

# **GWERU COMPLAINTS REPORTING AND ADMINISTRATION MOBILE APPLICATION**



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## **ABSTRACT**

Service delivery to the citizens is the core business of the Gweru City Council. This means that they have to provide quality services always in order to keep the citizens secure from disease and crime. To enhance the quality of the services provided the city council the Gweru Complaints Reporting and administration mobile application is an effort to ease the process of lodging complaint by providing a highly available online system. This is an effort to make the city smart. A Smart City is one whose municipality uses which uses Information and Communication technologies to improve operational efficiency and to share information with the public. This system is there to solve the problem of not having a system for reporting problems and faults that encourages accountability for both the citizens and the city council. The manual system does not provide for effective communication between the city council and the citizens. A research on other existing complaints system was done and it proved that most complaint system are moving from having to visit the organisation to lodge complaints to online complaints management systems. The feasibility study was carried out to see if it was a viable project. It encompassed economic, technical and operational aspects. The system comprises of two environments that is the mobile application and the web administration application. The mobile application is intended for the citizens and the web application for the city council. The citizen can upload pictures and videos when lodging complaints and their GPS coordinates are captured. The web application will use geographical analysis to find the problem site and determine the best routes. There is an initiation by the town council to start using Geographical Information systems which is an important tool for service delivery. Installation and maintenance strategies are outlined which show all the considered strategies and ultimately the chosen strategy. The complaints mobile application is easy to understand and use and will make a difference in making the city smart. Smart cities

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# **CHAPTER 1: INTRODUCTION**

## **1.2 INTRODUCTION**

The Gweru Municipality Complaints Reporting and Administration Mobile Application is a system that will assist the citizens in lodging complaints and tracking the complaints. It will also assist the officers in making decisions on how to respond to requests. In this chapter the problems with the current system will be outlined. A background of the study will give an understanding of other solutions being currently used. The aim and the objectives of the project will be outlined.

## **1.2 BACKGROUND OF STUDY**

Among the many challenges for governments in countries of both the developed and undeveloped world, is the rise in public expectations about standards of public services. Customer satisfaction has become as important an indicator of performance in the public sector as it has long been in the private sector the citizens have no efficient way to communicate with the council offices. According to Jacobs (2010), feedback is important because it allows service providers to be more confident about quality from the user's viewpoint and to learn about the scope and directions for service improvement and development. Traditionally, users of public services, the world over, have had little direct impact on the nature or quality of provision, and have largely been expected simply to accept the standards they encounter or receive (Alford, 2002). According to Faed (2013), while most companies have to manage complaints of some kind, certain businesses like healthcare institutions, municipalities, educational systems, financial services companies, restaurants, and retailers also have to consider how failing to properly handle a complaint could potentially damage their reputation or even create liability due to compromised compliance. Online based complaints system are being implemented the world over and have significant results in service provision in banking, shopping, insurance, medical care and so on.

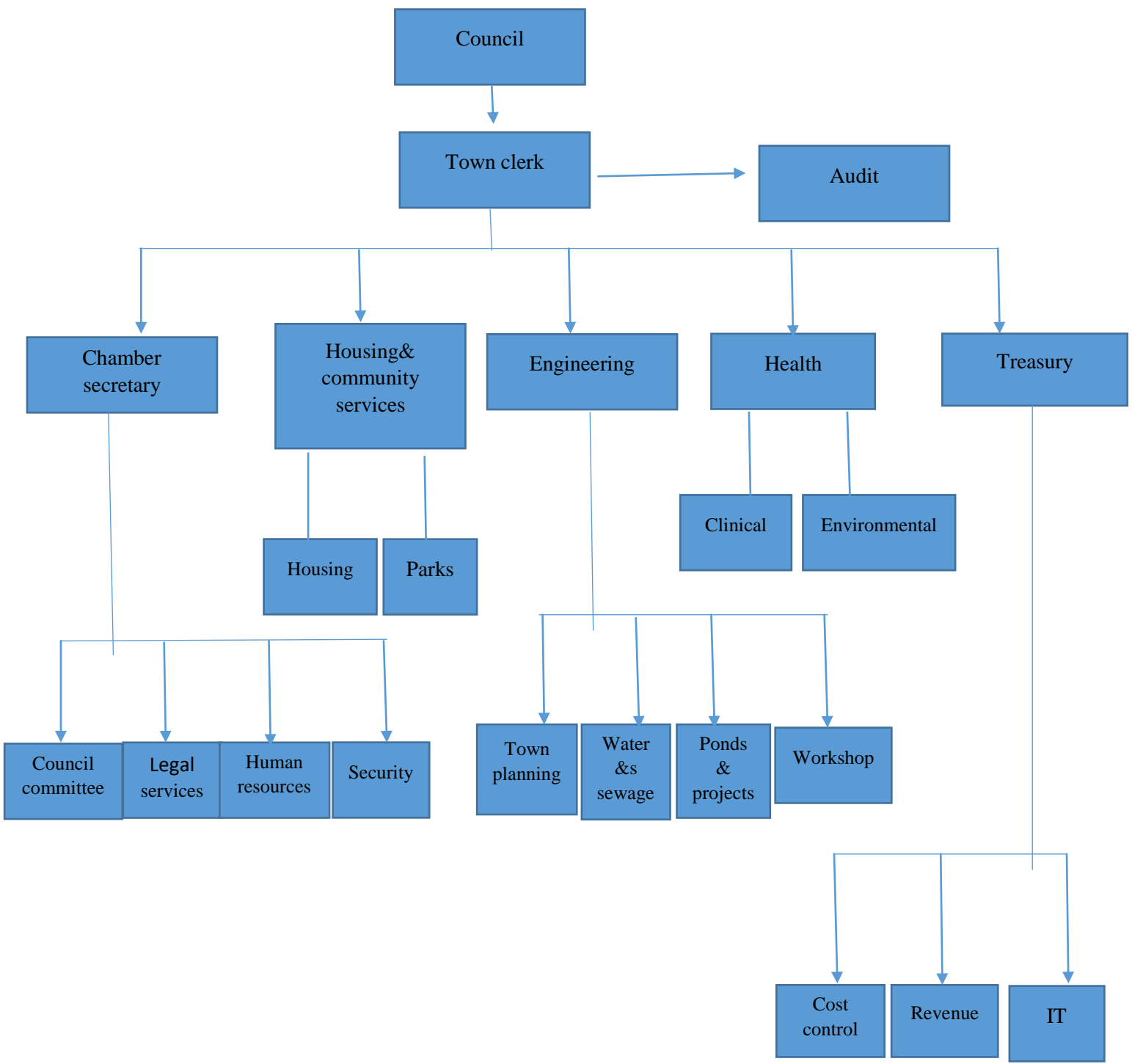
### **1.2.1 Background of the Organisation**

(Wordpress 2018), Gweru city was founded in 1894 by Dr. Leander Starr Jameson. It grew and attained its city status in October 1973 and now is the third largest city in Zimbabwe. Today, Gweru city has a municipal area that covers over 30 000 hectares. The population of Gweru as at the population census of 2018 is estimated at 146 073. Gweru city is divided into 18 wards each represented by an elected Councillor. The council of Gweru is led by His Worship the Mayor councillor Josiah Makombe. The Executive Management is comprised of the town clerk, director of the engineering services, director of finance, director of health, chamber secretary, director of housing and community services.

### **1.2.2 Organisational Structure**

According to Buchman and Huczynski (2004) an organisational structure is a formalized system for task and reporting relationships that manages, coordinates and motivate the organisation's employees so that there would be team work such that the organisational goals are achieved. Therefore it is put in place to characterize how the jobs, roles, duties and posts are isolated, coordinated and assembled in formally in an organisation.





**Fig 1.1 Gweru Municipality Organisational structure**

### **1.2.3 Vision**

To be a dynamic, green and prosperous city.

### **1.2.4 Mission Statement**

Gweru City council is committed to good governance, the provision of cost effective services to its residents and promoting local economic development.

## **1.3 PROBLEM DEFINITION**

Neelankavil (2015) asserts that problem definition is an articulation of the data required by the on making decisions to give a clear understanding of what is supposed to be solved. Problem definition is the most critical step in conducting a research, Hass and Springer (2014). Stating the problem gives heading to the research. Gweru (named Gwelo until 1982) is a city in central Zimbabwe. The Gweru City Council is an administrative body responsible with service provision for residence of country's capital. Responsibilities range from the provision of clean drinking water, health services, decent housing and refuse collection and many others. In the existing system being used by the Gweru municipality, the citizens must go to the municipal office or make a call to log a complaint and they have to wait for a response team to be assigned. The problem may go for days without being fixed. The public cannot get information regarding the problem and fix procedures which include date and time. The authorities are not notified of some of the problems because they would be insignificant and may escalate to become lager problems as the current system is tedious. The authorities cannot verify the extent of the issues lodged because they do not have visual evidence or because the description would be inadequate.

## **1.4 AIM**

To build a unique system that connects the public and the local authority where complaints, suggestions and solutions can be posted and the administration can analyse the recurring problems in the community and reasons

## 1.5 OBJECTIVES

- To create a mobile solution that can be accessed from mobile phones where the citizens can lodge complaints and keep track of the solution suggested by the authorities using an assigned unique complaint ID
- To use geospatial analysis to improve the service delivery in water for residential and industrial areas, sewage, health and hospitals by determining the best route to the problem site
- To be able to verify the problem by giving the user an option to upload pictures and videos of the occurring problem at a specific time in order to allocate adequate resources
- To increase citizen participation and transparency in the municipality's efforts to resolve raised issues and concerns
- To prioritize issues by checking for duplicate request and to reallocate resources to high priority requests

## 1.6 INSTRUMENTS AND METHODS

Valencia (2016) suggests that in a research it is ideal to state the instruments and methodologies that are to be used in the development process. The following are the tools that are to be used in the development of the application.

### PHP

- PHP is a server side scripting language that is used to develop Static websites or Dynamic websites or Web applications. PHP stands for Hypertext Pre-processor, MySQL
- MySQL is an Oracle-backed open source relational database management system (RDBMS) based on Structured Query Language (SQL). MySQL runs on virtually all platforms, including Linux, UNIX and Windows.

### Adobe Dreamweaver

- Adobe Dreamweaver is a software program for designing web pages, essentially a more fully featured HTML web and programming editor

## XAMPP Server

- The acronym XAMPP refers to a set of free (open source) applications, which are commonly used in Web server environments. The XAMPP stack provides developers with the four key elements of a Web server: an operating system, database, Web server and Web scripting software.

## Android Studio

- Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development.

The research techniques are questionnaires, interviews and observation. Kimberly (2006) defines questionnaires as questions that are arranged in a certain manner that are intended for a particular audience which give their answers and that information is used in a research. An observation data gathering through watching and studying a system, the components in the system and how it operates. An interview is an oral process whereby the interviewer asks and probes for information from the interviewee.

## **1.7 JUSTIFICATION AND RATIONALE**

The Complaints and Administration mobile application is based on Android which is a mobile phone platform. There is a rise in the number of people using android based smart phones which means that the mobile application can be accessed by a large population in the community. Using the mobile application the citizens can lodge complaints online anytime with convenience as the mobile application would be highly available to them. The authorities would be able to verify locations of the requests, assess severity of the lodged complaints. They can process multiple complaints lodged and review them effectively. There is better transparency as the local authorities can communicate with the citizens and the ability of citizens to track their requests.

## **1.8 CONCLUSION**

Complaints can be easily registered by the user and can be tracked with a unique complaint ID. Both the admin/authority is restricted to edit or delete the complaint. The authority can only update the progress status of the raised complaint. The user can then view the progress of the complaint. The complaint and reporting system for the Gweru Municipality will not only save the time of the complaint fillers but also lead to track their complaint and its status in a regular interval of time. Once the reply of the complaint is given, the user get the update on it phone and email address as well. The use of Geographical information systems will assist in decision making which will increase response time by the local authorities responsible for fixing the issue raised.

## **CHAPTER 2: PLANNING PHASE**

### **2.1 INTRODUCTION**

To lead a project under investment demand successfully there is need for an assessment to ascertain that the project is technically, socially, economically and operationally viable. It involves making a thorough assessment of the factor that are financial and no financial that may or may not contribute to the success of the project. This chapter reveals the business value of the proposed project by calculating return on investment, the net present value and a cost benefit analysis and to legitimize venturing in the project. Potential dangers that have high and low probability of occurrence during the development life cycle are to be analysed in order to come up with plans to counter them.

### **2.2 BUSINESS VALUE**

As defined by Bennatan (1995), business value is the principles and standards that a system must conform to in its performance and the characteristics that make it valuable to the business. Highlighting and pointing out the business values that are brought about by the use of computers in an organisation is a very difficult task. The productivity of an organisation can be improved to greater extent by the use of computers in the day to day business processes. Haris et al (2008), supports the point by posing a question that asks the expectations of organisations from the use of information technologies as in this proposed complaints reporting and administration mobile application. Haris et al go on to assert that the usage of information technologies must bring maximum benefits at lower costs to answer the question.

The proposed system is an online application where the citizens can lodge complaints which are then attend to by the administrator and gives a response on proceedings fix the problem. The business qualities of such a system can be streamlined into fundamental classifications.

#### **2.2.1 Shareholder Value**

Shareholder value is delivered to the shareholder by the organisation or the partners in the business venture. The shareholder is meant to enjoy from the value they have. The major shareholder of the proposed project is the Gweru city Council. They are to put an investment

into the project and are to be the sole owner of the application. This means that they would have authority over the operations of the proposed system

### **2.2.2 Customer Value**

Time required to lodge complaints will be reduced and the service would be highly available which means citizens can use the application at their most convenient time. Explanation of the request would be easier as the request can be accompanied by pictures and videos.

### **2.2.3 Employee knowledge**

Employee knowledge is the expertise that an employee has and that they acquire while working for an organisation over a period of time. Employee knowledge could be the business they brought to the organisation or the operational knowledge that cannot be acquired from an education institution. This knowledge has to be harnessed in order to know the processes that are done at the Gweru city council. This information is useful in coming up with a system that the employees can understand and relate to. The employees of the Gweru city Council must have skill to administrate the website and also the database. Basic computer skills are also required. However before the implementation of the system employees are going to be trained.

### **2.2.4 Channel Partner Value**

A channel partner may be an organisation and or a person that can provide a service or sells products on behalf of a networking, software, cloud services and or hardware vendor. Examples of channel partners can be consultants, value added resellers, system integrators and so on. For this particular project the author is the channel partner. The main objective is to utilize the resources availed to develop a mobile application that can be used to lodge complaints and to track the complaints while on the administrator side they are able to manage the complaints with ease.

