

## **ABSTRACT**

The purpose of this research was to come up with a solution to problems that were faced at National Railways of Zimbabwe Contributory Pension Fund in conducting their board meetings and other general meetings at large. The organization was failing to comprehend the problems with the current system, hence there was need for a practical solution to do away with the problems at hand. Through the use of interviews, document reviews, questionnaires and observations all the Fund's problems were identified together with possible solutions to the problems. After having identified the current problems, the following tools were used in the development of the new system, Adobe Dreamweaver CS6, Adobe Photoshop CS6, code igniter framework, MySQL Database. The main objective of the system was to reduce excess amount of money purchasing stationary, overtime payment to employees preparing for board meetings as well as reducing the amount of labour typing, binding and scanning board materials. The planning phase included a detailed feasibility study which aims to find justification for the development of the new system. Results gathered from the feasibility and planning stage were used to design the new system. The system was examined through a series of test procedures so as to remove bugs in the system. With all being done the new Boardpack system was fully implemented and a user manual was produced to help users how to use the system. This dissertation contains five chapters that will walk you from the feasibility stage until the system is fully implemented.

## DECLARATION

I, **Peter Mbweku (R123821Y)** hereby declare that I am the sole author of this thesis. I authorize the **Midlands State University** to lend this thesis to other institutions or individuals for the purpose of scholarly research.

Signature \_\_\_\_\_

Date \_\_\_\_\_

## **APPROVAL**

This dissertation/thesis entitled “Virtual Boardroom” by **Peter Mbweku** meets the regulations governing the award of the degree of **BSc Information Systems honors** of the **MIDLANDS STATE UNIVERSITY**, and is approved for its contribution to knowledge and literal presentation.

Supervisor .....

Date .....

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## **DEDICATIONS**

This dissertation is dedicated to my brothers Kupakwashe Mbweku and Learnmore Moyo and my special friend Moud Mtandwa.

Table of contents

**ABSTRACT..... i**

1.0 CHAPTER 1: INTRODUCTION ..... 11

1.1 BACKGROUND AND HISTORY OF THE COMPANY ..... 11

1.2 ORGANIZATIONAL STRUCTURE ..... 12

1.2.1 VISION ..... 13

1.2.2 MISSION..... 13

1.2.3 VALUES..... 13

1.3 PROBLEM DEFINITION ..... 13

1.4 AIM ..... 14

1.5 OBJECTIVES..... 14

1.6 RESEARCH INSTRUMENTS ..... 15

1.7 JUSTIFICATION..... 15

1.8 CONCLUSION..... 16

**CHAPTER 2: THE PLANNING PHASE ..... 17**

2.0 INTRODUCTION ..... 17

2.1 REASONS FOR BUILDING THE NEW SYSTEM ..... 17

2.2 BUSINESS VALUE ..... 18

2.3 FEASIBILITY STUDY ..... 19

2.3.1 TECHNICAL FEASIBILITY ..... 19

2.3.2 TECHNICAL EXPERTISE..... 19

2.3.3 HARDWARE SPECIFICATIONS ..... 19

2.3.4 Software specifications ..... 20

2.4 ECONOMIC FEASIBILITY ..... 21

2.4.1 Cost benefit analysis ..... 21

2.4.2 Net present value..... 23

2.4.2 Return on investment ..... 24

2.4.3 Payback period ..... 25

2.4.4 Payback analysis..... 25

2.5 RISKS ANALYSIS ..... 25

2.5.1 Hardware..... 25

2.5.2 Budgetary risks..... 26

2.5.3 Resistance by users ..... 26

2.5.4 Technical risks ..... 26

2.5.5 Time constraints.....	27
2.5.6 Other Risks .....	27
2.6 SOCIAL FEASIBILITY .....	27
2.7 OPERATIONAL FEASIBILITY.....	27
2.7.1 Developers .....	28
2.7.2 The board members.....	28
2.7.3 I.T department .....	28
2.7.4 The System Administrator .....	28
2.7.5 The Secretary .....	28
2.8 Work plan.....	29
3.8.1 The Gantt Chart.....	30
2.9 CONCLUSION .....	30
<b>CHAPTER 3: SYSTEM ANALYSIS .....</b>	<b>31</b>
3.0 INTRODUCTION .....	31
3.1 INFORMATION GATHERING .....	31
3.1.1 Observation.....	31
3.1.2 Interviews.....	32
I.) Structured interviews .....	32
II.) Unstructured interviews .....	32
III.) Semi structured interviews.....	32
2.1.3 Questionnaires.....	33
3.2 ANALYSIS OF THE CURRENT SYSTEM .....	34
3.3 DATA ANALYSIS .....	34
3.3.1 Context diagram.....	35
3.3.2 Data flow diagram (DFD).....	35
3. 4 WEAKNESSES OF THE CURRENT SYSTEM .....	37
3.5 EVALUATION OF ALTERNATIVES .....	38
3.5.1 Outsourcing.....	38
3.5.2 Improvement of existing system.....	38
3.5.3 Developing a new system.....	39
3.5.4 Summary of alternatives .....	39
3.6 REQUIREMENTS ANALYSIS.....	39
3.6.1 Functional requirements.....	40
<b>I.) Use case diagram.....</b>	<b>40</b>

3.6.2 Non-functional requirements .....	42
3.7 CONCLUSION .....	43
<b>CHAPTER 4: DESIGN PHASE .....</b>	<b>44</b>
4.1 INTRODUCTION .....	44
4.2 SYSTEM DESIGN .....	44
i.) Security .....	44
ii.) Reliability and consistency .....	45
iii.) Compatibility .....	45
iv.) Data Analysis Tools .....	45
v.) User friendliness .....	45
vi.) Effectiveness .....	45
vii.) Maintainability .....	46
viii.) Efficiency .....	46
4.2.1 Context Diagram of the proposed System .....	48
4.2.2 Data Flow Diagram (DFD) of the proposed System .....	49
4.3 ARCHITECTURAL DESIGN.....	51
4.3.1 Client Machines.....	51
4.3.2 Networking Cables .....	51
4.3.3 Router .....	51
4.3.4 Internet server, switch and wireless router.....	51
4.3.5 Apache Server .....	52
4.3.6 Firewall.....	52
4.4 Physical Design.....	52
4.5 Database Design.....	54
Database Architecture design.....	54
<b>Description of Three Schemas: .....</b>	<b>55</b>
4.5.1 Entity Relationship (E.R) Diagram .....	56
4.6 PROGRAM DESIGN .....	63
4.6.1 Class Diagram .....	63
4.5.2 Package Diagram.....	64
4.6 Network design .....	65
4.6.3 Network Architecture Diagram.....	66
4.7 INTERFACE DESIGN .....	66
4.7.1 Input Design .....	67



4.7.2 Output design .....	75
4.8 PSEUDO CODE .....	79
i.) Login : .....	80
ii.) Create new meeting : .....	80
iii.) Add agenda : .....	81
iv.) Writing minutes : .....	81
4.9 Security Design.....	81
5.0 CONCLUSION.....	84
<b>CHAPTER 5: SYSTEM IMPLEMENTATION .....</b>	<b>85</b>
5.0 INTRODUCTION.....	85
5.1 STRUCTURE OF SYSTEM MODULES.....	85
5.2 TESTING.....	86
5.2.1 Unit testing.....	87
5.2.2 Functional or system testing.....	87
5.2.3 Regression testing .....	87
5.2.4 Performance testing.....	88
5.2.5 Security testing .....	88
5.2.6 Acceptance testing.....	90
5.2.7 Verification and validation .....	91
I) Verification.....	91
II) Validation .....	91
5.3.1 Validation of input fields.....	94
5.3.2 Features and operations of the current system.....	95
5.4 INSTALLATION .....	106
<b>5.5 TRAINING.....</b>	<b>106</b>
5.6 CHANGE OVER STRATEGIES/METHODS OF CONVERSION .....	107
5.7 WAYS OF GAINING ACCESS .....	109
5.8 MAINTAINANCE.....	109
5.8.1 Corrective Maintenance.....	110
5.8.2 Adaptive Maintenance .....	110
5.8.3 Perfective Maintenance.....	110
5.8.4 Preventive maintenance. ....	110
5.9 SOFTWARE SECURITY AND BACKUP SERVICES.....	110
5.9.1 System security .....	111

5.9.2 Physical Security.....	111
5.9.3 Software Security and network security.....	111
5.9.4 Possible problems .....	111
5.9.4 Preventing unauthorized access .....	112
5.9 RECOMENDATIONS .....	112
5.10 CONCLUSION .....	112
<b>REFERENCE LIST .....</b>	<b>113</b>
<b>Appendix A: User Manual.....</b>	<b>116</b>
<b>Appendix B: Interview Checklist .....</b>	<b>131</b>
<b>Appendix C: Questionnaire Checklist .....</b>	<b>133</b>
<b>Appendix D: Observation Score Sheet.....</b>	<b>134</b>
<b>Appendix E: Snippet of Code .....</b>	<b>135</b>

**LIST OF APPENDICES**

Appendix A: User Manual ..... 116  
Appendix B: Interview Checklist..... 131  
Appendix C: Questionnaire Checklist ..... 133  
Appendix D: Observation Score Sheet ..... 134  
Appendix E: Snippet of Code ..... 135

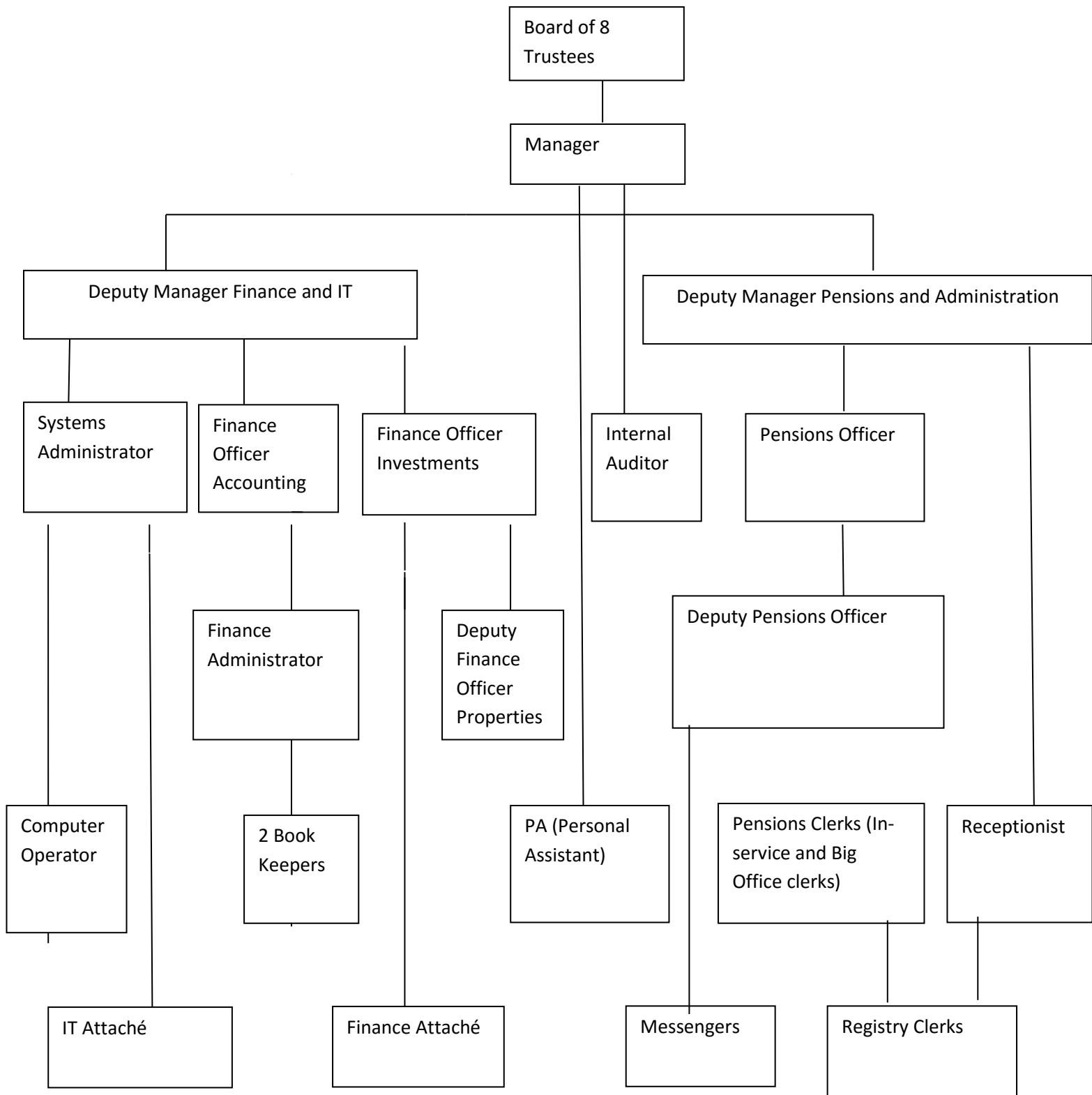
## **1.0 CHAPTER 1: INTRODUCTION**

Virtual boardroom is a paperless environment that moves meeting documents and company information online in a highly secured central knowledge library. A board Pack portal allows collaboration among board members in the compilation of the board pack and then to share that and other key board information with directors. It also allows building meeting agendas from previous meetings, linking related documentation, discussions and historic evidence and attaching decision items into the agenda. Board papers and other key documents can be viewed by directors anywhere in the world at any time, meaning that they are better prepared to do their job since they have a ‘mobile library’ with them at all times. The system will be accessible and compactable on computers, tablets and phones with very powerful tools to securely upload, update, and deliver all board meeting information. And rest assured that you and your board will be fully supported throughout the process. This proposed system will provide the Fund with a strategic advantage over the challenging management forces it faces when conducting its board meetings. Above all the proposed system will have the ability to automatically produce accurate reports so as to aid in better planning and decision making for the benefit of the organization.

### **1.1 BACKGROUND AND HISTORY OF THE COMPANY**

The Fund was established in 1949 as a pension scheme for the National Railways of Rhodesia, during that time it was under the management of the then National Railways of Rhodesia until 1976 when it was required by an Act of Parliament to privatize and become a separate legal entity from the National Railways of Rhodesia. As it complied with the Act, it was registered as National Railways of Rhodesia Contributory Pension Fund. Therefore, the Fund became a self-administered Pension Fund in terms of the definition contained in the Pension and Provident Funds Act 1976 constituted by a Trust Deed and Rules dated 4th October, 1949, as amended from time to time. With Zimbabwe obtaining its independence in 1980, the Fund has since that time been renamed the National Railways of Zimbabwe Contributory Pension Fund. The term self-administered means the pension is administered by trustees. In a self-administered Pension Fund, the trustees receive the contributions, invests the money received, collect the profits, and pay benefits to the members eligible to receive them. The National Railways of Zimbabwe is the Fund’s employer. The Members of the Fund shall be construed as all permanent staff members of the National Railways of Zimbabwe and the permanent staff members of the Fund itself.

## 1.2 ORGANIZATIONAL STRUCTURE



**Fig 1.0 Organogram of the NRZ CPF**

### **1.2.1 VISION**

To be the leading provider of pension benefits in the region.

### **1.2.2 MISSION**

To provide, protect and enhance the present and future economic well-being of the Fund members and the Employer in a sustainable manner.

### **1.2.3 VALUES**

**In the administration of the Fund the following values are embraced:**

- **Quality**-To provide quality services to its members and pensioners.
- **Respect**-To sustain mutual respect among its staff members, and to respect the rights of pensioners and members
- **Integrity**-To adhere to moral principles, ethical principles and honesty
- **Openness**-To be open minded and innovative in running the Fund
- **Accountability**-To be accountable for any transactions and decisions to pensioners, and appointed Auditors
- **Efficiency**-To make the Fund competent in its service deliverance

## **1.3 PROBLEM DEFINITION**

NRZ-CPF is currently conducting its board meetings in a traditional fashion where board resources (minutes and related documents) are printed on a hardcopy and they are given to each board member for use in the board meeting, also meetings are conducted in the board room at NRZ Headquarters i.e. each board member is forced to travel from their designated homes to Bulawayo so as to attend the meeting. This current system is time consuming, labor some and rather too expensive, where a lot of stationary is being used, and secretaries and some employees are being paid overtime for compiling, printing, scanning and binding board meeting documents for each of the board members, more so the Fund incur costs of sending hardcopies with DHL to the board members, this expense is rather too significant since some board members are residing outside the country. Once the board materials have been send to board members changes cannot be accommodated, unless the company is re-incurring the cost of sending the documents with DHL again. In the board meeting the meeting agenda, minutes, business resolutions and other meeting discussions are recorded manually on paper

which is not feasible enough to keep track of records in future .The current system that is more of paper work, and filing system has been useful at the Fund during its early startup, however the current system setup for board meetings has reached its limitations because the is growing bigger , the Fund has expanded its territories in oversees countries namely Britain ,United states of America among others and it's still growing, hence there is significant need for a setup where meeting members can conduct meetings from where ever they are located, sharing meeting documents from a shared database on a dedicated platform. More so some problems associated with the current system are :

- Group members may think alike and as a result may limits to new ideas not tolerated.
- There is poor planning if the group members have problems with each other.
- Some participants with valid alternatives to problem solving may fear to speak.
- Some individuals may be dominant in the group and this results in recommending decisions contributed by a few individuals.
- Inaccurate membership records and reports.

#### **1.4 AIM**

To develop an electronic virtual paperless boardroom that allows group communication and collaboration and allows remote decision making with board members in different geographical locations, allowing members to securely access all the meeting documents from a shared database using any mobile phone or computer.

#### **1.5 OBJECTIVES**

The following are the objectives of the system:

- To develop a system that allows group communication and collaboration with members in different geographical locations as well as producing up to date reports on meeting minutes and agendas among others.
- To develop a system that provides electronic central database with all meeting documents and company information.
- To develop a system that provides online adding and updating of meeting documents to the system as well as sending announcements and notice posting via the system and emails.

- To develop a system that provides backup logs and user login history for system review, security and auditing purposes.
- To develop a system that provides secured online voting facility and also anonymous input that aid to do away with reluctance of some members to speak.
- To create a system that have advanced and simple search abilities using MySQL query database.

## 1.6 RESEARCH INSTRUMENTS

By implementing an electronically Board pack system the problems currently faced with NRZ-CPF can be dissolved. The proposed system will help to facilitate active participation by all members of the group, and the software does everything from facilitating the exchange of information among members to providing automated tools for discussion and resource sharing. The following tools will be used in development of the electronic board packs:

- **Dreamweaver C6** : for coding and designing the web interface.
- **Android Studio** : for designing the android interface and optimization of the web interface.
- **MySQL Server 5.5**: for creating the database.
- **Crystal Reports**: will be used to create graphs and reports.
- **Filezilla ftp**: for uploading the system into the internet to make it accessible by everyone anywhere.

## 1.7 JUSTIFICATION

The board pack system is a computerized system that uses MySQL as its central database which has normalization as one of the standard requirement during design. This feature removes the problem of data inconsistency, redundancy and integrity problems, which are some of the major problems currently faced by NRZ-CPF. Programming languages such as HTML5, JavaScript, Hypertext Preprocessor (PHP) and android studio development software will be employed in the development of the system. PHP, JavaScript and android studio are open source software applications, that cant easily be downloaded from the internet for free of charge and they supports many databases like Sybase, unifomix ,xbase and SQL among others databases also they are compatible with all operating systems through the use of a web browser. The main aim is to provide compatibility so the system will provide a dynamic web



interface that runs on all screen sizes using the same database. The integration of JavaScript, PHP, CSS and MySQL produces user friendly interfaces and ensures speed and improved security which in turn improves productivity.

## **1.8 CONCLUSION**

This chapter has clearly defines the problems of the current system together with the aim and objectives of the proposed system. All being done, the next proceeding phase is Planning Phase. The planning phase focus its attention on feasibility study, risk analysis and creating the project work plan schedule.

## **CHAPTER 2: THE PLANNING PHASE**

### **2.0 INTRODUCTION**

The previous chapter fully describes the problems being faced by the current system and the objectives of the proposed system. The planning phase provides a clear analysis how the proposed system will be implemented. Feasibility study, business values, time and resources needed to develop the new system together with estimated costs and benefits will be analysed in full as the chapter progresses.

### **2.1 REASONS FOR BUILDING THE NEW SYSTEM**

Board papers and other key documents can be accessed and viewed by board members anywhere in the world at any time. The Virtual Board pack system have the following abilities that creates a greater need to implement the virtual board pack system.

- Timely and accurate information - helps the board to work more effectively and so promotes better governance.
- Eliminates hardcopy documents – board members can access board papers online promptly as no time is wasted on hard copy document compilation or waiting for a courier.
- There is instant access to past minutes and papers as well as to other information, such as meeting schedules, announcements and venues.
- Electronic board packs are simple to use and directors generally respond very positively to them, especially when used on iPads and Tablets.
- Time saving - Using electronic board packs saves time for the Company Secretarial team as there is no longer any need to check every pack and worry about whether a page might be missing. Human error in compiling hard copy packs is eliminated and the Secretariat's time can be put to better use than putting together hard copy packs.
- Electronic board packs are remotely secure – and there is no more risk of confidential papers being left on trains or planes. Fortunately if tablets, iPads or laptops are with company information are misplaced there is some protection to the device, in order to log in to the device the unauthorized user will first have to enter username and password or the device may have some biometric authentication.

- Multi-user access and security –The system will have different user levels that consists of the secretary, system administrator, and the board members. The users will have username and password protection to log into the system, Moreover the passwords and username will be encrypted using different methods.
- Management reviews - to increase the decision making by automating the board meetings, putting all the meeting documents on one place and providing performance analysis to the directors.
- Motivation and coordination – The proposed system will ensure improved motivation and coordination among the board members of the Fund furthermore reduces duplication of data and delays in printing and distributing hard copies to the board members.

## **2.2 BUSINESS VALUE**

Business values includes societal value, economic value, channel partner value, employee value, managerial value among others and not all values can be measured in monetary figures. Below are the business values that come along with the new electronic board pack system:

- Reduce risks of papers ending up in wrong hands, by providing password protection to the softcopy company documents and also by providing backup of the database on frequent bases so as to recover the information in occurrence of natural disasters.
- To cut labor costs and time consumed in printing, scanning and binding of meeting documents
- Quick and easy generation of reports of previous meetings.
- Improves satisfaction, as every board member will have up-to-date minutes, agendas, individual tasks and upcoming meetings plus the aid of reminders.
- Reduces costs of traveling, hotel and food expenses, the board meeting can be conducted virtually while the members are at different places with the help of Skype which aid in voice and visual contact.
- Improved decision making by automating the board meetings, putting all the meeting documents on one place and providing performance analysis to the directors.

## 2.3 FEASIBILITY STUDY

Holz, et al (2013) defined feasibility study as an analysis of the viability of an idea. The feasibility study helps management when making rational decisions, whether to pursue the project or not. Feasibility study is categorized into Economic, Operational, Technical and Social feasibility, and these classifications are expanded and analyzed below.

