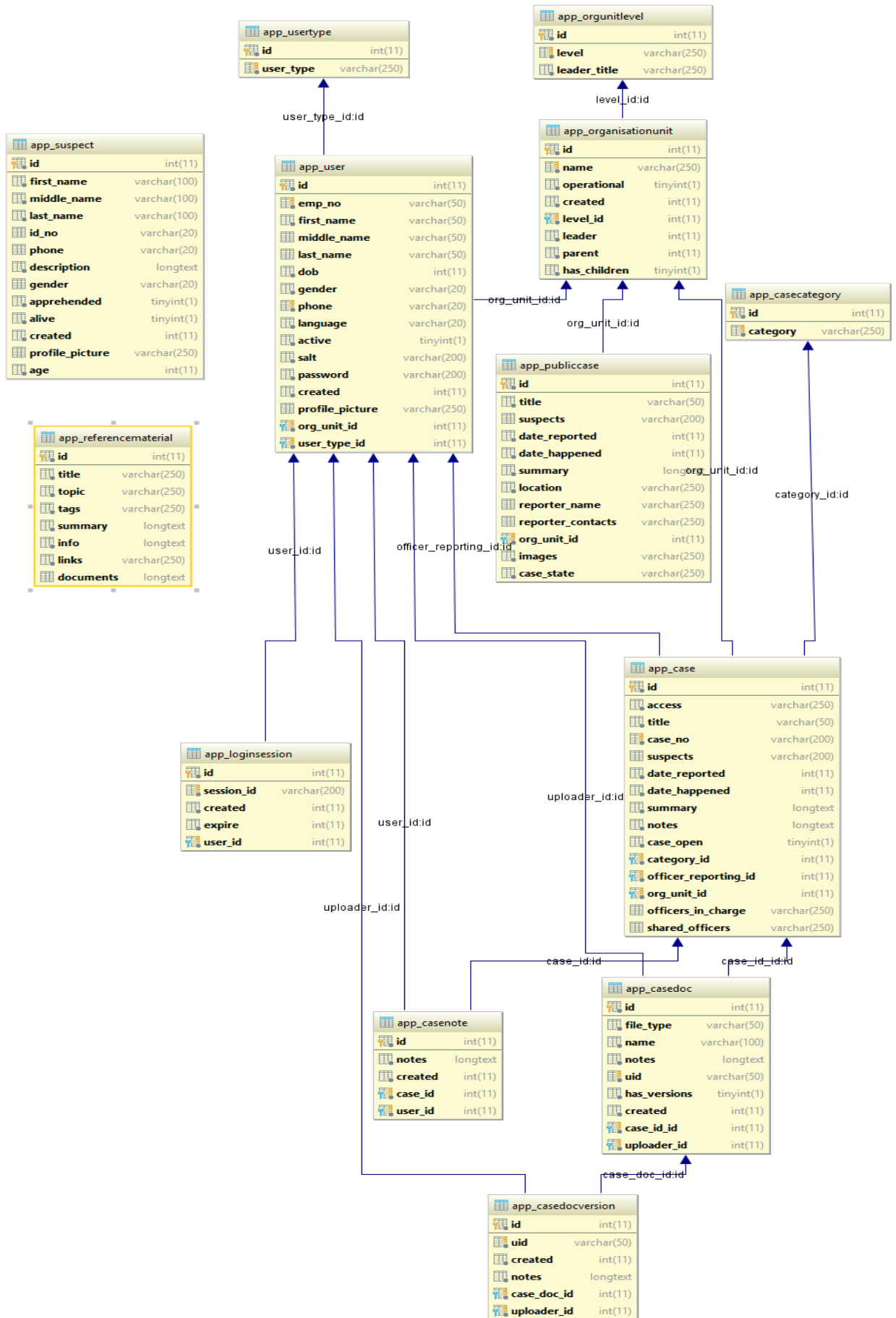
1.12 SYSTEM STRUCTURE


```
                    Database
                    (MySQL)


              Backend (Python, Django)



                      VueJS




                    HTML and                Front End
                      CSS
```

Fig 1. System Overview

1. **Database**

   The database used in the system runs on MySQL. MySQL is a secure open source and relational database management software. All the data in the system is stored in the same database.

Fig 2. Database

As seen in the database structure, the system categorises data into five main parts.

1. **Organisation Units**

   Organisation units represent the place where the case is or where the user is stationed. The organisation units have levels and parents.

   Level 1 Represents the Country. Level 2 represents the Provincial Region Commander. Level 3 Represents the Police Division. Level 4 Represents the Police Station

   Each organisation unit also has a parent which is the organisation unit that is above it in the hierarchy. For example, Nairobi Region is under country Kenya.

2. **Users**

   These are the police officers that use the system. Each user is tied to an organisation unit where they work. For example, the Inspector General is tied to the country and an Officer Commanding Station is tied to a police station.

   All cases are reported at the lowest level which is the police station. However, users at a higher level have access to cases in all the police stations in their region. For example, an officer at Nairobi Region headquarters has access to all cases that have been reported in all police stations in Nairobi Region.

   Each user also has a job title which defines their role and position in the hierarchy. They also have login credentials to keep information secure and confidential.

   Each user can get access to the system at any time because it is online.

3. **Suspects**

   Information about suspects is also stored in the database. Each suspect also has a trail of cases they have ever been involved in stored. This is to easily identify first time and repeat offenders.

4. **Cases**

   There are two types of cases stored in the database. Cases reported by the public and cases reported by the police officers. Both have to be tied to a police station.

   Further information and evidence about a case is also stored in the database.

5. **References**

   This are articles and documents that the users can refer to for educational or referral purposes.

6. **Backend implementation**
The backend implementation has been done with Django 1.11. Django is a scalable, fast and robust web framework written in Python, an object oriented programming language.

Each database table is regarded as a class and therefore each record in the database is regarded as an object. Requests to create, read, update and delete data in the database are made through API calls from the clients. This is enabled by two Python packages.

DjangoREST
This is a Python package and Django dependency. It enables database operations by creating API endpoints and converting data in a format that is understood by both the client and server. In this case, the data representational format used is JavaScript Object Notation (JSON).

Django CORS Headers
For security purposes, Django blocks requests from unknown sources through Cross-Origin Resource Sharing. This package identifies the clients that are allowed to make requests to the server for information.

7. **Front end implementation**
The front end is a web application. It is written in HTML5, Semantic UI and VueJS. It can be accessed through a web browser.

HTML5
HyperText Markup Language is a language used to create web pages. It basically defines the structure of web pages.

Semantic UI
Semantic UI is a CSS3 (Cascading Style Sheet) and Javascript library that is used to style pages. It is used to create responsive and good looking web pages in a short period.

VueJS
VueJS is a Javascript library and progressive framework for building user interfaces. It uses a two way binding system to show data on web pages, meaning that if the value of data changes, it is updated on the web page without updating the whole page.

It also enables the creation of a single page application. This means that, the whole application is a single HTML page. This aids in the page loading fast.

It also enables the communication between the client and the server through API calls.

8. **Clients**

   Clients are devices that are used to access the system. These mainly include computers and mobile phones. The application runs in a browser, therefore can be accessed on any device with a web browser.

1.13 SYSTEM REQUIREMENTS

1. **Server**

   The server hosts the database, backend implementation and the front end implementation. The minimum server specifications are:
   1. 512MB Memory
   2. 2GHZ Processor
   3. 3GB Hard drive memory
   4. Operating System. (Windows, Linux or Mac)
   5. Server software (Nginx)
   6. SSL certificate for secure connection
   7. Python interpreter

2. **Clients**

   The clients will access the web application through a web browser. Therefore their requirements are:
   1. Internet connection
   2. Web browser (Google Chrome, Chromium, Opera Browser, Mozilla Firefox or Safari Browser)

1.14 DEVELOPMENT

a) Backend Implementation

The first step was to install the required software and dependencies to run the back end and database. The software are:
- Python 3.6 interpreter
- MySQL
- Pycharm, a Python Integrated Development Environment Software
-

The second step was to create a virtual environment for the project and installed all the Python packages required which include:
- Django, the Python Web Framework.
- Django CORS Headers to allow requests from external clients.
- DjangoREST for API calls.
- MySQL Client to connect Django application with MySQL database
- Passlib to hash passwords.

The third step was creating the Django application and creating the database models (tables)

The fourth step was writing the logic and API endpoints for the front end implementation.

b) Front end implementation

The first step was to install the necessary software which are:

- NodeJS. This is an open source Javascript server framework that enables javascript code to be run on a server.
- NPM (NodeJS Package Manager). This is a command line tool to install packages like VueJS.
- Vue CLI (VueJS Command Line Interface tool). It is a command line tool that enables creating and managing VueJS projects.
- Webstorm. An Intergrated Development Environment software for web frameworks and languages.

The second step was to create the project and installed the dependencies which include:

- VueJS
- Semantic UI
- Sweetalert for beautiful notifications.
- Vue Router for creating a single page applications
- Axios for making API calls to the server.
- jQuery for page animations and event listening on web pages.
- Vue-Semantic-Modals to show pop ups on the web pages.
- Vuex and Vue Session to manage shared data throughout the whole web application like information about the user logged in user.

c) Project Management

To manage changes in the whole project, Git was used. Git is an open source version control system that backs up source code and keeps track of changes to the code from beginning to end.

Report Incident

Public Users
(Anonymous)

Give reference
number for follow up.

Confirm/act

Collect related materials

Report

**Specialized
Department**

**E-policing
application**

**Police
Officers**

1

2

3

4

**Knowledge
Management
System**

Confirmation/
Reference No.