### **2.2.5 Supplier value**

A supplier is an organisation or an individual that sells products or provides services to organisations or individuals. The supplier is expected to be committed and provide support, generate feasible proposals, develop required actions and implementation plans, perform detailed technical and cost analysis and to communicate about specific proposals. Suppliers are going to be required for the supply the hardware and software components of the system.

### **2.2.6 Managerial Value**

A manager is someone who is responsible for the control and administration of resources in order to achieve a certain goal. The project manager is responsible for coming up with the project plan, risk analysis, feasibility analysis, coming up with project team and communication between parties involved. The manager is integral in a project as they are responsible for the general operations of the project. If the project manager fails in any of the duties the project would be likely to be delayed or to fail.

### **2.2.7 Societal value**

A society is an aggregate of a group of people who live together following a set of rules and standards of living. The society in question for the proposed system is the general population of Gweru across all wards. They are going to be affected directly by the system as it is developed to ease some of the processes they carry out to better their communities. Information about the current system also comes from the citizens. Suggestions on preferences for the new system can also be acquired from them.

## **2.3 FEASIBILITY STUDY**

According to Bruce and Langdon (2000), to commence a project it is necessary to take precautionary steps which include analysing the feasibility to guarantee the success of the project. Feasibility study is an economic analysis that is carried out to ascertain the ability of the final product to satisfy the objectives of the investor. A feasibility analysis is done to confirm if the proposed system meets the organisation's objectives. It also analyses if the system will produce with the budgeted technologies available. It also analyses the implementation of the proposed system to see if its processes will not affect the existing systems. Simpson et al (2004) argue that the following are the main aspects of the feasibility study.

### **2.3.1 Technical Feasibility**

Mathers (2006), asserts that technical feasibility analysis is significant as it assesses and asserts if the framework is usable and viable, mulling over the condition of hardware and the public included. In this, the abilities of the clients of the proposed system can be revealed to see if they can utilize the framework proposed. According to Rosenblatt (2012), technical



feasibility is far reaching in deciding the attainability of a quality product while checking the present condition of the technology available or that can be attained.

The technical requirements for the proposed system are hardware and software and are as follows:

Quantity	Component	Specifications	Status
1	Production server	<ul style="list-style-type: none"> <li>• 32Gb RAM</li> <li>• Intel Xeon processor</li> <li>• Speed of 3 GHz</li> <li>• 1 Tb HDD.</li> </ul>	Will be bought for the project
1	Backup server	<ul style="list-style-type: none"> <li>• 32Gb RAM</li> <li>• Intel Xeon processor</li> <li>• Speed of 3 GHz</li> <li>• 1 Tb HDD.</li> </ul>	Will be bought for the project
6	Desktop computers	Minimum specs <ul style="list-style-type: none"> <li>• 4Gb RAM</li> <li>• Intel core i3 processor</li> <li>• 1.8 Ghz processor speed</li> <li>• 500 GB storage</li> </ul>	Departments already have desktop computers which meet the requirements specified
	Networking		The is already a fully function network
1	Storage	<ul style="list-style-type: none"> <li>• HP Direct Attached Storage with expansion bays</li> <li>• 5 Tb storage space</li> </ul>	Not available but can be acquired in the limits of the budget

**Table 2.1: Hardware requirements**

Quantity	Component	Specifications	Status
6	Operating system	64 bit Microsoft Windows 7 or better	They already have licensed windows 7 operating systems
1	Database	MySql	Open source software
1	Webserver	xampp	Open source software

**Table 2.2: Software requirements**

### **2.3.2 Economic feasibility**

Jeffrey (2001), describes economic feasibility as a profit test aimed at finding out whether the system will have enough returns or losses. The principal aspects addressed by the economic feasibility of a project are the financial strengths and other related resources that can be quantified in monetary terms in relation to the costs that an organisation is liable to bring about the required proposed system, also paying as much attention to the usage and keeping up of the proposed framework after implementation (Kendal, 2006). Economic feasibility is more concentrated on the financial costs that are to be incurred during the development of a project and how they can be kept at minimum (Munsaka, 2013). The costs of developing a new project and cash inflow that is expected to be generated by this project when implemented are all going to be weighed against each other in order to make decisions on whether the project should be carried on with or not .To simplify this, economic feasibility infers that costs including the entire costs associated with the possession and upkeep of a system, all consolidated should be surpassed by the normal focal beneficial points that the proposed framework is set to convey.

#### **2.3.2.1 Development costs**

The aggregate related costs to be experienced in the entire project development procedure are termed development cost. Jewell (2000) characterizes development costs as expenses that are encountered during the development process of a new system.

Unit	Quantity	Price (\$)
Production server	1	18 000
Backup server	1	18 000
Desktop computers	6	available
storage	1	14 600
Total cost		50 600

### **Table 2.3 Development Cost**

#### **2.3.2.2 Operational Cost**

According to Stoner (2000) operational expenses are costs which keep happening in spite of meeting each and every development cost. Operational costs are particularly related to the operation of a framework (Cadle and Yeates, 2008). Operational costs are only incurred after the system set up/execution and continue doing in that capacity for whatever time span that the framework continues working. These are represented on the accompanying table.

Operational cost	2019	2020	2021	Total
	(\$)	(\$)	(\$)	(\$)
Maintenance and support	4 000	3 000	3 000	10 000
Training	3 000			3 000
Total	7 000	3 000	3 000	13 000

### **Table 2.4 Operational cost**

Total costs including operational cost and development cost is \$63 600.

### **2.3.2.3 Cost benefit analysis**

Cost benefit analysis is a process of analysing the inputs for the proposed system and the possible gains as asserted by Whitten and Bentley (2008). Cost benefit analysis can be broken down to two steps

1. Estimation and identification of all costs of carrying out the project from the beginning to the end that is the operating costs, deployment costs and other small costs that may be deemed insignificant.
2. Express the cost and benefits in common units to evaluate the net benefits.

Costs and benefits are expressed in monetary terms.

#### **Cost**

Steward (1987) explained cost as the charges that are related to development and operational of the system. These costs are categorised according to their origination in the system development life cycle and these costs are identified and quantified in the approximate monetary value. The cost is grouped into either developmental cost or operational costs. The development cost consists of the following:

- Cost of user training
- Setup and equipment cost
- Expert hiring

The cost incurred during the system development only and are being estimated at the onset of the system development and should be refined on each and every project phase.

Operational cost is categorised as fixed or variable and these costs incurred during the development of the big data project.

- Fixed Costs: these costs occur at regular intervals and at rates which are relatively fixed.
- Variable costs: These are cost that occur depending on the usage factor.

#### **Benefits**

Benefits come along with the system were grouped as either tactical benefits or strategic benefits.

- Tactical benefits are the long-term benefits that are realised by the management team. These benefits can help to improve the working environment or socially.
- Strategic benefits that help system to perform better at a lower cost and usually are regarded as intangible since they are not seen clearly by anyone.

Steward (1987) grouped benefits as tangible and intangible. The tangible benefits are the benefits or costs that can be measured. These costs are known in the project development and they can be estimated accurately. Intangible benefits are not easily quantified for example improvement of the customer’s service through the use of the system. During the evaluation process the intangible and tangible benefits must be taken into consideration. Some of the benefits that can be noticed after implementation of the project includes the following

### 1. **Tangible benefits**

These benefits are hard to estimate but the farmers will enjoy these benefits in the future.

- Provides communication between the citizens and the city council
- Reduction in stationary use
- Easy navigation to problem site
- The system is highly available, complaints can be lodged at any time day or night with ease
- Capacity: multiple users can lodge complaints and review them easily.

Tangible benefits can be represented in monetary term as the following table shows

Year	2019	2020	2021	Total
Item	(\$)	(\$)	(\$)	(\$)
Stationary	200	200	300	700
Reduced operational costs	20 000	23 000	25 000	68 700
Total	20 200	23 200	25 300	68 700

**Table 2.5 Tangible Benefits**

## 2. Intangible benefits

- Time saving
- Good will: According to Siegel and Shim (2014) good will is the assumed value of the attractive force that generates sales revenue in a business, and adds value to its assets. Goodwill is an intangible but saleable asset, almost indestructible except by indiscretion.

Intangible benefits are difficult to estimate in monetary terms and to justify. For example the level of customer satisfaction

Year	2019	2020	2021	Total
Item	(\$)	(\$)	(\$)	(\$)
Good will from the customers	10 000	12 000	15 000	37 000
Total	10 000	12 000	15 000	37 000

**Table 2.6 Intangible Benefits**

The estimate summation of the intangible and tangible benefits in monetary terms \$105 700

### 2.3.2.4 Return on Investment (RIO)

RIO is defined by Lucey (2011) as the ratio between the investment cost and the net profit resulting from a resource investment that the difference between the gains and what had been invested. The following equation is used to calculate the return of investment.

$$\frac{\text{Net benefits} - \text{total costs}}{\text{Total cost}} * 100$$

The total benefits are derived from both the tangible and intangible benefits

$$\text{RIO} = \frac{105\,700 - 63\,600}{63\,600} * 100$$

RIO = 66.2% (correct to one decimal place)

#### **2.3.2.4 Conclusion**

There is no actual revenue that can be generated directly from the use of the mobile application. However, the investment is to come from the City Councils budget for innovative ideas to better service delivery. The benefits from the system can however be determined from the benefits of mobile solutions that have been implemented. The development of multipurpose computers has been growing at a high rate, thus the capabilities of mobile phones are known.

#### **2.3.3 Social feasibility**

As defined by Hoffer et al (2006), social feasibility analysis is a study on how a certain project will affect the community that is anything that is outside the participating organisation.

- There is going to be better transparency and accountability by the local authority to the public
- The citizens can report any problem with ease, thus any insignificant issue can be reported
- This use of mobile computers that are android based to assist us in daily operations
- Is increasing, thus this would be easy for the citizens to adapt.

#### **2.3.4 Operational feasibility**

Bentley et al (2006) view operational feasibility as an assessment of how the system operates to tackle the challenges and its fit to the business environment and the business processes as well. Operational feasibility measures how well a proposed system eliminates an identified problem, and exploits identified opportunities in scope defining how it fulfils the prerequisites distinguished during the requirements analysis of the system development phase. The main focus of operational feasibility is on issues which

incorporate the proposed system utilization once there is successful implementation (Rosenblatt 2012). It is of best interest to take a glance at the helpfulness of the recently proposed system mirrored against the present working framework so as to have the capacity to completely welcome the new framework's attainability as far as its operational efficiency is concerned (Rodger, 2005).

- The proposed system is web based and the citizens will access the system using their mobile devices which would be android based. Use of android based mobile phones is growing rapidly.
- The administration can use the geographical information system to provide better services in a timely manner.
- There is better communication and clarity when citizens lodge their complaints.

## **2.4 RISK ANALYSIS**

Risk analysis is to identify all possible hindrances to the project that may or may not cause it to stop, or that may cause major delays in coming up with the final product. Through this process possible solutions are suggested for the possible risks. Risks can be categorised.

### **2.4.1 Technical risk**

The technical risk analysis is done in the project development in order to produce high quality products and to avoid poor outcomes. The technical risk consists of the following:

- Giving task to the personnel with appropriate skills to avoid poor software.
- Formation of teams with people with different skills to allow modular programming, experts will be doing hard tasks while beginners will be doing simpler tasks.
- Be able to track and trace the error during the development of a software.

### **2.4.1 Risks in Software Development Process**

During the software development process, the engineers may face several threats that can hinder the success of the project if they do not take of those development risk. The following



checklist and guidelines help to notice the software development related threats and the possible counter measures:

- The writer gathers and ensure that all the processes are planned and well documented to avoid confusion.
- Ensure that the stockholders are following the planned and documented process.
- Ensure that each and every stage is tested before proceeding to the next stage.
- To ensure that all the software bugs are successfully removed and to avoid the same problem to occur during development

### **2.4.3 Project Schedule**

Most of the software projects fail due to the tight schedules which result in poor quality product. To avoid that risk the writer planned the work schedule and resource schedule in a way that no delays will take place in order to meet all the deadlines. The writer worked so hard, sometimes the writer over the night in order to deliver high quality product on time.

## **2.5 WORK PLAN**

According to Rajaraman (2004) defined work plan as the outline of the small and major tasks to be done in the software development process. The work plan consists of the team members and the corresponding task the member should perform. The work plan consists of the following:

- The list of the members and their corresponding task to perform in the project.
- The equipment list needed to complete the project.
- The project breakdown into tasks in their completion order.
- The schedule showing the activities with their start date, duration and end date.

### **2.5.1 Work Breakdown**

The work breakdown groups and it defines the project's tasks and its elements in a manner that helps to define and help to organise the work to be done in the project

Task	Start	End	duration
------	-------	-----	----------

Project introduction	27/08/2018	31/08/2018	1 week
Planning	03/09/2018	07/08/2018	1 week
Analysis	10/09/2018	21/09/2018	2 weeks
System design	24/09/2018	12/10/2018	3 weeks
Implementation	29/10/2018	02/11/2018	1 week
Monitoring and Maintenance	05/11/2018	07/12/2018	3 weeks

**Table 2.7 Work Breakdown**

### 2.5.2 Gantt Chart

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11
Project introduction											
Planning											
Analysis											
Design											
Implementation											
Monitoring and Maintenance											
Documentation											

**Fig 2.1 Gantt chart**

## 2.6 CONCLUSION

Carrying out the project of developing and implementing a Complaints Reporting and Administration Mobile application is feasible. Technical and financial requirements have been clearly outlined and they are in the reach of the interested parties. Risks associated with development process have also been outlined and the procedures to be taken to mitigate the risks. The following step is to outline the design of the system.

## **CHAPTER 3: ANALYSIS PHASE**

### **3.1 INTRODUCTION**

This stage of the development life cycle aims at performing an in-depth analysis to understand the business needs. System requirements are to be studied and put into structures. This is achieved by asking questions about the problems that exist, the adoption of certain methods of work, and the alternatives that are available. Requirements gathering techniques such as interviews, observations and questionnaires are used in an attempt to understand all aspects of the current system and eventually indicate how things may be improved by the new system. The current system is studied to collect facts and an analysis of the limitations of the current system.