### 2.3.1 TECHNICAL FEASIBILITY

It is carried out to determine whether the Fund has all the technical infrastructure to build the project system in terms hardware and software, network infrastructure and technical expertise

### 2.3.2 TECHNICAL EXPERTISE

The development of the system requires skills in web designing (using css and html5), advanced programming using PHP, JavaScript and query and also some basics of android software development to optimize the web interfaces into android system. NRZ-CPF have its own Information Technology department with enough work force with enough skills to develop the proposed virtual boardroom system.

### 2.3.3 HARDWARE SPECIFICATIONS

Item	Minimum required	Recommended
Processor	1.5Ghz	3.4Ghz
Memory(RAM)	255MB	2GB
Hard Disk Drive	120GB	320GB
Network Card	10/100 LAN	10/100 LAN
DVD Writer Rom Drive	16x	52x
Tape Drive	20/40	20/40
Printer	LX 300 printer	LX 300 printer

**Table 2.0 shows client device hardware specifications**

## Software specifications

Item	Minimum required	Recommended
Wireless Router	3u 1Mb/Sec	42u 2 Mb/Sec
Internet Server	MS Windows server 2003	Later versions
Switch	10 port	24 port
UPS APC	Power Backup 1000VA	Power Backup 8000VA

**Table 2.1 Network Specifications**

## 2.3.4 Software specifications

Software	Required Package
Dreamweaver	CS6
SQL Server	5.5 and higher versions
Antivirus	Eset node 6
Filezilla	8.0 Or later versions.
Operating System	Windows, IOS, android etc (browser supported)
Browser internet software.	Chrome, opera mini, Maxthon, edge and other modern browsers.
Local server software	Xamp 6.0

**Table 2.3 Software specifications**

## 2.4 ECONOMIC FEASIBILITY

According to Fayol (1978), economic feasibility the analysis and evaluation of cash flows in order to determine whether if it is feasible to continue with the project. Basically economic feasibility is determined by subtracting the all the costs from all the benefits of the project. If the benefits exceed the costs then the project is said to be economically feasible. Costs include operational costs, development costs and costs of maintaining the system whilst benefits include intangible and tangible benefits.

### 2.4.1 Cost benefit analysis

The analysis aims to provide a clear representation of total costs and total benefits to be incurred by the project during a certain period of time. It can only be economically feasible if the benefits exceed the costs. Total cost is made up by the concatenation of:

- **Developmental costs:** are all costs incurred while the project is being built.
- **Operational costs:** this involves costs of using the system and training costs.
- **Tangible benefits:** these are costs that can be realized and are measured in monetary terms.
- **Intangible benefits:** these costs cannot be put in quantity value and they are measured in terms of accuracy, efficiency and effectiveness among others.

The table below shows expected costs and benefits.

YEAR	2016	2017	2018	2019
<b>BENEFITS</b>	\$	\$	\$	\$
Reduction in stationary costs	700	1000	1000	1000
Increase in efficiency in service value	900	1350	1350	1400
Servings in overtime	900	1100	1100	1100
Servings in operational costs	1200	3300	3000	2500
Improvement in management planning and control	2000	3140	3140	3140
<b>TOTAL BENEFITS</b>	5700	9890	9590	9140
<b>DEVELOPMENT COSTS</b>				
Installation of Software	40	0	0	0
Training	400	0	0	0
Stationary for documentation	200	0	0	0
Hardware costs	1000	0	0	0
Software costs	500	0	0	0
Network infrastructure	300	0	0	0
<b>Total development costs</b>	2440	0000	0000	0000
<b>OPERATIONAL COSTS</b>				
Hardware and software Maintenance	900	700	700	700
Operational Labor	400	250	150	150
System maintenance and repairs	1300	1000	800	400
Monthly hosting payments	90	90	80	80
User support	90	90	70	70
Backup	20	20	20	20
Other	70	70	70	70
<b>Total operational costs</b>	2880	2030	1710	1310
<b>TOTAL COSTS</b>	<b>5320</b>	<b>2030</b>	<b>1710</b>	<b>1310</b>

<b>NET BENEFIT</b>	<b>380</b>	<b>7880</b>	<b>9440</b>	<b>7830</b>
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**Table 2.4: Cost benefit analysis in US Dollars**

The total benefits in 2016 accumulated to \$5 700 with total costs of \$5 320 showing a net benefit is \$380 and followed by more satisfactory results in year 2017, 2018 and 2019. These results prove without reasonable doubt that it is economically feasible to develop the proposed system.

### 2.4.2 Net present value

The net present value (NPV) of an investment defines the present (discounted) value of future cash inflows minus the present value of the investment and any associated future cash outflows. This approach is mainly preferred in large project for deciding whether to continue with carrying out the project if the cash flows exceed the cash outflows. The main advantage of net present values is that it takes the time value of money into consideration. Hence future expenses and benefits are proportionally apportioned to time.

Formula:

$$\text{Net Present Value} = \frac{\text{Total Benefits}}{(1 + r)^*N}$$

- R is the discount rate
- N is the number of years

The discounting factors were calculated as follows:

$$\begin{aligned} \text{For year 1} &= 1/ (1+0.08)^1 \\ &= \underline{0.925925} \end{aligned}$$

$$\begin{aligned} \text{For Year 2} &= 1/ (1+0.08)^2 \\ &= \underline{0.857338} \end{aligned}$$

$$\begin{aligned} \text{For year 3} &= 1/ (1+0.08)^3 \\ &= \underline{0.793832} \end{aligned}$$



$$\begin{aligned} \text{For year 4} &= 1 / (1+0.08)^4 \\ &= \underline{0.735030} \end{aligned}$$

A discounting factor of 8% (the current inflation rate) was used for discounting the cash flows.

### Net Present Value analysis

Years	Discount Factor (8%)	Cash flow	Present Value
0	1.000000	(1000)	(1000)
1	0.925925	380	352
2	0.857338	7 860	6739
3	0.793832	7 880	6255
4	0.735030	7 830	5755
<b>NPV</b>			<b>18 101</b>

**Table 2.5: Net Present Value analysis**

The NPV resulted to a positive value that determines that it is feasible to continue with the project.

### 2.4.2 Return on investment

Return on investment or Accounting Rate of Return (ARR) is employed to make comparison between net profit and the total investments which is required to complete the project. ARR is calculated using the following formulae:

$$\text{ARR/ROI} = \frac{\text{average annual profit}}{\text{Total investment}} \times 100$$

$$\begin{aligned} \text{Average annual profit} &= (380 + 7\,860 + 7\,880 + 7\,830)/4 \\ &= \$23\,950/4 \end{aligned}$$

$$=\$5987.5$$

Total investment = **\\$5 320**

$$\mathbf{R.O.I} = (5987.5/ 5\ 320) * 100 = \mathbf{113\ \%}$$

The Accounting Rate of Return is 113% which is much satisfactory to carry on with the project, The ARR of 113 % means that for the initial investment will increase by 113% at the end of the year, hence the initial investment will be covered in less than 12 months.

### **2.4.3 Payback period**

The payback period is the calculation to find out how long the initial investments will be paid back. It also is referred to as the time to break even between the initial investment and the total accumulated profits.

The payback period is calculated as follows:

### **2.4.4 Payback analysis**

<b>Year</b>	<b>Initial Outlay</b>	<b>Cash Inflow/Outflow</b>	<b>Balance</b>
1	(1 000)	(8 500)	(11500)
2	(12500)	6240	8000
3	10 500	6 000	8500

**Table 2.6 Payback Analysis**

The payback period for this project is expected to be 1 year 5 months.

## **2.5 RISKS ANALYSIS**

Risk analysis analyses all the threats and dangers which are brought about by the development, implementation, use and maintenance of the project system. With a thorough analysis of risks it is possible to conduct pre-active plans to avoid some risks before they occur and also it's possible to device pro-active plans so as to deal with the risks while they occur. Below is a list of all possible risks and their effects, likelihood of occurring and action plan to be taken.

### **2.5.1 Hardware**

The NRZ-CPF has enough hardware to build, operate and maintain the system. Network servers, switches, routers, storage devices, backup facilities, laptops and tablets are already in place ready to be used. To avoid any uncertainty all the hardware equipment must be stored in safe place so as to avoid damage, theft and moisture damage among other uncertainties. Further more frequent maintenance (cleaning and removal of dust) to the hardware should be conducted to ensure a longer life.

### **2.5.2 Budgetary risks**

Budgetary risks include under budgeting and this may lead to the project being aborted due to lack of funds. To avoid under budgeting a thorough analysis taking into consideration three important budgeting factors that include time, the Fund's financial position and the project needs. Comparing the budget of other recent similar projects with the proposed project will aid a great help in estimating the costs of the project, since the difference doesn't deviate much from each other.

### **2.5.3 Resistance by users**

User resistance in adoption of the new system is a major cause of project failure. There are a number of reasons that triggers this resistance that includes fear of failing to adopt to new technology, strong attachment to the old system, fear of losing jobs to the new system and other people are just reluctance to change.

As a counter measure:

- Build the system using RAD development methodologies like prototyping that require user involvement from start of the project to the finish. When users are involved in idea sharing and decision making there is less resistance to the new system.
- Conduct thorough training of employees towards all the system aspects.

### **2.5.4 Technical risks**

There are many technical risks that is involved with all computerized systems that include system errors, data loss and integrity issues due to code errors, data modification or deadlocks, physical damages and virus attacks.

**Counter Measures:**

- Security measures like username and passwords protection, antiviruses, firewalls, data encryption and session and cookie protection should be put in place to ensure high security to our system.
- Thorough testing should be conducted so as to detect all database and code errors with the aim of fixing all the errors before the system is installed for final use.
- Parallel system implementation should be employed so as to detect and fix before the new system is fully installed for use. Pilot implementation allows the old system and the new system to be used at the same time, so as to detect and fix errors.

### **2.5.5 Time constraints**

Another major reason for project failure to meet deadlines, as a counter measure system developers should be motivated to finish the project as fast as possible and at the same time be monitored so as to produce a quality system also employing Rapid Application Development (RAD) methodologies like prototyping will be an ideal.

### **2.5.6 Other Risks**

- Conflicts may rise between project members.
- A long hierarchy of authority slows down communication that in turn slows down production.
- Lack of communication skills results in confusion amongst project members.

Employee motivation is the key half of these risks, especially the employee relations problems, coordination problems and failure to meet deadlines.

## **2.6 SOCIAL FEASIBILITY**

The proposed system is not directly targeted to the society. However since the system will be uploaded to the internet the whole world will see it but only the Fund's board members and other employees are able to log in and use the system's recourses, the society will however be able to have information about NRZ-CPF including how to contact us, how to physically locate us and other general information.

## **2.7 OPERATIONAL FEASIBILITY**

Operational feasibility analyses the effectiveness in use of the new system by comparing the new computerized system and the current system's operations. When analysing the feasibility of the operations the following factors are considered:

- **Performance**- throughput, response time and accuracy
- **Controls** - Adequate controls to protect against fraud.
- **Services**– Quality and reliable services ensures high motivation and productivity.

The system users are of vital importance in the use of the system. The following is the list of the system users:

### **2.7.1 Developers**

With the knowledge and skills of JavaScript, jquery, PHP and MySQL database query language together with advanced analysis and design skills, the developers can start building the system.

### **2.7.2 The board members**

The board members are the back bone of NRZ-CPF, their role is upload meeting documents/ presentations, view uploaded meeting documents, view their tasks, set up reminders, view upcoming meetings among others.

### **2.7.3 I.T department**

The ICT support group is the first line of defence when problem arises. They are responsible for support, maintenance and upgrading the system and also they are responsible for data backups on the central server.

### **2.7.4 The System Administrator**

The system administrator's role in the system is to add and manage users, upload meeting documents, upload information about upcoming meetings and insert any notifications among others.

### **2.7.5 The Secretary**

He/she is responsible for editing or amending the previous minutes and writing minutes the current meeting. The secretary needs more training than anyone else, because the system will

have forums to insert assigned individual tasks into the system and also to be able check if the individual tasks given on previous meetings have been completed or not for management review purposes.

## 2.8 Work plan

A work plan is a schedule of events that shows when individual tasks are expected to start and when they are expected to be completed. The schedule is based on estimations, it is very essential to compare our work plan with the other of previously similar completed projects so as to come up with a candid work plan. A thorough analysis should be conducted so as to reduce risks, a shorter estimation results in failure to meet due dates or poor quality products whilst a longer estimation results in more costs incurred.

Activity	Start date	Completion date
Proposal	01/03/2016	08/03/2016
Planning	08/03/2016	15/03/2016
Analysis	15/03/2016	29/04/2016
Design	29/04/2016	12/04/2016
Implémentation	12/04/2016	26/04/2016
Evaluation and Maintenance	20/04/2016	...

**Table 2.7 Project work Plan**

### 3.8.1 The Gantt chart

Activity/Period	1	2	3	4	5	6	7	8	9	10
Investigations	■									
Planning Phase		■								
Analysis Phase			■	■	■					
Design Phase					■	■	■			
Implementation							■	■	■	
Evaluation									■	■
Documentation	■	■	■	■	■	■	■	■	■	■

**Figure 2.8: The Gantt chart**

## 2.9 CONCLUSION

From the estimates projected above, it is notable that the project will yield more income benefits and less costs, also the aspect of a paperless environment will ensure saving water, trees and reduces industrial pollution in the production of paper. The next preceding stage is the analysis phase, where the evaluation is centered on the operations of the current system.

## **CHAPTER 3: SYSTEM ANALYSIS**

### **3.0 INTRODUCTION**

According to Leonard and Slaughter (1974) system analysis is the evaluation of all undertaking elements that make a contribution to the development and implementation of the project. This stage the evaluation will be focused mainly on the current system. In order to implement the right and better system, it is of vital importance to first gain enough information about the current system.

### **3.1 INFORMATION GATHERING**

Different research methodologies have been employed to gather information about the current system. These methods includes observations, questionnaires and interviews .Data was also collected from external sources so as to improve the reliability and validity of the research findings.

#### **3.1.1 Observation**

According to Blaxter (2006), “Observation is referred as a research technique often used for case studies and involves the researcher in watching, recording and analysing events of interest”. Using direct observation I managed to observe how the Fund conducts their board meetings and other general meetings. Observation proved to be the most effective and produced accurate results, as a former employee of NRZ-CPF I have been observing the current system for months and also had the privilege to prepare documents for most board meetings and attended all IT and Finance meetings. The observation results in accurate information furthermore it was costless, however since the meeting were not executed on a daily bases, observations took me about seven months to complete. On those seven months about 9 meetings were executed and directly observed. Furthermore observation can be used to check the accuracy of other data collection methods and the overall project is mainly based on the information that I have gathered during my observations.



### **3.1.2 Interviews**

According to Kendall and Kendall (2002), “An interview is a face to face information gathering technique and comprises of three types that includes structured, unstructured and semi structured interviews”. I managed to execute all three methods for the purpose of validating the accuracy of the information. Interviews does not only aid in gaining information about the current system, but also gains recommendations and ideas on how to come up with the improved system from interviewees .

#### **I.) Structured interviews**

The interview was conducted on a face to face bases with exactly seven employees of the Fund. The data analyst had a standard set of questions that were asked to each interviewee. The interviewees answered strictly the questions asked and there was no room for additional information. This was done so as to save time and only to gather relevant information to the subject. Structured interviews can also be conducted a media, such as a telephone or video conferencing technologies.

#### **II.) Unstructured interviews**

Unlike structured interviews on unstructured interviews the interviewer did not have a piece of paper with universal set of questions to ask, the questions were generated by the interviewer from his heard and expanded the questions depending with the response of the interviewee. Only ten people were interviewed and each interviewee was given room to express himself or herself freely in a casual manner, and the main advantage is that the interviewer was able to explore different areas of relevance that was not planned for.

#### **III.) Semi structured interviews**

Here the interviewer concatenated techniques of both structured and unstructured interviews. The interviewer had a piece of paper with standard set of questions and at the same time he expanded and generated some of his own questions depending on the response of the interviewee. Six people were interviewed using this technique, and the main advantage is that we managed to gain only relevant information and able to gain vital information on unintended topics.

#### **IV.) Advantages of the interview technique**

- There was instant response that saved time, hence quick decision making.
- There was room for clarification on understood answers and questions especially on unstructured and semi structured interviews.
- None verbal communication was noted from body movement, voice projection and facial expressions among others since the interviews were carried on a face to face bases.
- Using unstructured and semi structured interviews, the interviewee was given room to freely participate in a more casual way that in turn results in venturing in some other important unplanned areas.
- Also they provides adequate clarification to some business areas that were not understood by the interviewer also after a series of interviews the interviewer were able to come up with the mode set of information that is accurate.
- Interviews enabled the interviewer to focus on one person's responses, rather than dealing with a group dynamic.

#### **V.) Disadvantages of the interview technique**

- Interviews were time consuming and very costly. There was a lot of preparation, and we ended up taking over a month conducting the interviews, also some peoples were resenting a negative attitude towards interviews.
- Some information were bias and distorted through recall errors, language differences, selective perceptions, un-desire to disclose company information and desire to please interviewer.
- Information gathered amounted to large volumes, and it became difficult for the interviewer to analyze.

#### **2.1.3 Questionnaires**

Questionnaires were given out to all staff members of the Fund. 29 questionnaires were given out and only 19 were returned and amongst them only 14 were completed without unfilled gaps. The purpose of questionnaires was to gather information about the current system and to gather their opinions about the implementation of the electronic board pack system.

#### **I.) Advantages**

- The staff members answered the questions at their convenience time so that they give comprehensive answers, also response was provided at their own pace.
- Anonymity was maintained which in turn increased genuine responses.
- It saved time of discussing with the each individual staff.
- Questionnaires provided straight up answers to the questions, as a result it became easy to analyze.

## **II.) Disadvantages**

- Some people had a negative attitude and some were just lazy to read the questions so they just marked random answers and answered unwillingly. Some of them didn't even answer.
- They were time consuming since the response was not instant.
- Some questionnaires were lost before answered.

From the fact finding techniques I relied most upon my observations and interviews and less on questioners.

### **3.2 ANALYSIS OF THE CURRENT SYSTEM**

The Fund uses more of a manual system when carrying out the board meetings and other meetings at large, before the meeting whoever was assigned to keep record of the last meeting's minutes should submit them to his/her supervisor for review and approval. After approval, the minutes are printed and binded spirally together with the other related documents so they can be distributed to the meeting attendees. The documents are send to board members or other meeting attendees to their designated places via DHL or Swift before the meeting is executed. If there are any changes another copy is made and distributed with the updated content. The meeting comprises of the secretary, the main presenter or presenters and the other meeting attendants. The secretary is responsible for keeping records of attendees, minutes and distributing meeting related documents to meeting members. The main presenter's task is to present the meeting while being guided by the meeting agenda. The other meeting members are responsible to help with the writing of the minutes and taking note of their assigned individual tasks.

### **3.3 DATA ANALYSIS**

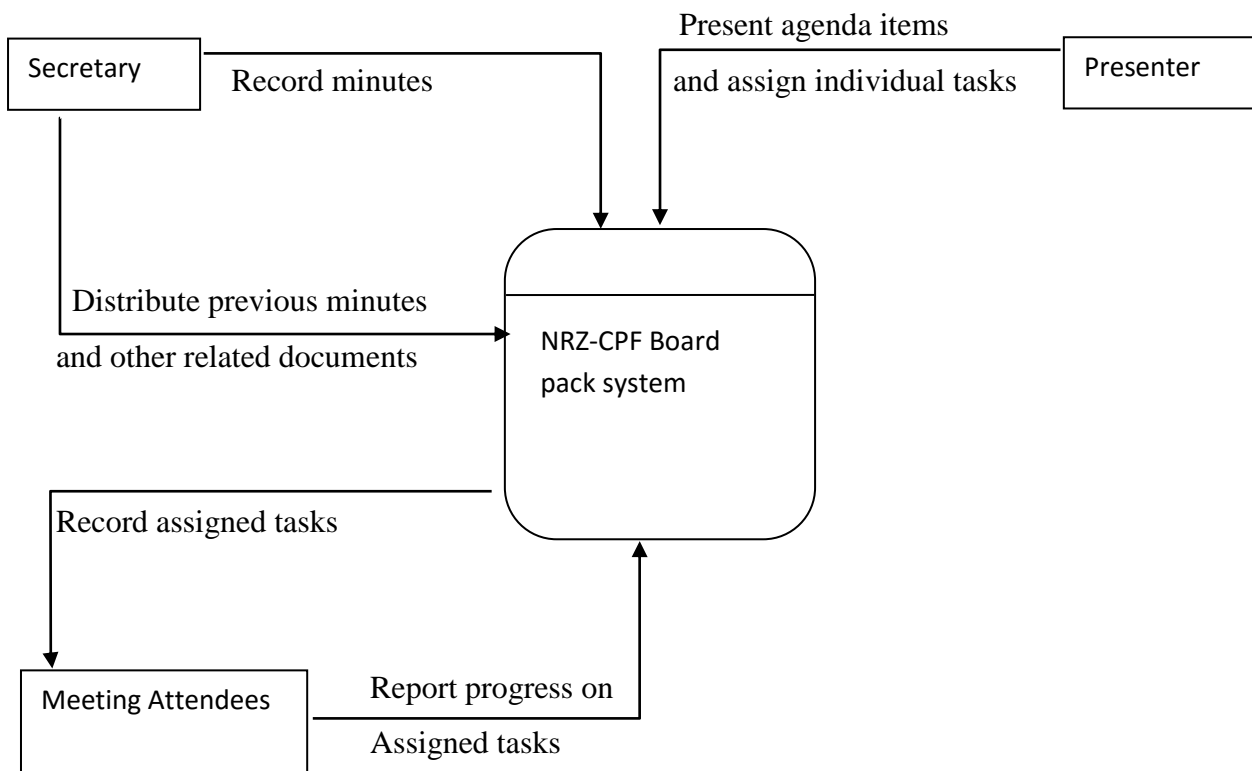
Hubbard (2009) defined data analysis as a process of evaluating the data gathered from interviews, observations and questioners for the purpose of providing diagrammatic

representation of the processes and procedures of the current system, with the aim of highlighting important information, better understanding and support quick and quality decision making. Data analysis has multiple approaches encompassing diverse techniques in representation of data. Here the developer used Context diagram and the Data Flow diagram to analyse the current system. These are explained and modelled below:

### 3.3.1 Context diagram

Shows the interaction between the system and its users. The context diagram represents data sources data sinks. On the context diagram the system's interactions with the outside world are modeled purely in terms of data flows across the system boundaries. The context diagram shows the entire system as a single process connected with its internal and external users.