Ask more details

Get report details, report further details, report action taken
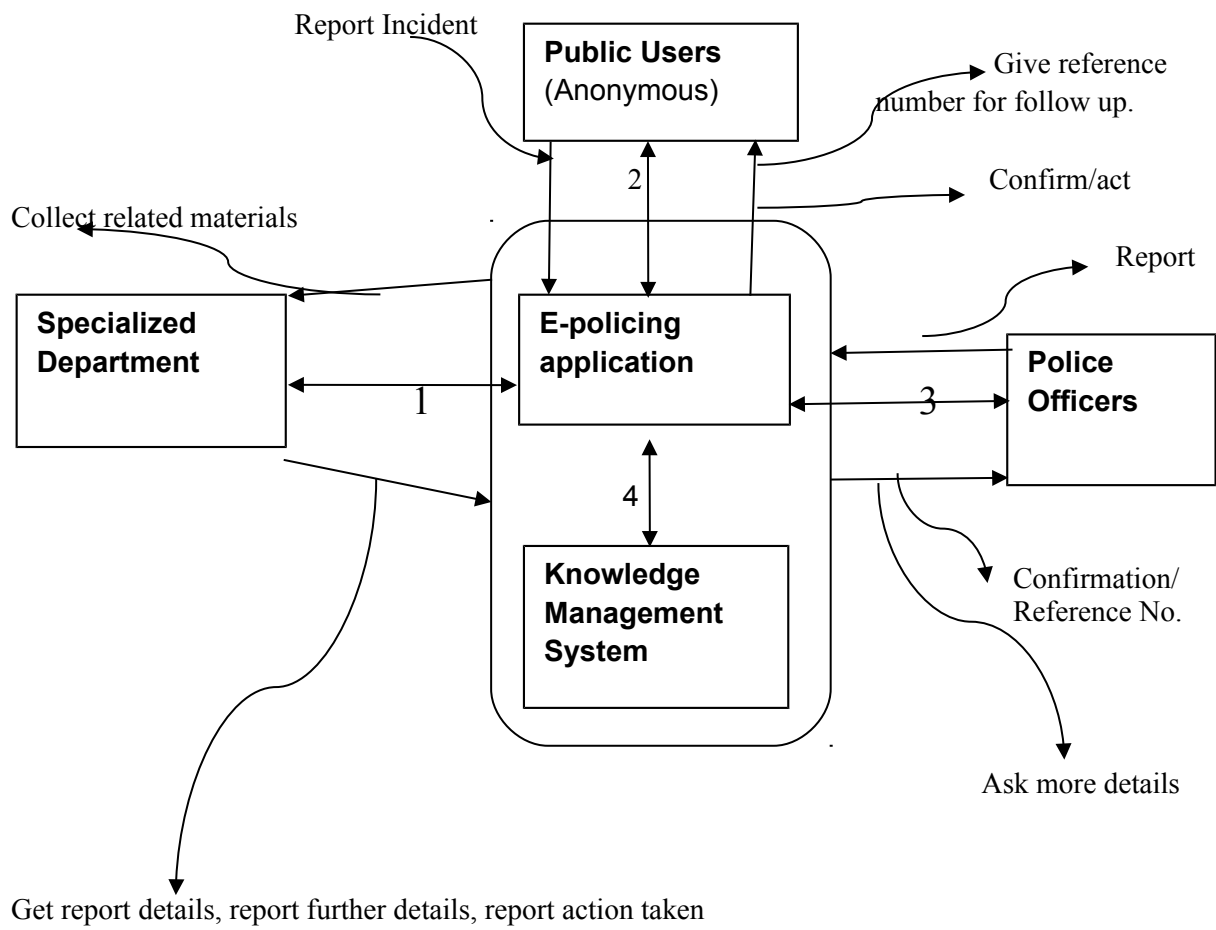
Figure 10: Case Process
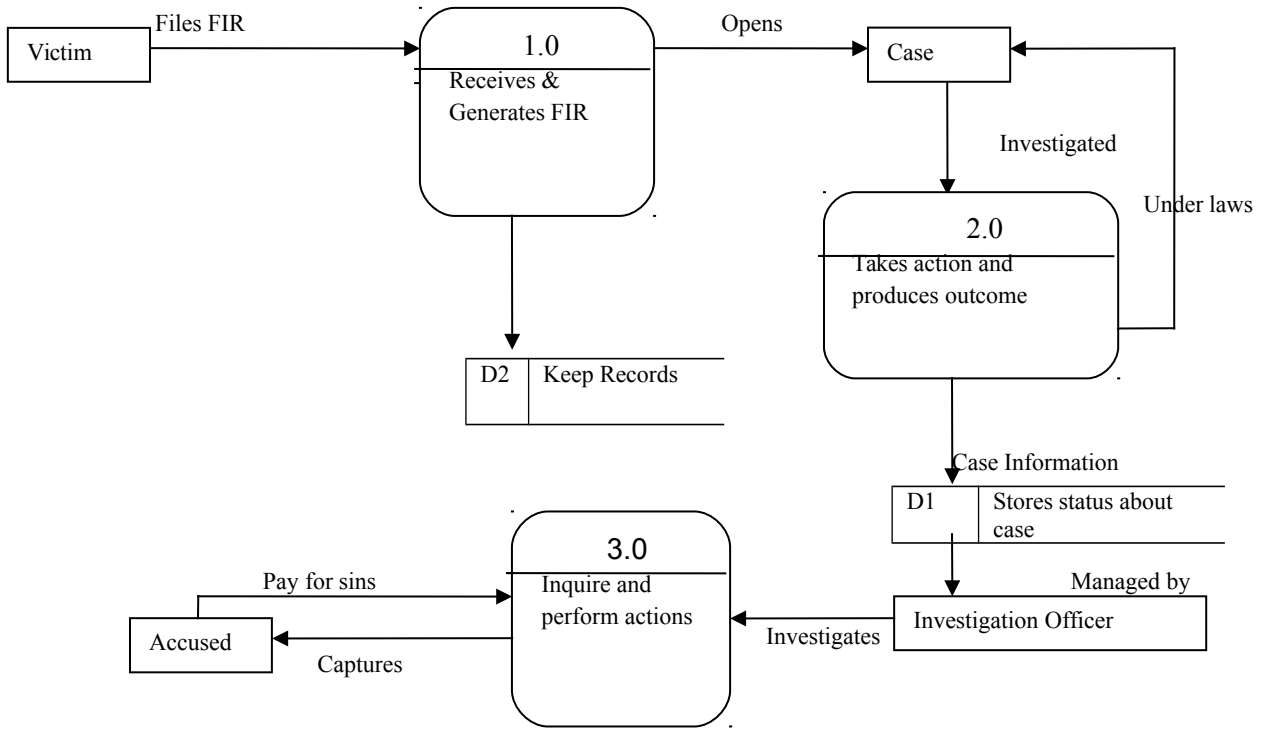
Figure 11: Entity Relation Diagram
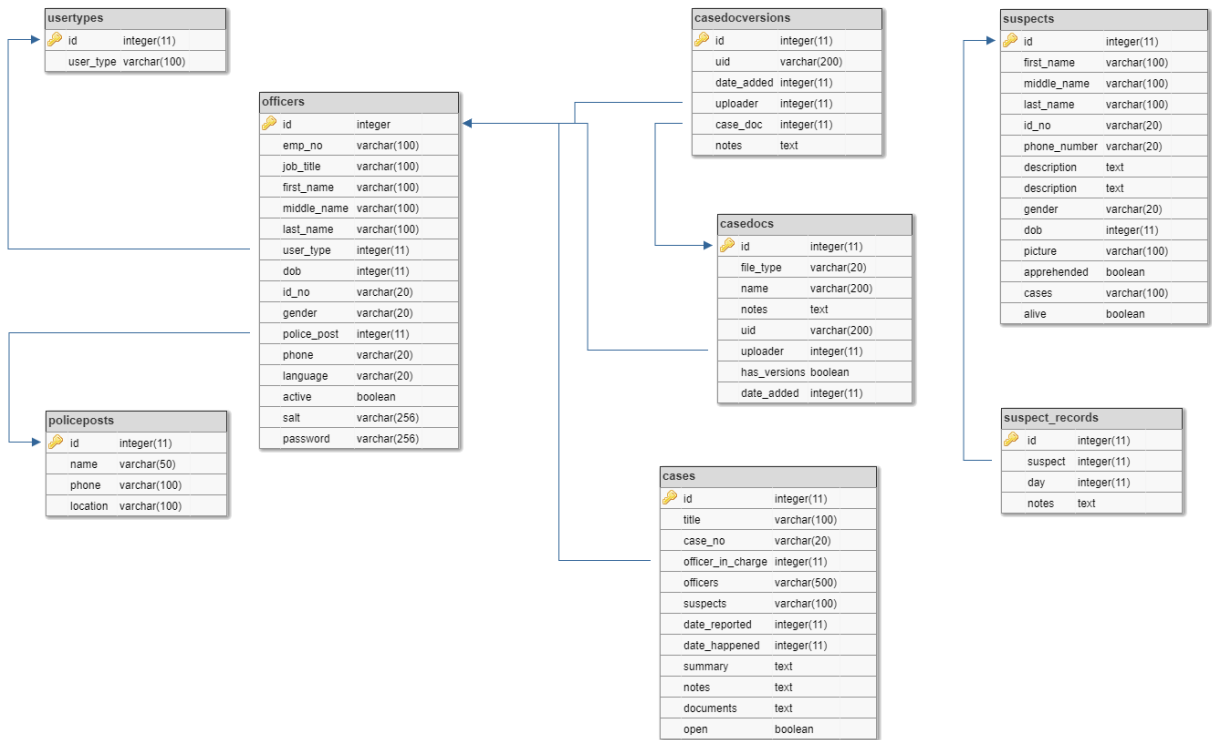
Based on the criteria established and after much investigation, the KMS concentrated on a three-tier architecture:

Front-end interface:

The front-end should be a thin client, consisting of a series of user-friendly query screens matching the four main areas previously discussed (Person, Location, Vehicle, and Incident). The front-end would generate query requests.

Middle-ware application server:

The middle-ware would handle secure requests from multiple clients, and execute the stored procedures in the database.

Back-end database:

Results from the database would be processed by the middle-ware, and be formatted into return data strings. These return strings would then be sent to the front-end where they would be parsed and displayed to the user.

There are four main query screens, each resulting in a summary listing of information related to an initial query.

Figure 12 illustrates relationships among queries. For example, if a user initiates a search on a particular first-name/last-name combination, a summary table is presented as a result of a dynamic SQL query, listing all possible matches, as well as the number of incidents associated with each individual match. From there, the user can select either a secondary listing of incidents related to a particular individual or can access a more detailed summary of the personal information on the individual. For an incident summary, all the pertinent case detail information on a particular incident is presented. For a detailed person summary, the user can select the incident summary for that individual, and from there obtain case details for any incident listed.