### **3.2 INFORMATION GATHERING**

Information gathering helps the individual and the organization to undertake complicated tasks that would otherwise be extremely hard to accomplish if not outright impossible without the benefit of gathered information. According to Roth et al (2012) Information gathering, in general practice is collection of data to be used by an individual or organisation to help with their current situation. More data helps broaden the minds of those who have been tasked to solve the problems. Information Gathering is an assignment for the researcher. The information gathering methodologies are questionnaires, observation and interviews.

#### **3.2.1 Questionnaires**

Roth et al (2012) defines questionnaires as a set of arranged questions usually answered sequentially by a number of certain individuals to obtain information for a particular research. In circumstances where there are many people whose viewpoints and data should be gained it is better to make use of questionnaires (Dennis et al, 2012). Questionnaires are suitable to collect data from a sample population that is the citizens of Gweru. The structure of the questions require yes or no answers and short answer questions to make it easy for the audience. The question asked about the challenges and faults that are faced that concern the Gweru city council and the method of reporting they use and the response of the city council to their requests. They also ask about access to mobile phones in this case android based.

### **3.2.1.1 Findings**

From a survey of 200 questionnaires spread through all ages of able starting from high school students about 84% use and have access to android mobile devices, 8% using iOS phones, 5% using Microsoft windows and the remaining 2 percent using other and some do not have mobile phones.

The most common methods of lodging complaints is calling and visiting the city council offices. Some of the issues are not raised with the city council. There is no communication after the complaint has been lodged until they call again to check if there is no response

The most challenges that are faced are lack of water supply, burst pipes, burst sewages, and garbage collection.

### **3.2.1.2 Advantages**

- There was ease in reaching out to a large sample population
- Anonymous questionnaires promote unbiased responses thus the data is reliable to some extent
- Respondents could attend to the questionnaires at convenient time to them

### **3.2.1.3 Disadvantages**

- Requires a lot of time to aggregate that data from the questionnaires
- After distribution, collection is the next step. At times the questionnaires were not answered and is time consuming.
- There is no certainty that the respondent will take their time to answer and to also give proper information

### **3.2.2 Interviews**

Roth et al (2012) define an interview as a methodology intended to acquire data from a man's oral reaction to oral requests and suggests that this is still the most commonly used fact finding methodology. Seidman (2013) asserts that in most cases of a research, an interview that is fully and properly carried out is the most appropriate method of gathering data in a research. Interviews were aimed at the employees of the city council. To acquire information

on the processes that are done when responding to a request. This kind of information cannot be accessed by reading or using questionnaires. The employee knowledge can only be attained from the employee. Probing for this information is the best way to attain the information. The question were seeking for information on how they process the lodged complaints and people involved when responding to a specific request.

### **3.2.2.1 Findings**

The complaints are lodged and are recorded at the help desk and the process is manual. When the complaint is lodged the attended at the help desk then must send the request to the department responsible. The department then assigns personnel and resources available to the problem site.

The request has to go through the helpdesk attendant, the supervisor of the department and then to the technicians. The technicians have to then determine the site to where they have been requested.

All of the employees have computer skills that are adequate to be able to use the system.

### **3.2.2.2 Advantages**

- The researcher can acquire first-hand information from the employees about the processes they take according to their code of conduct.
- Other relevant information can be attained when the interviewer probes for information. The information would not have been thought of by the researcher.

### **3.2.2.3 Disadvantages**

- To interview different people from different departments is a time consuming exercise
- The interviewees may not comfortable with giving out information as the rules and regulations of the organisation restrict them from giving out information.

### **3.2.3 Observations**

Roth et al (2012) assert that an observation is a process of data gathering through watching a procedure or different procedures while they are being performed. Watching and observing a system as processes are being performed gives better understanding and the observer gets a

grasp at how things work. The researcher must observe the process of lodging the complaint, how the information is passed around from one person to another, communication with the distressed party.

### **3.2.3.1 Findings**

Complaints are lodged and recorded by the help desk assistant. The helpdesk assistant writes an email to the responsible department. When a call is made the helpdesk attendant redirects the call to the responsible department. At times they may be no one to attend to the call.

They use maps to find the request location and sometimes their street knowledge. There is no consistent up keep of records of the lodged complaints.

### **3.2.3.2 Advantages**

- The information gained is first hand and nothing is distorted or hidden from the researcher. Thus, the researcher will get the exact answers that he or she is searching for.
- There is less interaction with the staff thus it is easy because there is no need to create reports.

### **3.2.3.3 Disadvantages**

- It is time consuming as there is need to observe for days as there would be differences in location of requests, type of request and personnel on duty
- Some organizations do not welcome external observers or feel comfortable to carry on with their day to day activities whilst they are being watched

## **3.3 ANALYSIS OF EXISTING SYSTEM**

### **3.3.1 Description**

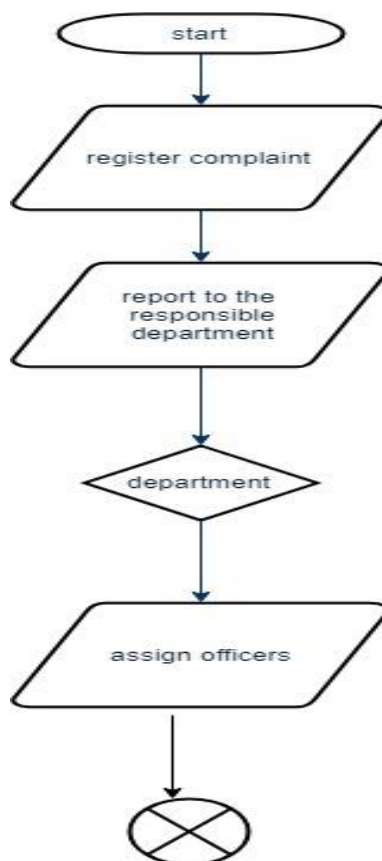
In Gweru, for one to report a burst water pipe, or other related service faults, citizens have to travel to the municipal offices where they are directed to different offices just to make a single report. Citizens can also call the city service numbers which can be found online via the Telone Online Directory or My Gweru website. The city doesn't even have a public website where citizens can be updated on the current events and programmes by the local authority.

### 3.4 PROCESS ANALYSIS

Process analysis is a step by step breakdown of the phases that must be completed of a process to be successful. It is used to outline the inputs, operations and outputs of each phase. This analysis aims at giving and improving the understanding of how the process works, and determine the potential alterations and improvements to the process by removing all unnecessary items and increase efficiency. The process analysis of the current complaints system can be represented by an activity diagram.

#### 3.4.1 Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system similar to a flowchart or a data flow diagram. Activity diagrams are often used in business process modelling. Activity Diagrams describe how activities are coordinated to provide a service which can be at different levels of abstraction. Activity diagram is essentially an advanced version of flow chart that modelling the flow from one activity to another activity.

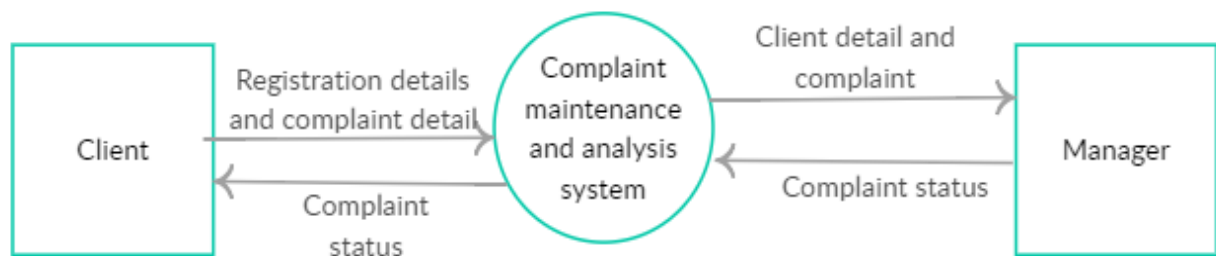


**Fig 3.1 Activity Diagram**

### 3.5 DATA ANALYSIS

Data analysis is an aspect that seeks to enhance the representation of data when there is need for one to implement it as a database. Data analysis is carefully taken into consideration and is a well calculated process of decision making on deciding the most useful and important data that has to be taken note of.

#### 3.5.1 CONTEXT DIAGRAM

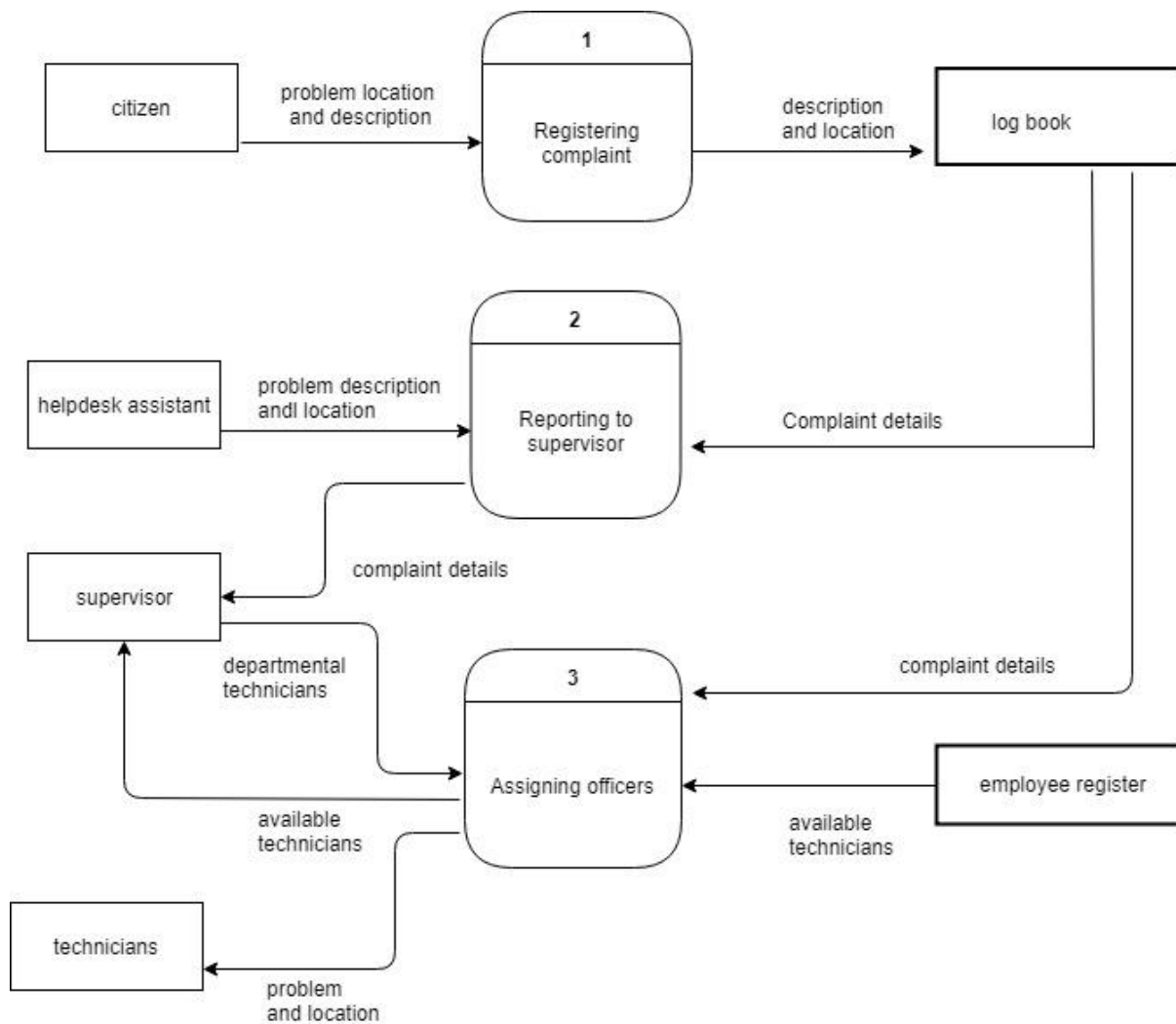


**Fig 3.2 Context diagram of the existing system**

#### 3.5.2 DATAFLOW DIAGRAM

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.





**Fig 3.3 Data Flow Diagram of the Current System**

### **3.6 WEAKNESSES OF THE CURRENT SYSTEM**

- The citizens have to visit the city council offices and make calls in order to register a complaint and also to track the progress. This system is mostly available during working hours
- There is little and at times no transparency and accountability of the city council on the registered complaints and requests
- People have to wait for each other until it's their turn on the queue or when the line is open to lodge a complaint
- The process is manual and capturing and analysing data is difficult
- It is difficult for the assigned officers to navigate to the problem site

### **3.7 ANALYSIS OF ALTERNATIVES**

Evaluation of the available alternatives to make the system more efficient is done to highlight the advantages and disadvantages from each course of action and the reason why one option is chosen. There are various solutions that can be chosen by the organisation to address the problems being faced.

#### **3.7.1 Outsourcing**

According to Shelly and Rosenblatt (2010), outsourcing is the process of obtaining a software from an external entity or organization, the organization that provides the software either tailor makes the software for the contracting organization or the organization in need will buy an already developed software that performs similar tasks of the required software to address a particular problem. Outsourcing has its advantages. One is that it is relatively fast as an external entity develops or provides an already existing solution. All the work is shipped to the performing organisation thus business processes that are carried out by the employees is continued without any disturbances. However this option is not viable because the packages that are available are expensive to buy and maintain as the vendor has to be contacted if the system fails or malfunctions, the software package is robust and the employee has to work accordingly to the system, the software packages are usually large thus the organisation will pay for some functionality they do not require for their operations.

#### **3.7.2 Improvement**

This is just a simply way of modifying the current system so as to enhance its effectiveness. This method does not do away or throw away the existing system but rather improves it either by computerizing certain aspects of its operations and in this case, computerizing the application and information storing processes. The current system is manual and requires someone to physically attend to citizens with requests. Improvements would be challenging because to integrate the manual processes with some that are computerized such as tracking may be difficult and this may cause some of the data may not be captured. Improving the system has its upside such as maintaining privacy and confidentiality, reduce development and operational cost and less training.