#### Context Diagram for the Current System

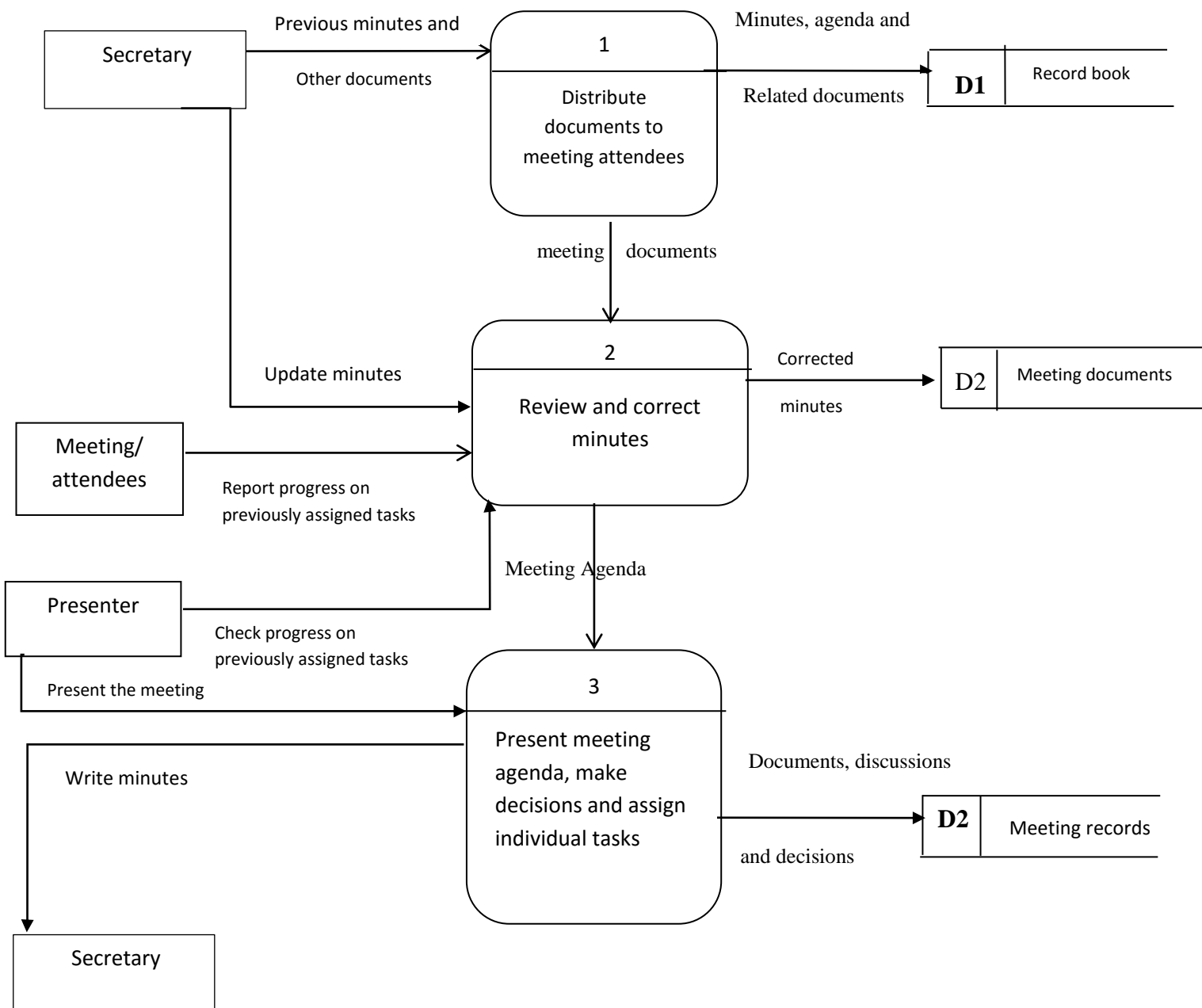


**Fig 3.0 Context Diagram for the current System**

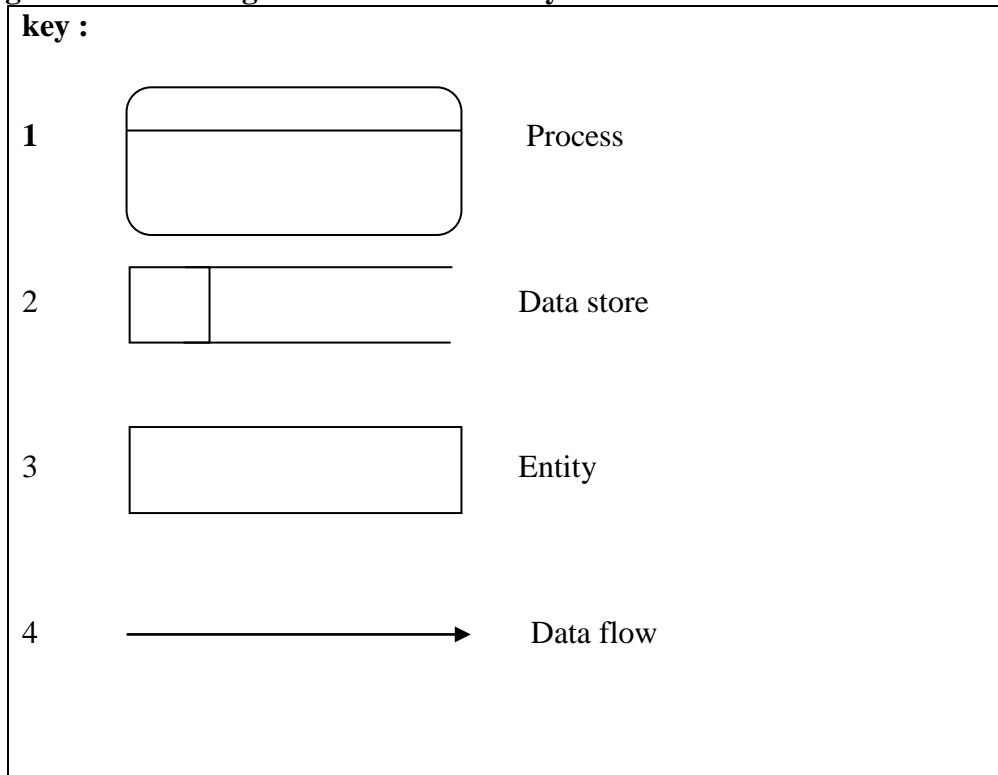
### 3.3.2 Data flow diagram (DFD)

According to Whitten, et al (2003), "A data flow diagram a data modelling tool that shows a clear representation of the functions of the current system in a graphical fashion". The

technique begins with an overall picture of the business and continues by analyzing functional areas of interest. They create a clear overview of the current system that brings about a better understanding of the processes and functions of the current system. DFDs shows data, inputs, processes and outputs however they don't show any information about the timing of processes. Processes may be executed sequentially or concurrently, unfortunately data flow diagrams does not reveal that information. Below is the Data flow diagram for the current system:



**Fig 3.1 Context Diagram for the current system**



As presented by the Data Flow Diagram above, before the meeting starts the secretary presents the previous meeting minutes to the presenter or to his / her supervisor for correction and approval, once they are approved they are distributed to the other meeting attendees together with the other related documents. During the meeting the presenter reviews the minutes and checks the progress of individual tasks assigned on the previous meeting. One person is chosen to be the secretary for taking records on the discussion. The presenter goes on to present the meeting following the meeting agenda, decisions will be made by the whole group and tasks will be assigned to each individual and due dates to complete these tasks will be specified.

### **3. 4 WEAKNESSES OF THE CURRENT SYSTEM**

From the above analysis and problem statement of the current system, the Fund is using vast amounts of paperwork which is a waste of stationary and difficult to update information on hardcopies as well as extracting the hardcopy documents for future reference and reviews. Some of the weaknesses faced by NRZ-CPF in carrying out board meetings are outlined below:

- Failure to keep track on the progress of individual assigned tasks.

- Most decisions are made by a few influential members, thus in turn limits toleration of new ideas.
- The current system is very insecure since there is no security measures to hardcopy documents if they happen to get lost, also the confidential documents in the office place are all accessed by the other coworkers since the offices are being shared by two or more people.
- There is data redundancy since the copies of meeting documents are continually printed whenever changes are made.
- The fund is experiencing extra costs in paying overtime work to employees who remain behind typing, scanning, printing and binding board materials.
- Failure to generate accurate reports at any period of time.

After synchronizing the loopholes of the system at hand, it is now clear that the system is time consuming, exerts too much labour and costs and above all its unsecured. With the current size of the Firm the current system can no longer be relied upon.

### **3.5 EVALUATION OF ALTERNATIVES**

Developing the proposed system, the analyst considered three alternatives namely outsourcing, improvement of the existing system and building a new system from scratch. After a thorough evaluation of these alternatives management has finally considered building a new system for the following reasons.

#### **3.5.1 Outsourcing**

According to Brien (1996), outsourcing is hiring a software developing company to develop the software for you. This alternative was rejected because the software sellers were quite expensive in terms of the cost of the software, installation and maintenance. These vendors could not guarantee maintenance of the software after the implementation. Also, the software available could not specifically meet the noted problems of the current system, also these vendors does not offer the source code of the software system, meaning the Fund can't improve the system on their own so for any alterations the Fund will have to incur the costs all the time.

#### **3.5.2 Improvement of existing system**

Upgrading the existing system will not effectively meet the stated problems. Reasons for rejecting this alternative are:

- The system will remain manual and this would not have met the problems of the current system.
- Data storage remains compromised since the records will be kept on paper which is more prone to easy destruction or misplacement.
- Since it will remain a manual system, there are high chances of data corruption due to human error.
- There is no security on the records since they are kept on paper.
- There is data duplication especially when updating the records that result in imminence confusion and errors.

### **3.5.3 Developing a new system**

This alternative has been adopted because of the following reasons:

- Since the system would have been tailored to meet the users' specifications, it will meet the stated problems of the current system.
- It is less costly to develop an in house system since the expertise is from within the company and the development software applications and hardware is already in place
- Maintenance of the system after its implementation becomes easy since the expertise is from within the organization and also they have the source code.
- Tracking assigned jobs, previous minutes and associated documents and dates will be easy to track it will be automated and computerized.
- NRZ-CPF will have full ownership of the software, since it is in house developed software.
- With In-house development staff training will be easy since they contributed on the requirements specifications.

### **3.5.4 Summary of alternatives**

The alternative of outsourcing and improving the current system are very expensive, in fact improving the current system will only increase more costs and the problems of the current system still remains at large. Also with both alternatives the Fund will still incur costs of maintenance forever.

## **3.6 REQUIREMENTS ANALYSIS**



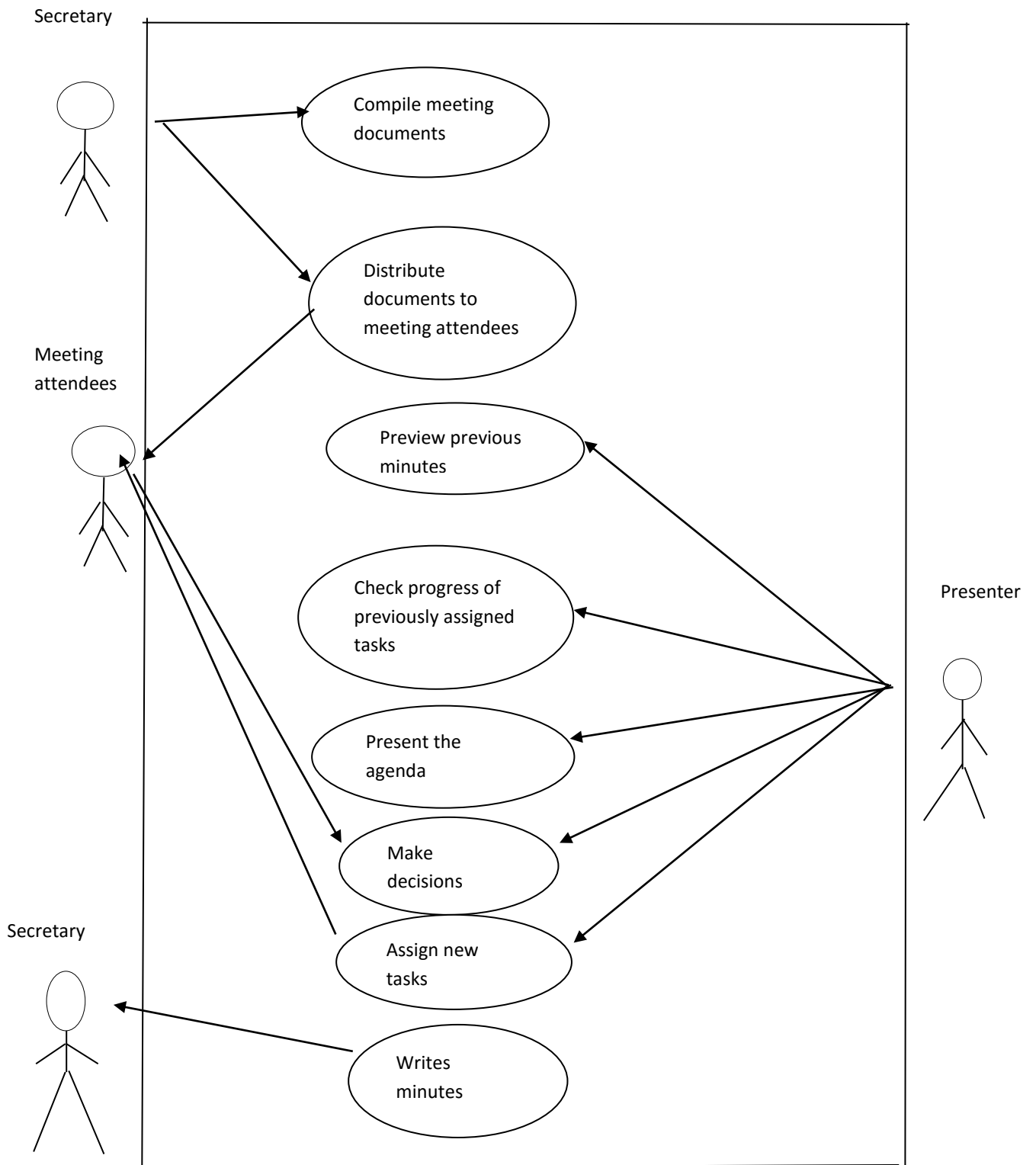
According to Brinkman (2008), requirements analysis determines all functions and capabilities that the new system is expected to provide for its users. The system requirements are divided into two categories, namely functional requirements and nonfunctional requirements.

### **3.6.1 Functional requirements**

- Publishing meetings, agendas and inserting meeting related documents.
- Email or text message reminder notifications for upcoming meetings.
- Live Voting panel.
- Different user views, every user have some selected documents and information he/she can view according to the user level.
- System log that tracks who have been logged in and what documents can be viewed by each system user.
- Provision of secure data storage through the use of database passwords.
- Easy report generation on specified dates.
- Provision of data consistency.
- No data duplication.





#### **I.) Use case diagram**

According to Whitten, et al (2003), a use case is a case (or situation) where the system is used to fulfil one or more of the user's requirements. A use case has a sequence of steps that include an interaction between the users and the system. A complete set of use cases specifies all the different ways of using the system, and thus defines all behaviour required of the system without dealing with the internal structure of the system.



**Fig 3.2 Use case diagram**

**Key**

Symbol	Description
	<b>Actor</b>
	<b>Use case</b>
	<b>System boundary</b>
	<b>Uses / Extends</b>

**3.6.2 Non-functional requirements**

Non-functional requirements are those requirements that specifies the criteria that can be used to judge the operation of a system, rather than specific behaviors. Requirements can be measured in terms of efficiency, motivation and satisfaction among others. The online Board Pack system will have the following requirements:

- The system will provide an interface that is easy to comprehend and use to both users.
- The system will be fast and updates content in real time without refreshing pages.
- The system should be consistent in all operations and reliable. That means the system has minimal down times and information is not lost during both active and passive states.
- The system should be highly portable and flexible on all devices.
- System should be able to support multi-user scenario.
- System should allow for data recovery in situations of failing.

### **3.7 CONCLUSION**

A fully computerised boardpack system is obliged to do away with all the problem faced by the current system and is guaranteed to meet all the requirements mentioned above. After evaluating the alternatives it is cost beneficial to the organisation to develop the system inhouse using the resources at hand. With all being done the next proceeding stage is the design phase, the design stage is where the system requirements will be specified in details so as to permit the physical realisation of the proposed system.

## **CHAPTER 4: DESIGN PHASE**

### **4.1 INTRODUCTION**

According to Joanne (2006), design is a process that employs different techniques and methodologies to define the proposed system in sufficient detail so to permit its physical implementation. System design, architectural design, physical design, program design, database design, software design and security design will be fully executed on this phase. It includes diagrammatic representation of different design structures for easy understanding. The software specification is the output document generated in this phase. After the design stage the programmers can have a clear road map on how to go about building the system, hence they can start building the system.

### **4.2 SYSTEM DESIGN**

According to Dury (1992), system engineers uses the user requirements to analyze and determine the functionality of the proposed system, however if any requirement is not feasible or cannot be meet the users, users are informed in time so as to make alternative plans. Every design structure is documented, the document serves as the blue print for software specification. The document menu structures, navigations, forms of interests, data structures and the general overview of the system. Furthermore entity diagrams, dataflow diagrams, data dictionary and documentation for system testing will also be elaborated in this phase. A well designed system is characterized by User friendly interface, good performance, effectiveness, strong security system, maintainability and reliability.

#### **i.) Security**

Security is a major concern in every system in the world. On the board pack system different techniques will be employed to avoid unauthorized access to the company

information. Security ranges from physical security, network security, database security and software security, and these types of security are explained in full on security design page.

**ii.) Reliability and consistency**

Reliability is the ability to perform intended operations in a real executable environment without having errors or failure of some type. The system must be able to recover its data after the occurrence of system failure or error in a timely manner. Hence in the event of a system failure the system should be able to roll back to the consistent state it was before the fault. Also the system should deliver accurate information at all times.

**iii.) Compatibility**

Compatibility is the ability of the system to execute on different platform. Board pack system must be flexible enough to run on different operating system and on all browsers. Also the system's screen resolution must dynamically adjust in accordance with the device screen. Hence the system will be designed to run on desktop screen, tablet phones and mobile phones.

**iv.) Data Analysis Tools**

The system should have well designed platform for data analysis. Reports, graphs and tables can be employed to compile different type of data for analysis purposes that in turn aids managers in decision making.

**v.) User friendliness**

A good system should have user friendly interfaces that are easy to use. Interfaces are the major bridge that determines the acceptance or rejection of the system by users.

**vi.) Effectiveness**

The use of the system must result in reduction of costs and realization of more profits as well as non-tangible benefits. The users should be allowed to contribute on the system requirements so that they operate the system more effectively after it is implemented.

## vii.) Maintainability

The system should be flexible enough so as to incorporate future system upgrades such as adding, removing and altering system features and functions.

## viii.) Efficiency

Efficiency is the ability to produce the required product with minimum effort. According to Aubyn *et al* (2009) efficiency entails doing the thing right. The system should execute different functions in the least expected.

## ix.) Effectiveness

Effectiveness refers to the capability of the system to produce desired results thus the intended outcome will be realized (Sumner, 2003). Hence effectiveness is about producing the right system. The effectiveness of the Board pack system must be measured by the output deliverables.

## Description of the proposed system

To have a better understanding of the proposed system, the inputs, processes, outputs and together with the functions will be briefly described below. The system functions supports the processes in producing the outputs. The system have 3 level users namely the system administrator, meeting members and the meeting secretary.

Function	Description	Inputs	Outputs	Processes
Add, suspend and activate users	Provision for user verification when accessing the system resources.	<ul style="list-style-type: none"><li>User details including name, email, username, password, level etc.</li></ul>	<ul style="list-style-type: none"><li>User work, contacts, personal, authentication details</li></ul>	<ul style="list-style-type: none"><li>System access verification</li><li>Update user details</li><li>Suspend User.</li><li>Activate User</li></ul>
Meeting arrangement	The creation of a meetings, control and management of meeting resources.	<ul style="list-style-type: none"><li>Meeting details including time, date, tittle, location</li></ul>	<ul style="list-style-type: none"><li>Meeting details</li><li>Agenda items</li><li>Associated files</li></ul>	<ul style="list-style-type: none"><li>Create meeting</li><li>Add agenda items</li><li>Upload meeting documents</li><li>Create votes</li></ul>

		etc as well as creating group members	
Sharepoint for meetings	Creation of group members to attend and view the meeting resources	<ul style="list-style-type: none"> <li>Names of users</li> <li>Access levels</li> </ul>	<ul style="list-style-type: none"> <li>Group community</li> <li>Select users to attend the meeting</li> </ul>
Share point for all system users	A forum for non-Data duplication where documents are uploaded once and shared to selected users	<ul style="list-style-type: none"> <li>User id</li> <li>User full name</li> </ul>	<ul style="list-style-type: none"> <li>Group community</li> <li>Select document to share</li> <li>Select users to view the document</li> </ul>
Votes	A forum to create and allow group members to vote	<ul style="list-style-type: none"> <li>Vote description</li> <li>Option names</li> </ul>	<ul style="list-style-type: none"> <li>Voting panel for all meeting members</li> <li>vote</li> </ul>

**Fig 4.0 System functions**

### Meeting attendees

- Login using personal username and password.
- View meeting details including agenda items and meeting associated documents.
- Ability to vote electronically through the system.
- Write assigned tasks.
- Monitors designated risks.

### System Administrator



- Add user accounts.
- Suspend and activate users.
- Create and publish meetings.
- Add meeting agenda for every meeting.
- Upload meeting documents.
- Create Votes.
- View reports.