Figure 12: Relationship among queries

Person Search Form — Person Summary Table — Case detail screen — Location Search Form — Location Summary Table — Incident Search Form — Incident Summary Table — Offence Search Form — Offence Summary Form
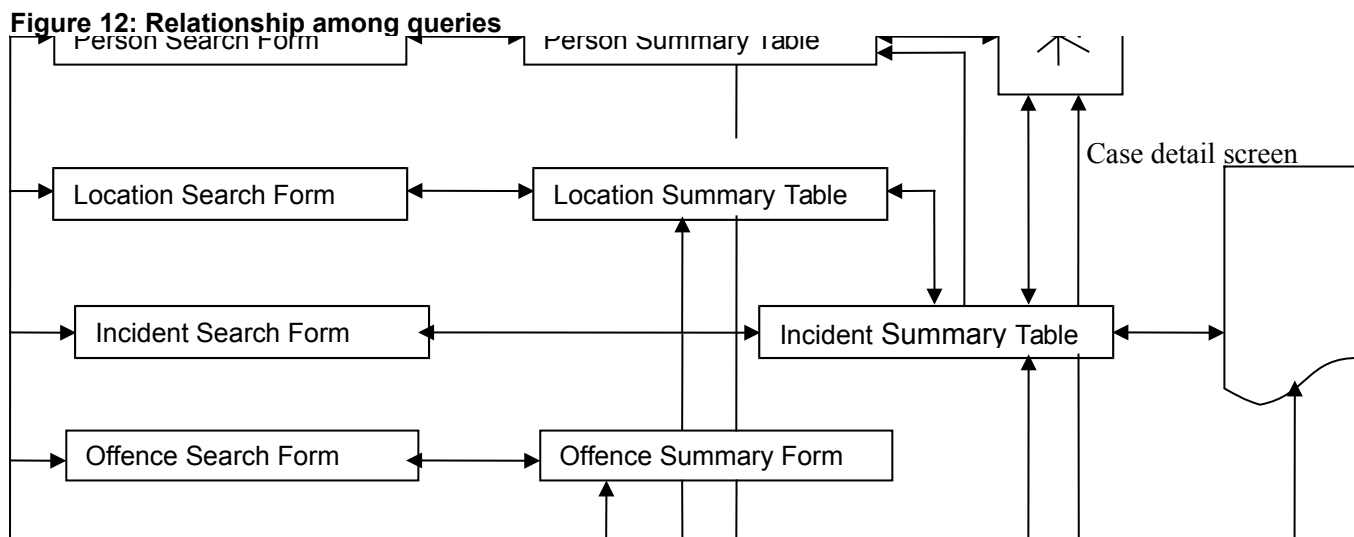
Flow of Operations

Details of how operations are done in the system.

User Creation

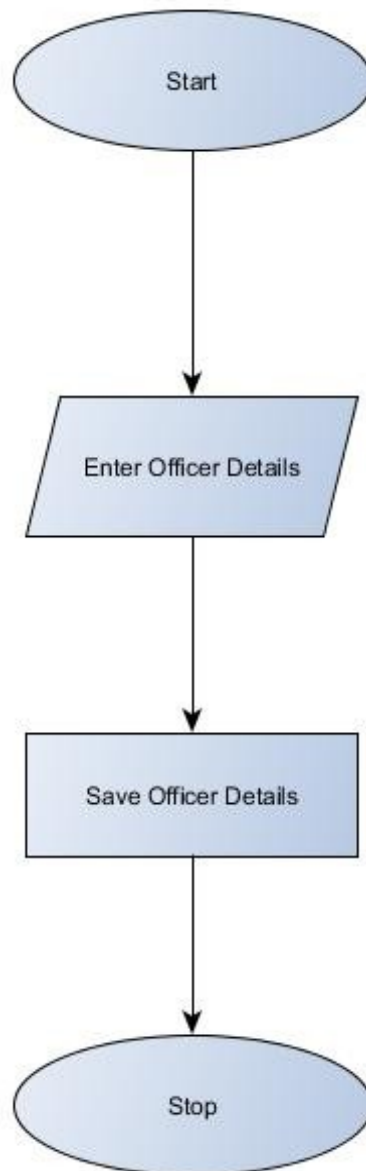The Officer with user creation rights (Officer Commanding Station) will create other users.

Figure 13: User Creation

User Login

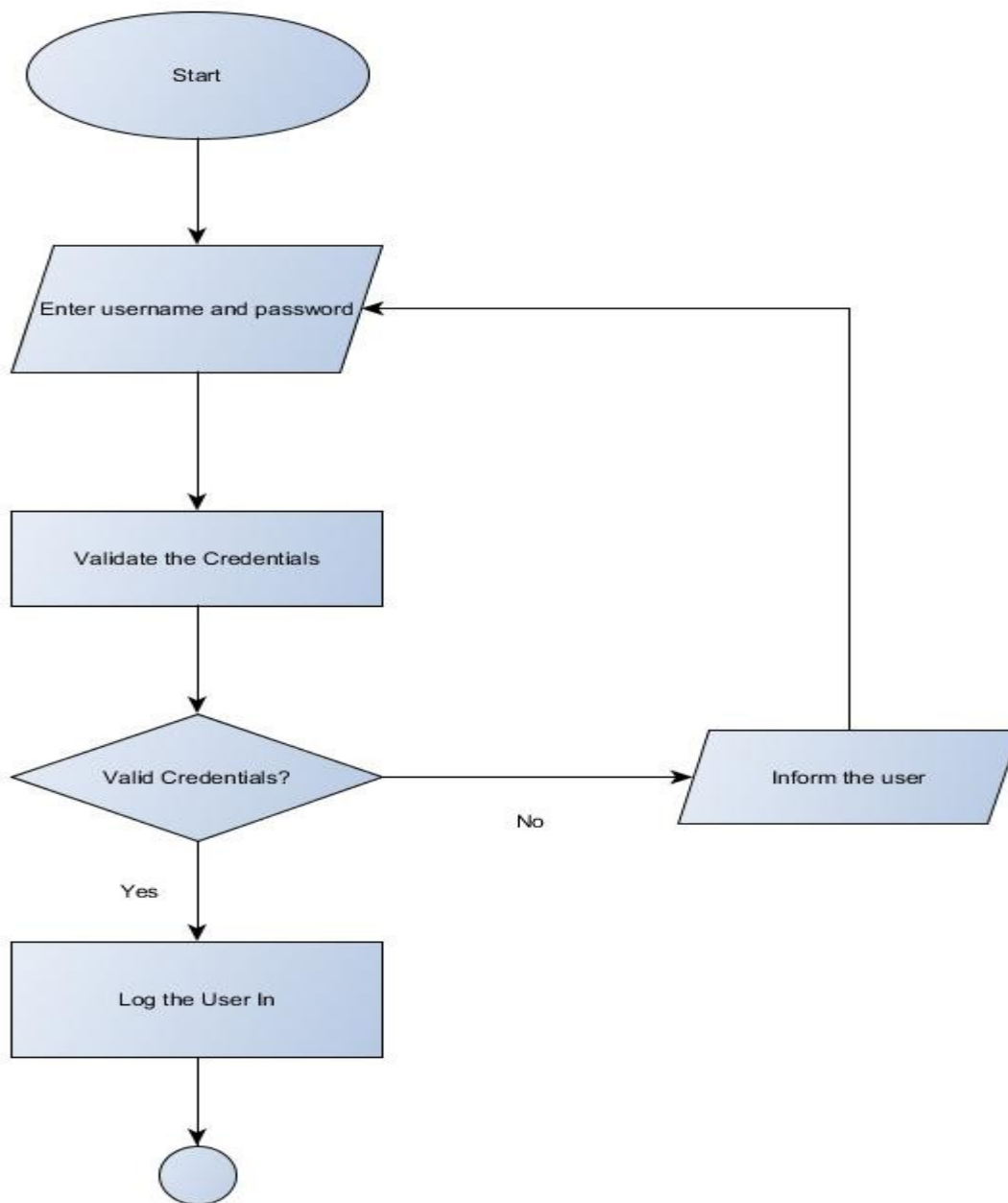Users will login to the system with their employee number and password

Figure 14: User Login

Case reporting

An officer logs in

The officer enters the case number and details

The officer then uploads documents/ pictures related to the case if any.

The officer enters the details of a suspect or suspects that are involved in the case.
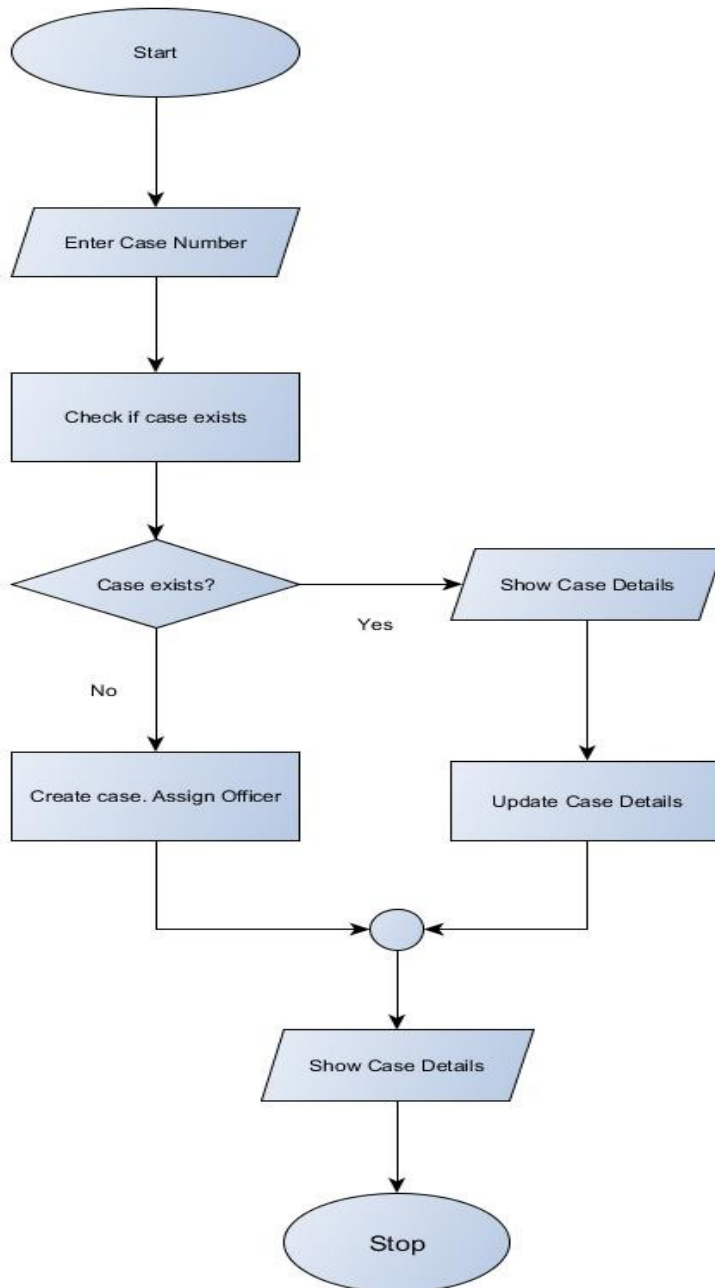
Figure 15: Case reporting

Updating case details

An officer logs in

The officer searches the case using the case title or case number

If the officer is in charge of the station/ division, he/ she can assign the case to other officers.