### **3.7.3 Development**

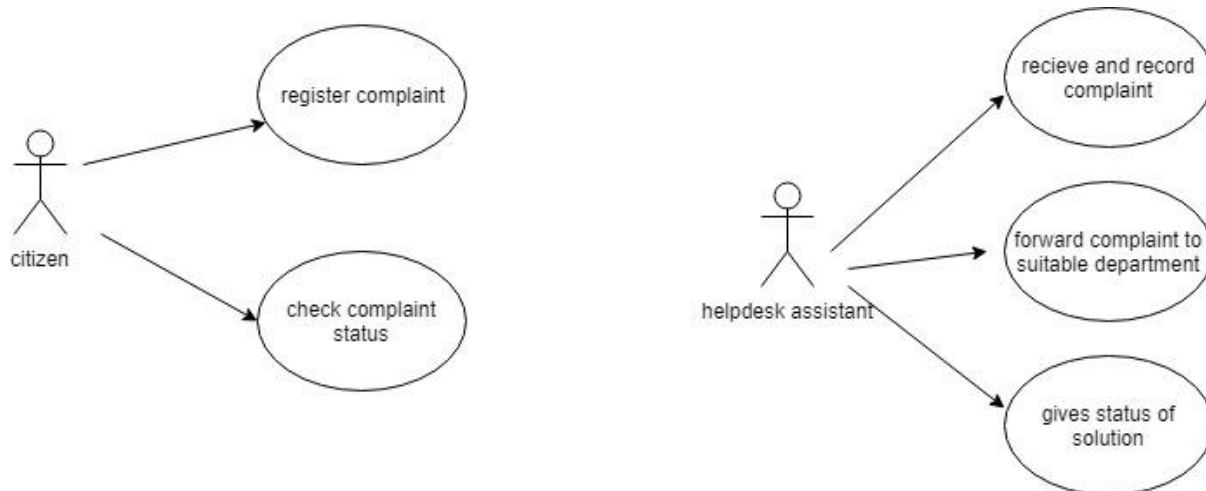
As stated by Shelly and Rosenblatt (2010) in-house development involves developing of a software by the internal members of an organization especially the I.T department in order to address a particular problem brought about by the current system. The option of in-house development has become increasingly more viable because of the current stability of the software industry due to proper funding hence the availability of open source development tools. Availability of reliable development tools means that there developers can develop with more accuracy and precision thereby satisfying the needs of the organisation. A proper documentation is kept for future references. The in-house team will have the source code thus maintenance and alterations and updates can be done with ease. These are the reasons why the development is more viable. It is not without its disadvantages. It shuts out new innovative ideas that may have come with outsourced solutions. There is a limited knowledge base thus the final product may not be state of the art or may be lagging behind.

## **3.8 REQUIREMENTS ANALYSIS**

### **3.8.1 Functional Requirements**

Thompson (2013) relates functional requirements to the targets of the real actual design of the system. When a new system is being developed and is at its design phase, functional requirements can be specified as the requirements that are initially identified and are usually hard to identify. A functional requirement is a specific functionality that defines what the system is supposed to accomplish. The complaints reporting and administration system will have the following functions:

- Creating an account by the users that is the administration and the citizens
- Lodge complaints which would have unique ID for tracking the request.
- Upload videos and images of the problem being reported
- Make use of the GPS to give location and determine route
- Statistical information is to be kept for analysis



**Fig 3.4 Use Case Diagram**

### 3.8.2 Non-functional Requirements

- Security: the use of access control methods such as passwords and user accounts will guarantee that privacy and confidentiality of the information of the organization is maintained.
- Performance: concurrent usage and access will speed up the processes of the system.
- Operation: this is an easy to use system that will be easily accessed on the World Wide Web irrespective of our different geographical areas.
- Supportability: the system shall be easy to install and configure. Incorporating supportability facilitating features will typically result in more efficient system maintenance and reduce operational costs as well as maintain the organization's continuity.
- Usability: the proposed system shall be more efficient to use that is, it will take less time to accomplish a particular task. It will also be easier to learn and more satisfying to use.
- Reliability: the system shall be fit for its intended purpose and performing as the users require it to

### **3.8.2 Constraints**

A couple of challenges can be defined in the midst of the adjustments and tune ups of the system being made and created. In any case, the challenges perhaps be experienced in the midst of various motivations behind the improvement procedure of the new system.

- Employees may be impenetrable to change as a result of the fear of the obscure. This may generally be as a direct result of the anxiety of using computers.
- The implementation process of the system will require a ton of time.
- Resources deficiency which come as the major blow to the organisation.
- The accomplishment of the new system is not flawless in any case since programming errors and also the generation of the required algorithms may present itself as a challenge.

### **3.9 CONCLUSION**

Analysing the existing system is an essential part of the development lifecycle. The existing system has a lot of shortcomings which have to be solved and the android application which has a server side for the administration would address some of the issues that cause in efficient provision of resources. There are several options in making the system more efficient, these options were analysed and it was concluded that developing a new automated system with an android application is the best solution. From the information gathered about the existing system the functional and non-functional requirements for the new system were outlined. the information gathered is sufficient for starting the design of the of the new system.

# CHAPTER 4: DESIGN PHASE

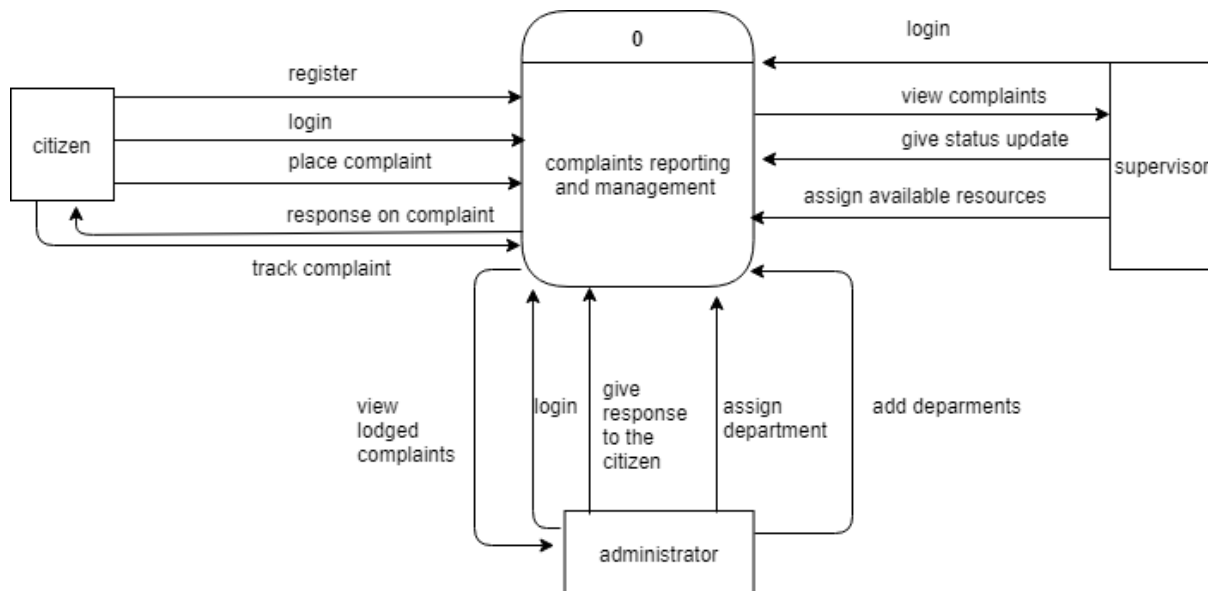
## 4.1 INTRODUCTION

The design phase focuses on the on how the components of the system are to be arranged in order for there to be full and efficient functionality of the system. According to Michael (2012), the design phase is about when standards and methods are put into practice to design a system and to realize the intended functionality after wards. This phase covers the system design, architectural design, physical design, database design, program design, interface design and security design. These have to be planned well so that the final system meets the objectives and solves the problems.

## 4.2 SYSTEM DESIGN

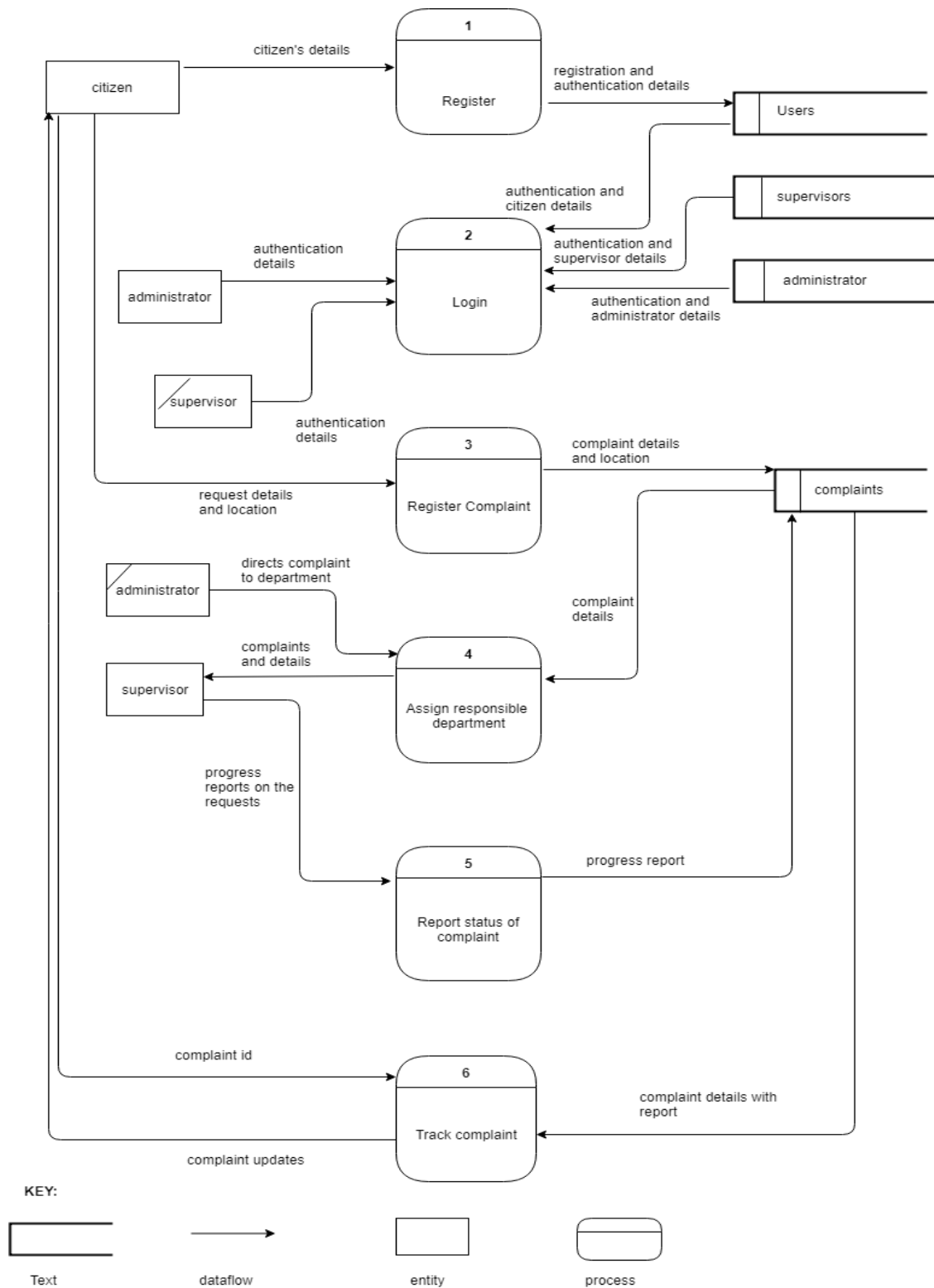
System design is defined as a process of defining the elements of a system that is the architecture, components and modules, interfaces of the components and modules and the data that goes through the system. System design must satisfy the user’s requirements and their specific needs through engineering a well running system that is coherent.

### 4.2.1 Context Diagram



**Fig 4.1 Context Diagram of the proposed system**

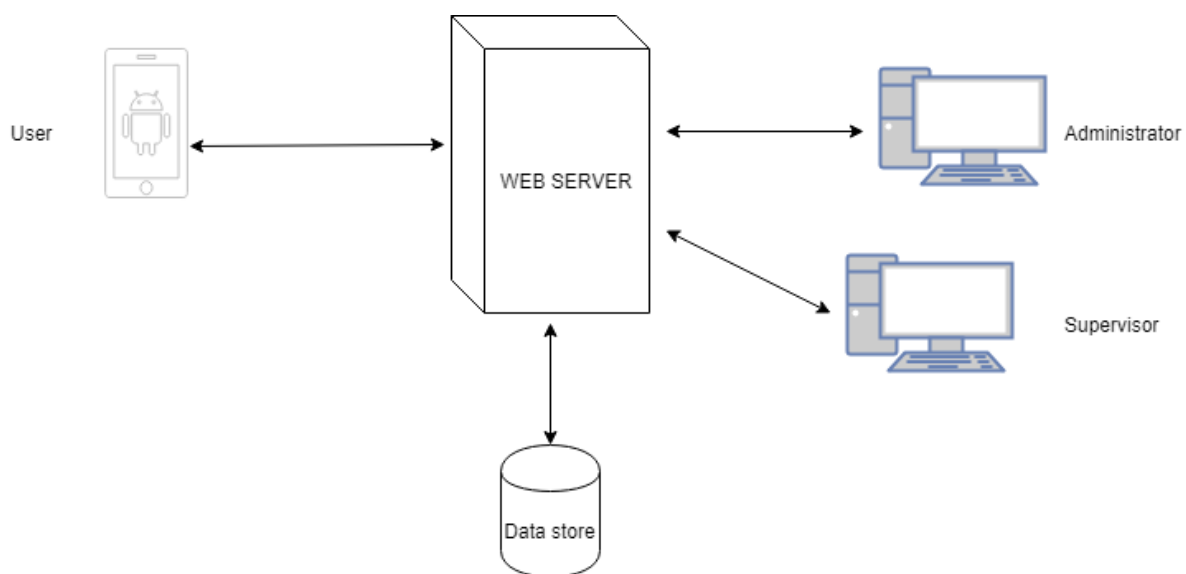
## 4.2.2 Data Flow Diagram



**Fig 4.2 DFD of the Proposed System**

### 4.3 ARCHITECTURAL DESIGN

Architectural design is an important component of the design phase as it describes the general environment of the system that is the hardware, software and network components. According to Roth et al (2012), it is primarily flowing from the non-functional requirements that is operational, cultural, security and performance. The objective is to outline the fundamental components of the system, describe client-based, server-based and client-server-based architectures, to describe hardware and software specifications and ultimately come up with the architectural design.