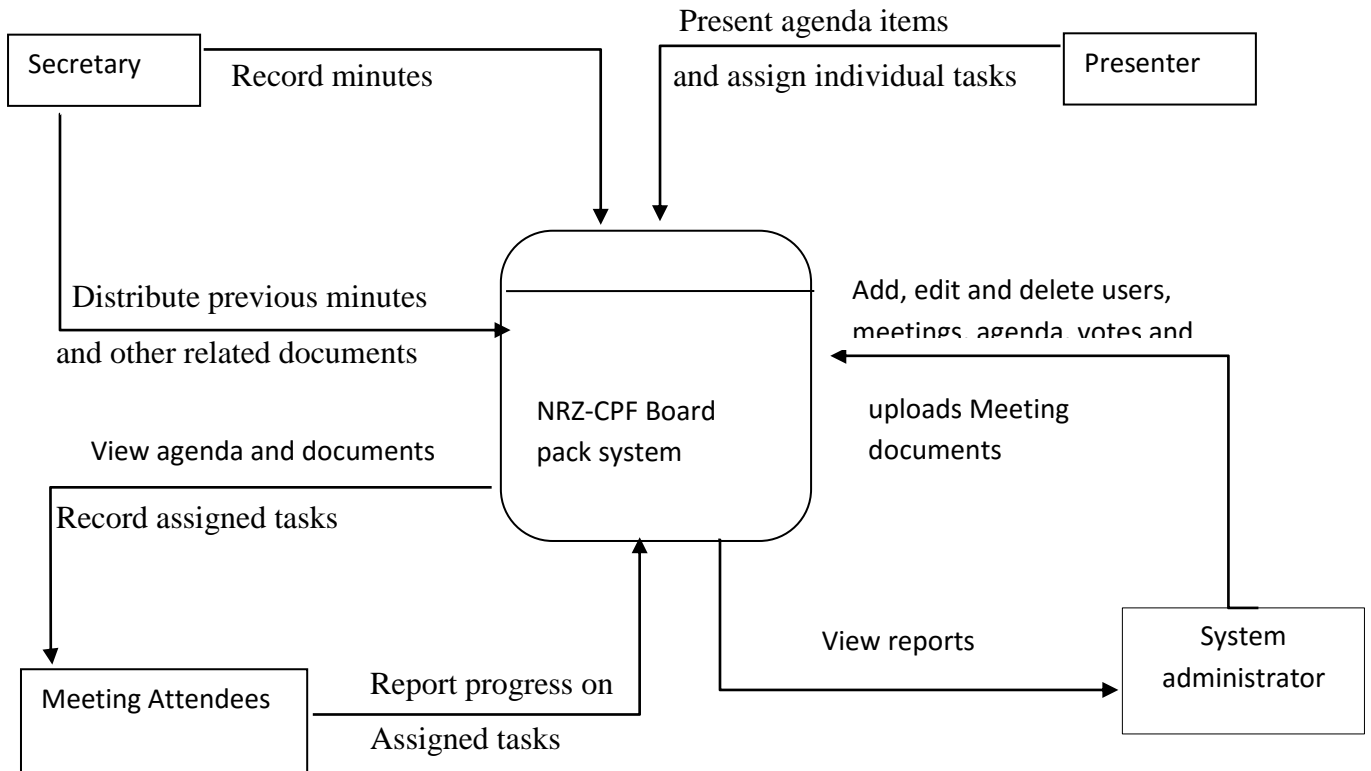
### **Secretary**

- Login using personal username and password.
- Write minutes.
- View meeting details including agenda items and meeting associated documents.
- Ability to vote electronically through the system.
- Write assigned tasks.
- Monitors designated risks.

#### **4.2.1 Context Diagram of the proposed System**

The context diagram shows how the users interact with the system. The diagram represents data sources and data sinks. There is a single process that summarizes the system's interactions with its internal and external users, the interaction is modelled in terms of data flows within the system boundaries

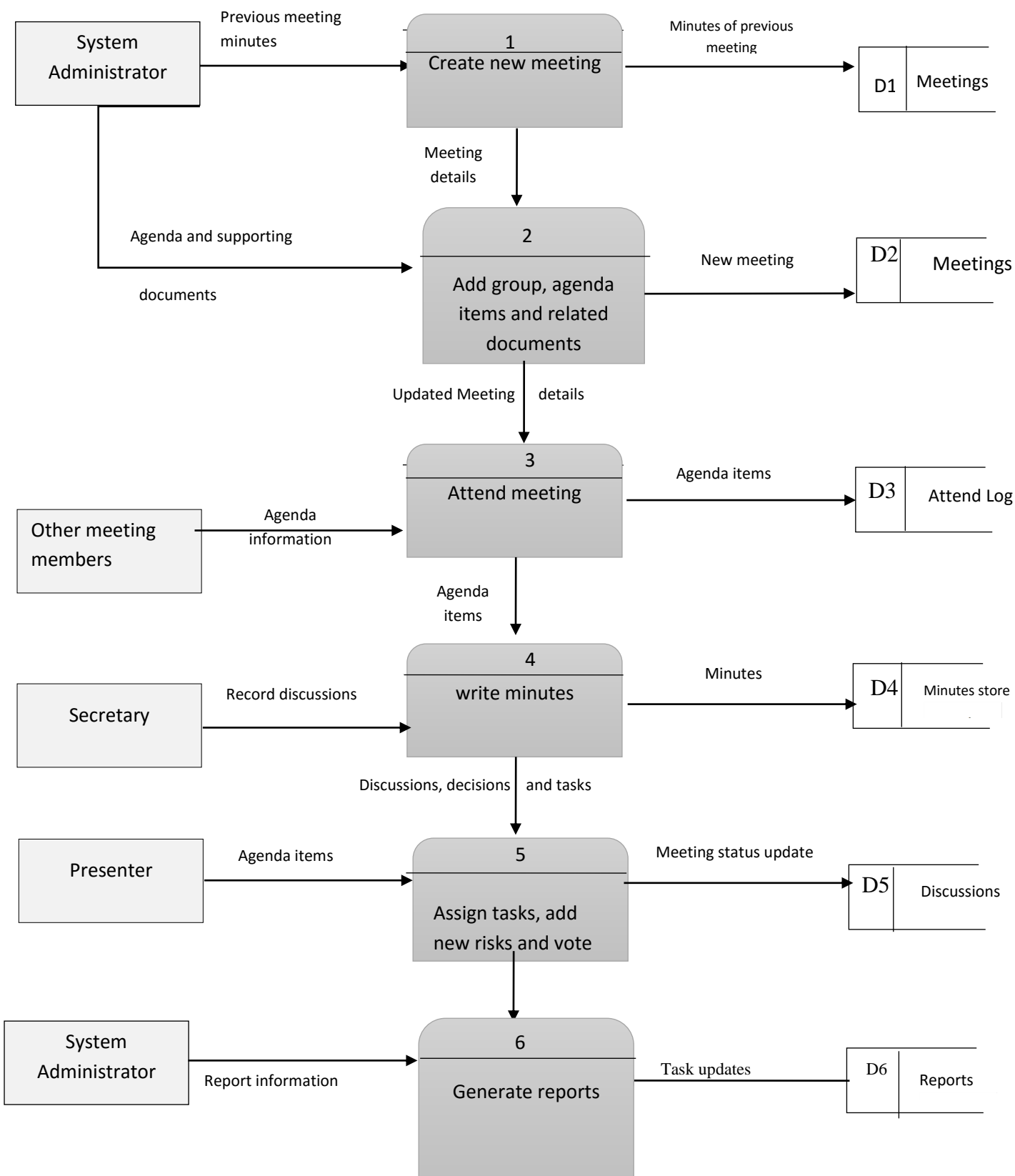
Context Diagram for Current System:



**Fig 4.1 : Context diagram**

#### 4.2.2 Data Flow Diagram (DFD) of the proposed System

According to Dury (1992), Data Flow Diagram is a graphical representation of the system's component processes and flow of data between them. They show the inputs, processes and output for each process. The DFD for the proposed system is shown below.



**Fig 4.2 Dataflow diagram for the current system**

### **4.3 ARCHITECTURAL DESIGN**

The architectural design is the combination of hardware, software and network infrastructure. It looks at the hardware setup of this proposed system. Architectural design is concerned on the physical setup of hardware components and the installation of software on the underlying hardware. The network infrastructure will be based on a Wide area network so as to enable communication between devices. The idea behind, is to interconnect the hardware, software and network infrastructure at a lower cost in terms of money, time, labour and efficiency. Measures undertaken to reduce threats of theft, loss of devices, unauthorized access among others. Features of the architectural design.

#### **4.3.1 Client Machines**

These includes desktops, tablets and mobile phones and they contain the Graphical user interfaced applications brought about by their operating systems. Since the board pack system is a web system application, it is therefore accessed through the use of the browser. The client machines will access one central database stored on the cloud server, so as to do away with security, data consistency and integrity issues concerned by storing the data in multiple different machines.

#### **4.3.2 Networking Cables**

These includes CAT 5 or RJ45 Ethernet cables that links communicating devices in the LAN or the WAN networks. Network cables are only used on desktop machines, mobile phones and tablets uses Wireless networks.

#### **4.3.3 Router**

A router is used to transfer data packets from and to the server. It receives and forwards data packets on different routers through established networks until the data reaches the final destination.

#### **4.3.4 Internet server, switch and wireless router**

The internet server provides clients with internet on their devices. The router collects data packets back and forth server and the client's devices. The internet server controls and manages access of internet by the users, the switch allows multiple access to the server and the switch allows wireless access of mobile devices and tablet phones.

#### **4.3.5 Apache Server**

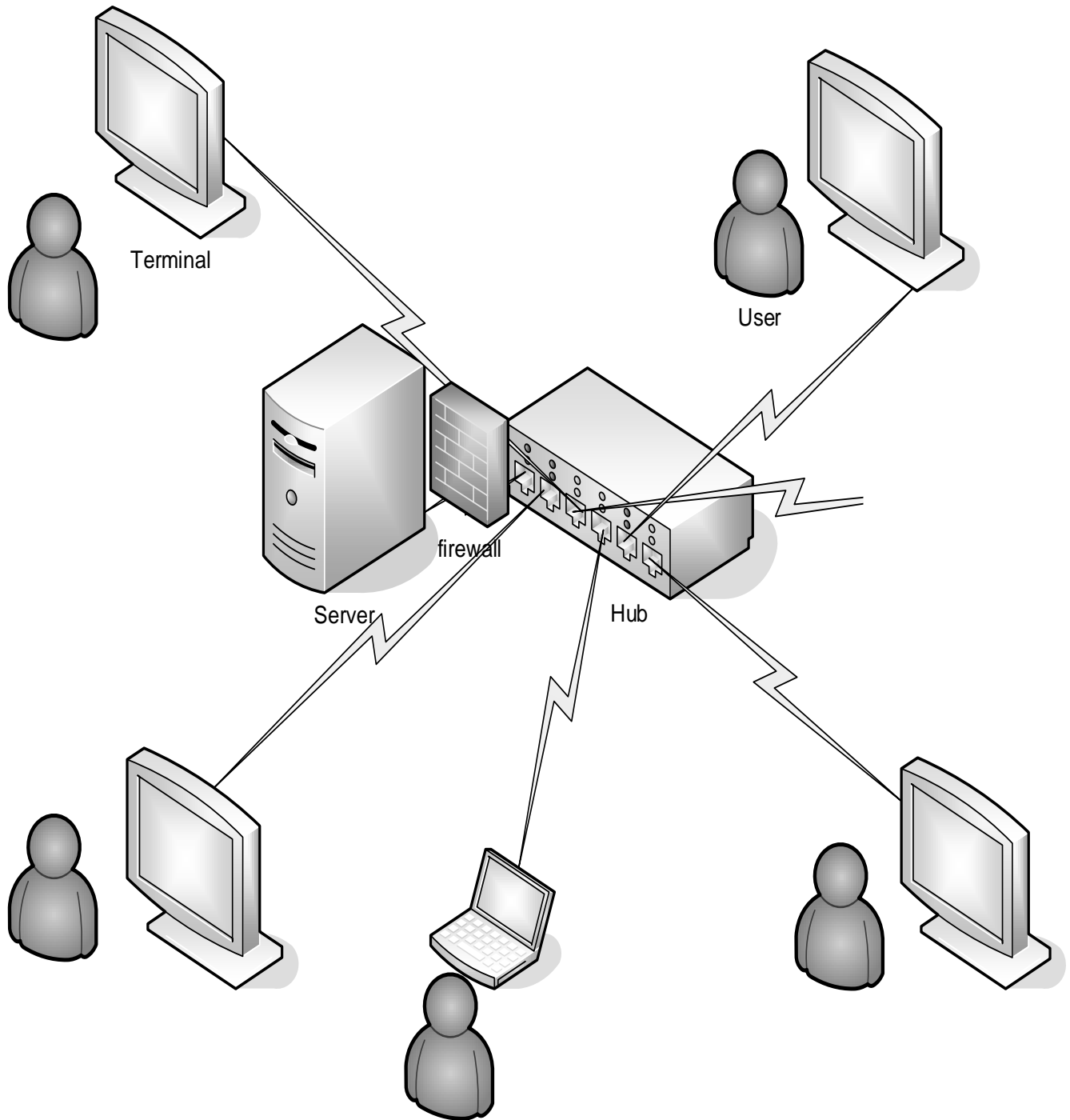
The system files with the source code together with the database will be stored on the cloud server provided by hosting company. All the company documents, images and all board materials will be stored on this server.

#### **4.3.6 Firewall**

Firewall is a network's primary defence system that analyses the network traffic in determining whether ongoing or incoming packets should be allowed through the network or not depending on the predetermined set of rules. It creates a bridge between the local area network and other external networks assumed to be insecure and untrustworthy.

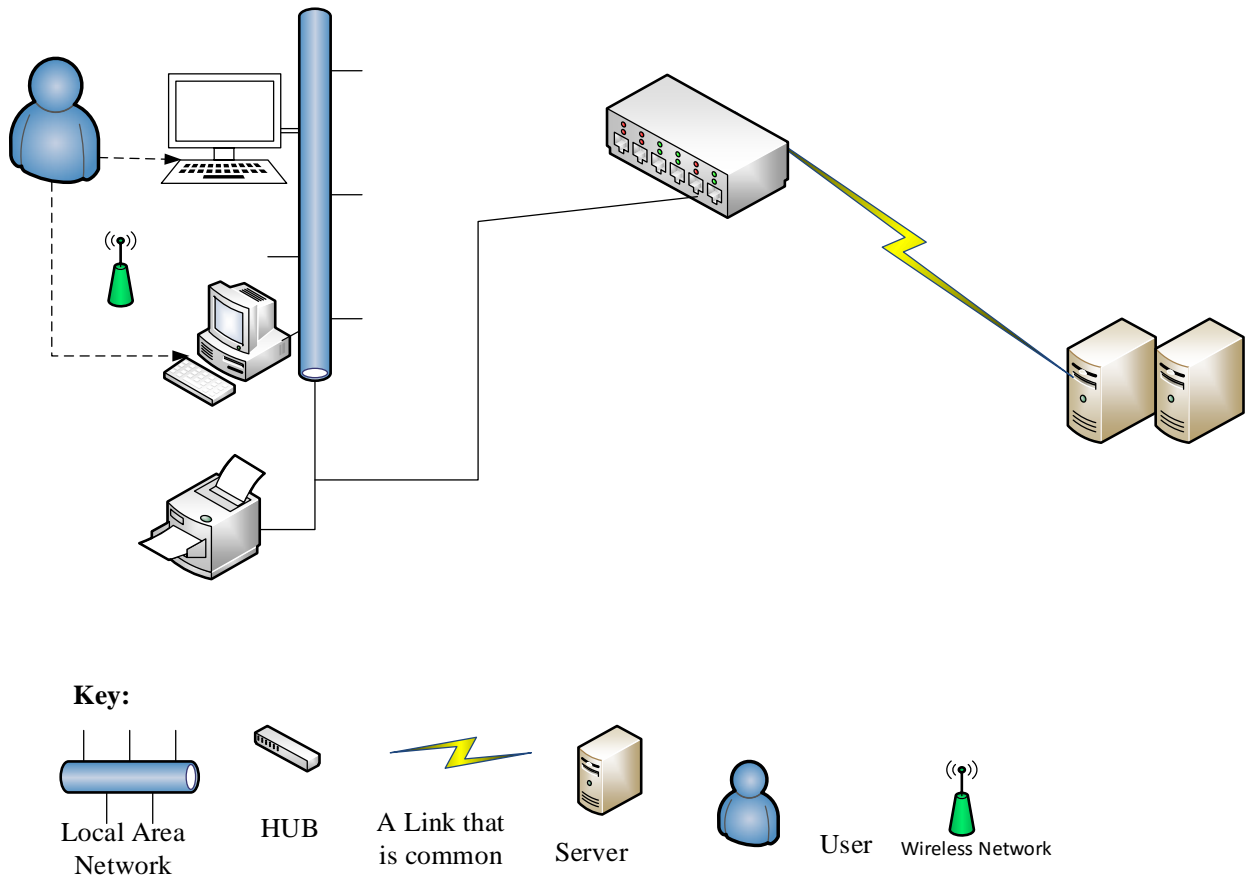
#### **4.4 Physical Design**

It encompasses the transformation of a logical abstract version into explicit technical design Coronel (2007). It encompasses the design of hardware and software components prior to the execution of the board pack system. The physical design consists of the router, client computers/ tablets, switches and internet server. The diagram below shows a physical design of the new system that is mainly focused on the client side connectivity platform. Also the diagram shows the layout of devices in a star tropology.



**Fig.4.3 Physical design of the new system**

The physical design of the proposed system can also be shown by the diagram below focusing more on networking devices.



**Fig 4.4 Physical design of the new system**

#### 4.5 Database Design

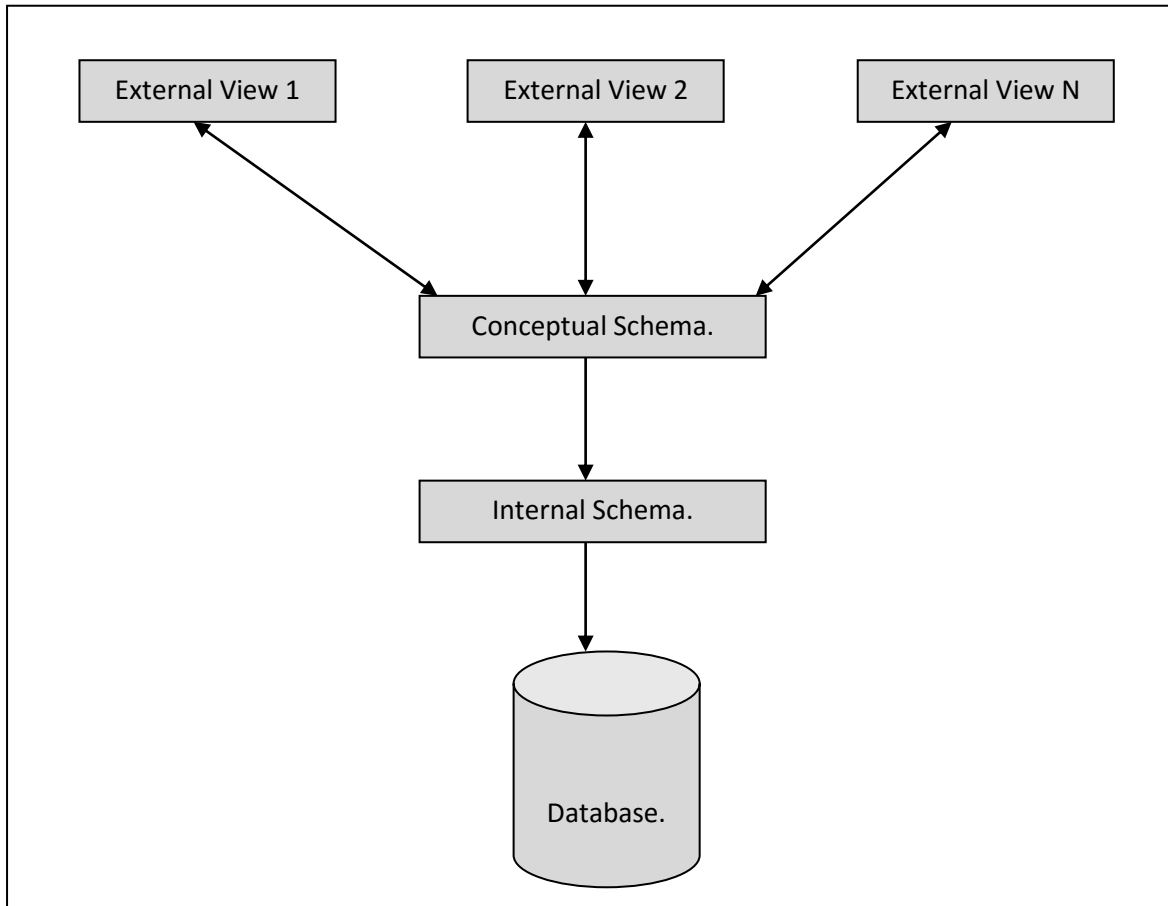
Mathers (2007), defines a database is a central repository for data. Database design architecture shows the arrangement data in a database in form of layers known as schemas. The layers comprises of the application layer, the conceptual layer and physical layer. The database management system (DBMS) transforms database requests made by users at the external schema against the conceptual schema, into database queries on the internal schema. From the internal schema the query will be executed in the actual database, then the results are brought up to the requester.

#### Database Architecture design

According to The architecture depicts a logical view of the proposed system's database. The ANSI/SPARC is a three level architecture that logically represents how the database is crafted. The architecture is flexible and easy to understand describing the independence and integrity of data layers. It identifies three schemas in the database design which include:

- External level
- Internal level
- Conceptual level

### Database architecture design



**Fig 4.5 Database architecture**

Description of Three Schemas:

#### I.) View Level

The view level can also be referred as the application level, it displays the highest level of abstraction. The users deals directly with this level. It also aims to present data into different formats or views for example the same data can be viewed using tables, graphs, charts, forms and in descriptive format.



## II.) Conceptual Level

According to Coronel (2010) the conceptual level describes what data is stored in the database and its associations. It describes entities, attributes and entity relationships as well as security and integrity constraints among others. The attributes includes data types such as string or text or integers or decimal values among others and the specific data size and character encoding sequence. Queries are also defined in this level and how they link with each other.

## III.) Internal level

The internal level describes how data is being stored in the database, Crocket (2009). It also describes how data is stored in the database in terms of storage, files and structures. It is responsible for data manipulation, compression and encryption and also describes what form data/records will take when stored. Is also responsible for allocating data in database tables, allocation of space for the data, describing the forms the new data will take when stored.