The officer can also add notes/ documents to the case

The officer can also update the information of suspects involved in the case

If the case is done or dropped, the officer can change its status.
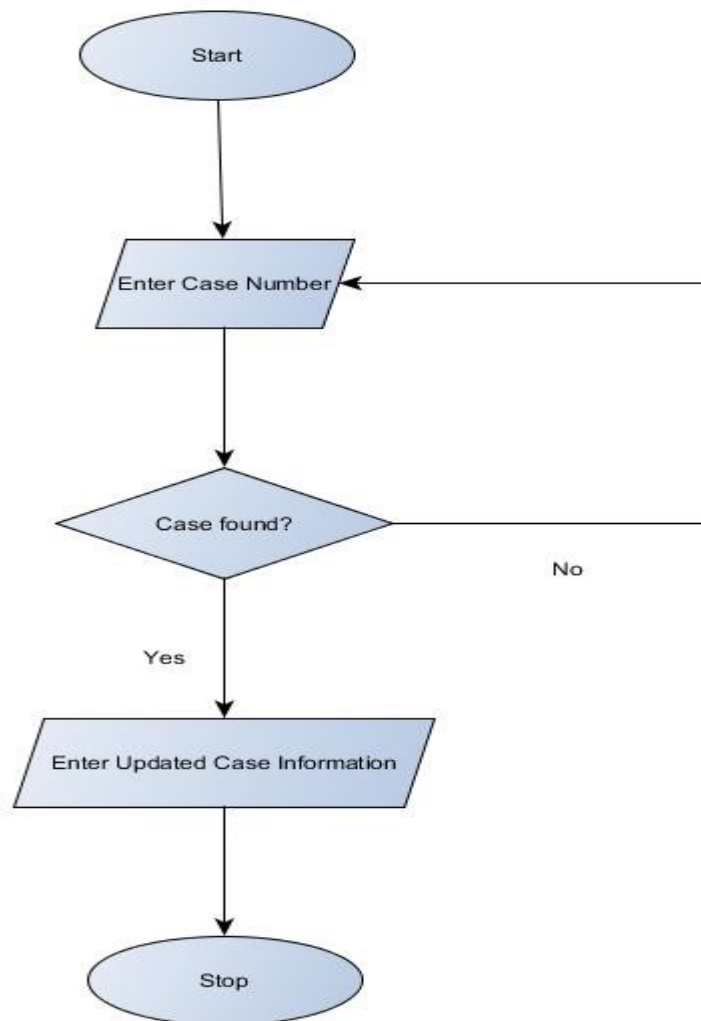
Figure 16: Updating case details

Updating Case Documents

An officer logs in.

The officer searches the case using the case number or title

The officer then selects the case document he/she wants to update

The officer then uploads an updated version of the document with some description

The original document stays.
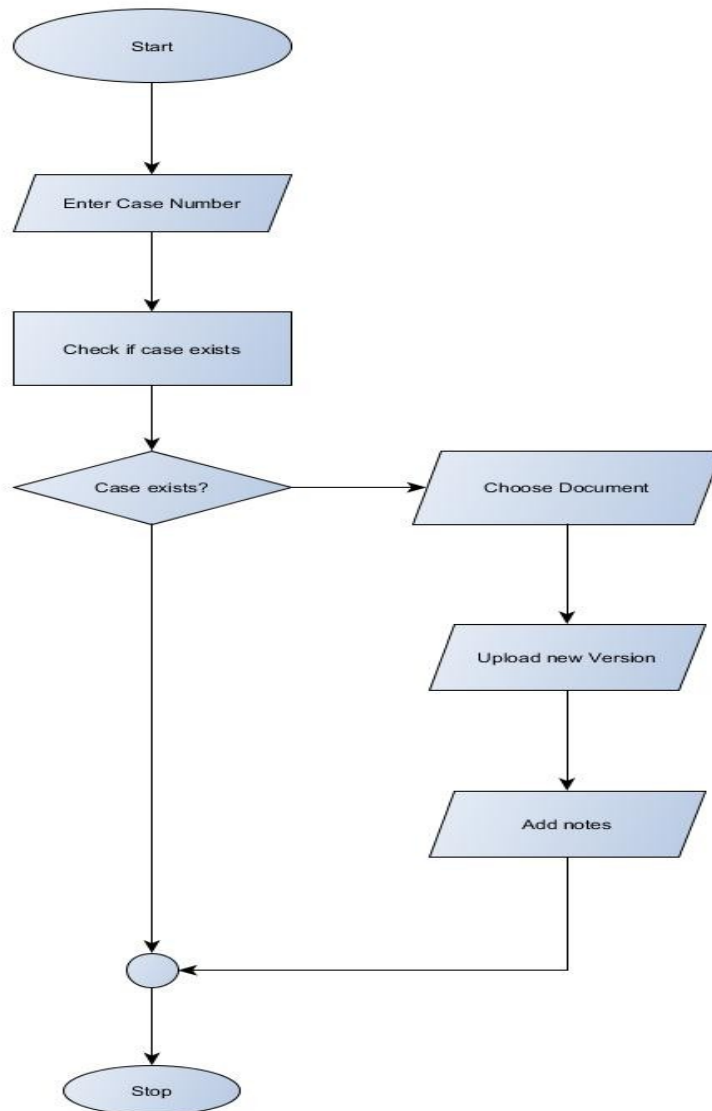
Figure 17: Updating Case Documents

Adding a suspect to a case

An officer searches the suspect using the ID number

If the suspect exists, add him/her to the case

If the suspect does not exist in the system, add his/her details to the system and then add the suspect to the case.
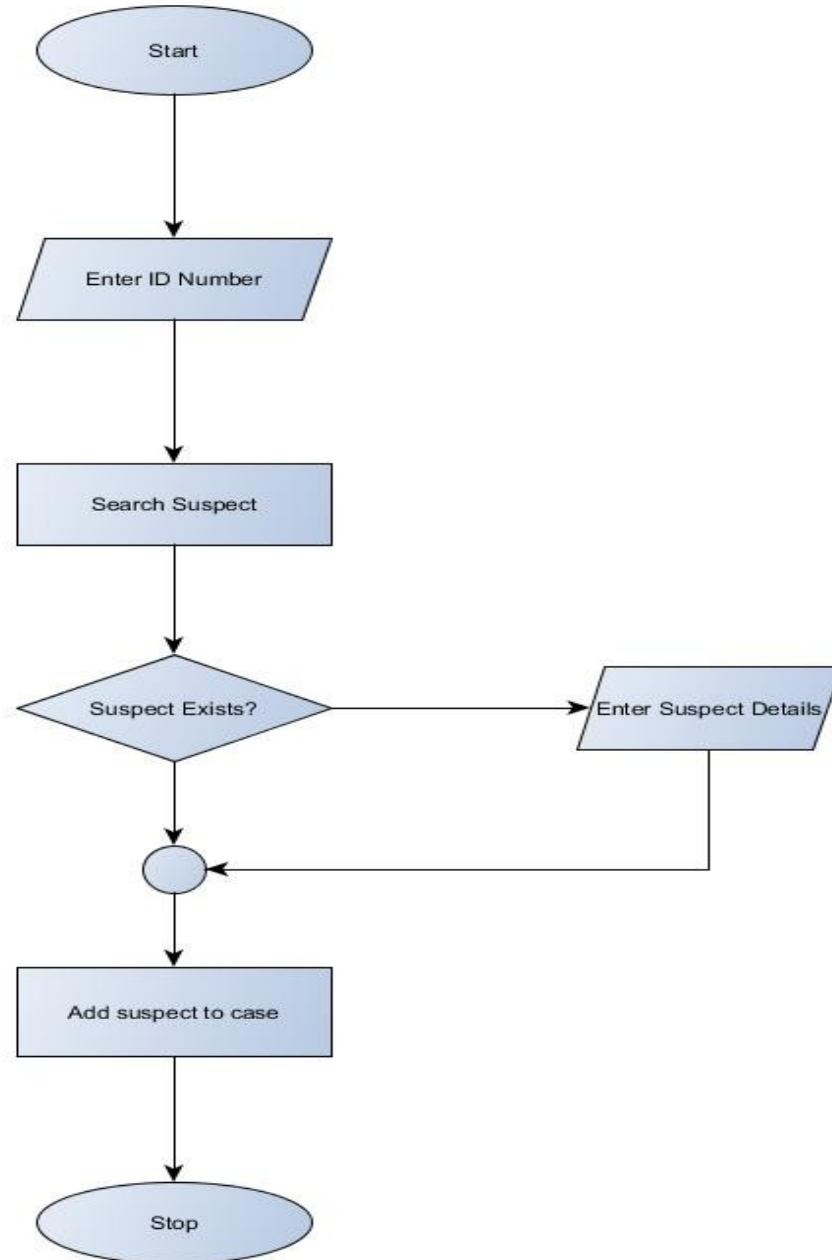
Figure 18: Adding a suspect to a case

CHAPTER FOUR: IMPLEMENTATION

On the first page of the application, a user can report a case by filling a form. The user can choose to remain anonymous or leave their contact information to be contacted later?

Ripoti Kesi Leo
Ripoti kisa kwa polisi. Unaweza ukapeana jina lako na nambari ya simu ili tuwasiliane na wewe

Kichwa

Washukiwa

Ilipofanyika

18/02/2018

Muhtasari

Mahali

Kituo cha karibu cha polisi

-chagua-

Ushahidi (Kama vile picha)

Choose File | No file chosen

Fig 1: Reporting a case

The part where the user leaves their contact information.
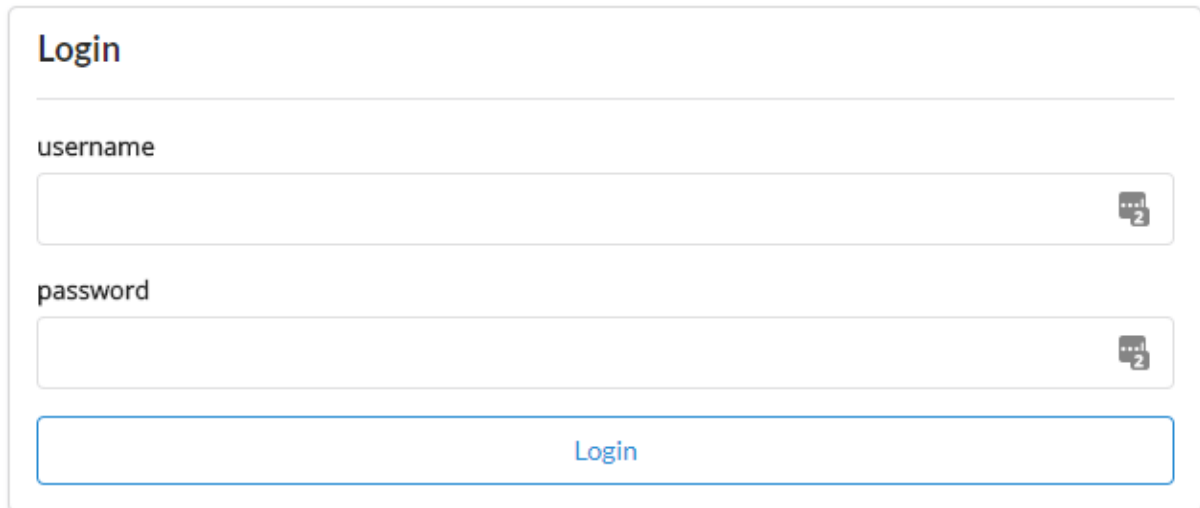
Wasifu wako
Jina Lako

Njia ya Kuwasiliana

Kama vile nambari ya simu ama barua pepe

Tuma

 The login of the system. The officers and administrators login to the system to view and share information about cases.