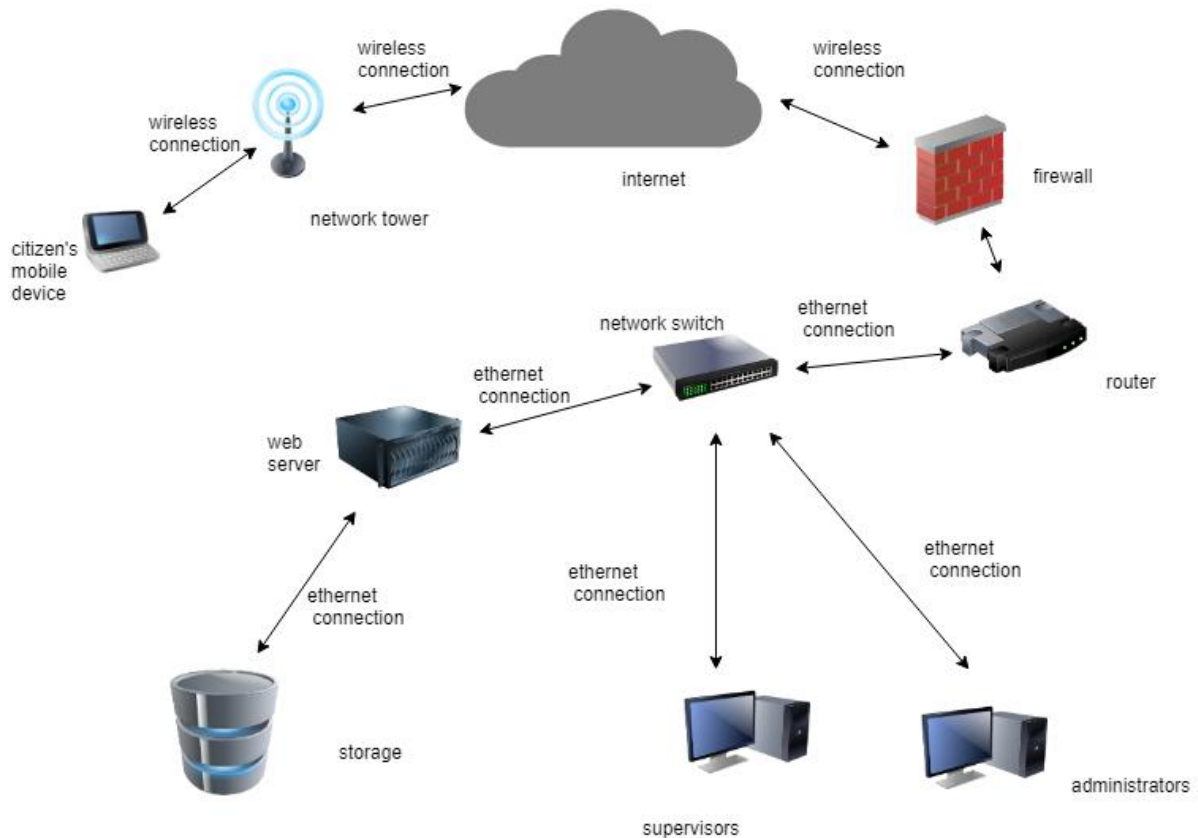


**Fig 4.3 System architecture**

### 4.4 PHYSICAL DESIGN

The raw inputs and the output processes of the system are related to the physical design. This is shown by noting down the way in which the data enters the system as inputs, how it is validated and verified, the data processing way and the way in which the data is presented as outputs. During the physical design, requirements will be decided about the system such as the input, output, storage and processing requirements.





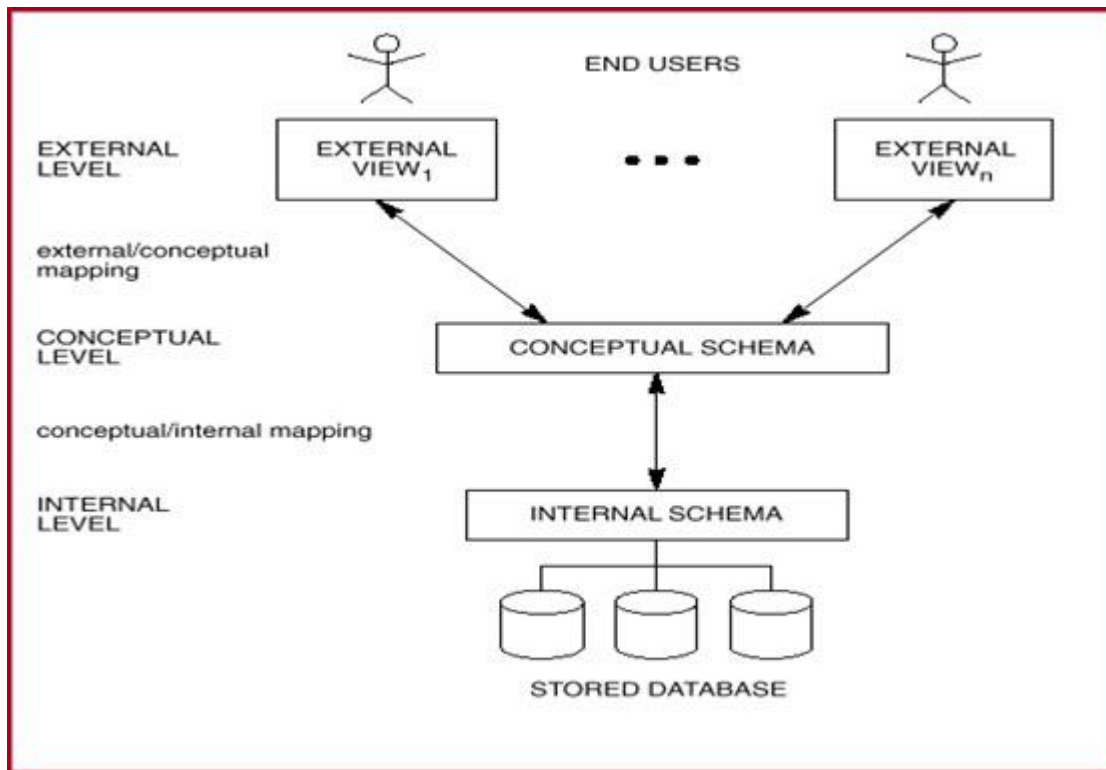
**Fig 4.4 Physical layout**

## 4.5 DATA BASE DESIGN

As defined by Wickham and Grolemond (2016), a database is a structured set of data that is kept electronically on a computer and can be accessed in different ways by different users simultaneously. It is a collection of data that is interrelated in design to meet the information needs of individuals and organisation.

### 4.5.1 Three Level Architecture

The architecture of a database consists of abstraction levels which are internal external and conceptual. It is also known as the three level architecture.



**Fig 4.6 Three level Architecture**

### **External Level**

It shows the external view of the database by the users and it shows the database parts that is crucial to a certain user.

### **Conceptual Level**

Conceptual level shows the actual data that is stored in a database and the existing relationships of the data.

### **Internal Level**

Internal level depicts the greatest abstraction level and database physical representation on the machine. Describes the data storage in the database

### **4.5.2 Conceptual Design**

As asserted by Wickham and Grolemond (2016), conceptual database design is the process of constructing a model of information used in an enterprise, independent of all physical considerations. It involves constructing an Entity Relationship model, checking for redundancy on the model and validating user transactions to ensure the scenarios represented are supported.

## Tables of the database

### Complaints

Name	Type
Complaint Id	int(10)
Description	Varchar (5000)
Date	date
Time	time
location	spatial

**Table 4.1 Complaints**

### User credentials

Name	Type
id	varchar(12)
name	varchar( 15)
surname	varchar (18)
address	varchar (50)
password	varchar (100)
email	varchar(255)

**Table 4.2 User credentials**

### Administrator credentials

Name	type
id	Varchar(12)
username	Varchar(15)
password	Varchar(100)

email	Varchar(255)
-------	--------------

### **Table 4.3 Admin Credentials**

#### **Department Supervisor credentials**

Name	type
id	varchar(12)
username	varchar(15)
password	varchar(100)
email	varchar(255)
department	varchar(20)

### **Table 4.4 supervisor credentials**

#### **Department**

name	type
department name	varchar(20)
technicians	int(2)

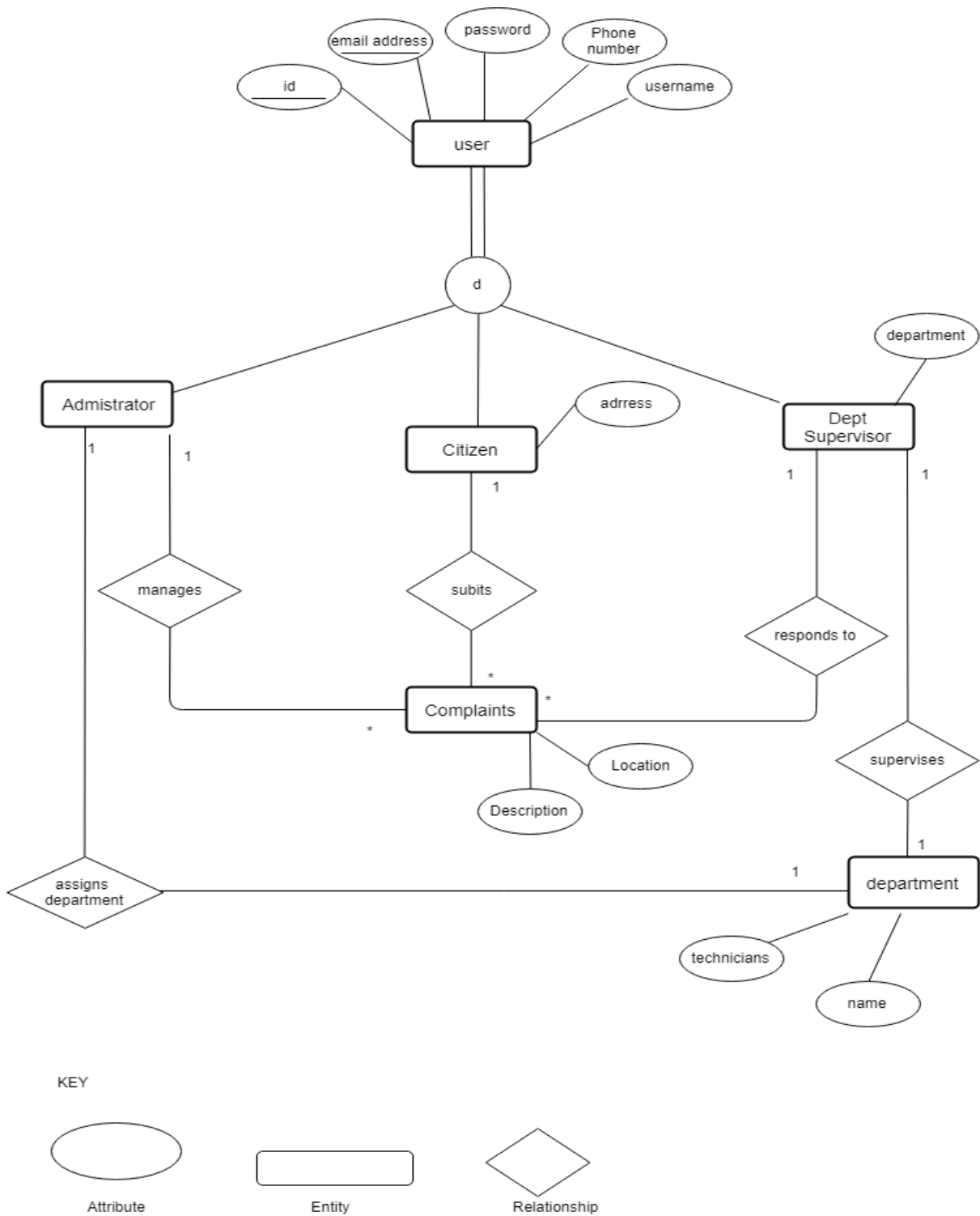
### **Table 4.5 Departments**

### **4.5.3 Enhanced Entity Relationship Diagram**

Enhanced entity-relationship models, also known as extended entity-relationship models, are advanced database diagrams very similar to regular ER diagrams. Enhanced ERDs are high level models that represent the requirements and complexities of complex databases.

In addition to the same concepts that ordinary ER diagrams encompass, EERDs include:

- Subtypes and super types (sometimes known as subclasses and super classes)
- Specialization and generalization
- Category or union type
- Attribute and relationship inheritance



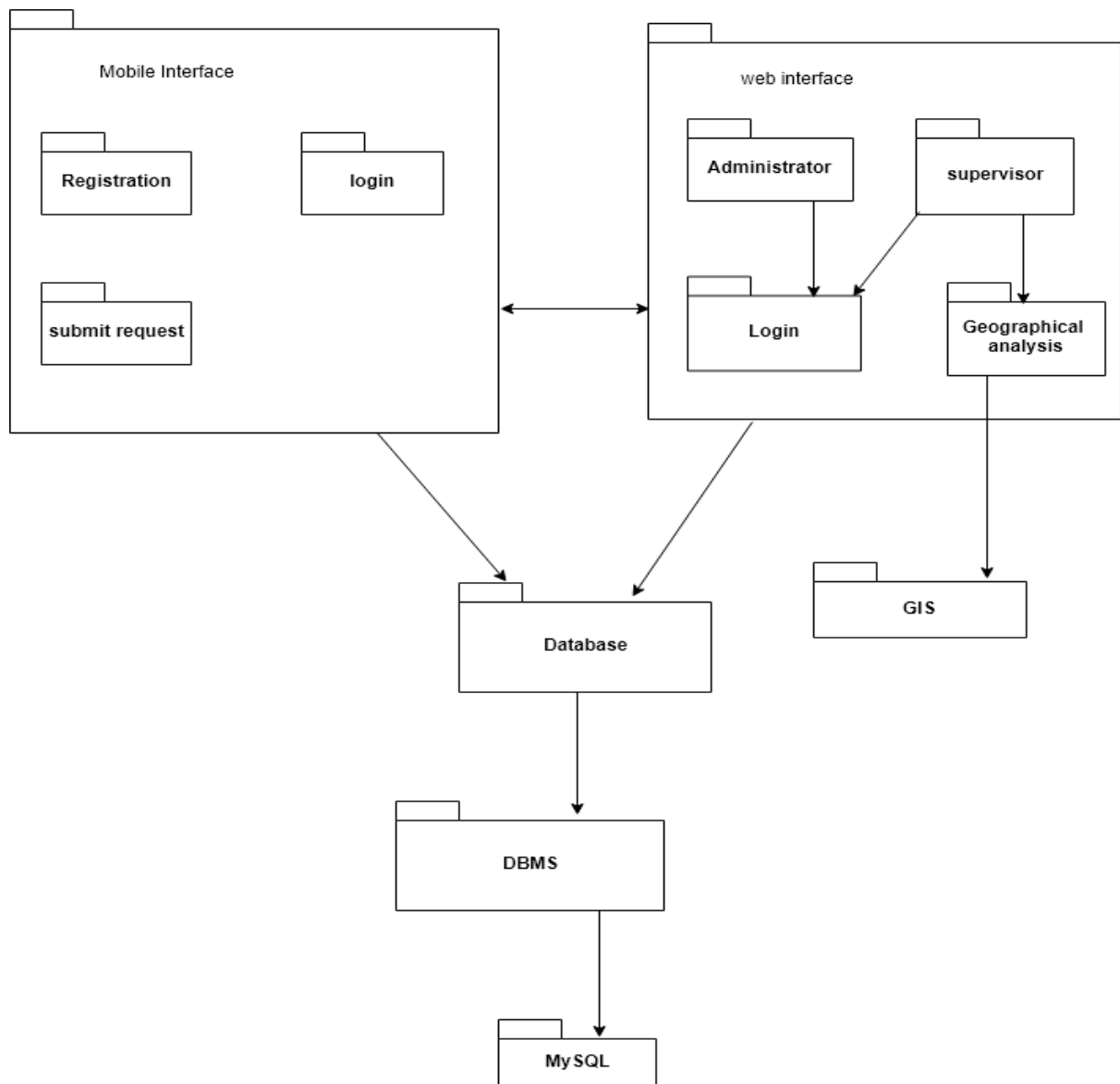
**Fig 4.7 EER of the proposed system**

## 4.6 PROGRAM DESIGN

According to Mcguire (2016) program design is defined as the activity of progressing from a specification of some required program to a description of the program itself. The input to this phase is a specification of what the program is required to do. The designs are to be represented on package and class diagram and sequence diagram.