## IV.) Physical Level

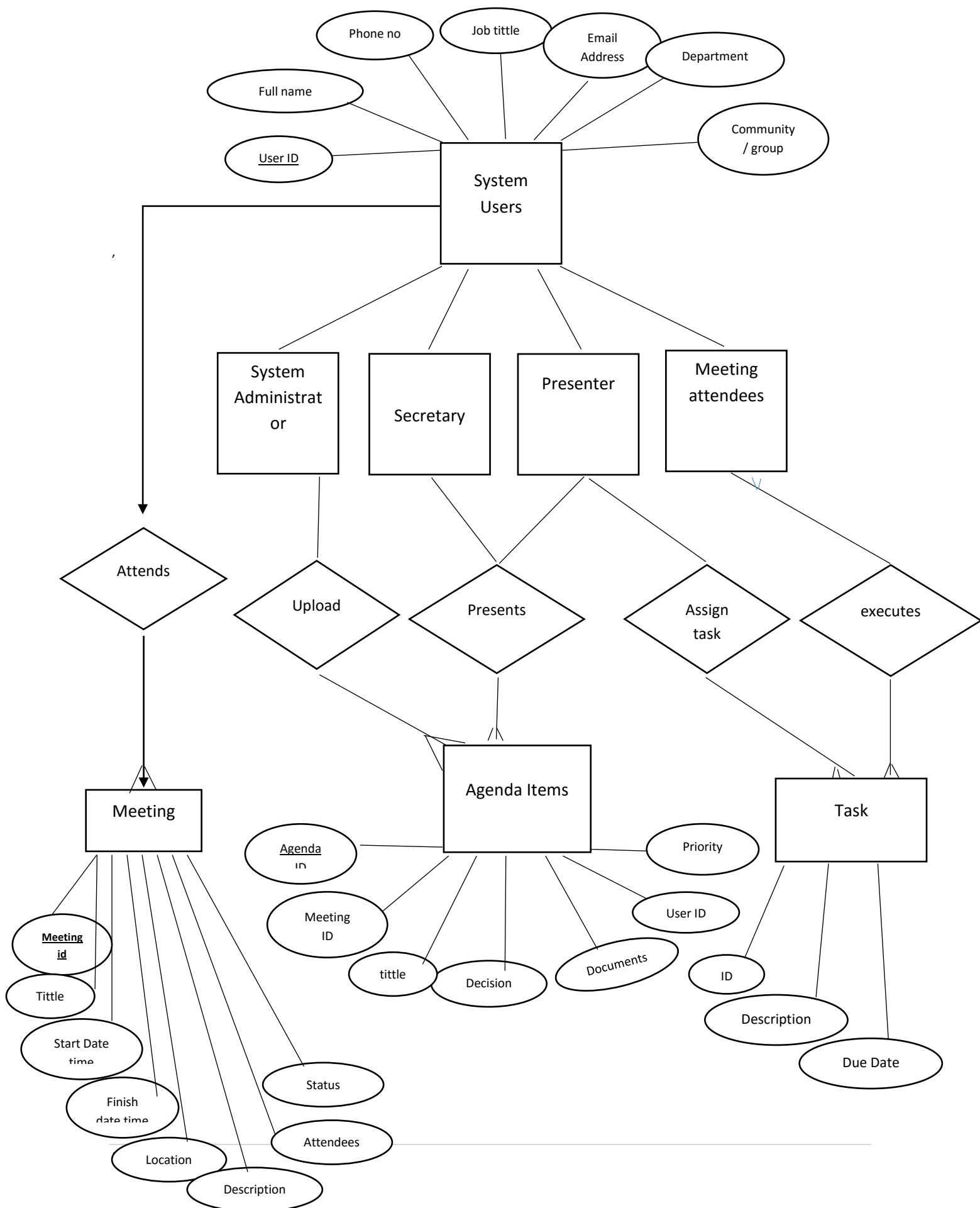
This is the lowest level of abstraction and defines how data is actually stored.

## V.) The actual database

This is where the actual data is being stored. The database will be designed using MySQL (Standard query language).MySQL version 5 and later versions have a greater performance and can support almost all systems developed by any programming language.

### **4.5.1 Entity Relationship (E.R) Diagram**

It is a logical data model that provides a pictorial depiction of the entities involved, their relationship and attributes. The E.R diagram is a logical arrangement structure that shows how the actual database will look like when created. The Underlined fields are referred as the unique keys. Below is the E.R diagram of the proposed system.



**Fig 4.6 Entity relationship diagram**

As shown on the data flow diagram, the system administrator review the minutes of the previous meeting, for verification and validation. Once the minutes are approved they are uploaded to the system. The system administrator is responsible to create new meetings edit and delete the meetings. After a meeting is created the administrator inserts agenda items for the new meeting. He/she can go on to rearrange the agenda items by just dragging and dropping. With all being done the system administrator uploads related meeting documents and can also go ahead and associate each document with the associated agenda item.

The meeting presenter presents the meeting with the agenda items being the road map of his/her presentation. Decisions will be made and recorded into the system. For more complex decision making a voting panel will be in place for the meeting members to vote.

Whilst the meeting is being presented the secretary is responsible to record the minutes, and sends the finished copy to the system administrator for verification and validation.

The presenter go ahead and check status on the progress the individual tasks assigned on the previous meeting. The status is updated in the database. New tasks will be assigned, and each individual is responsible to record his/her assigned task into the database together with the due date. The system will remind the users about tasks and upcoming meetings via the use of text messages or email notifications. For each task in progress or task completed the user should give continual update to the system for managerial purposes.

#### 4.5.2 Data Dictionary / metadata repository

It is data repository that stores information about data facts such as data format, field size, meaning, origin, usage and relationships to other data (Everest, 2001). The actual data is stored in tables which are database elements. Details about the entities on the ERD are further described in the data dictionary thus meta data such as :

##### Users

Column	Data Type	Description
<u>id</u>	Integer	Applicant Identification Number
User_id	Variable Character (50)	User's unique system id number
First_name	Variable Character (50)	User's first name
Second_name	Variable Character (50)	User's second name
Department	Variable Character (50)	Department name

Designation	Variable Character (50)	Job title
Phone_number	Integer	Mobile number
Email_address	Variable Character (50)	User email address
Access_level	Variable Character (50)	Admin or secretary or board member
Username	Variable Character (50)	username
password	Variable Character (50)	User password

**Table 4.0: Users database table**

### Meetings

Column	Data type	Description
<u>id</u>	Integer	Meeting unique identification
Title	Variable Character (250)	The title of the meeting
Description	Text	Description of the meeting
Start_date_Time	dateTime	date and time when the meeting is starting
Finish_date_Time	dateTime	Finish date and time of the meeting
Group_community	Text	The group members to attend the meeting

**Table 4.1 : Meetings database table**

### Agenda\_items

Column	Data Type	Description
<u>id</u>	Integer	Agenda item unique identifier
Meeting_id	Integer	Meeting id from meetings table (foreign key)
Description	text	Description of the item

**Table 4.2: Agenda items tables**

### My\_documents uploads

Column	Data Type	Description
<u>id</u>	Integer	Document unique identifier
Agenda_id	Integer	Derived from agenda items (FK)
Meeting_id	Integer	Derived from meetings (FK)
Document_name	Variable Character (50)	Document name
Document_type	Variable Character (50)	Doc, docx, pdf, gif or png etc
Document_compiled_by	Variable Character (50)	Compiler of the document
Last_update	dateTime	Document last updated
Last_update_by	Variable Character (50)	The person who last updates the system

**Table 4.3 : My\_documents table**

### Decisions

Column	Data Type	Description
<u>id</u>	Integer	Invoice ID Number
Agenda_id	Integer	Date of invoice
Description	text	Abnormal Vehicle Registration Number
Decision	text	Invoice amount
Votes_results	text	The results after members vote

**Table 4.4: Decisions table**

### Votes

Column	Data type	Description
<u>id</u>	Integer	The unique identifier (primary key)
Agenda_id	Integer	Agenda item unique identifier (Foreign Key)
description	Text	Full description of the decision
Arrived_by	boolean	Either through voting or group agreement

**Table 4.5 : Votes database table**

### Votes\_options

Column	Data Type	Description
<u>id</u>	Integer	Option unique identifier (primary key)
Vote_id	Integer	Id from votes created (secondary key)
Agenda_id	Integer	Agenda id as foreign key
Option_name	Variable Character	Name of the option

**Table 4.6 : Votes options database table**

### Votes\_results

Column	Data type	Description
<u>id</u>	Integer	unique identifier (primary key)
Votes_id	Integer	Id from votes created (foreign key)
Votes_options_id	Integer	Id from votes options (secondary key)
User_id	Integer	the id of the person voted
vote	Variable Character	The option name voted for
Comments	text	

**Table 4.7: Votes results table**

### Risks

Column	Data Type	Description
<u>id</u>	Integer	Risk unique identifier (primary key)
Meeting_id	Integer	Id from meetings (foreign key)
Agenda_id	Integer	Id from agenda_items (secondary key)
Risk_name	Variable Character (250)	The name of the risk
Risk_description	Text	Description of the risk
Countermeasure	Text	Pro and pre active measures to be taken to avoid risk from occurring
Risk Impact	Integer (10)	Risk impact rated from 1 to 10
Risk_likelihood	Integer (10)	Likelihood of risk to occur rated from 1 to 10
Person_responsible	Variable Character (50)	The person responsible to monitor the risks and to

		oversee the execution of the counter measures
Comments	Text	

**Table 4.7 : Risk table**

**Tasks**

Column	Data type	Description
id	Integer	Task unique identifier (primary key)
Agenda_id	Integer	Id from agenda_items (foreign key)
Task_name	Variable Character (60)	Name of the task
Task_description	Text	Description of the task
DueDate	dateTime	Date and time task must be completed

**Table 4.8: Risk table**

**Minutes**

Column	Data type	Description
id	Integer	Minutes unique identifier (primary key)
Agenda_id	Integer	Id from agenda_item (foreign key)
Description	Text	Minutes description
Decision_description	Text	Description of the decision made
Decision	Text	The decision made
Votes_results	Text	The results after votes

**Table 4.9: Risk table**

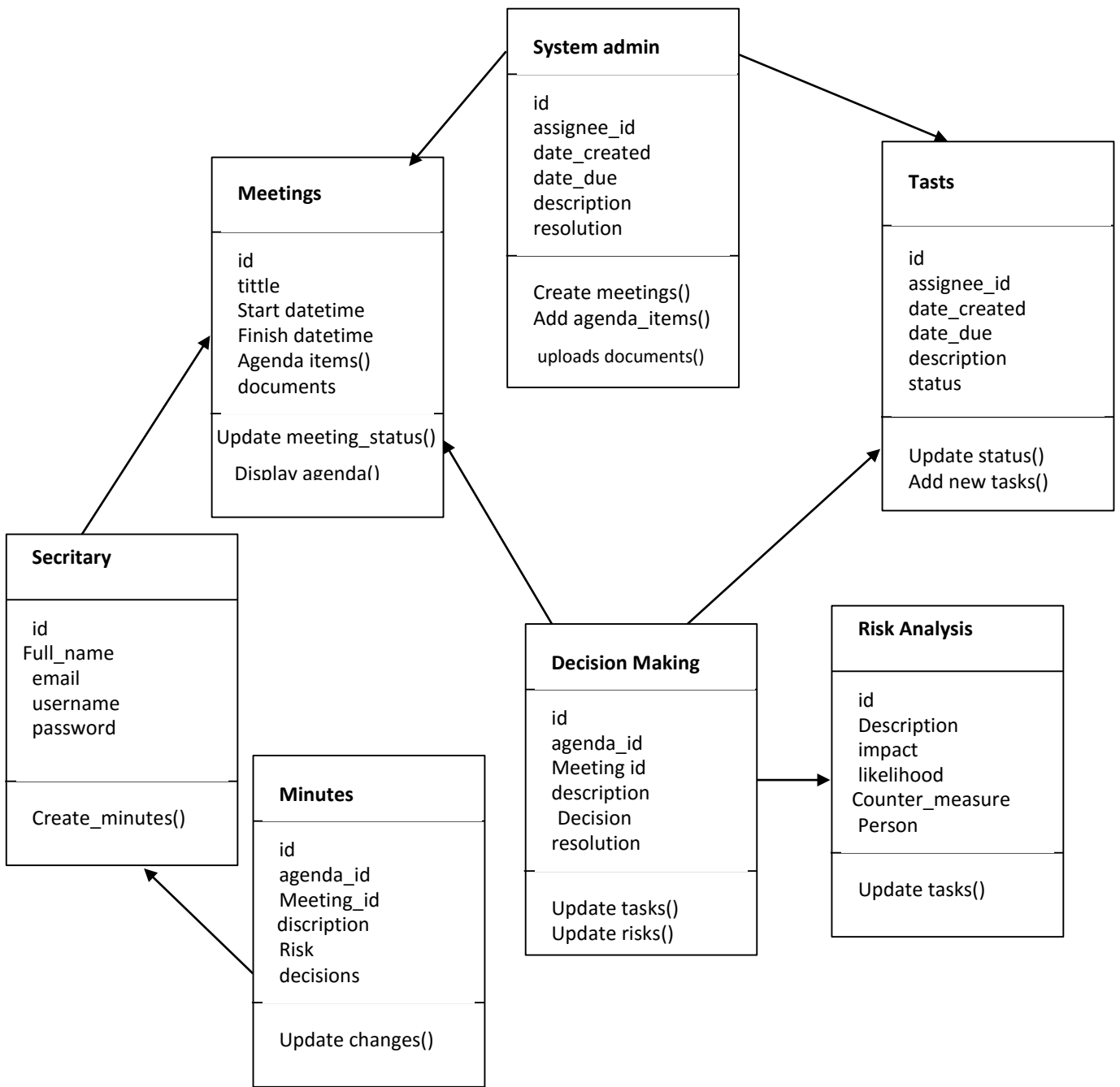
## **4.6 PROGRAM DESIGN**

According to Thomas (1993), “program design is a technique for designing and procedures in software. This involves the design of the system modules and how they interact with each other using UML diagrams, which include class, sequence and package diagrams.

### **4.6.1 Class Diagram**

Class diagrams are used to describe the entities types and objects in the system together with their relationships and behavior. The diagram below shows the class diagram for the NRZ-CPF Board pack system.

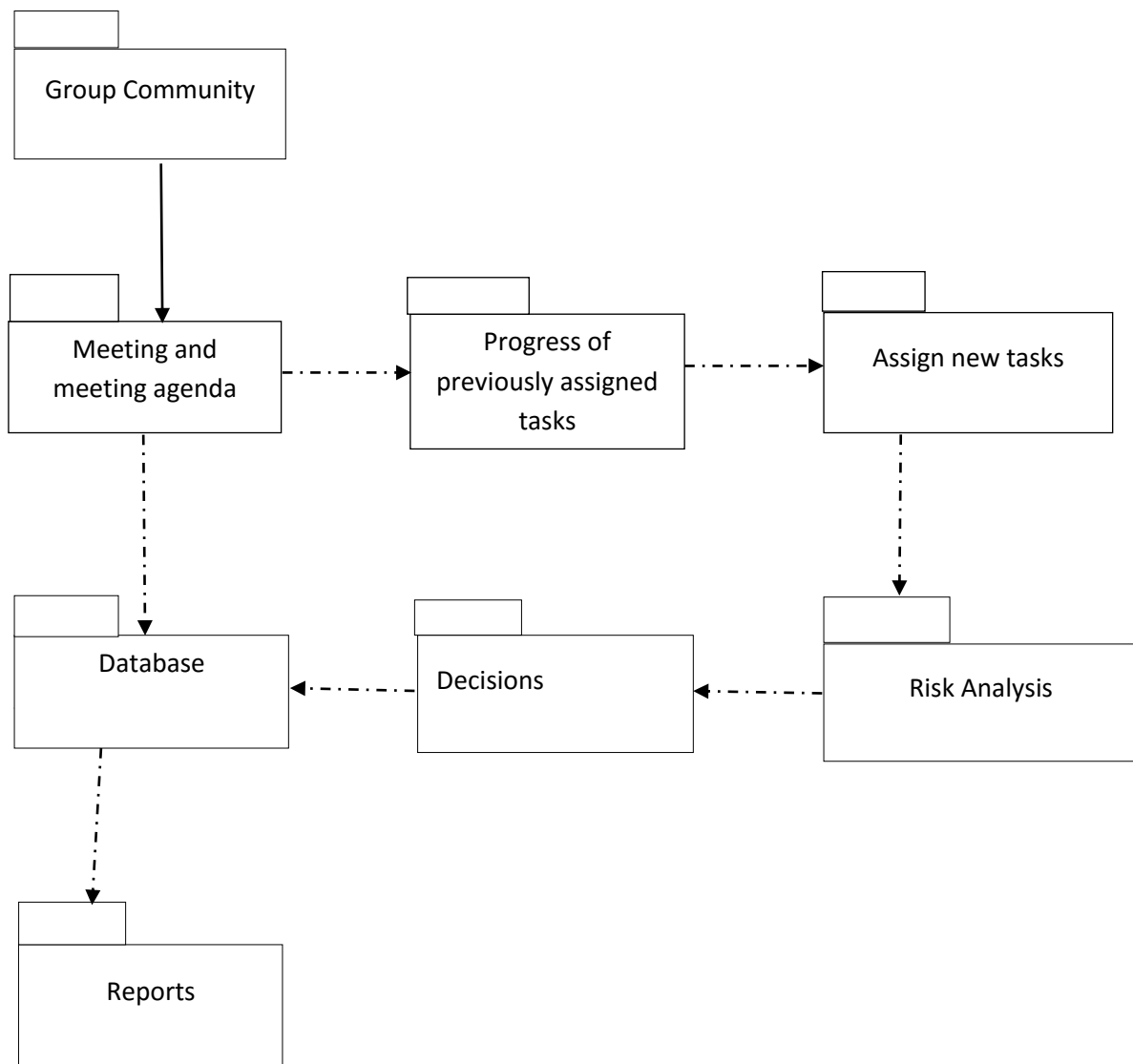




**Fig 4.7 class diagram**

### 4.5.2 Package Diagram

The package diagram shows the dependencies of various components or modules that implements the objectives of the system. The package diagram reduces complexity and thus enabling a clear and better understanding of the system.

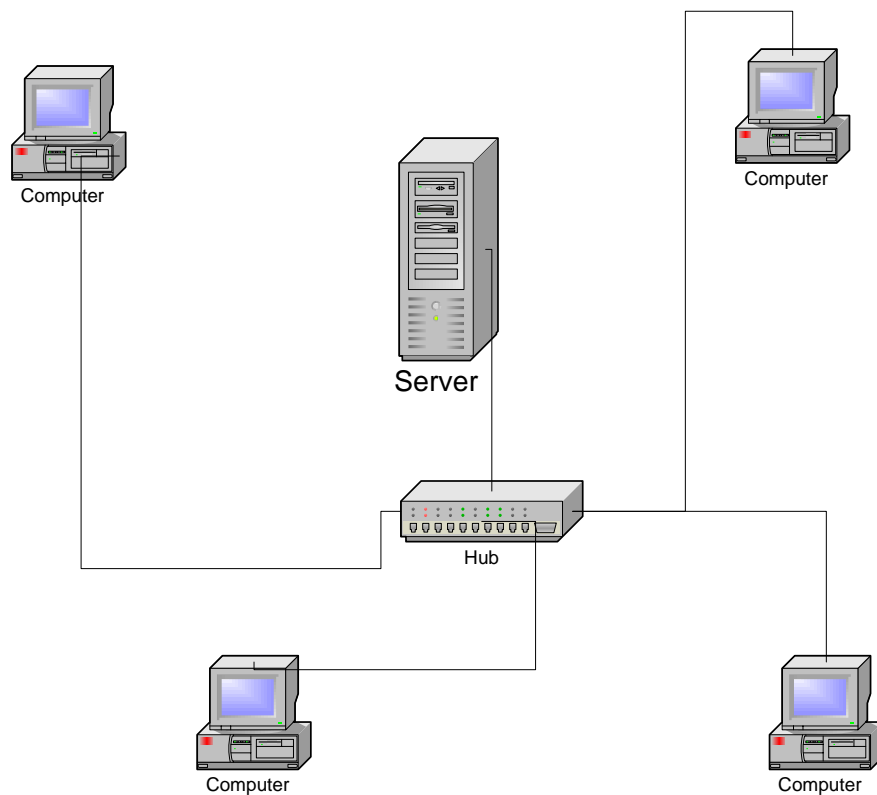


#### 4.7 Package diagram

#### 4.6 Network design

In this design there is the layout of the network environment that it is going to be used in. Also, it will look at the hardware and software requirements of the proposed system for it to operate in the network environment. There is going to be a central server, which enables the access of the database as well as a storage device for the college's database.

### 4.6.3 Network Architecture Diagram



**Fig 4.8 Network Architecture Diagram**

Since the system will be hosted on the cloud server, the physical arrangement of our devices will follow the star topology. A star topology has high network security, also configuration and auditing is made easy since the configuration and auditing is centred on one device that is the apache server. However when the central server is down so is everyone connected.

### 4.7 INTERFACE DESIGN

According to Whitten, et al (2003), system interface entails how the user interacts with the system. It includes defining internal and external controls such as menus, forms, reports, graphs, charts, tables, help screens among other interfaces controls. Interface design is a highest level of abstraction and it hides the complex parts of the system by simplifying the user's interaction with the database by providing an ease of use webpage interfaces with

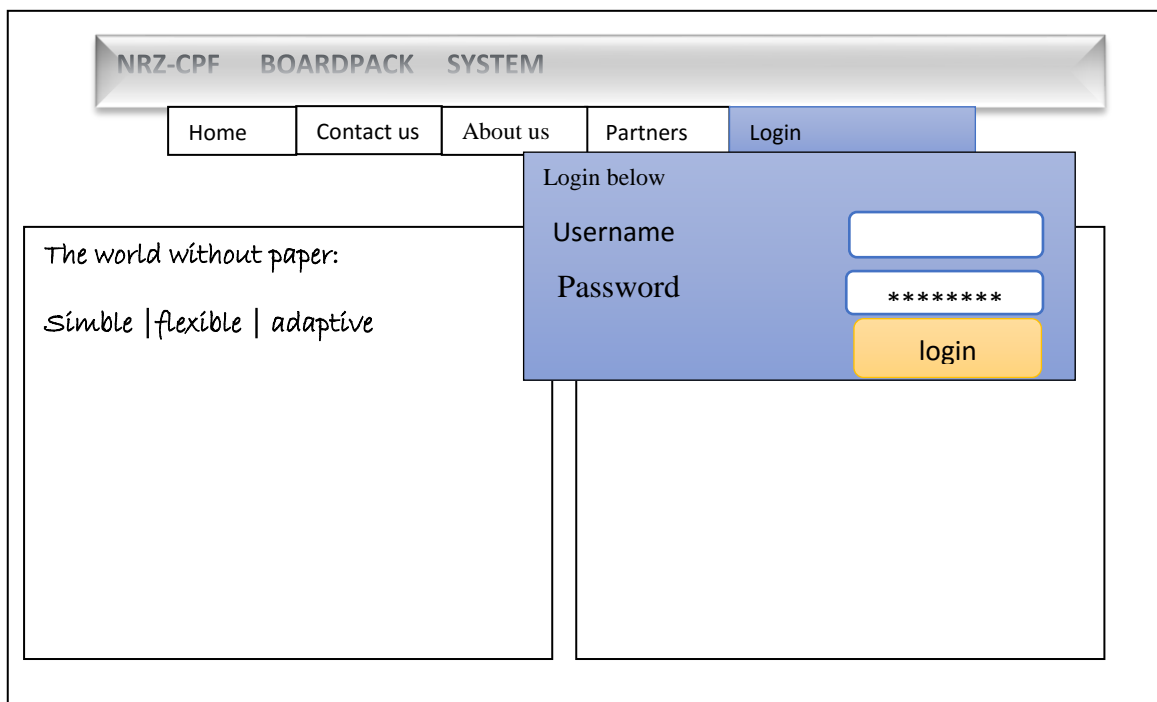
direct instructions. The user interface is mainly concerned with the input and output. User interface is external view in the ANSI-SPRC diagram. The database setup and how data is being processed, stored and retrieved is kept hidden to the users, therefore will not occur in the interface design.