Fig 3: Login form

If the wrong credentials are entered, the user is shown a warning message.
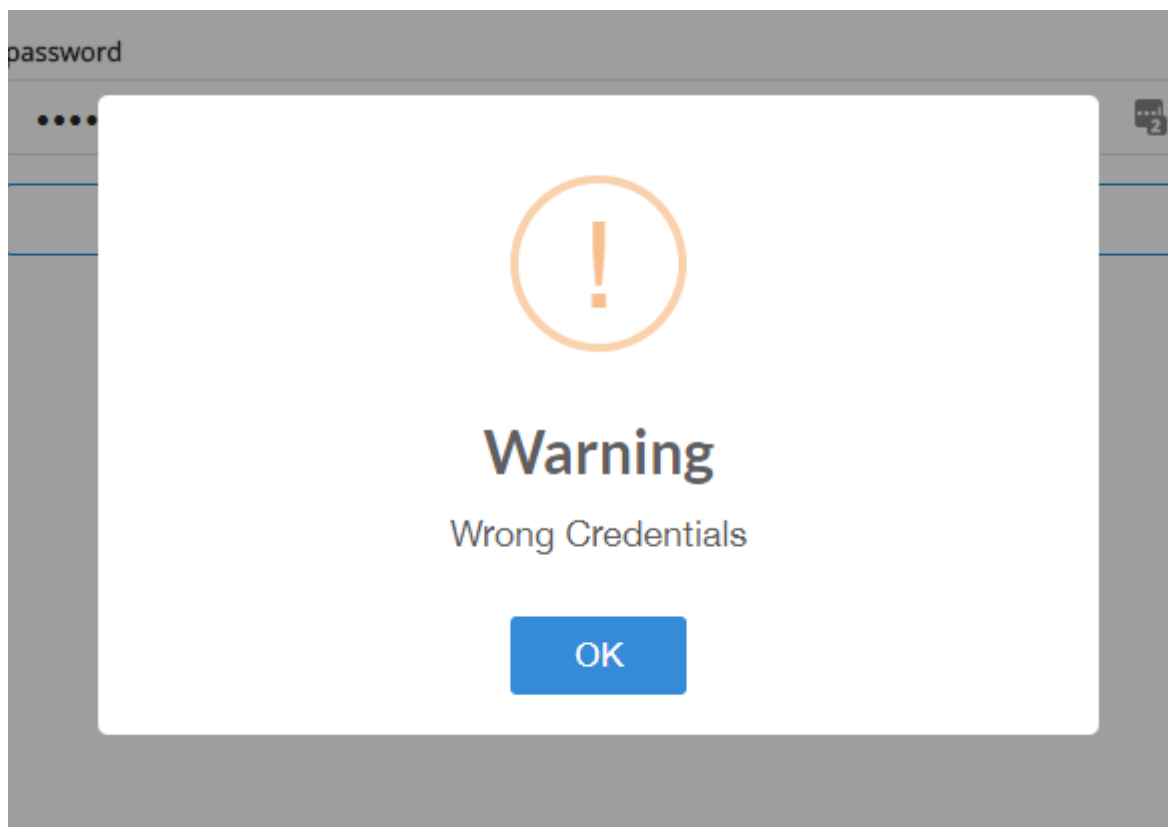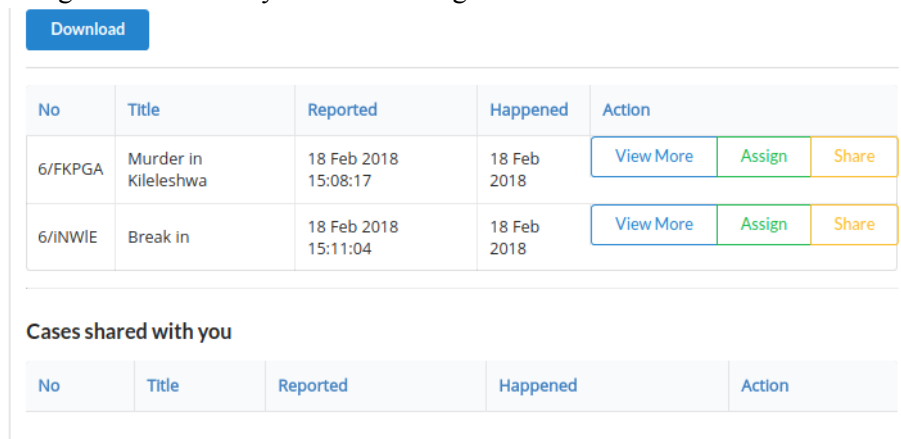

Fig 4: Warning for wrong credentials

Cases

The first page an officer sees after they login to the system. It is a page of all cases that they are in charge of or those they have been assigned to.
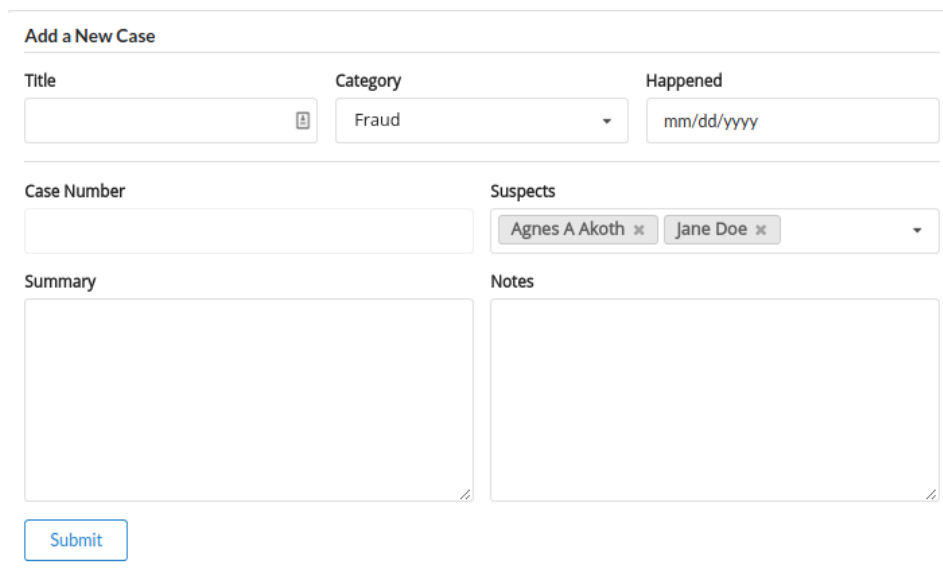

Fig 5: Cases Page

An officer can also add a new case to the system. This is if it is reported to the station by a member of the public, or if the officer encounters a scene of crime during work. They can fill in the details of the case in the system

Fig 6: New case form

An officer also has access to cases that have been reported by a member of the public through the system. They can view the details of the case and contact the person who reported if they left their contact information. If they did not, the officer can follow up the case and register it as a normal case.

No	Title	Reported	Happened	Action		
6/FKPGA	Murder in Kileleshwa	18 Feb 2018 15:08:17	18 Feb 2018	View More	Assign	Share
6/iNWlE	Break in	18 Feb 2018 15:11:04	18 Feb 2018	View More	Assign	Share

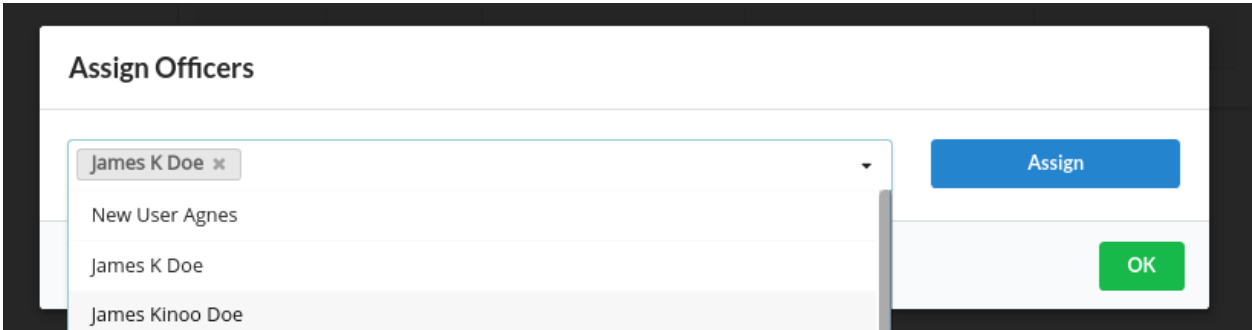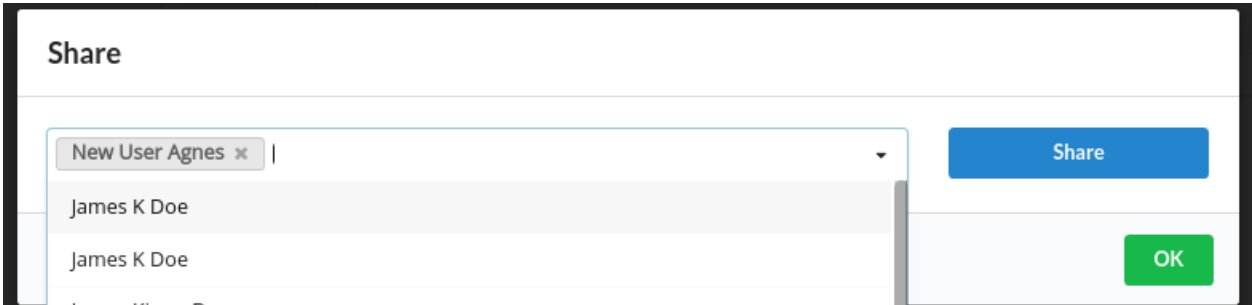*Fig 7: List of cases reported by the public*

Fig 7.2 Assigning a case to other officers in the same station

Fif 7.3 Sharing a case with officers from other stations

An officer can view the details of a case, the officers in charge, the notes of the case, the documents of the case and the suspects involved. The officer can also share the information on the case with another officer, whether the other officer is in the same station or in another station. The officers in charge of the case can view and add notes/ documents to the case. However, they cannot delete any information about the case.