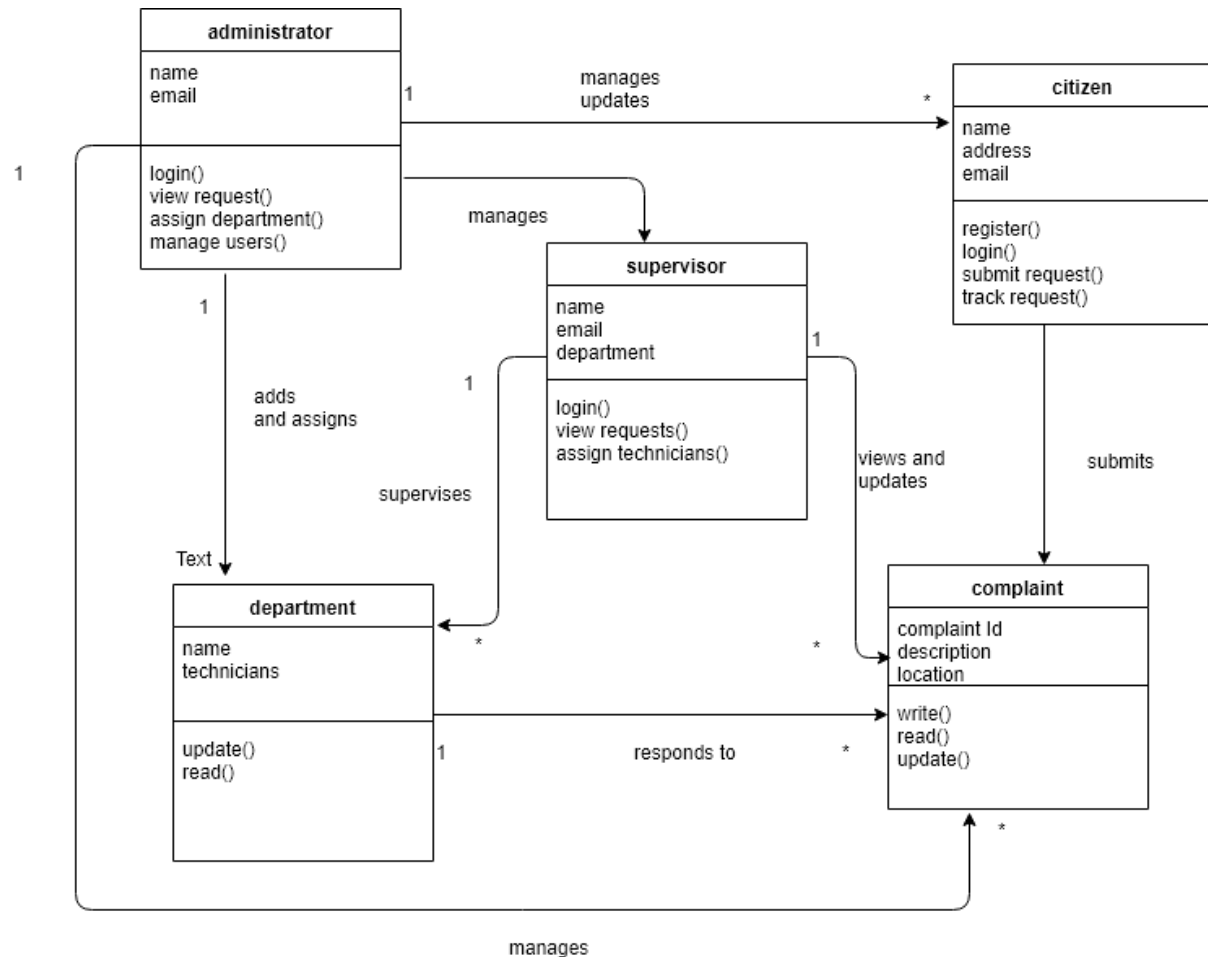
### 4.6.1 Package Diagram

Shows the arrangement and organization of model elements in middle to large scale project. Package diagram can show both structure and dependencies between sub-systems or modules, showing different views of a system.



**Fig 4.8 Package Diagram**

## 4.6.2 Class Diagram

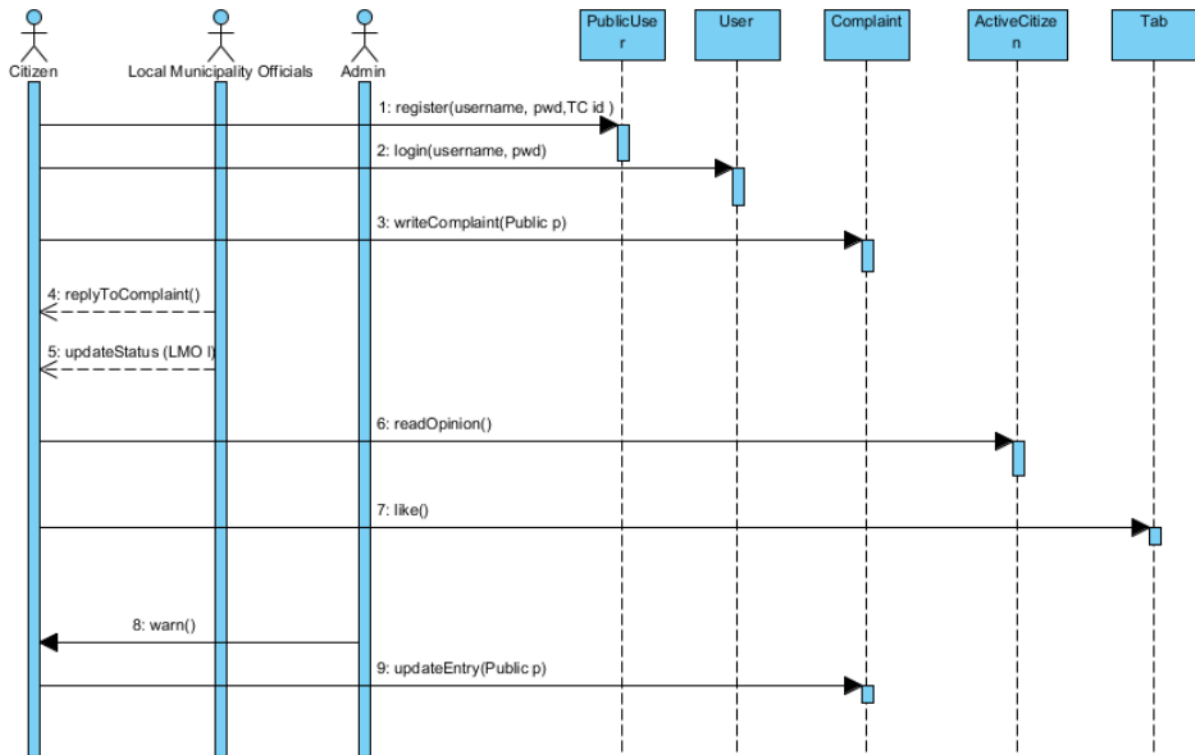


**Fig 4.9 Class Diagram**

## 4.6.3 Sequence Diagram

As asserted by Rumpe (2016), sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when.





**Fig 4.10 Sequence Diagram**

## 4.7 INTERFACE DESIGN

### 4.7.1 Menu Design

Menus are navigation panels that list content categories or features that are usually presented as links and or icons that are grouped and have a style that is different from the other design of the system. Menus have to be well designed in order to make the system user friendly and easy to navigate through the system.

### Main menu for Mobile Application

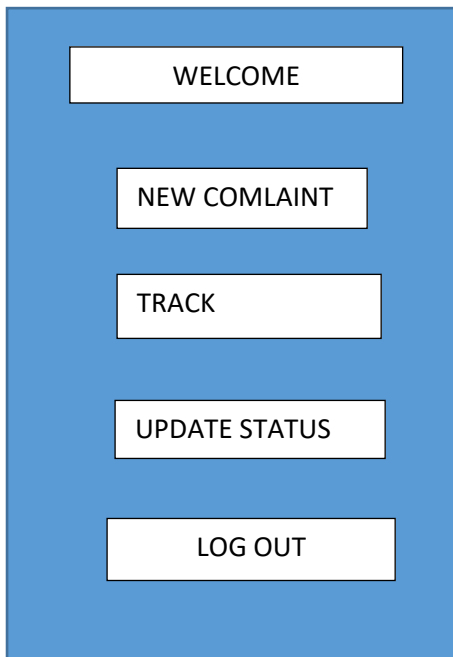


Fig 4.11 Mobile application main menu

### Main Menu for Administration

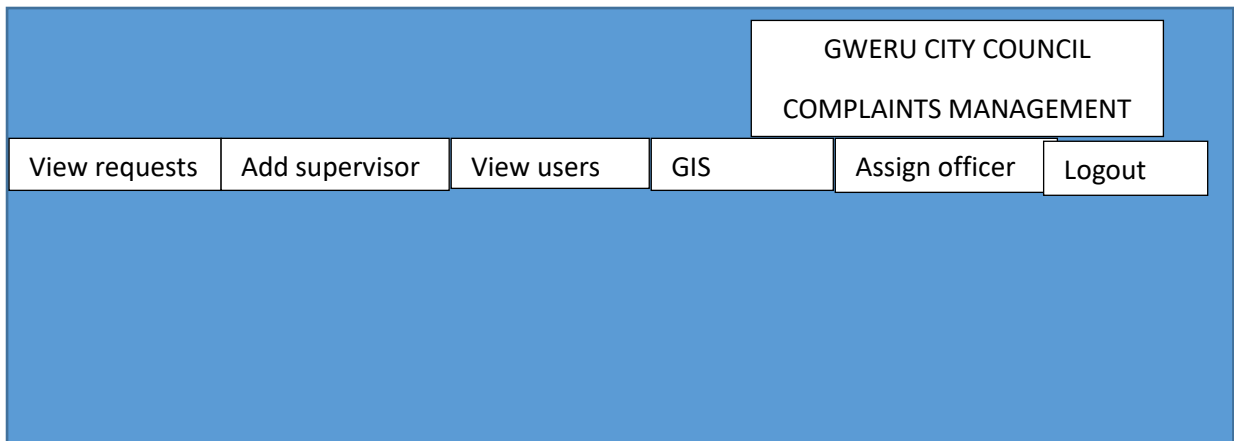
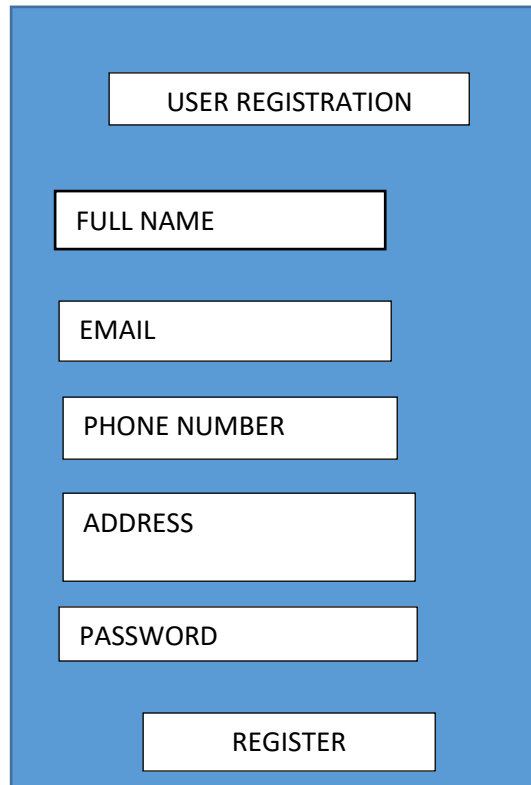


Fig 4.12 Administrators dashboard

## 4.7.2 INPUT DESIGN

This shows the input form of the system

### Citizens Registration



A vertical registration form with a blue background. At the top is a white box labeled "USER REGISTRATION". Below it are five white input fields: "FULL NAME", "EMAIL", "PHONE NUMBER", "ADDRESS", and "PASSWORD". At the bottom is a white button labeled "REGISTER".