#### 4.7.1 Input Design

Input design is the layout of forms that the user uses to fill in data that is to be send to the system, for the purpose of processing data, retrieving data and storing data. All the input forms will be thoroughly validated against error input. Our design layout permits one to open two forms at the same time in different tabs. Below are the input forms:

##### i.) The main form (homepage)

The main form will include general information revealed to the public, such as information about us, contacting us among other general information. The home page will also contain a log in page that prompts the user to log into the system by first entering the correct combination of username and password. The home page will look like:



**Fig 4.8 Login form and home page**

**ii.) Create account**

The System administrator creates individual account for everyone, once the account is created then every user can log in and use the system resources. The form for account creation is shown below:

The form is titled "Add new user" and is enclosed in a blue border. At the top, there is a grey button labeled "Add new user". Below this, there are three radio buttons for selecting a user role: "Secretary" (selected), "System Administrator", and "Meeting attendee". The form contains the following input fields:

- First Name
- Second name
- Department
- Ec number
- Job tittle
- Home Address
- Work Externsion
- Phone (cell)
- Email Address work
- Email (personal)
- Username
- Password
- Confirm password

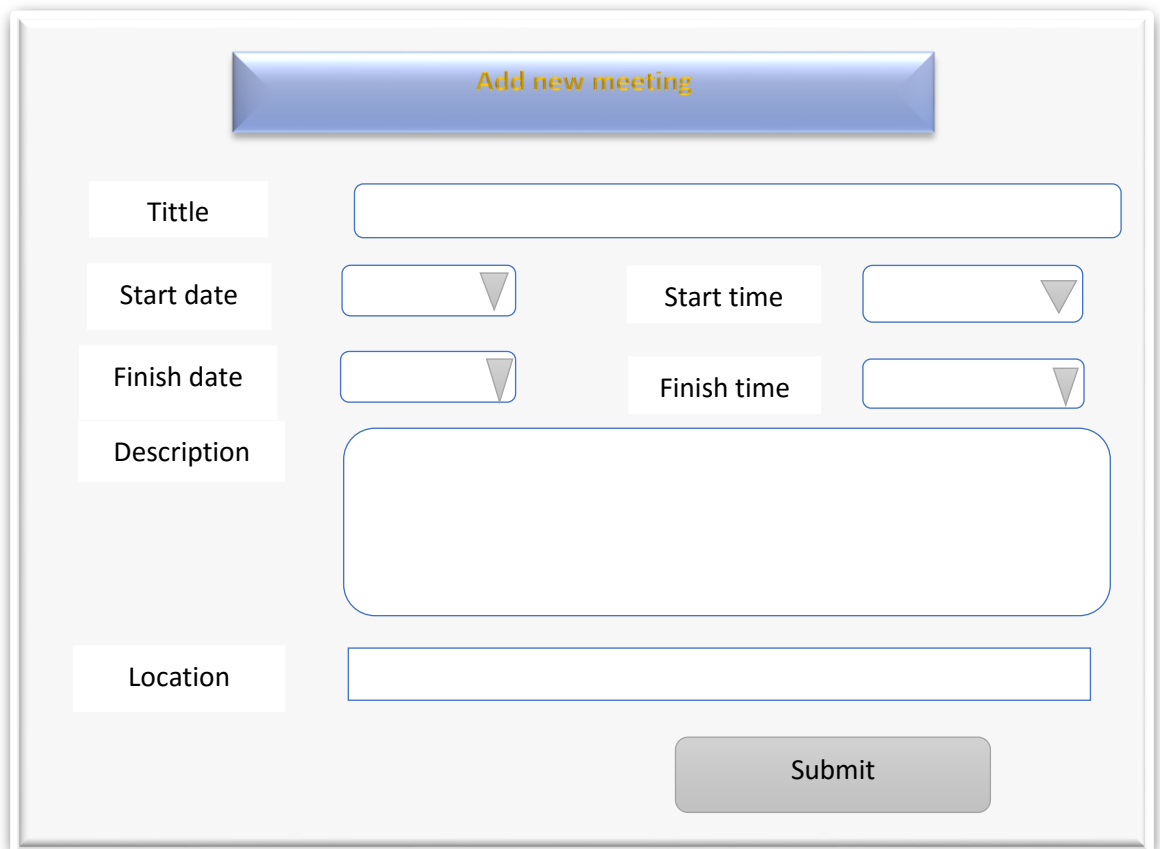
At the bottom of the form, there are two green buttons: "Clear fields" and "Submit".

**Fig 4.9 Create user account**

There are three level users, namely the secretary, the system administrator and the other meeting attendees. Each user is apportioned to his/her designated user level. Each user level has different view of the system.

### iii.) Create new meeting

The system administrator creates a new meeting, and all the fields above should be filled with valid information. After publishing a new meeting the system administrator adds agenda items, and related documents, including the minutes for the previous meeting.



The screenshot shows a web form titled "Add new meeting" in a blue button at the top. The form contains several input fields: a text box for "Tittle", a date selector for "Start date", a time selector for "Start time", a date selector for "Finish date", a time selector for "Finish time", a large text area for "Description", and a text box for "Location". A "Submit" button is located at the bottom right of the form.

**Fig 4.10 Create new meeting**

**iv.) Add agenda items**

ADD AGENDA ITEM 4

Drag and drop documents here

Title

Description

Submit

**Fig 4.11 Add agenda items**

**v.) Create minutes**

While the meeting is being executed decisions will be made, and for some complex decision making that require voting, a secured voting panel is put in place for such decisions. For every decision made, it is recorded into the database, as well as new tasks assigned to each individual. These recordings will represent minutes for the meeting.

UPDATE MENUTES FOR AGENDA ITEM 4

Description

Decision

Task

Assigned to

Submit

**Fig 4.12 Create Minutes**

**vi.) Voting**

When voting, a person is permitted to vote only once. Once a person votes, he/she cannot revert the vote already made. After voting this form automatically disappears. Below is the voting panel.



Vote

Description

Our next Principal officer .

Chipo Hlabangana

Patience Dhlwayo

Alfred Mandrawe

Peter Mbweku

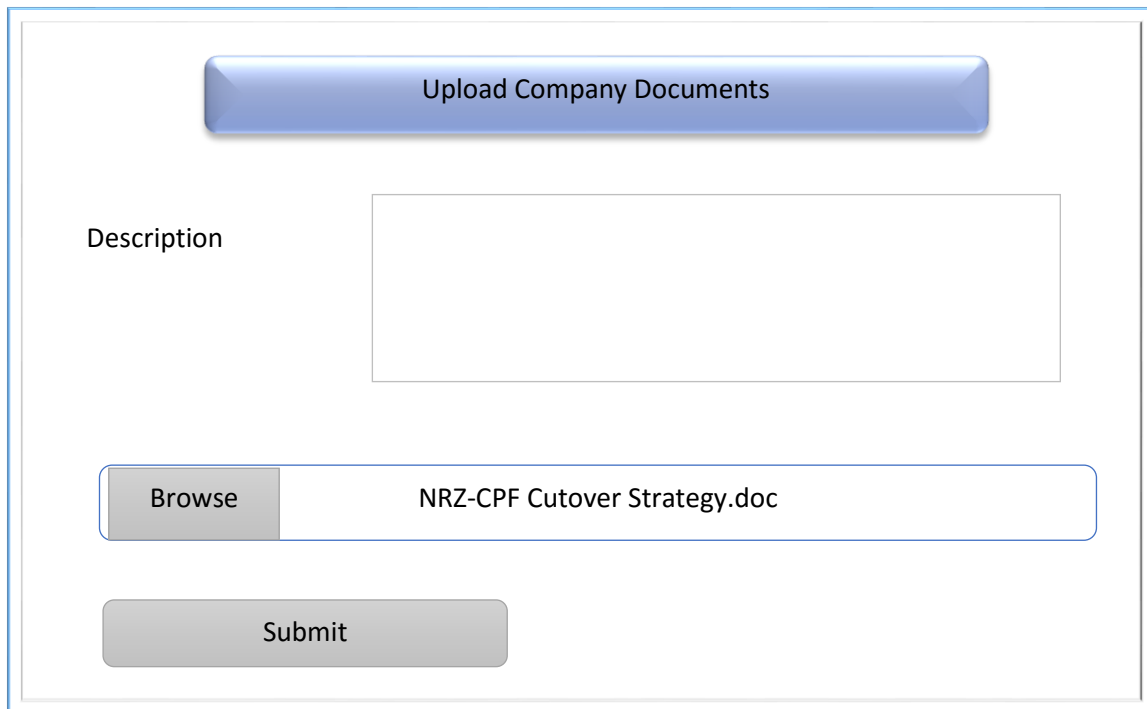
VOTE

**Fig 4.13 Voting panel**

**vii.) Uploads company documents**

Since we are going paperless, we want all the company documents to be stored in the cloud server. The system administrator have administrative powers to upload company documents. Below is the form to upload documents, all the fields are supposed to be filled with valid

information. All the fields are vital, they are made reference when searching by the search engine.



The image shows a web form titled "Upload Company Documents". At the top is a blue button with the text "Upload Company Documents". Below this is a "Description" label followed by a large, empty rectangular text input area. Underneath the text area is a file selection interface consisting of a "Browse" button and a text field containing the filename "NRZ-CPF Cutover Strategy.doc". At the bottom of the form is a grey "Submit" button.

**Fig 4.14 Upload Company Documents**

**viii.) Add new risks**

The other important module of the board pack system is risk monitoring and management. For any potential risk identified, its details are entered to the database, including its impact, likelihood, description, counter measure and the person responsible to manage and control that risk. The form below shows the input layout to insert risk details to the database.

Risk Name

Description

Likelihood

Risk Impact

Counter Measure

Person Responsible

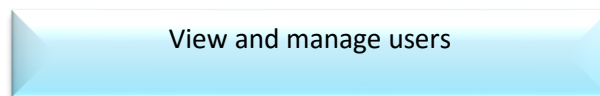
**Fig 4.7.8 Add new risk**

## 4.7.2 Output design

Output design entails the form layout for displays data from the database. These forms normally are in form of tables, graphical representations and reports among others. Below are the output design forms.

### i) View and manage users

The system administrator can view all system users, and have the capacity to suspend users, activate users, delete users and view full detail information about each and every user of the system. Once a user is suspended he/she cannot log into the system, until he/she is activated.

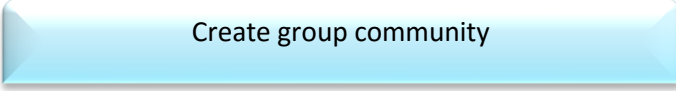


Full name	Department	Designation	e-mail	ext	status	Un/Suspend	Delete	View
Chipo Hlabangana	I.T & Finance	Manager	chipo@nrzcpf.com	227	active			
Petience Dliwawo	pensions	Manager	petience@nrzcpf.co.zw	204	active			
Mbuso Moyo	I.T	System Admin	mmoyo@nrzcpf.co.zw	203	active			
T.Zhou	I.T	System Admin	tzhou@nrzcpf.co.zw	203	active			
Darlington Siziba	Finance	Officer (investment)	darlington@nrzcpf.co.zw	226	Suspended			
Resmond Madzivire	Finance	Officer (accounting)	resmond@nrzcpf.co.zw	209	Suspended			
Ronald Dhliwayo	Finance	Internal Auditor	ronald@nrzcpf.co.zw	220	active			
Alfred Mandrawe	Pensions	Officer	Alfred@nrzcpf.co.zw	217	active			

**Fig 4.15 View and manage users**

### ix.) Creating a group community

On preparation for a new meeting, the system administrator creates a group from existing users, that community group is comprised of members who are allowed to attend the meeting. The system administrator will select one of the meeting attendees to act as the secretary to take record of the minutes. This process is demonstrated by the form below:



Full name	Department	Designation	e-mail	ext	Add	Add secretary
Chipo Hlabangana	I.T & Finance	Manager	chipo@nrzcpf.com	227	✔	✔
Petience Dliwawo	pensions	Manager	petience@nrzcpf.co.zw	204		
Mbuso Moyo	I.T	System Admin	mmoyo@nrzcpf.co.zw	203	✔	
T.Zhou	I.T	System Admin	tzhou@nrzcpf.co.zw	203		
Darlington Siziba	Finance	Officer (investment)	darlington@nrzcpf.co.zw	226	✔	
Resmond Madzivire	Finance	Officer (accounting)	resmond@nrzcpf.co.zw	209	✔	
Ronald Dhliwayo	Finance	Internal Auditor	ronald@nrzcpf.co.zw	220		
Alfred Mandrawe	Pensions	Officer	Alfred@nrzcpf.co.zw	217		

**Group members:**

- 1 Chipo Hlabangana
- 2 Mbuso Moyo
- 3 Darlington Siziba
- 4 Resmond Madzivire

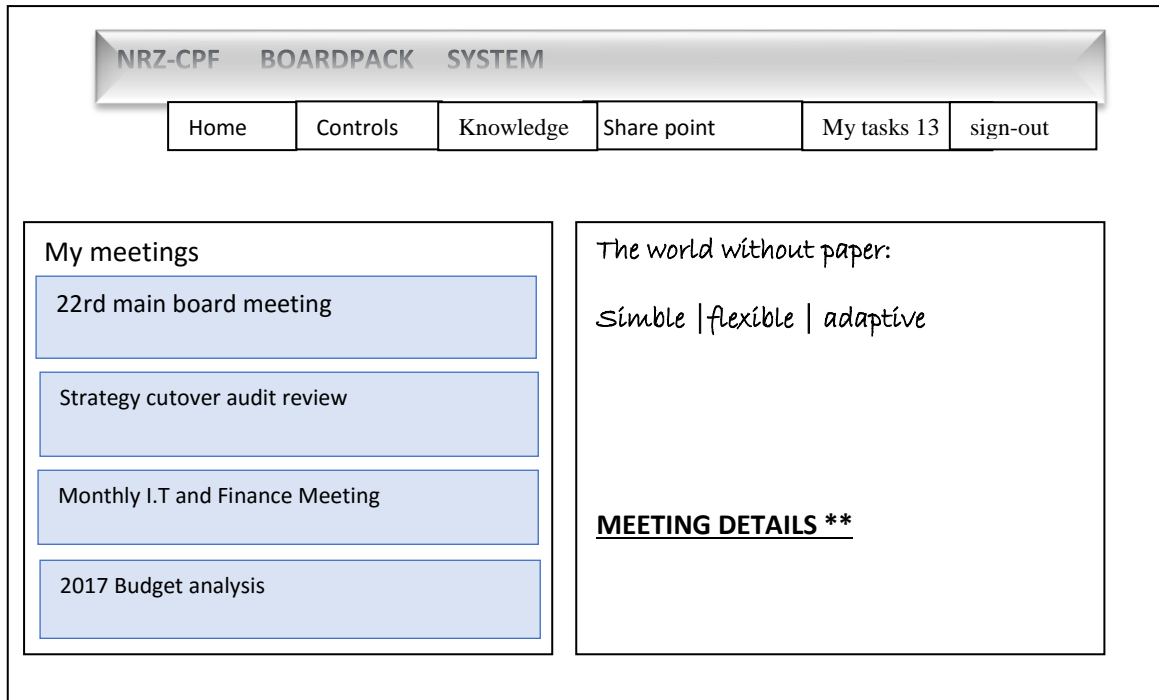
**Secretary :**

**1 Chipo Hlabangana**

**4.16 Create group community**

**ii) Display view of upcoming meetings**

Once group members are selected, the system administrator goes on to add a new meeting to the database, and once the new meeting is published, every group member is notified on the new meeting via email or text message. All the upcoming meetings are displayed on the user's home page as shown below.



**Fig 4.17 Upcoming meetings**

**iii) Meeting details**

Once a meeting is clicked, its details are shown on the right pane of the page. The meeting details includes the agenda and the meeting related documents as shown below:

meetings

Strategy cutover finance meeting

Start Date 12/06/2016 , 8.00 pm

Start Date 12/06/2016 , 1.00 pm

The previous meeting was held on 24 march 2015, and the budget was expected to be \$100 000, immense during the economic transition of the third dimension cellular phones.

Agenda Items

Documents

1	Apologies for absence		After clicking on the document
2	Chair report	1	
3	Approval of previous minutes	1	
4	Review international expansion plan	3	
5	Audit review	4	
6	Budget analysis	3	
7	Closing remarks		

nts, that you want to view the following form slides down after the agenda items , the form shows all the documents associated with the target agenda item.

Audit review

- 1 Finance Report q3.docx
- 2 December board meeting strategy review.ppt
- 3 Risk Analysis | impact VS likelihood
- 4 UPS MEMO.docx

**Fig 4.18 Meeting details**

**iv) Document searcher**

The system user might want to search some documents from the cloud server. The search form is shown below, it includes the text field where one should type the search keywords and upon pressing the search button the results are displayed below.

Q3 audit report 2016 | Search

4 results found

- Pokoko Finance strategy and audit report 2015.docx
- NRZ\_CPF Mr Dhliwayo report 2015 August .doc
- NRZ-CPF audit report 2015.pdf
- NRZ-CPF audit report corrected 2015.ppt

**Fig 4.20 Search for documents**

If results not found, the user is advised to try again using different key words

**4.8 PSEUDO CODE**



Pseudo code has the similar program logic with real coding except that it does not follow syntax of any programming language, instead it is written in plain English statement. Pseudo code gives the programmers an overview of how the system works. The following is part of system's pseudo code:

**i.) Login :**

```
Start:  
Enter username and password  
If (username and password) = valid Then  
Goto userAccount  
else  
Prompt user to enter correct detail  
//log in fails  
Goto start:
```

**ii.) Create new meeting :**

```
Input {  
Meeting_title  
Start date time  
Finish date time  
Location  
}  
If( input is valid) then{  
Submit to database  
}  
Else{  
Goto Input  
}
```

**iii.) Add agenda :**

```
Input {  
    Agenda items  
}  
  
Upload documents {  
    While ( each agenda item ) {  
        Upload documents related to the agenda item  
    }  
}
```

**iv.) Writing minutes :**

```
Input {  
    Agenda item  
    Decisions  
    Task  
    Person name task assigned to  
}  
  
If(input is valid){  
    Submit to database  
}  
  
Else{  
    Goto input  
}
```

## **4.9 Security Design**

Security is becoming a major area of concern to all systems on earth. The design, implementation and use of the board pack system is made consideration of the following security issues

**i.) Software Security:**

- Advanced session and cookie protection will be set on all pages of the system, so as to avoid unauthorized users entering the system. Also the sessions will have expiring time frames and unique session IDs so as to avoid session hijacking.
- MySQL Real escape sequences will be set on all variables that holds values to be sent to the database, so as to avoid MySQL injections.
- Only registered users are allowed to enter the system and use the system resources. Authentication has been put in place so to log in the users enters a correct combination of username and password. Hence there won't be any unauthorized users to enter the system.
- There are three access levels and the Fund's employees are apportioned to those access levels. The access levels include the secretary, the system administrator and the meeting members or the meeting attendees. Each level has its own administrative limitation towards the access, control and management of the system resources.
- There are different user group communities that are selected by the system administrator. Every time a meeting is conducted a community group is created made up of the meeting attendees. Each group are limited to access all company information and documents, they can only access information and documents only relevant to them.
- Anti-viruses will be installed on both the server and the client machines to protect the system from unauthorized entry and unauthorized copying, deletion and modifying of data.
- There is a login and logout log record that displays all records about who have been log on and what time did the person logs out including the ip address of the logger. Every time a user logs into the system, he/she is notified about the time he/she last login. This logbook helps in auditing purposes and in the event that someone somehow logged into the system we can be able to catch the hacker.
- Above all the users are advised to change the password on monthly bases, and the password should contain alphanumeric values with characters longer than 8.

## ii.) **Physical Security:**

Due to our strong software security, the hacker might opt to break into the premises and damage or stole our backup hard drives with confidential information. Physical damage also

includes fire, water damage, and radioactive materials among others. Since our database is stored in a cloud server, the fund make backup copies of the database every month, so in the event of a system crash with the hosting server we still have the company information on our back up hard drive. That backup storage hard drive is the main matter of concern on physical security. As a pre-active measure we will put the following security in place to avoid such physical damage.

- The backup devices will be stored in a secured safe, and can only be accessed by the system administrator.
- The safe will be stored in a room that is locked the room should have optimal temperature system so as to avoid damage to the hard drive due to high temperature.
- A Gas suppression system will be put in place where the hard drive is stored, so in the event of fire, emergency alarm will lay off and gas will be released to stop the fire.
- The safe containing the hard drive, must be made with copper and its dimensions must be at least 5 inches thick so as to avoid damage from radioactive materials.
- Closed Circuit Television (CCTV) will be put in place to monitor the safety of our backup storage room.
- Above all security guards will be put in place, to keep the data secure from thieves.

### **iii.) Database Security:**

The board pack system's database is the core heart of the Fund. No information is found on paper all the company information is stored in the cloud database. The following security is put in place to protect our database from unauthorized access and modification of data:

- Only the system administrator is allowed to access the database. To access the database he or/she should put the correct username and password.
- A combination of Md5, crypt and reverse cypher encryption techniques will be employed hide information, so that without the right program to decipher the cypher the hacker will fail to read the information from the database.
- Firewalls - The firewall will provide controlled and audited access to database information. The firewall is set some digital specific requirements or some digital signatures, if any file of information does not meet those requirements then the file/information is denied access to the database.

#### iv.) **Network security:**

Data is transferred amongst devices in different locations and using different established networks. There are many risks that arises since the data travels through different routers, different routes and travels through public networks. The hacker can simply hijack data through the network while being transferred. Security measures are put in place to avoid network security risks.

- Firewalls - The firewall will provide controlled and audited access to services between two or more networks. It does this by permitting, denying, or redirecting the flow of data across the firewall. A firewall also support anonymity for internal network hosts, through a special function known as 'address translation'. The address translator substitutes the address of the firewall in IP packets delivered to the external network so that the internal network topology is hidden from the external network, thereby reducing the risk of an attack on the internal network.
- Security Filters – security filters will be installed between two separately classified systems, to manage and control the flow of classified data which is presented for transmission across the interface. A security filter is programmed to scan the data and allow or disallow the transmission in accordance with a security policy. In this manner, a filter may be designed to prevent certain information leaving a classified or sensitive network, and may be termed an "output filter". Similarly, an 'input filter' may be used to limit the input from a potentially high-risk environment to a sensitive or classified network. An example of such as filter may be to remove executable programs or all attachments from incoming emails.

## **5.0 CONCLUSION**

The design phase enabled to come with the way the new system is supposed to look like. The design phase captured the citizen requirements and specification explicitly and implicitly. It then defined how the system would work in the actual environment. The specification of the components of the software that is going to be developed is defined in detail. All the design was carried in the design phase. Inputs, processes and outputs of the new system were

designed. There was also design of the data flow, entity relationships and the database as a whole.

## **CHAPTER 5: SYSTEM IMPLEMENTATION**

### **5.0 INTRODUCTION**

After the design phase is approved, the requirement specification document will be the road map to the construction of the actual board pack system. The implementation phase includes system coding, validation, verification, installation, user training and maintenance and a series of system testing throughout the phase. System implementation aims to deliver a bug free system with all the function specified.

### **5.1 STRUCTURE OF SYSTEM MODULES**

The code structure describes the different modules of the system and how they interact with each other.