Case Details

Case Number
6/FKPGA

Title
Murder in Kileleshwa

Case Open
Yes

Category
Murder

Happened
18 Feb 2018

Reported
18 Feb 2018 15:08:17

Reporting Officer
Rank : OCS

Name:Samson Chitechi
Rapando

Phone Number0720735121
:

Officers in Charge

Summary
Body found at Total petrol
Station

Notes
The dead man, James Kinuthia,
was last seen with Agnes Akoth at
the petrol station where thy were
arguing

Suspects (1)

Name: Agnes A Akoth

Gender: Male

ID Number: asddas

Phone Number: dasdsa

Description: dsafdasfsd

Picture: View More

Fig 8: Basic information about a case

By Samson Chitechi Rapando

Another eye witness, Anne Gicheru said that the man did not wake up from the trench. The woman (Agnes) touched the man in the trench and then she ran away.

Posted: 18 Feb 2018 15:20:30

By Samson Chitechi Rapando

The people in the viscinity said the man was angry with the woman and they started fighting. The woman then pushed the man in a trench

Posted: 18 Feb 2018 15:19:35

Fig 9: Notes of a case

New Note

New information has come in regarding this case

Submit

Fig 10: Adding a new note to the case

Picture of the fighting scene [Picture]
This picture was taken by a civilian

Uploaded: 18 Feb 2018 15:22:28

View More	Update

Fig 11: Documents of the case

Name

The National ID of the victim

Notes

This is the national identification card of James Kinuthia

File

Choose File Screenshot from 2...-18 15-22-38.png

Type of File

Picture

Submit

Fig 12: Adding a new document to the case

Suspects

An officer can also see suspects. A suspect is anyone who has been involved in any case. The officer can add information about a suspect and edit the information later. However, the suspects cannot login to the system.

Suspects (4 of 5)

Alive	Dead	Apprehended	Not Apprehended

New Suspect Details
Alive | Apprehended | Male
The short description
View

Jane K Kamotho
Alive | Apprehended | Female
The woman is dark and tall. She has a tatoo on her left arm
View

Kane Karanja
Alive | Apprehended | Male
The man is dangerous and armed
View

Fig 13: A list of suspects

Fig 14: Viewing/Editing a suspect

Fig 15: Adding a new suspect to the system

Users

An officer can view other officers that are using the Knowledge Management System. If the rank of the officer is Officer Commanding Station or above that, the officer can also add another officer to the system.

Fig 16: A list of users

New User

Name

| first name | middle name | last name |

| Gender | Job Title | Org Unit |
| -Language- | -select- | -select- |

| Employee Number | Date of Birth | Phone Number |
| | mm/dd/yyyy | |

| Language | Picture |
| | Choose File No file chosen |

Submit

Fig 17: Adding a new user.

References

The officers have access to reference material. The reference material has content that is helpful to the officers on how they can investigate and solve cases. An officer using the system has access to the reference materials and can also add material for other officers to read.

All References (3)

No	Title	Topic	tags	Action	
11	dsacds	cszc	scsxz	Read	
12	Murder	Murder	tags, tags	Read	Documents
10	Some Title	Topic	tag, tag, tag	Read	Documents

Fig 18: List of references

Fig 19: Adding a new reference

Murder [Murder]

tags, tags

sdfvgbcnv

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Suspendisse aliquam lacus eros, non congue massa vulputate sit amet. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Etiam ullamcorper mollis sem eget vestibulum. Curabitur feugiat faucibus elit. Vivamus interdum lorem libero, id mollis quam consectetur vel. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Suspendisse massa arcu, pharetra in mauris eu, commodo bibendum massa. Nullam leo justo, ultricies non tincidunt sit amet, imperdiet in elit.

Integer ultricies nisl nulla, tempus porta dolor blandit in. Mauris id nisi accumsan, semper libero ac, commodo turpis. Cras lacus odio, scelerisque interdum massa in, accumsan consectetur purus. Nullam maximus lacinia quam, sit amet iaculis tortor. Aliquam vulputate nulla consequat, feugiat massa mollis, vulputate nunc. Phasellus a nunc volutpat, luctus velit in, fermentum dui. Vestibulum eget odio tempus, hendrerit odio a, imperdiet nisl. Nam et elementum augue, vel pretium mauris. In suscipit diam a tincidunt malesuada. Suspendisse tempor sodales pulvinar. Praesent id eros ipsum. Pellentesque a ipsum pharetra, mollis justo a, posuere augue. Maecenas in tellus congue, lobortis ligula sed, volutpat velit. Sed ac nunc fringilla, blandit ante pretium, dictum magna. Nam viverra risus orci, sed tristique magna semper quis. Duis ultricies hendrerit mi, eget faucibus nunc sollicitudin id.

Sed tincidunt congue elementum. Nullam facilisis fermentum urna, quis vestibulum erat tempor eget. Cras mollis dapibus tellus vel ornare. Nam pulvinar neque eros, nec lobortis ligula egestas ut. Integer posuere, nisi a sodales dictum, ex orci faucibus purus, interdum hendrerit massa sapien ut neque. In consectetur elementum accumsan. Nam id metus neque. Vivamus rhoncus sollicitudin nulla. Mauris sapien dolor, ultrices at faucibus sit amet, sollicitudin ut quam. Pellentesque eu lorem sem. Sed dapibus, ligula a molestie scelerisque, dui nisl malesuada leo, eget porta libero est nec tellus. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nam eget diam faucibus neque fringilla posuere. Ut ac odio blandit, dapibus libero id, tempor augue. Mauris auctor leo elit, non aliquet tortor dapibus et.

Vestibulum suscipit, purus in consectetur fermentum, sem magna hendrerit velit, a ornare ligula dolor nec ligula. Sed et finibus dui, vel facilisis magna. Etiam porta ipsum pulvinar, finibus est nec, malesuada mauris. In feugiat dapibus mi. Aliquam dapibus tincidunt interdum. Nulla velit quam, tincidunt vel nisl vitae, imperdiet convallis ante. Vivamus quis ultrices neque, at fringilla elit. Cras quis auctor est. Suspendisse hendrerit, turpis eget sollicitudin eleifend, tortor leo vestibulum nisl, non consectetur ipsum tellus quis dui. Mauris suscipit eu lacus at cursus. Orci varius natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Maecenas aliquam aliquam augue, id luctus sapien elementum nec. Curabitur malesuada iaculis dapibus.

Ut blandit tortor ut molestie pretium. Sed a euismod tellus. Sed tincidunt est sed nisl interdum, nec feugiat ligula hendrerit. Fusce tempor erat a nulla ultrices iaculis. Nullam aliquet, ante vitae vestibulum placerat, eros lacus tempor metus, et ultrices velit ipsum quis augue. Pellentesque faucibus vitae arcu ac egestas. Sed maximus finibus odio. Phasellus at ipsum eget turpis porta lobortis. Nam id dui consectetur, vehicula tellus at, ornare sapien. Morbi urna elit, viverra ac dolor ut, volutpat posuere arcu. Suspendisse potenti. Nulla scelerisque in est eget porta. Nulla facilisi. Aliquam ut sollicitudin urna. Donec pretium accumsan leo interdum condimentum.

Fig 20: A reference article page

Organisation Units

Organisation Units are the physical locations for the officers. Each organisation unit has a parent and a level. Level 1 is Kenya, the country. Level 2 is the Police Provincial Regions. Level 3 is the Police Divisions and level 4 is the police station. Each officer is assigned to an organisation Unit. On the page of organisation units the officer can view cases in that unit and also view statistics on cases reported to that unit.

Fig 21: Organisation Unit

Language

The system is available in two languages. English and Swahili. To switch between the two, a user has to click their name on the Menu and choose the other language
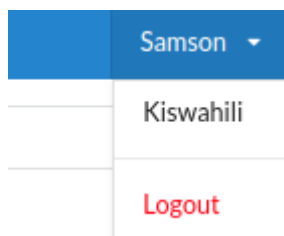
Fig 22: Choosing a language
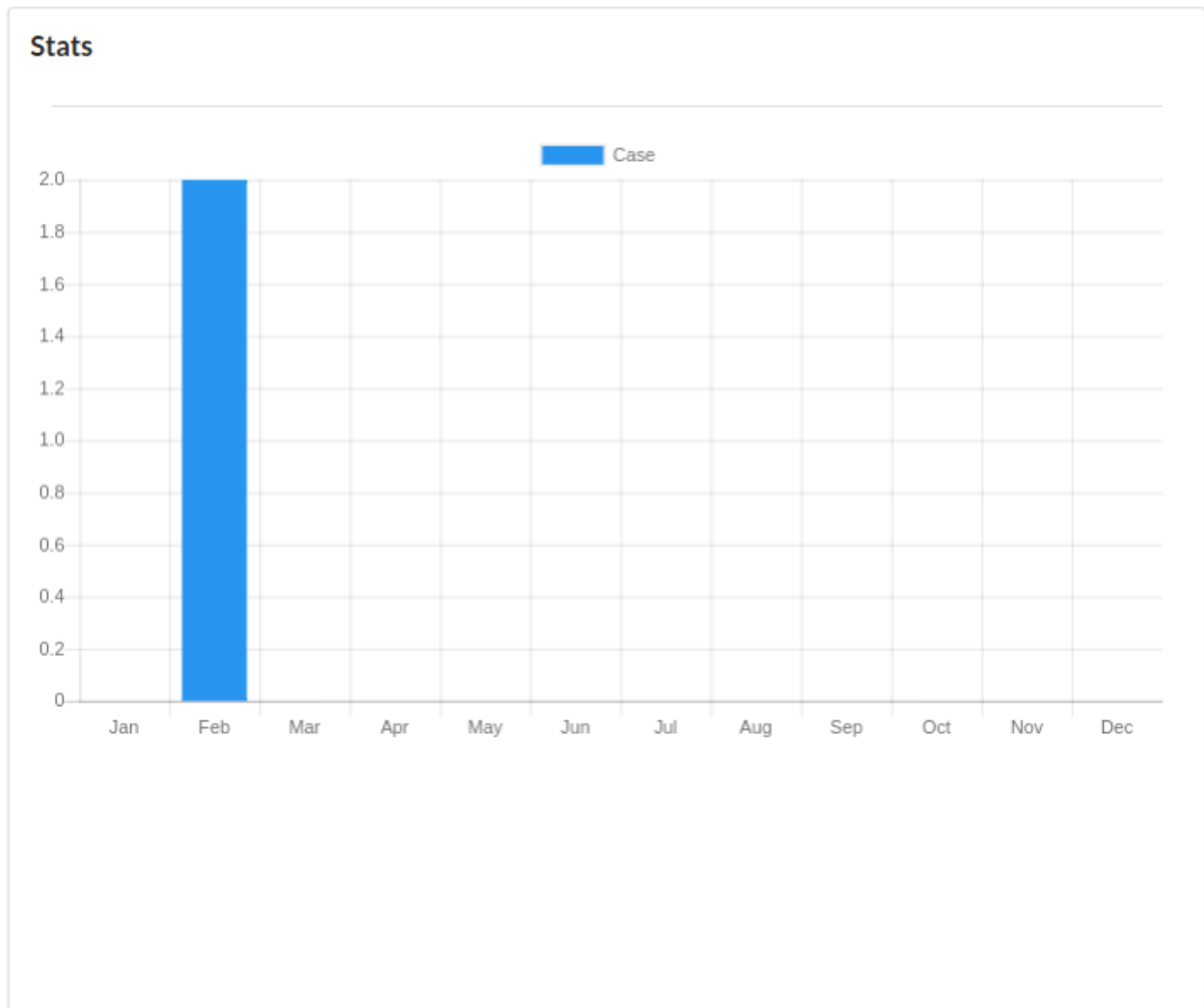
Fig 22: Stats

MEASURE IMPACT

In conjunction with implementing a knowledge management system, it is also important to measure the impact of the system in order to evaluate its performance and to manage expectations. "Through measurement, organizations can tie knowledge management programs and activities to demonstrated results,"

Using a measurement approach modified from an approach suggested by the APQC, implementation plan proposes designing knowledge management metrics which evolve as the department's implementation matures. Thus the developed specific metrics based on the department's implementation stage (pilot stage, roll-out stage or institutionalization stage). Due to the unique goals and challenges of each Implementation stage, different knowledge management metrics will be suggested.