**Fig 4.13 Registration form**

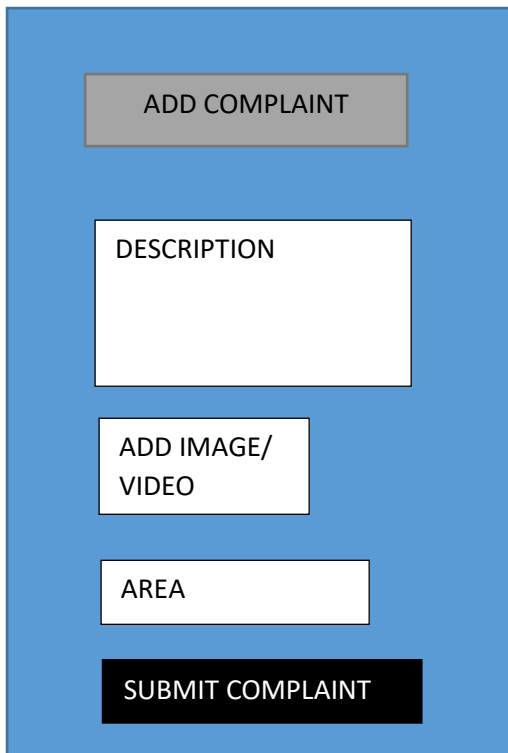
### Citizen's login



A vertical login form with a blue background. At the top is a white button labeled "SIGN IN NOW". Below it are two white input fields: "Email" and "Password". At the bottom is a white button labeled "Sign in".

**Fig 4.14 Citizens Login form**

## Register complaint

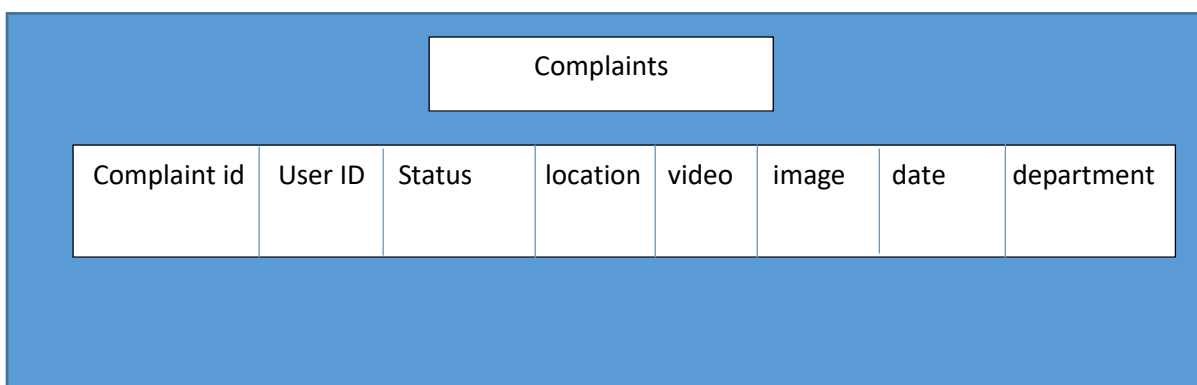


A vertical form with a blue background. At the top is a grey button labeled "ADD COMPLAINT". Below it is a white text input field labeled "DESCRIPTION". Underneath is a white button labeled "ADD IMAGE/ VIDEO". Below that is another white text input field labeled "AREA". At the bottom is a black button labeled "SUBMIT COMPLAINT".

Fig 4.15 Complaints Submission form

### 4.7.3 OUTPUT DESIGN

#### Administrator's view of complaints

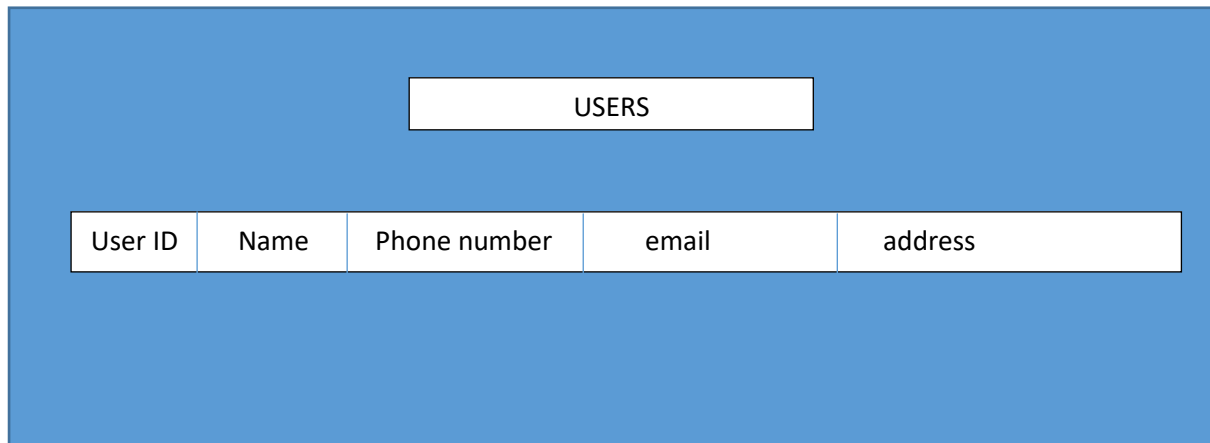


A table with a blue background. At the top center is a white box labeled "Complaints". Below it is a table with 8 columns: Complaint id, User ID, Status, location, video, image, date, and department.

Complaint id	User ID	Status	location	video	image	date	department
--------------	---------	--------	----------	-------	-------	------	------------

Fig 4.16 View of complaints

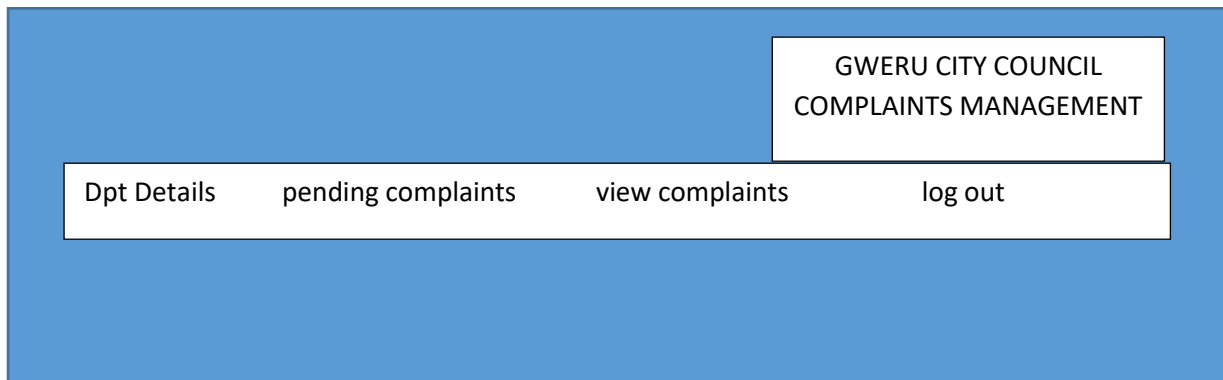
## User details



User ID	Name	Phone number	email	address
---------	------	--------------	-------	---------

**Fig 4.17 Viewing user details**

## Supervisor's view



Dpt Details	pending complaints	view complaints	log out
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**Fig 4.18 Departmental view**

## 4.8 PSUEDO CODE

According to Olson (2015), pseudo code is describing the general operating principle of a computer program and other algorithms using an informal high level language. It is intended for human reading rather than machine thus there are structural conversions of the known programming languages. This phase shows the pseudo codes to give the general design of the program codes.

## Login

Enter details in text boxes

Check email on database

If email is valid

Read password

If password is valid

Login

End

### **Database connection**

Check if there are connections

If no connection exists

Establish connection

Else Ignore

End if

### **Submitting complaint**

Enter details in text boxes

Add image or video

Validate the entered text and media

Description is mandatory

If input is valid

Submit complaint

Else return error

## **4.9 SECURITY DESIGN**

As asserted by Pernul et al (2015), it is an approach to ascertain that the software and hardware system are free from vulnerabilities and are impervious from attacks. According to

Kizza(2008) this is can be achieved through adhering to best programming practices, continuous testing and authentication safeguards which ensure that there would be physical security, network security and operational security. Efficient security measures ensure that the system performs up to the standard requires, lessens downtime and eases maintenance. The goal is to make the system highly available.

#### **4.9.1 Physical Security**

According to Pernul et al (2015) this is the protection that is given to people and systems in case there occurs a physical disaster or event that may cause the failure of the system. Physical measures can be put in place to protect the system from unauthorised access and natural disasters.

- Locking up the server room: the server room must be locked when there is no authorised personnel doing work in there
- Setup surveillance: in case of theft the surveillance footage can be used to find the criminals. The footage also shows who accessed the server room and when.
- Use rack mount servers: server racks contain the servers. The racks also provide cooling
- Use biometrics to secure the server room: biometrics are unique. Finger print devices must be put in place to secure the systems.

#### **4.9.2 Network Security**

According to Kizza (2008) network security as protection of directories and file access in a computer network against misuse and hacking. The following will be used to secure network:

- Firewall will be put in place to block unwanted access.
- Use of usernames and passwords to secure the networks and machines.
- The Avast antivirus will be installed on computers for internet security

### **4.9.3 Operational**

According to Bejtlich (2013), operational security is the ability to protect the critical information against the public. The big data system will be operationally secured by using the following measures:

- The users will be given different access levels as per their daily tasks.
- The system will prompt the users to change password after two weeks.
- The outgoing and retiring workers account will be deleted after they leave.
- More sensitive information will be encrypted every day.

### **4.10 CONCLUSION**

The designs have been clearly outlined showing how the system is going to work. These designs can be implemented and fashioned into a working system. This phase shows the security measures that are put in place to protect all the information that is collected on the system. All the design aspects are attainable thus the system can be developed. The following phase deals with how the system can be efficiently put into a working environment.



## **CHAPTER 5: IMPLEMENTATION**

### **5.1 INTRODUCTION**

This is the final stage of the development life cycle. The problems were outlined and the objectives of the project were stated. An analysis of the current system was done. A feasibility study was done which showed that it was feasible to carry out the project. The design of the system was done which and there has to be an implementation of the designs. This chapter focuses on the coding of the system, the changeover strategies, testing, installation and maintenance of the system. This is required to show how the system is going to be introduced into a working environment.

### **5.2 CODING**

To achieve the objective of creating an online application there are a series of instructions that must be given to the computer in order to perform the required functions. Therefore according to Martin (2009) coding is a list of step by step logical instructions that will cause a computer to do what you want hence making it possible to create computer software, applications, games and so on. Coding is done by personnel who have the basic skills in programming languages and system development. For the system that is question, it is an online application which has a server side and an android application. The web page is developed in Hypertext Pre-processor (PHP). For the android application it is going to be developed by android studio an integrated development environment based on intellij.

### **5.3 TESTING**

It is a process conducted on a finished or complete integrated system or prototype to check if the functionality of the system meets the requirements that were set at the beginning of the project. It is performed on the entire system. For complaints system there are several types of tests that must be carried out that is unit, module, security and acceptance testing.

### **5.3.1 Unit testing**

A computer system is made up of small parts which can be referred to as units. These units can be individually tested as this is a process that needs to be carried out in system development. It involves testing the characteristics of a unit that are not only vital to the performance of the unit but of those that are insignificant also. This encourages the developers to make modifications to the unit without any consequence that may affect the functionality of the whole system.

### **5.3.2 Module Testing**

It is also known as integration testing. As highlighted in unit testing a computer application can be broken down into small testable units. These units can be tested and may be found working properly. However these units cannot function on themselves, they need or may borrow some functions and data from other units. According to module testing is a process whereby the small application units are combined and tested together in different ways. The approaches to integration testing can be bottom-up method and top-down method

### **5.3.3 Security Testing**

Computer applications are susceptible to various threats that may be internal or external which may cause the system failure. The security mechanisms that are put in place have to be tested to ensure that the system is secure. It includes how much the system is secure from malicious software and the strengths of the authorization and authentication processes. The system is to be password protected for all the users and antivirus software is to be installed

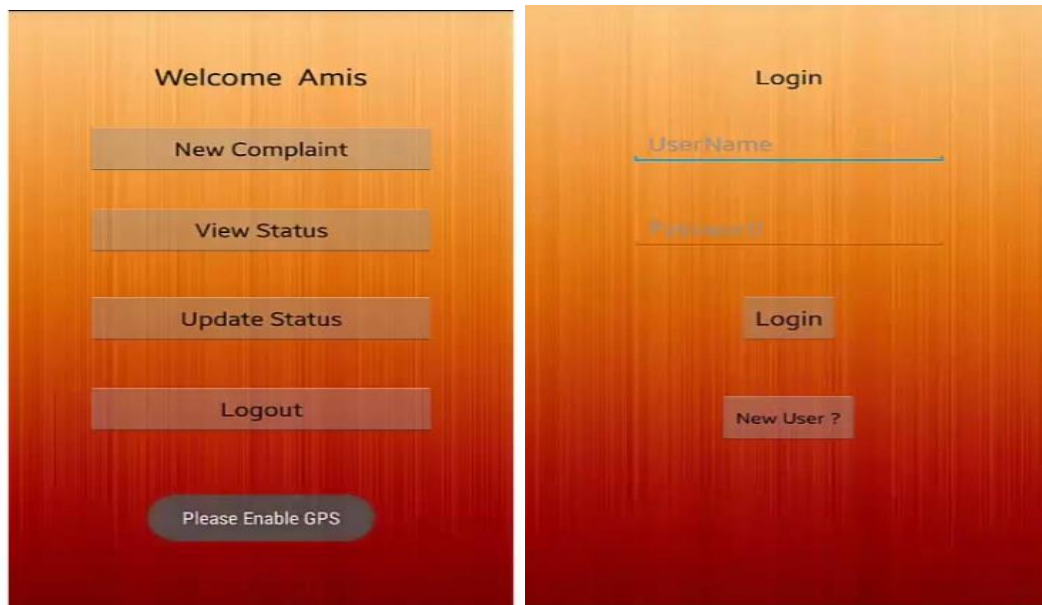
### **5.3.4 Acceptance Testing**

The aim of this test is to determine the accessibility of the system to all, to check if the system met the requirements, and to assure quality. The system is intended for the public and thus the system must be accessible to all. The public consist of the deaf, blind, crippled,

young and old. For the public it is an android application, therefore if one can use an android based mobile phone they can access the system. The system must therefore be tested in a working environment to assure that all the users can understand and use the system. The requirements of the system must also be tested in the working environment.