#### **i) Log in module:**

Once the system loads, the login form is automatically displayed on the public home page. The log in module is to verify whether the user is authorized access or not. Authorized users have user accounts created by the system administrator, hence they can log into the system and use system resources by entering a correct combination of their passwords and usernames.

#### **ii) User management:**

This is the key aspect of security amongst the system users, the system administrator creates group communities, to attend the meeting and to view selected documents. Hence not every user can view all the documents.

#### **iii) Meetings :**

This is the core module of our system. The system administrator creates and publishes an upcoming meeting by entering details such as meeting title, start date and time, finish date and time and location among other details as well as selecting a group community to attend the meeting. Once the meeting is published emails are sent to the group members for notification.

After creating the meeting the system administrator can insert agenda items to the meeting as well as uploading meeting related documents including the minutes of the previous meeting.

**iv) Security module.**

This module entails how the system can be safe guarded against unauthorized access, natural disasters as well as loss of data among others.

**v) Knowledge base.**

This is the main data store that stores all the company documents.

**vi) Risk Management**

This module entails how the system manages and control risks.

.

## **5.2 TESTING**

According O'Brien (1996) Software testing is the comparison between the build software and software requirement specifications for verification and validation purposes. The aim is to produce the right thing and to remove all system errors A series of testing will be done throughout the whole implementation phase. There are many types of software tests that can be used, but the most effective ones will be executed on the board pack system and these tests includes unit testing, regression testing, functional and acceptance testing.

There are two methods of testing involved namely black box testing and white box testing.

- **Black box Testing.** Involves comparison between the results produced by the target unit against the inputs and the executing environment. Black box testing is never concerned about internal code structure of the system unit. The tester already knows the outputs so after executing, if the unit produces different results then there is an error. The test involve examining different units of the system that includes forms, graphs, data and other units of the system. Main focus is to detect

data errors and interface errors. The test results are more accurate and not biased because the tester and the code programmer are independent from each other.

- **White box Testing.** Unlike the black box testing the white box is more concerned with the internal structure that is the system code. The tester writes code tests to call a method with certain parameters, to check for run-time errors, syntax errors and other errors not revealed by black box testing.

### **5.2.1 Unit testing**

The tester only tests individual part of the system at one time. Each unit is part of either part of the software or part of the hardware. The tester usually uses mocks or stub objects so as to isolate the unit from the entire system. Normally the testing is automated and also can be done manually. The tester can do code modification to the unit, without affecting how the other modules. Once all units are tested and found error free the system is then evaluated by means of integration testing, regression testing and acceptance testing. Results documentation must be produced for each test executed.

### **5.2.2 Functional or system testing**

Functional testing is usually done at the end of the system development after unit testing, where the whole system is tested basing on the requirement specifications of the program or module. Functional testing falls under the black box testing where the internal code structure of the system is not considered. The user submits some specific inputs into the system and expects some specific results. If the system produces unexpected results then it is noted that there is an error somewhere. The system is tested for functionality, data consistency, data integrity, data accuracy as well as being tested for compatibility by executing the software programme in different environment such as different hardware and different operating systems so as to validate and verify if the system meets the required specifications.

### **5.2.3 Regression testing**



Regression test is done to make sure that changes done to any part of the system does not affect other parts of the system. It is executed via both black box and white box testing. If one module is modified, that does not give guarantee that it will run along with other modules after being integrated

#### **5.2.4 Performance testing**

The system is tested to check if it meets the performance requirements. There are two types of performance testing namely load and stress testing. Load testing is performance testing while the system executing a heavy duty task (load). For example we can overload the website by uploading, downloading large documents or executing large tasks simultaneously, then we test to determine at what point the system's response time degrades or fails.

Stress testing entails the system being stressed beyond its specifications to see when it will fail or degrade its response time. For example executing complex database queries, inserting data beyond normal capacity, or continuous input.

#### **5.2.5 Security testing**

Security is a major concern in all online electronic systems in the modern day society. The testing is normally carried out by a professional ethical hacker. The system will be examined against threats such as session hijacking, link manipulations, virus attacks, Denial of Service attacks, MYSQL injections and other forms of hacking. Security testing is as more critical as the acceptance test, once the system is vulnerable to attacks even if it is free of errors, easy to use and great functionality, the system cannot be used, it is automatically rejected. Some of the security tests are explained below with the aid of diagrams:

##### **I) Group community**

The system administrator creates a group of members to attend the meeting. If the user was not selected then he/she cannot view the meeting resources.

Creating group community:

Share Point : Create group community

EC#	Name	Department	Ext	Email Work	Members	Secretary
kuku323	Mr Kukukwashe mbweku	Management	4332	kuku@gmail.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B87043	Mrs Gloria Dube	Management	344	gloria@nrzcpf.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B29498	Mrs Chipo Hlabangana	Management	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B60574	Mr busi ncube	Finance	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B04225211	Mr ddj3434 dhd637	Management	work	dee@me.com	<input type="checkbox"/>	<input type="checkbox"/>
B04321860	Ms deon hama	IT	5483	deon@nrzcpf.com	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B04165836	Mr hellen golahp	Finance	900	pearson@gmail.com	<input type="checkbox"/>	<input type="checkbox"/>
B0427242	Mr damaris mbweku	Trustes	5483	tafa@gmail.com	<input type="checkbox"/>	<input type="checkbox"/>
B04312652	Mr liogy o78gyu	Trustes	789	pearson@gmail.com	<input type="checkbox"/>	<input type="checkbox"/>
B04323184	Mr OLIHIULBYUgvyugvYGgb ugb	Trustes	678	tafa@gmail.com	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>

[Share](#)

**File Shared to 5 people**

1. Mr Kukukwashe mbweku
2. Mrs Gloria Dube
3. Mrs Chipo Hlabangana
4. Mr busi ncube
5. Ms deon hama As Secretary

**Fig 5.1 Creating group community**

**ii) Viewing meeting information**

If a user who was not added to the group, on clicking the meeting header on the left pane of the page the following information appears

Home
Veiv Meetings
+risk
view risks
View Menutes

**Sorry: Have no permission to view this page**

Pensio  
22/04/  
24rd N

**Fig 5.2 View meeting details**

### iii) User Access log

Every time a user logs into the system, the system records the login time and the logout time. The log can be shown below:

3 Results Found

Name	userid	Login Time	Logout Time	status
Mr Kukukwashe mbweku	kuku323	27/04/2016 , 02:58:43	27/04/16 [03:03:am]	offline
Mr damaris mbweku	B0427242	27/04/2016 , 03:03:50		online
Mr Kukukwashe mbweku	kuku323	27/04/2016 , 03:04:03		online

Fig 5.3 User access Log

### iv) Data Encryption :

The user passwords are encrypted using a combination of sha1 and md5 technologies: The combination of two or more encryption methods results in a more secured data.

ext	phone	username	password	level	status
4332	0710201040	admin	1619d7adc23f4f633f11014d2f22b7d8	admin	1
344	07122928222	gloria	1619d7adc23f4f633f11014d2f22b7d8	user	1
432	07122334432	chipo	1619d7adc23f4f633f11014d2f22b7d8	user	0
432	0712020303	chipo	1619d7adc23f4f633f11014d2f22b7d8	user	0
work	oiuyt63	dee	0a2ede56f6523e16b6a2794c26921580	user	0
5483	0712020303	deon	1619d7adc23f4f633f11014d2f22b7d8	user	0
900	0712020303	hellen	1619d7adc23f4f633f11014d2f22b7d8	user	1
5483	0712021020	damaris	1619d7adc23f4f633f11014d2f22b7d8	user	1

Fig 5.3 Log access

## 5.2.6 Acceptance testing

The test is carried out after the system is finished, all errors have been removed and when the system is ready to be deployed. The test is carried out by the users of the system. Acceptance

test cases are created from the user requirements and are validated by the users themselves. Acceptance test is most vital because once the users reject the system then that marks the failure of the project and all the efforts and resources used will be a wasted. Once the users accepts the system then the system is installed for use at the Fund. When the users finds the system easy to use and does what they expect normally they accepts the system.

### **5.2.7 Verification and validation**

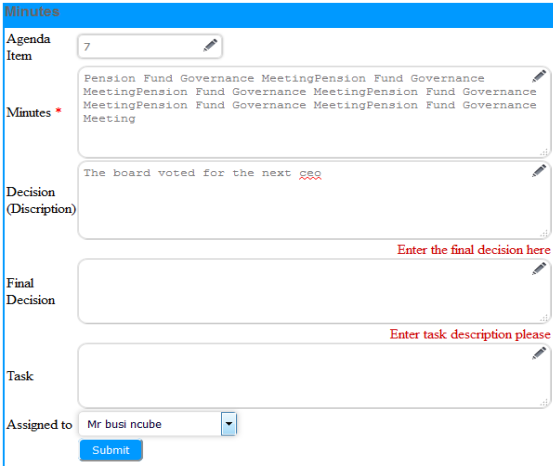
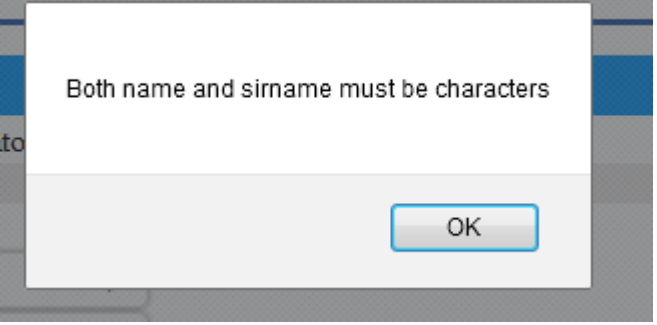
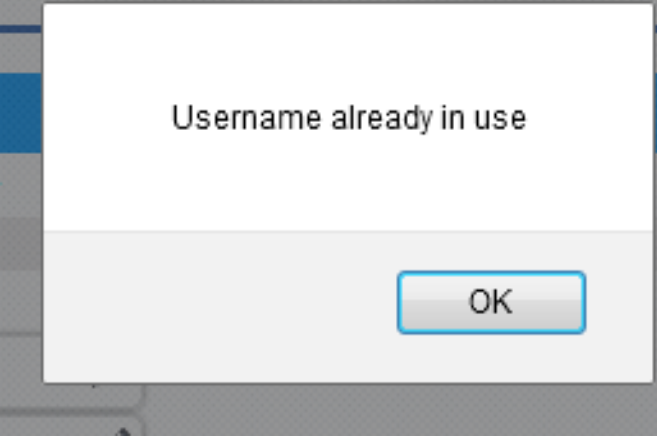
#### **I) Verification**

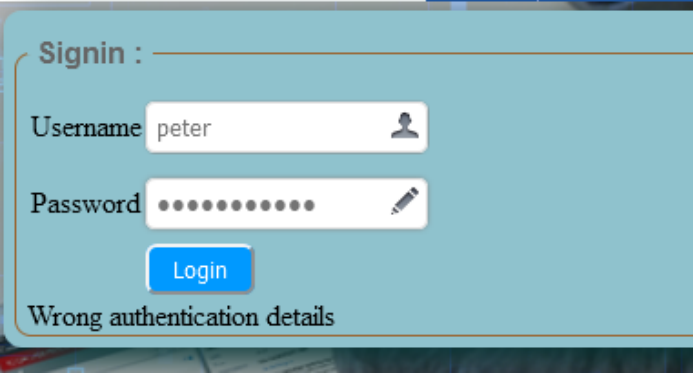
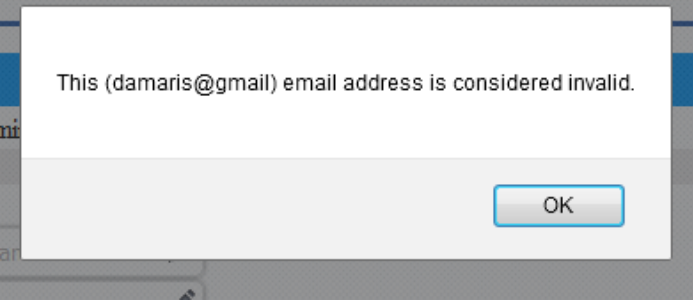
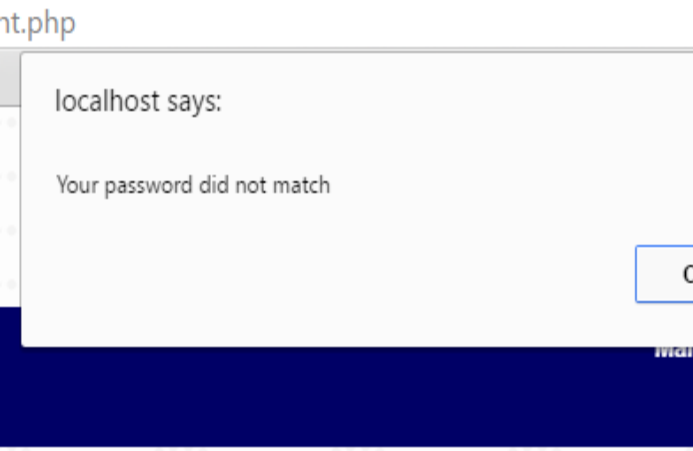
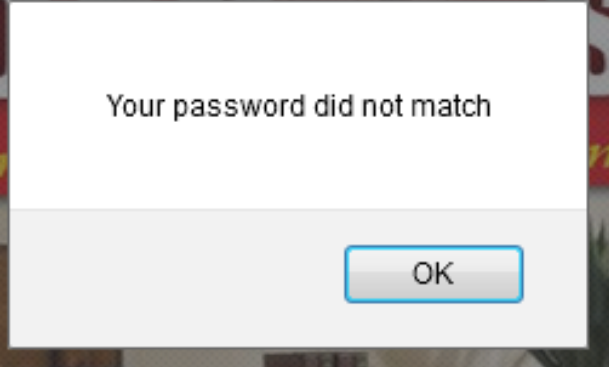
Verification is the process of checking if the system build is the correct system. The process checks if the system meets its requirement specifications that it was built for. The verification process involves continual testing throughout the whole development process. For example, it is known that only the group members are to view meeting information and documents so the system is verified towards such.

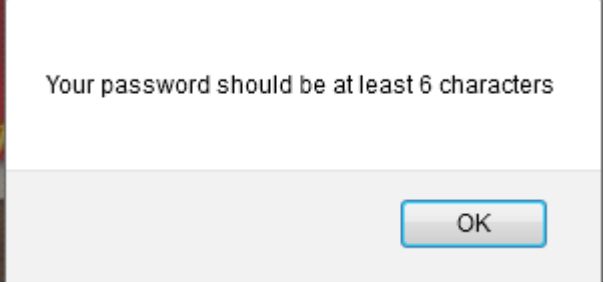
#### **II) Validation**

Validation is the process of evaluating the system or the system component to review if the features build in the system software meets the user requirements .this phase is concerned about answering the question “are we building the right system”. For example , we know that the user’s personal details are to be seen by that user only and the system should have simple and advanced search options to search solutions in the knowledge base, but is that what the user want. Hence this is an iteration process throughout the whole development process of comparing the system and the user requirements.

## Validation test cases

Case	Description	Output
<p><b>Null Values</b></p>	<p>For all mandatory fields the system will produce an error message if the input is empty</p>	
<p><b>Numeric fields</b></p>	<p>An error message will display if the user enters numeric values where characters are required.</p>	
<p><b>Username validation</b></p>	<p>For all users there must be only one username, if on account creation or profile amending a username matches another username already in the system, a warning notification will be displayed.</p>	

<p><b>Login Authentication</b></p>	<p>If the user logs in with the username and password that doesn't match with his or her profile, then an error message will appear.</p>	
<p><b>Email</b></p>	<p>After entering a wrong email address format the following error message will appear.</p>	
<p><b>Password not matching</b></p>	<p>When an account is being created the system allows the user to create a password and then confirm it. If the passwords don't match an error report will pop up</p>	
<p><b>Password length</b></p>	<p>On account registration or when changing password the user is obliged to enter password and confirm passwords. If both</p>	

	<p>passwords doesn't match then an error message appears. If the password has less than 7 characters then the system will be prompted to enter a least 6 characters</p>	
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**Table 5.0 Validation test cases**

### 5.3.1 Validation of input fields

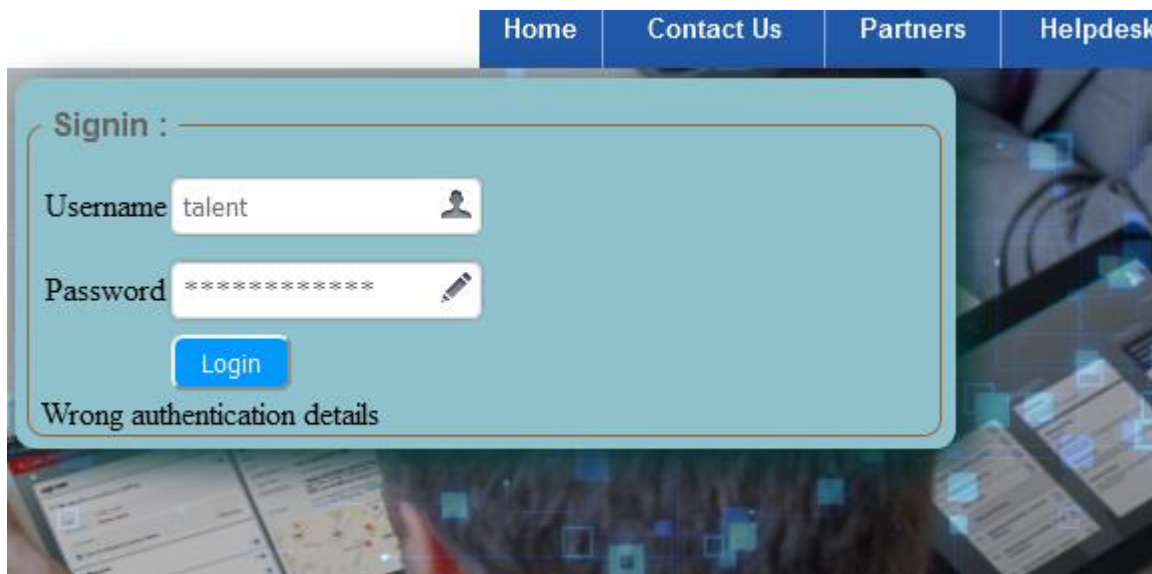
- To avoid data duplication, data inconsistency and data integrity errors there is a significant need for strong validation of form attributes, namely textfields, compoboxes, radio buttons, check boxes, textareas among other input fields. For example :
- the system must deny input of numbers where the user is supposed to enter strings eg name, surname, description etc
- The system denies input of strings where the user is supposed to enter numbers eg phone numbers, date of birth etc
- on phone number input the system must limit the number of characters to ten
- The system denies the same data to be submitted more than once
- All mandatory fields must not be left with null values, hence the system should prompt the user to enter the value before the data is processed or submitted to the database.
- The password must have more than 6 characters that includes a combination of letters and at least one numeric value.
- The username must be unique to each and every user.
- The system must reject submission of wrong date and time, for example inserting the date for tomorrow as date of birth or putting a reminder time of an hour ago.

- Email addresses will be fully validated so that the system will only submit valid addresses.

The diagrams below show pictorial representations of field validation:

### 5.3.2 Features and operations of the current system

Login is the first step towards accessing system resources. The user must enter the correct combination of username and password. Once the username and password matches with one row in the database user table then the user is allowed access. Every user have a user level, each user level have different data to be viewed and different administrative privileges. Hence once the user enters the right username and password he/she is redirected to his/her user level homepage. If wrong information is entered the system will instantly displays the error message.

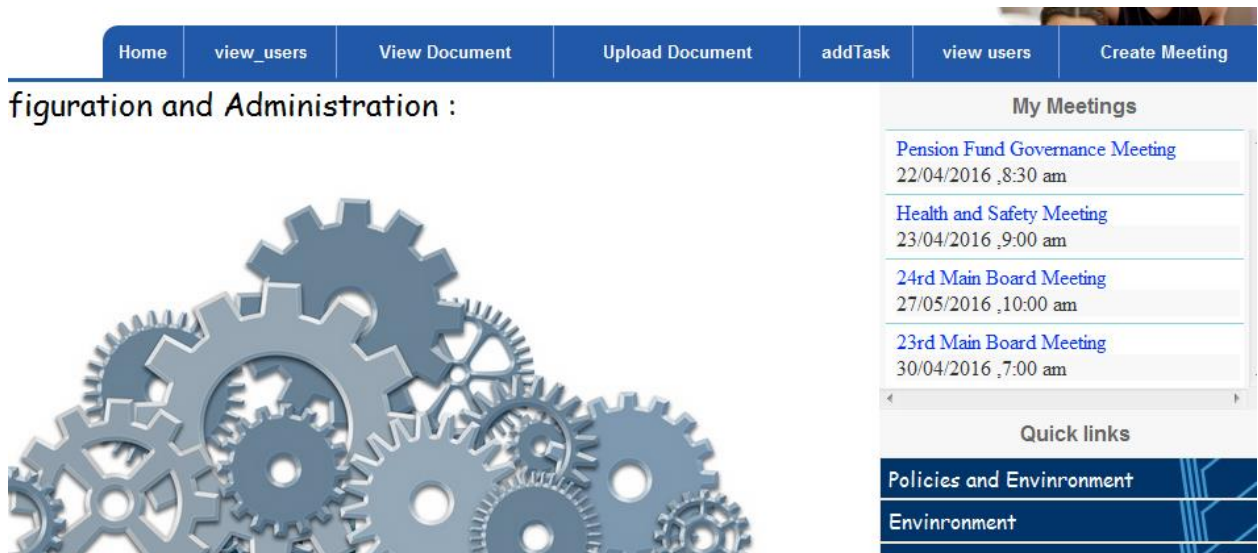


**Fig 5.5 login page**

- **The admin home page:**

It shows all the links on the navigation menu, all the upcoming meetings and other information.





**Fig 5.6 Admin Homepage**

- **Create meeting:**

Only the system administrator has the privilege to create meetings. To create meeting the admin should click on the new meeting on the navigation menu. All the following fields are mandatory:

The screenshot shows the 'Create Meeting' form. The navigation bar includes Home, view\_users, Create Group, and addTask. The form fields are: Meeting Title, Sub\_Title, Description, Committee (dropdown menu showing 'finance'), Start Date, End Date, Start Time (dropdown menu showing '7:00 am'), End Time (dropdown menu showing '7:00 am'), and Location. A calendar pop-up is open, showing the month of April 2016, with the 20th highlighted. At the bottom of the form are 'Clear Data' and 'Create' buttons.