In designing these different metrics, it is important to remember that all of the metrics chosen must align the goal of the knowledge management system with the department's overall performance strategy. Carla O'Dell of the APQC states. "One of the fundamental principles of knowledge

management measurement is that you've got to connect the measures and indicators of knowledge management processes directly to the measures that matter to your organization". In addition, suggestion on choosing a menu of both qualitative and quantitative metrics which best match both the goal of the knowledge management system in the current stage and the department's overall business strategy. Below, is the description of some of the knowledge management metrics appropriate for each stage of a knowledge management implementation.

The pilot stage

As stated above, the pilot stage of a knowledge management Implementation begins once the decision has been made to begin testing a knowledge management system. Because of the unique nature of this stage, it is appropriate to design a special set of metrics to evaluate performance.

The goal of this stage should be to prove knowledge management's worthiness such that the department can justify rolling out the knowledge management program to the broader department. Therefore, the metrics selected at this stage should seek to capture success stories and other examples of how the knowledge management system has improved the knowledge sharing capacity of the department. The "focus should be on meaningful measures that concentrate on exploring the various opportunities in your department for implementing knowledge management practices. Developing department's knowledge management strategies, measuring the progress toward departmental awareness, and experimenting with different knowledge management concept" Over-reliance on quantitative metrics at this stage may not do the program justice as users of the pilot are not yet fully aware of its capabilities as well as the fact that the pilot may be limited in its potential due to the fact that the pilot is only conducted on a portion of the department.

Some examples of qualitative metrics that are appropriate at this stage include:

➢ **Anecdotes and success stories** - The department can begin to collect anecdotes and success stories to document the benefits the pilot program has created. Such benefits can help to provide evidence to roll-out the program to the broader department.

➢ Employee awareness of the program - Beginning to build benefits at the pilot project level will help to drive increased usage during later stages.

➢ **User feedback detailing their experience** - . At the pilot stage, feedback is an important metric because it provides further evidence of the program's worthiness and it can provide helpful suggestions which can be incorporated into the broader roll-out. While quantitative measures should not be the primary focus of this stage, some examples of quantitative measures which may be appropriate include:

➢ Time saved - Measures of time saved by users as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success at the pilot stage.

- Cycle time reductions - Cycle time reductions as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success at the pilot stage.

- Contributions to knowledge database - The amount of information contributed to and retrieved from its knowledge database should be tracked to assess the degree to which the department is building its corporate memory.

- Communities of practice - By measuring the number of communities of practice sanctioned, the department can assess the degree to which its employees are meeting to share knowledge.

- Participation in communities of practice - The percentage of employees who participate in communities of practice can be used as a metric to assess the degree to which employees are in support of knowledge sharing efforts.

- Usage frequency - The frequency with which employees use knowledge databases/tools can be used to measure how useful employees perceive the knowledge databases/tools to be.

- Number of users - The number of absolute and repeat users can be used to measure how broadly accepted the department's knowledge management efforts have become.

These qualitative and quantitative metrics should attempt to capture the relative success the pilot program is having at getting users to share and transfer knowledge. A successful pilot program can provide compelling evidence to roll-out the program to the broader department.

The roll-out stage

The roll-out stage begins once the department has made the decision to expand its knowledge management pilot to the broader department. Once again, the metrics used at this stage should measure success as it relates to both the stage goals of the program and the overall business strategy because the knowledge management program is still in its infancy during this stage, it is again important to not rely too heavily on quantitative metrics. Particular emphasis should be placed on measuring relative progress from the pilot stage to the roll-out stage and building user awareness and usage. ''The value of knowledge management principles has already been proven and institutions/companies in this stage are focused on how to embed knowledge management throughout their organizations. Measures are used at this stage not to prove, but rather improve the existing projects and add to the corporate wide strategy.'' Only after a program has created awareness and educated its users can a department expect to realize the full benefit of its knowledge management efforts.

Qualitative metrics which may be appropriate at this stage include:
- Anecdotes and success stories - The department can also measure the number of such stories relative to the pilot stage and assess progress at generating successful instances of knowledge sharing.

- ➤ Employee awareness of the program across the department - The department should gauge whether it has been successful at increasing program awareness.

- ➤ User feedback detailing their experiences -The department should incorporate any feedback it received from the pilot stage in order to expand and improve its program.

- ➤ Performance review feedback -The department can also begin to include knowledge sharing as an element in employee performance reviews. Using such a performance review, the department can assess how well its employees share knowledge.

- ➤ Benchmarking -The department can also benchmark its knowledge management program relative to its peers such an analysis may indicate where the department trails its competitors and should consider focusing resources.

Again suggestion that quantitative measures should not be the primary focus of this stage: however, some examples of quantitative measures which may be appropriate include:

- ➤ Time saved- Measures of time saved by users as a result of lessons learned. Feedback from communities of practice or centers of excellence can provide meaningful evidence of success. Performance can also be compared to results from the pilot stage.

- ➤ Cycle time reductions -Cycle time reductions as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success. Performance can also be compared to results from the pilot stage.

- ➤ Quality improvement- Quality improvement in products or service as a result of lessons learned. Feedback from communities of practice or centers of excellence can provide meaningful evidence of success.

- ➤ Improvement in employee productivity -Improvements in employee productivity as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success.

- ➤ Customer satisfaction -Customer satisfaction or response time to customer inquiries can provide meaningful evidence of success.

- ➤ Contribution to knowledge database -The amount of information contributed to and retrieved from its knowledge database should be tracked to assess the degree to which the department is building its corporate memory.

- ➤ Communities of practice -By measuring the number of communities of practice sanctioned, the department can assess the degree to which its employees are meeting to share knowledge.

- ➤ Participation in communities of practice - This percentage of employees who participate in communities of practice can be used as a metric to assess the degree to which employees are in support of knowledge sharing efforts.

- ➢ Lessons learned / expert locator – Keeping a record of lessons learned or questions answered by experts can demonstrate how much knowledge the department is adding to its corporate memory.
- ➢ Usage frequency - The frequency with which employees use knowledge database/tools can be used to measure how useful employees perceive the knowledge database/tools to be.
- ➢ Number of users. The number of absolute and repeat users can be used to measure how broadly accepted the department's knowledge management efforts have become.

These qualitative and quantitative metrics should attempt to capture the relative success that the roll-out is having at getting users to share and transfer knowledge. These metrics can be measured over time to assess progress as the program gains traction.

The institutionalization stage

After the roll-out stage has been completed and been in operation for a period of time (perhaps 1-2 yrs), the institutionalization stage begins. Once again, the metrics used should measure success as it relates to both the stage goals of the program and the overall departmental strategy. During this stage, the metrics can begin to focus more heavily on quantitative metrics as the knowledge management program will have reached a more mature stage. Because a knowledge management program is a continual effort to add, delete and update knowledge contained in the department's corporate memory, particular emphasis in this stage should be placed on measuring the usage of knowledge technologies and techniques and measuring the amount of information contributed to and reviewed from its knowledge database. By keeping close watch over these statistics, the department will be able to closely monitor and ensure that its corporate memory is continually being updated.

Qualitative metrics at this stage should measure relative progress from the roll-out stage to the institutionalization stage. Examples of metrics which may be appropriate at this stage include:

- ➢ Anecdotes and success stories - The department should continue to measure the number of such stories even at this stage. These stories are useful to assess the progress the department has made as well as provide additional motivation for employees to continue program usage.

- ➢ Employee awareness of the program across the department - At this stage, employee awareness should be high across the department. However, the department should continue to monitor awareness to insure that there are not divisions or sections of the department which are less informed than others.
- ➢ User feedback detailing their experiences - The department should continue to incorporate any feedback it received from the pilot and roll-out stages in order to expand and improve its program.

- Performance review feedback - The department should also continue to include knowledge sharing as an element in employer performance reviews. Using such a performance review, the department can assess how well its employees share knowledge.
- Social network analysis -The department can conduct periodic social network analyses in order to assess the department's current level of knowledge sharing. As the knowledge management program matures and expands, the department should begin to see enhanced connectivity in its social network maps. To the extent that the department discovers areas of the department which are not as connected as other areas, then the department may seek to focus greater attention and knowledge management resources on this area of the department.
- Benchmarking -The department can also benchmark its knowledge management program relative to its peers. Such an analysis may indicate where the department trails its competitors and should consider focusing resources.

During the institutionalization stage, quantitative metrics can play a larger role. However, these quantitative measures should be used to check progress and monitor the continued evolution of the culture.' Some examples of quantitative measures which may be appropriately during this stage include.

- Time saved - measures of time saved by users as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success. Performance can also be compared to results from the pilot and roll-out stages.
- Cycle time reductions – Cycle time reductions as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success. Performance can also be compared to results from the pilot and roll-out stages.
- Quality improvement – quality improvement in products or services as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success. Performance can also be compared to results from the roll-out stage.
- Improvements in employee productivity – improvement in employee productivity as a result of lessons learned, feedback from communities of practice or centers of excellence can provide meaningful evidence of success. Performance can also be compared to results from the roll-out stage.
- Customer satisfaction - Customer satisfaction or response time to customer inquiries can provide meaningful evidence of success. Performance can also be compared to results from the roll-out stage.
- Contribution to knowledge database - The amount of information contributed to and retrieved from its knowledge database should be tracked to assess the degree to which the department is building its corporate memory. During this stage, it is important to monitor how current the

department is keeping its knowledge database. Measures can be designed to keep tabs on the documents added, deleted and updated to the database.