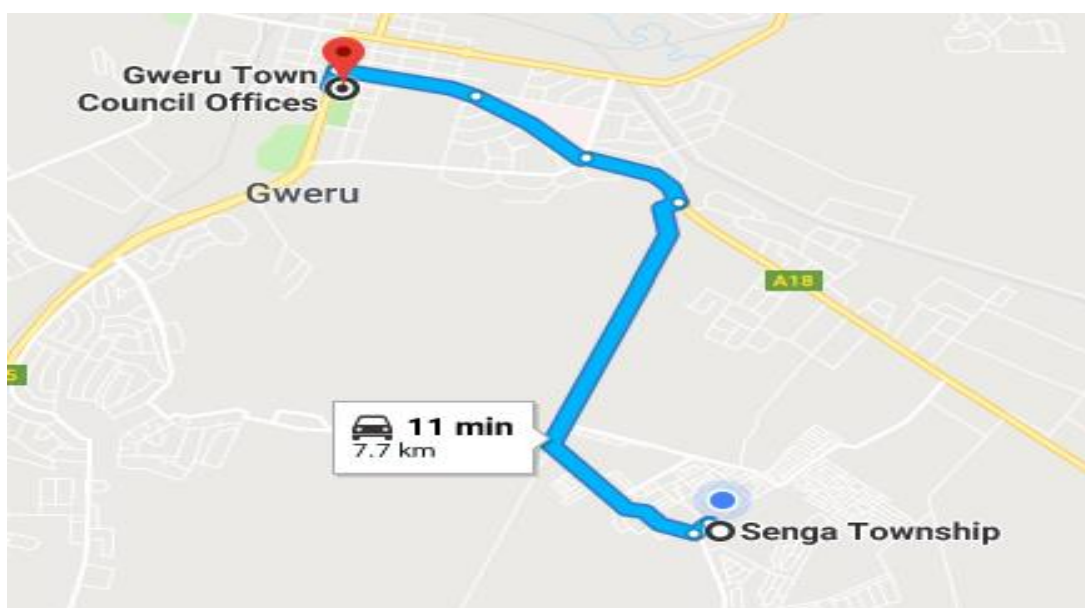
### 5.3.5 Test Cases

**To create an online solution that can be accessed from mobile phones.**



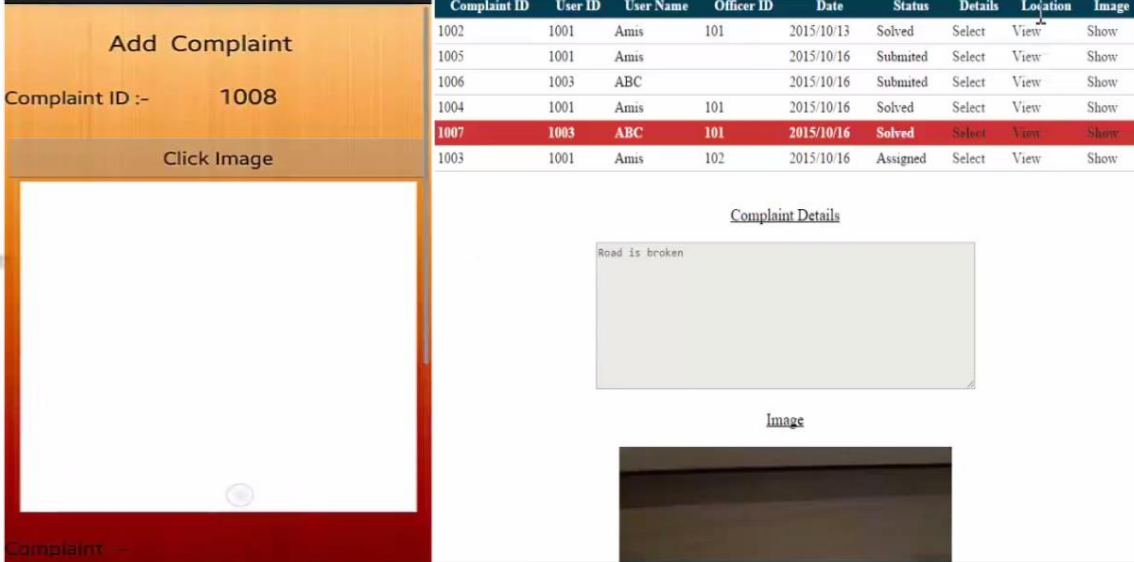
**Fig 5.1 Mobile application**

**To use geospatial analysis to improve the service delivery**



**Fig 5.1 Geospatial analysis**

To be able to verify the problem by giving the user an option to upload pictures and videos of the occurring problem




The screenshot displays a mobile application interface for adding a complaint. On the left, a form titled "Add Complaint" has a "Complaint ID :-" field with the value "1008" and a "Click Image" button above a large empty image upload area. On the right, a table lists complaint records with columns for Complaint ID, User ID, User Name, Officer ID, Date, Status, Details, Location, and Image. The row for Complaint ID 1007 is highlighted in red. Below the table, a "Complaint Details" section shows a text input field containing "Road is broken" and an "Image" label above a dark image upload area.

Complaint ID	User ID	User Name	Officer ID	Date	Status	Details	Location	Image
1002	1001	Amis	101	2015/10/13	Solved	Select	View	Show
1005	1001	Amis		2015/10/16	Submitted	Select	View	Show
1006	1003	ABC		2015/10/16	Submitted	Select	View	Show
1004	1001	Amis	101	2015/10/16	Solved	Select	View	Show
1007	1003	ABC	101	2015/10/16	Solved	Select	View	Show
1003	1001	Amis	102	2015/10/16	Assigned	Select	View	Show

**Fig 5.2 Uploading images**

To increase citizen participation and transparency in the municipality's efforts to resolve raised issues and concerns



The screenshot shows a mobile application screen titled "View Complaint Status". It lists "Complaint ID : 1002, 1003, 1004, 1005, 1008" and has a search input field containing "1008" and a "Submit" button. Below, the "Complaint :" field contains the text "too much mess" and a small white circular icon. The "Complaint Status : Submitted" is displayed, and a button at the bottom shows "Status : Submitted".

**Fig 5.3 Tracking Complaint**

## **5.4 INSTALLATION**

This is the act of making a software system or program run and execute in a working environment or to make hardware and software ready to use. The steps in the installation process vary from system to system and thus the installation process of the mobile complaints application must be outlined. The users of the system must be trained as they also are vital to the functioning of the system. The change over strategies should be analysed and the most suitable for the particular system implemented and should cater for data migration.

### **5.4.1 Changeover Strategies**

System change over must be smooth as it would be a shift from one way of doing things to another. There may be disruptions to the business activities thus the changeover strategy must be able to mitigate these disruptions. There are several changeover strategies but the ones considered are direct conversion, parallel conversion, and pilot conversion.

#### **5.4.1.1 Direct changeover**

This is referred to as immediate change over as it throws away the old system and the new system is used. As soon as the new system is powered up the old system is shut down and is no longer referred to as the new system is working. It carries a risk of not being able to revert to the old system if the new system fails. Data may be lost and may never be recovered. It works best where the failure of the new system does not have a significant effect on the business processes.

#### **5.4.1.2 Pilot Change Over**

The new system is implemented in a test environment before it can be put into a larger or a production environment. For example if an organisation has many branches, one branch maybe used as a test environment before it can be implemented all over. In this case a test environment can be created to test the function of the system before it can be used in a production environment. If a small test environment is set up aside the old system it could be cost effective and would allow for comparison of the old system and the new. After all the bugs and all the challenges sorted the direct changeover strategy can be used.

#### **5.4.1.3 Parallel Changeover**

With this strategy the new system runs simultaneously with the old system for a stipulated time at which there is comparison of the two system. Processing time of the system, data required and produced by the systems is compared. Bugs are also removed from the new system at this time. It carries less risk as it is simple to revert to the old system. There would be two systems running which may prove to be costly.

#### **5.4.1.4 Changeover Strategy to Be Implemented**

Considering that the current system the complaints are being lodged manually direct changeover is the most suitable. The current system is manual and the proposed system is computerized in most aspects of its functionality. It is easy to revert to the old system if there is a failure in the proposed system. The proposed system is ideally new and does not need any reference to the old system. The day to day business processes of the city council will not be affected if the system fails as this is separated from other business processes such as bill, human resource management, payments and so on.

#### **5.4.2 System Installation Process**

The following steps are to be completed for the system to be fully functional:

1. Set up the servers and connect to the internet
2. Install operating systems on to the servers
3. Install the database management software
4. Run the executable file and establish database connections
5. Check for connectivity

#### **5.4.3 User Training**

User training is going to be carried to train the users how to use and administer the system. There are four different types of users of the system that is the administrator, the supervisor

and the citizens. The IT department will handle the database administration. The training will focus on the modules of the system that the user will mainly be using. Training sessions are to be done for the employees of the city council and the android users will have the help button which will assist them in using the system. A user manual will be issued so that it can be used. Six hours of training will be required allocating to hours for each group. With time the users can consult the developer for further knowledge or when they do not understand.

#### **5.4.4 Data Migration**

Data from the old system will not be of great use to the new system. However data of the town has to be integrated with the system. Maps for traffic and land and geographic landscapes will be helpful and would make up the geographic information system. The data would have to be inputted manually as it was manually recorded. Some of the geographic information is digital and can be added through installations and or uploads.

### **5.5 MAINTENANCE**

This is the last phase of the system development life cycle. It starts when the system has been deployed into the production environment and continues until there is no more need for the system. Maintenance are solutions that come about from acceptable and available tactics in the event that the working system does not perform up to the required or desired standards. Maintenance is unavoidable especially when the system is to be used on a daily basis. The system is bound to run into an error or unexpected malfunction thus maintenance strategies are to be implemented to solve these problems. There are different type of maintenance that is adaptive, corrective, preventative and perfective maintenance.

#### **5.5.1 Corrective Maintenance**

Deals with repairing of the defects and the faults that a system encounters during operations. The causes of defects may be errors in the design of the software, logic and coding. These defects may be as a result of incorrect, incomplete or misunderstood requests for change to

the requests for change to the system while logical errors result from invalid tests and conclusions, wrong implementation of the specifications of the design, a logic flow that has faults and or the test data would be incomplete.

These are known as residual errors and they prevent the software from performing up to the standard of the agreed specifications. Corrective maintenance is done if the users come across bugs and other inconsistencies. With the proposed system if there is an error and the system fails the development team should be alerted and they perform fix procedures to restore operations. This requires to refer to the original specifications and requirements to see what the system was originally designed to do. Emergency fixes like patches may be used if there is pressure.

### **5.5.2 Adaptive maintenance**

This is an approach where changes are implemented to a certain part of the system or the whole system as a result of changes in the working environment or to a change in another part of the system. Changes in the environment may be the hardware, software or there is a change in user preferences and the data to be processed.

At the beginning the system is likely to have few citizens knowing about and using the system but as time goes on the usage of the system will increase. This will cause a change in the amount of data to be processed as there would be need manage more users and complaints. More administrators will be required to assist in handling the complaints that would be coming in. There would also be need to upgrade the servers and the storage for faster response times and to hold the data.

### **5.5.3 Perfective maintenance**

This mainly deals with the implementation of new or changed user requirements. There are functional enhancements that are done to add to the already existing activities to increase the overall performance even if the changes and additions would have not been suggested by faults. The user's needs are bound to change at a point in time thus functionality and efficiency of the program code have to be continually enhanced.

This type of maintenance is a task for the development team. There have to do market research to see how other complaints systems work not just in the local government



authorities but in other business processes. Technology is ever changing thus the development team must implement those new technologies and integrate them with the system.

#### **5.5.4 Preventive Maintenance**

Preventive maintenance is a pessimistic type of maintenance. The thinking is that an error is going to occur and hence before it occurs there should be measures put in place to prevent the error from occurring. It then reduces the complexity of the software and improve the understand ability of the program which increases software maintainability. Preventative maintenance requires for there to be updates of the documentation, optimization of the code and restructuring of the code. When there have been changes to any aspect of the system the change must be documented, how it was done , when it was done and why it was done and the final product after the changes. Code optimization is to make alterations which modify the program for faster execution and or for the efficient use of the storage. Transforming the code structure is code restructuring to reduce complexity and make it easier to understand.

This maintenance is done and mainly restricted to the performing organisation in this case the development team. This is done continually without having to wait for requests from any external party. This requires for there to be innovative thinkers who initiate ideas and execute them.

#### **5.6 Recommendations for Future Development**

- Geographic information system enabled service delivery is one of the efficient ways to provide standard services and respond to complaints by the Gweru city Council. GISs have many different use and therefore should be used for other services such as traffic control, allocation of land, waste management, health and Medicare and so on.
- GIS enabled complaints reporting system is targeted for the urban parts of Gweru. The system must be developed and enhance to support the rural settlement that are close to and under Gweru city council.
- The system should be developed to centralize all complaints for all local service providers such as hospitals, electricity and even law enforcements.

## **5.7 CONCLUSION**

This chapter encompassed demonstrating the success of the project of the Gweru Online Complaint Reporting and Administration Mobile Application because it passed the tests performed. It also showed how the system is to be put into a working environment by outlining the installation process, the changeover strategies, data migration and user training. Recommendations for use and future development show that the system can be used for more to benefit the Gweru community and city council. GIS technology should be leveraged to a greater extent in service delivery and local governance.

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# APPENDIX A: QUESTIONNAIRE

Please fill in your answer using the space provided.

Use a tick to check the boxes.

1. Have you ever reported a case to the City council about any problems and faults?

Yes

NO

2. If you have reported an incident, how did you report?

Phone call

Visited the Offices

Other specify.....

3. How long does it take for the reported fault or problem to be fixed?

State the problem you have reported or that you know of and the time taken for it to be fixed.

.....  
.....  
.....  
.....

4. Do you communicate with the city council offices often?

Yes

No

5. After you have reported a complaint how do you follow up or get a status report?

.....  
.....  
.....

6. Do you own an android smart phone?

Yes

No

If you have other specify.....

7. Would you be comfortable with lodging complaints online using your smart phone without having to see the person you are reporting to?

Yes

No

## **APPENDIX B: SAMPLE INTERVIEW QUESTIONS**

1. How many complaints do you receive on average in a day?
2. What is the most preferred method of reporting is used by the citizens?
3. What are the channels that the report has to go through until officers have been assigned to the problem?
4. How do you navigate to the problem site?
5. Do you communicate on the progress with the citizens and how?
6. How do you record all the complaints that are lodged?
7. How do create daily or monthly reports of complaints that are lodged?
8. Are you familiar with GISs and if so where and how have you learnt about them?



## **APPENDIX C: OBSERVATION POINTS**

1. Observe how the citizens lodge complaints and how the helpdesk assistant records the complaints.
2. Record the response that is given to the citizen when they lodge complaints.
3. Observe how priorities are given to certain lodged complaints.
4. How is the data collected from the complaints recorded, kept and reported?
5. Observe the availability of the assistant who receives the complaints to the citizens