- Communities of practice - By measuring the number of communities of practice sanctioned, the department can assess the degree to which its employees are meeting to share knowledge. Performance can also be compared to results from the roll-out stage.

- Participation in communities of practice - The percentage of employees who participate in communities of practice can be used as a metric to assess the degree to which employees are in support of knowledge sharing efforts. Performance can also be compared to results from the roll-out stage.

- Lessons learned / expert locator - Keeping a record of lessons learned or questions answered by experts can demonstrate how much knowledge the department is adding to its corporate memory. During this stage. It is important to monitor how current the department is keeping its lessons learned and directory of experts. Measures can be designed to keep tabs on the lessons added, deleted and updated.

- Usage frequency - The frequency with which employees use knowledge database/tools can be used to measure how useful employees perceive the knowledge databases/tools to be. Performance can also be compared to results from the roll-out stage.

- Number of users - The number of absolute and repeat users can be used to measure how broadly accepted the department's knowledge management efforts have become. Performance can also be compared to results from the roll-out stage.

- ROI -The department may also wish to measure return on investment which incorporates the revenue gain or savings from a knowledge management initiative relative to cost of the initiative.

These qualitative and quantitative metrics should attempt to capture the relative success that the program is having at getting users to share and transfer knowledge, to maintain high levels of usage and to contribute to and retrieve knowledge from the department's knowledge database, communities of practice and of centers of excellent . These metrics can be measures over time to continually assess the progress of the program.

Promote and Advertise Success

The last stage of implementation process is to promote and advertise the success of the knowledge management initiative. Such promotion is key to the long-term success of the initiative. "If people see the system as a powerful resource, they are also more likely in contribute to it." The more success stories that employs bear about, the more encouraged they are to increase their usage of the knowledge management tools and technologies. This leads to a "snowball effect" in which increased usage leads to further success stories which, then, leads to further increased usage.

There are several ways that a department can promote management efforts. A department can advertise its knowledge management techniques and technologies in a corporate newsletter or on the corporate intranet. If the department holds regular on-site or offsite meetings, the department can devote a portion of time to further describing its knowledge management tools. These tools can also be incorporated into the department's training program for new hires or into the department's continuing education efforts. By using these different media, the department can both educate its employees on its new knowledge management initiatives and encourage use by advertising success stories.

CHALLENGES AND CRITIQUES OF KNOWLEDGE MANAGEMENT

Knowledge Management Challenges

"A 1997 report from the Ernst & Young Center for Business innovation in Cambridge, Mass., and Business Intelligence Ltd. in London revealed that 94% of 431 organizations surveyed in Europe and the United States have executives who believe it would be possible, through more deliberate management, to leverage the knowledge existing in (their organizations) to a higher degree. Yet, while there's a lot of faith in the concept of knowledge management, 71% of those same executives rated their businesses average or worse at 'embedding knowledge in processes, products and/or services' Knowledge management will remain an elusive goal until companies overcome the barriers - both organizational and otherwise- to instituting it."

Because the benefits of knowledge management have remained elusive for a number of organizations/companies, it is worthwhile to explore some of the primary challenges companies face when implementing knowledge management systems. These challenges will be introduced in this section and the case study section which follows will discuss how selected companies have addressed and overcome these challenges in their successful implementations.

Justifying an investment in knowledge management

The first challenge that is often encountered is how to justify the importance of knowledge management.

The qualitative methods also have limitations. For example, social network analysis requires the firm to understand and map all of the communication linkages between its internal and external partners

Scenario planning may also have limitations. The use of scenario planning to justify an investment assumes that the firm accepts scenario planning as a strategic planning tool.

Finally, there may also be some challenges associated with applying the real options approach discussed above.

However, despite these limitations, these approaches attempt to enhance the firm's ability to understand the relative value that an investment in knowledge management can provide. Attempting to quantify an investment in knowledge management is no different than attempting to quantify an investment in any other intangible corporate asset, including investments in training, information technology or branding. While each of these types of intangible investments are difficult to quantify, at some level, sound business judgment which relies on relative value and benefits must factor into the investment decision.

Obtaining senior management support

As discussed in the previous section, obtaining senior management support for the importance of knowledge management is crucial.

Overcoming cultural hurdles to sharing

Another hurdle that some organizations/departments need to overcome is the natural cultural aversion to sharing that exists in many organizations.

Encouraging employees to use and share knowledge.

Some departments/companies design their knowledge management program under the "if we build it, they will come" philosophy

Aligning firm practices with knowledge management strategy.

A common mistake that some firms make is that they fail to properly align their knowledge management strategy with their overall business strategy and other firm practices.

Confidentiality issues may limit ability to share knowledge

In some situations, the ability to share knowledge may be limited by client confidentiality.

Technology is a means to an end and not the end itself

It is important to remember that a knowledge management program is a comprehensive strategy to improve a firm's knowledge sharing and retention.

Potential for over-reliance on knowledge management system

One of the potential drawbacks to developing a knowledge management system is that employees who rely extensively on the system may be constrained by the limits of the knowledge contained in the system

Firms may collect and store the wrong information

Some firms fail to properly assess what knowledge they should retain.

Project scope may be over-ambitious

Another challenge that some firms must grapple with is how to manage the scope of their knowledge management initiative.

CHAPTER FIVE: CONCLUSION

There is little evidence that the police profession is aware of Knowledge Management as an overall management strategy, but is involved in Knowledge Management activities in an incremental way. Knowledge Management, as a purposeful organizational strategy, is more than an innovation in itself, but is a fundamental part of the innovation process that is essential to sustaining an organizational culture that is based in innovation. If the police profession is to sustain its position on the "cutting edge" of innovation, there is a need to integrate the various knowledge management techniques into an interrelated system (see Figure 9). Such a system would link very specific crime type analysis with daily patrol strategies, monthly Computer Statistics (COMSTAT) process and the larger Comprehensive Model for Police Advanced Strategic Support (COMPASS) process that extends beyond the boundaries of the police department. While police departments may have adopted recent innovations because they need to, the relative rapidity of the adoption of recent innovations (Weisburd, 2001, Weisburd, et.al. 2001) and the emergence of intrinsically innovative police departments (Pendleton, 2002) suggest a growing natural interest in innovation. When police departments want to be innovative, they will re-craft their organizational structure, policy and practice. In effect, innovation will become an intrinsic value.

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APPENDICES

2 COST AND MATERIAL ESTIMATES

S/No	Item	Specification	Quantity	@ KShs.	Amount, KShs
1.	Internet Data Bundles		3 months	3,000	9,000
2.	Printing paper	High quality	5 reams	500	2,500
3.	Printer		1	12,000	12,000
4.	Binding and spirals				
5.	Writing pad	A4 size, High quality	5	100	500
6.	Laptop	HP Pavilion Intel core i7- 6500U	1	85,000	85,000
Total					**109,000**

3   ACTIVITY SCHEDULE:
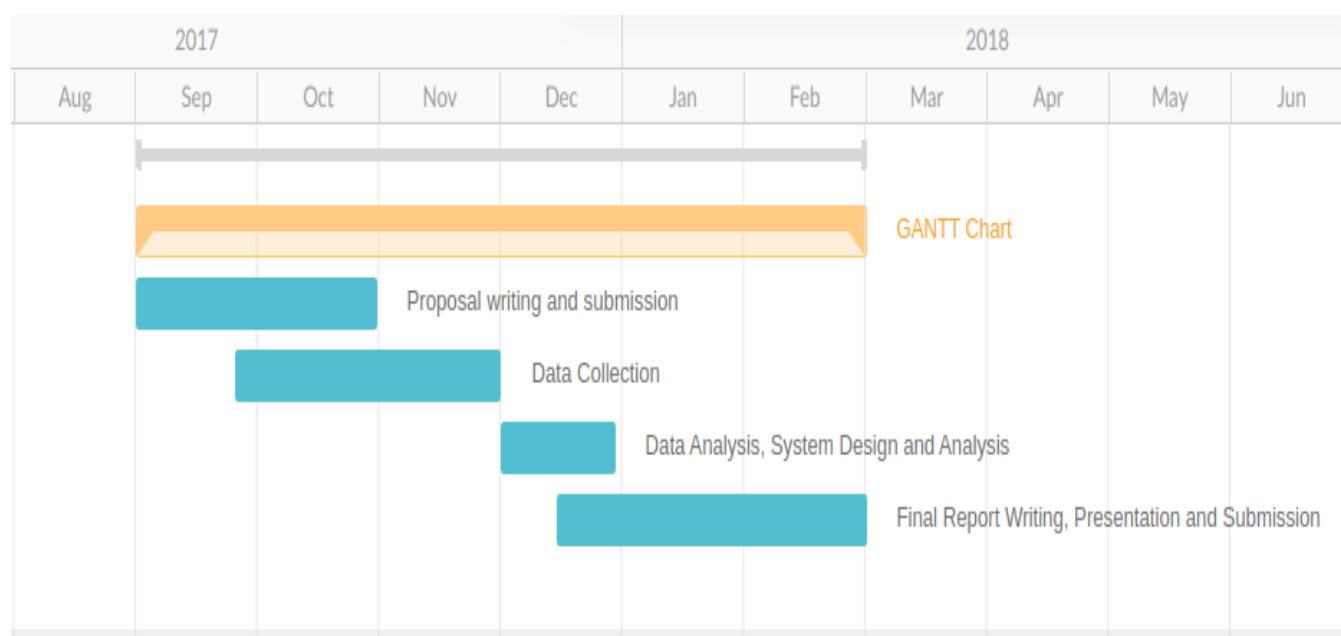
4   Questionnaire

Survey on case reporting and follow up Questionnaire

Directions: Please answer as much as you possibly can. In cases where you have to choose a score between strongly disagree and strongly agree, place an "X" mark in the box that matches your answer.

Q1. For how long (in years) have you worked in the police service?

Q2. Have you ever recorded a new case in the OB?

☐ Yes ☐ No

Q3. Have you ever been in charge of a case from investigation to the time it was closed?

☐ Yes ☐ No

Q4. What challenges did you face in the process of managing a case?

_____

Q5. What changes would you suggest to be made in the process of reporting and following up a case?

_____

Q6. In the following section, please mark the appropriate box with an "X"

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The process of reporting a new case is easy and straightforward					
All cases that are reported are followed up closely until they are closed at the court.					
Cases are not compromised by other police officers.					
It is easy to identify a repeat offender					
It is easy to transfer a case from one police station to another					
It is easy for officers from different stations/ departments to collaborate on the same case.					
It is easy to retrieve evidence for a case.					
It is easy to communicate with other officers on a case.					
It is easy to report a fellow officer if they report a crime					
Police officers on patrol are able to easily report a case.					
The process of reporting new cases should be done using a computer system.					
It is easy to find supporting materials (like books and posts online) that help in solving a case.					

Q7. Have you ever received threats because of a case you were working on?

☐ Yes   ☐ No