**Fig 5.7 Create new meeting**

After entering valid data the admin can click the submit button to publish the meeting. After publishing the meeting, the new meeting is displayed on the right pane of the page. Upon clicking the meeting, it will be displayed in full detail on the right pane of the page as shown below:







## Pension Fund Governance Meeting

Yearly strategy and policy review

22/04/2016 : 8:30 am ~ : 9:00 am

Location: Company Co : Mezzaine Floor, Packade center 5st & 9th ave. Bulawayo Email: nrzpension@nrzcpf.co.zw Phone: (263)-9-71

[+ Agenda Items](#)

Wellcome and Apologies for absence members	
Review minutes of the previous meeting	
Public Questions	
Chief s Executive S Report	
Strategic Management and Quality Assuarance	
New Businesses	

**Fig 5.8 View meeting agenda**

To create the meeting agenda the user must click on the add agenda button, and then a pop up dialogue box will appear with the form to enter the details for the agenda item as shown below:

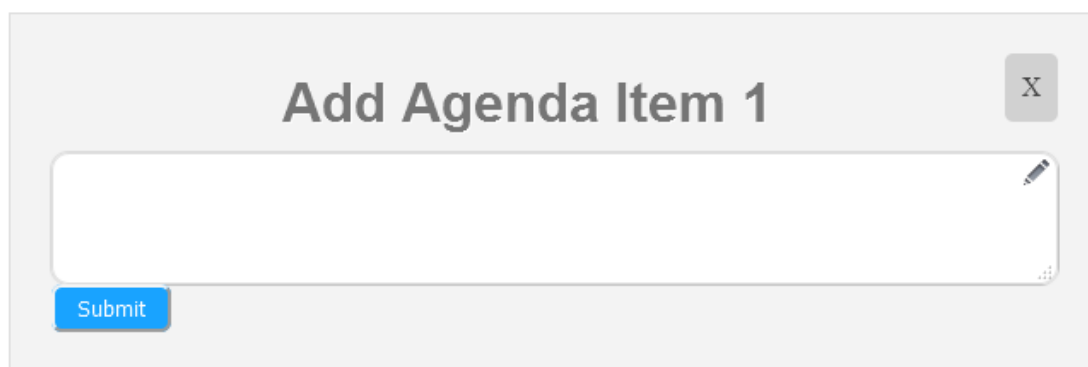
# Pension Fund Governance Meeting

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22/04/2016 : 8:30 am ~ : 9:00 am

Location: Company Co : Mezzaine Floor, Packade center 5st & 9th ave. Bulawayo Email: nrzpension@nrzcpf.co.zw Phone: (263)-9-71

+ Agenda Items

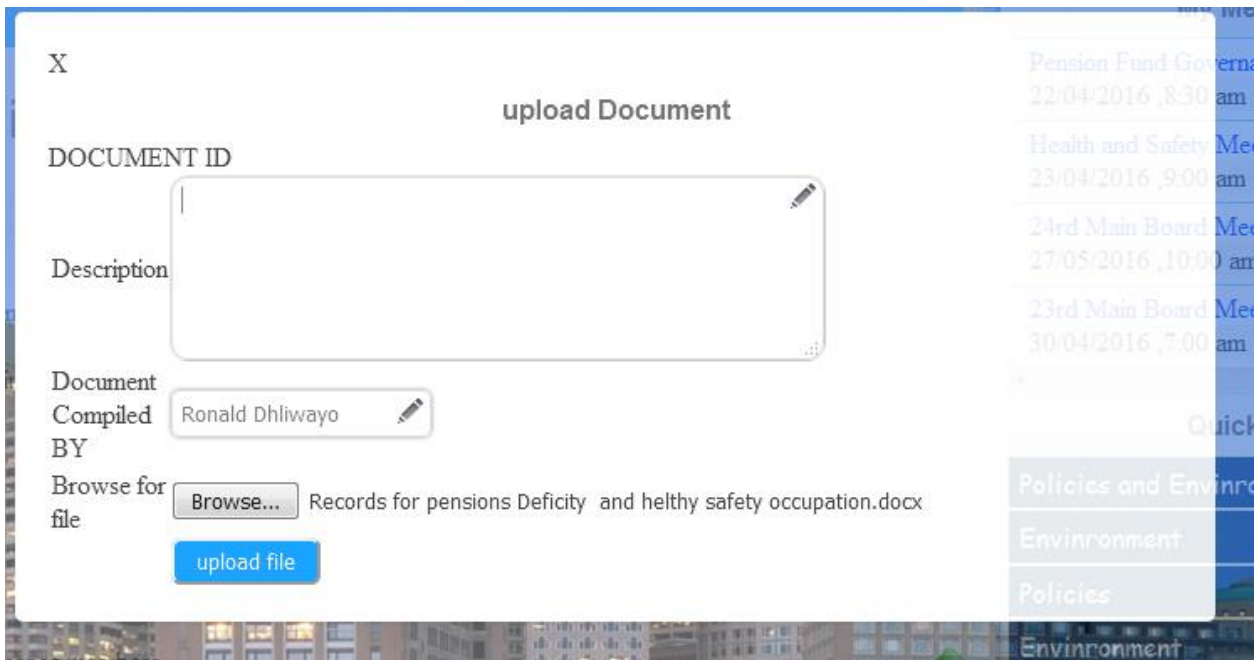


Add Agenda Item 1

Submit

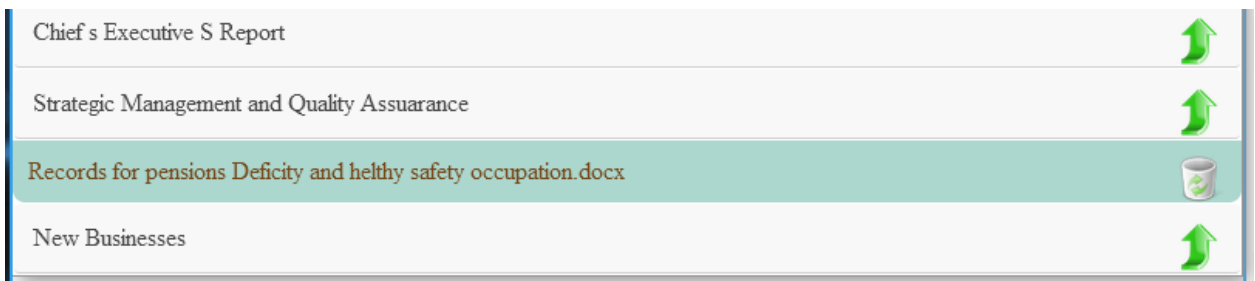
**Fig 5.9 Add Agenda Item**

After submitting the agenda item, there may be need to upload documents related to that agenda, the user just have to click on the green icon for upload, then the form for document upload will appear. All fields with a red asterisk marked are mandatory; hence they can't be left blank.



**Fig 5.10 Upload Agenda item**

After uploading meeting documents, u can view the documents by just clicking the agenda item, all the documents related to that agenda item will toggle down. By clicking the document, the document will automatically open on the new tab.



**Fig 5.11 View Agenda documents**

Also not all documents are related to a specific agenda item, some documents are related to all the agenda items for example the previous minutes. Those documents can be uploaded by the administrator by clicking the upload below the page named “Upload un -Associated Documents”: These un-associated documents can be uploaded the same way as agenda associated documents are uploaded.

Not all the system users are supposed to view all meeting materials. The system administrator will create a group community for any meeting that is created. Any system user that is not in

the group cannot see the meeting materials. To create a group the admin click the group icon on the top left, then the table with all the users will be displayed. Group members will be marked with the green tick, and to remove the user from the group the admin will just click the green tick again to remove it. The admin can select a meeting secretary from the users by clicking the Checkbox on the choose secretary column.

**Share Point : Create group community**

EC#	Name	Department	Ext	Email Work	Group Members	Secretary
B5651	Ms Blessing Mbweku	External Party	3443	bule@gmail.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B87043	Mrs Gloria Dube	Management	344	gloria@nrzcpf.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B29498	Mrs Chipo Hlabangana	Management	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="button" value="Share"/>

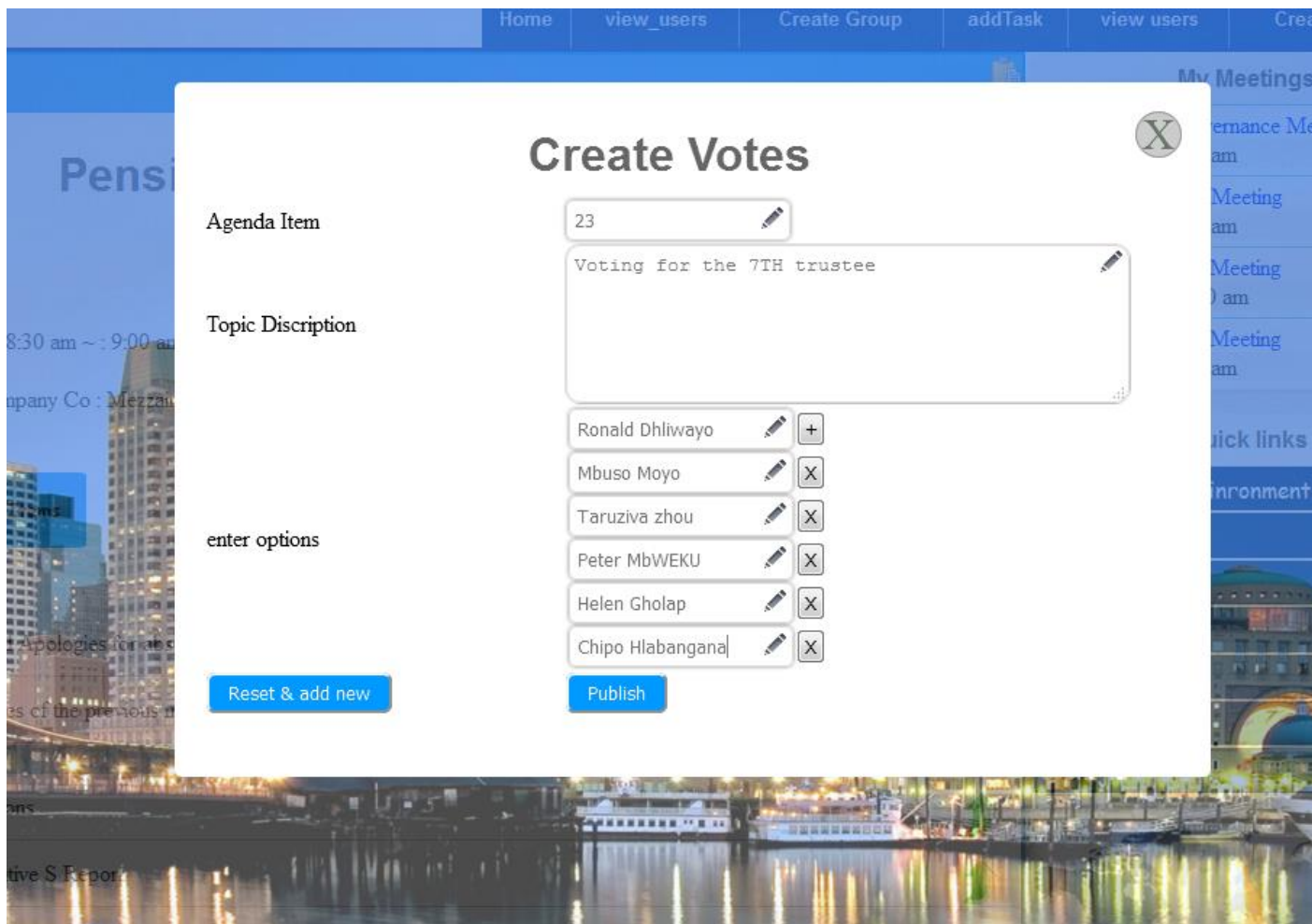
**File Shared to 3 people**

1. Mrs Chipo Hlabangana As Secretary
2. Mrs Gloria Dube
3. Ms Blessing Mbweku

**System Configuration and Administration :**

**Fig 5.12 Create group**

During the meeting any decisions will be recorded and votes will be created for some complex topics. Only the system administrator can create votes and close them. To create votes the administrator click on the create vote button below and a create vote window will appear. All the fields must be mandatory. Voting options are dynamic.



**Fig 5.13 Create Votes**

- **Risk analysis:**

The Fund like all other businesses has a series of potential risks. Using the board pack system the risks will be recorded as well as the description, impact, likelihood and the person to monitor the risk. The form to record new risks is shown on the diagram below.

**Enter New Risk**

Risk Name

Description

Likelihood

Risk Impact

Counter measure

Person responsible

**Fig 5.14 Add new risk**

- **The secretary:**

The duties of the secretary are to write all minutes discussed in the meeting. The minutes includes all the decisions, tasks assigned, new risks as well as recording all topics discussed during the meeting.

- **Creating minutes:**

The system view of the secretary is different from that of the system administrator. The secretary can click on the plus icon on any agenda so as to write minutes concerned with that specific agenda. Upon clicking the add minutes icon the following window will pop up.

The image shows a web form titled "Minutes" with a blue header. The form contains the following fields and controls:

- Agenda Item:** A text input field with a pencil icon for editing.
- Minutes \*:** A large text area for entering minutes, with a pencil icon in the top right corner.
- Decision (Discription):** A text area for describing a decision, with a pencil icon in the top right corner.
- Final Decision:** A text area for the final decision, with a pencil icon in the top right corner.
- Task:** A text area for describing a task, with a pencil icon in the top right corner.
- Assigned to:** A dropdown menu currently showing "Person responsible".
- Submit:** A blue button at the bottom of the form.

**Fig 5.15 Write minutes**

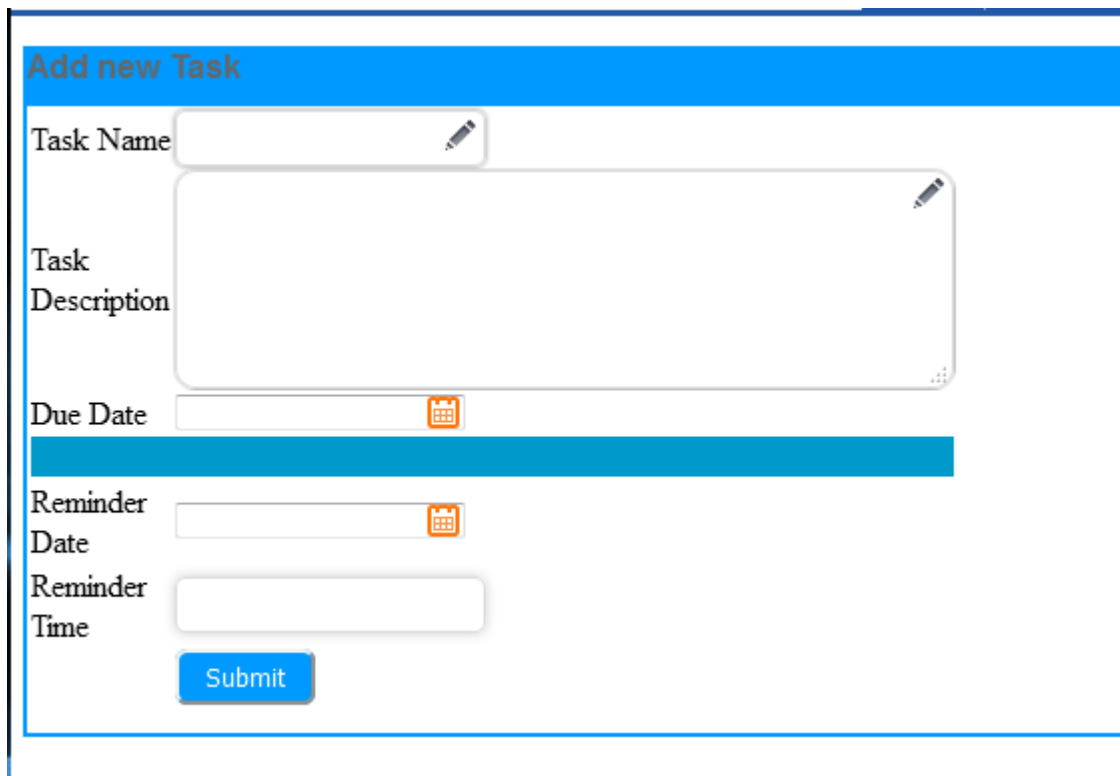
Only the minute's field is mandatory. If one enters the decision then he/she must enter the description to that decision. Once a task is assigned to anyone the secretary must enter the description of the task as well as the person responsible.

- **The other meeting attendees:**

The other meeting attendees have a different system view and privileges as compared to the secretary and the system administrator. All the roles that they do, are also done by both the secretary and the system administrator. Their role is to participate in the discussion, make decision, taking personal notes, as well as recording tasks assigned to them. To view the meeting the user clicks on the meeting on the right pane of the page then the meeting will be displayed as follow.



To add personal notes the user clicks on the add button just like the secretary. These notes will be used for the creation of the minutes by the secretary. The meeting attendees can record any job assigned to them by clicking the job icon on the agenda, the form for task assigned will appear as follows:



The screenshot shows a web form titled "Add new Task". The form is contained within a blue-bordered box. At the top, there is a blue header bar with the text "Add new Task" in white. Below the header, the form consists of several input fields: "Task Name" (a text box with a pencil icon), "Task Description" (a larger text area with a pencil icon), "Due Date" (a date picker with a calendar icon), "Reminder Date" (a date picker with a calendar icon), and "Reminder Time" (a text box). A blue "Submit" button is located at the bottom of the form.

**Fig 5.16 Add assigned tasks**

All fields are mandatory, the reminder will be send via email or text messages. Once the user votes, the voting page will disappear. Hence no one will vote more than once.

- **Document sharing:**

Microsoft office 2016 have the privileges to easily share documents in a group view. Hence once document can be viewed by the group at the same time whilst enabling live editing. When the group members are using tablets they can make use of annotation tools that are part of the android and Ios package.

View My Documents					
4 results found					
id	document / File	Compiled By	Date Uploaded	Date Modified	Up
0613pm52-4714325	<a href="#">Tulips.jpg</a>	Ms Blessing Mbweku	17/04/2016	never	1
lessing Mbweku4757187866	<a href="#">Hydrangeas.jpg</a>	Ms Blessing Mbweku	17/04/2016	never	1
Ms B5225855066	<a href="#">Koala.jpg</a>	Ms Blessing Mbweku	17/04/2016	never	1
344	<a href="#">Records for pensions Deficity and helthy safety occupation.docx</a>				1

**Fig 5.17 Document Uploading**

Every system user have the privilege to upload any documents to the website, without having to share with anyone. This is a platform for safe and secured document storage. On the navigation pane tab written “myDocs”, upon clicking the tab the following upload page appears.

**Fig 5.18 Upload document**

Description and some keywords will aid for easy and fast searching in the future. The user can choose to ignore those field the system will search using.

- **Document sharing**

To share the uploaded document with other users , you click on SharePoint then the following form displays.

Share Point					
EC#	Name	Department	Ext	Email Work	SharePoint
B5651	Ms Blessing Mbweku	External Party	3443	bule@gmail.com	<input type="checkbox"/>
B87043	Mrs Gloria Dube	Management	344	gloria@nrzcpf.com	<input checked="" type="checkbox"/>
B29498	Mrs Chipo Hlabangana	Management	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>
					<input type="button" value="Share"/>

File Shared to 2 people

1. Mrs Gloria Dube
2. Mrs Chipo Hlabangana

**My Meetings**

[Pension Fund Governance Meeting](#)  
22/04/2016 ,8:30 am

[Health and Safety Meeting](#)  
23/04/2016 ,9:00 am

[24rd Main Board Meeting](#)  
27/05/2016 ,10:00 am

[23rd Main Board Meeting](#)  
30/04/2016 ,7:00 am

---

**Quick links**

[Policies and Environment](#)

[Environment](#)

[Policies](#)

[Environment](#)

**Fig 5.19 Add new risk**

## 5.4 INSTALLATION

According to Mathers (2004) system installation is the process of deploying the system for final use by the users. Some change over strategies will be evaluated and the best one will be employed to move data from the old system to the new system. We are throwing away the whole current system and replace it with the new system.

The following are the steps for software Installation:

- We need to create our own virtual private network to store/upload our system sever so everyone in NRZ-CPF can access in using the internet or intranet. The system sever is where the whole system is stored including the databases.
- Once the server is uploaded the system administrator is the first person to access the system and enters the password and username being “admin” and “admin” respectively. The system administrator will then add users and technicians
- Validation is conducted to check if the delivered system is the exact replica of what the user specified in their requirements.

## 5.5 TRAINING

According to Drucker (2004) training is defined as all means of teaching the new system user the functionality and operations of the new system. Training of users is mandatory for any new system deployed. We have three types of system users and they will be trained as follows:

### I) All the meeting members

The meeting members are trained how to view new meetings and agenda items, meeting documents and how to vote. The meeting members are also trained how to write personal minutes, record assigned tasks and setting reminders for tasks. Furthermore they are being thought how to upload documents on their own and how to retrieve them.

## **II) The secretary**

The secretary like the system administrator are amongst the meeting members, hence they are trained the same as all the meeting members. However they will go a step further than the regular meeting attendees. The secretary is trained how to write minutes, record decisions, task assigned and record details for risk management.

## **III) The system administrator**

The system administrator have exclusive powers over the system. He will be thought how to add users, manage users, add announcements, create new meetings ,add agenda items, add associated and un associated meeting documents as well as how to search and view system reports. He/She is also trained how to create group members for upcoming meetings.

Training of NRZ-CPF Staff will be exclusively in-house training and will be conducted in sessions so as to save costs and time and everyday work will continue during training sessions.

## **5.6 CHANGE OVER STRATEGIES/METHODS OF CONVERSION**

The following methods of conversion were considered and are explained in detail below

- **Pilot conversion.** This technique is executed by installing the system for use by only one group of people or one department. The chosen group or department will evaluate the functionality, performance and interfaces of the system and the group will give feedback to the developers. If the group find it acceptance then the system will be installed to other departments, at the same time the old system will still be operating alongside the new system. The pilot setup is costly but associated with less risks eg of data loss, and it easy up training.

- **Direct conversion.**

The new system completely replaces the old system, the old system is now too expensive and obsolete to continue with hence it is cut and overridden by the new system. It is less expensive to execute because only one system is operating, however it involves high risk of data loss and the firm cannot use the old system as a backup option. This approach is most appropriate for small systems with very less sensitive data. As for the board pack the direct conversion is too risky to undertake, because if a threat come to surface all the company data get lost, the Fund might actually shuts down and faces legal consequences and worse.

- **Phased conversion.**

The system is installed in stages or phases or modules at one moment of time, hence one phase is installed to operate alongside with the old system. Its less expensive that parallel and also involves with less risk of data loss, however with the architectural design on the board pack system the concepts of installing one phase at a time does not do, since all the modules are interconnected or depends with each other.

- **Parallel conversion.**

Here both the new system and the old system will be operating simultaneously for a specific period of time. Once the users, management and the I.T group agree that the new system works effective and efficiently then it is then declared as the main system, with the old system being thrown away. With two systems running concurrently, it becomes very expensive since the resources are being doubled but fortunately the strategy does not involve any risks of data loss. The old system works as a backup platform. The parallel system is recommended in the installation of the board pack system because of less risk, and the users will have time to familiarize with the system.

#### **Parallel run steps**

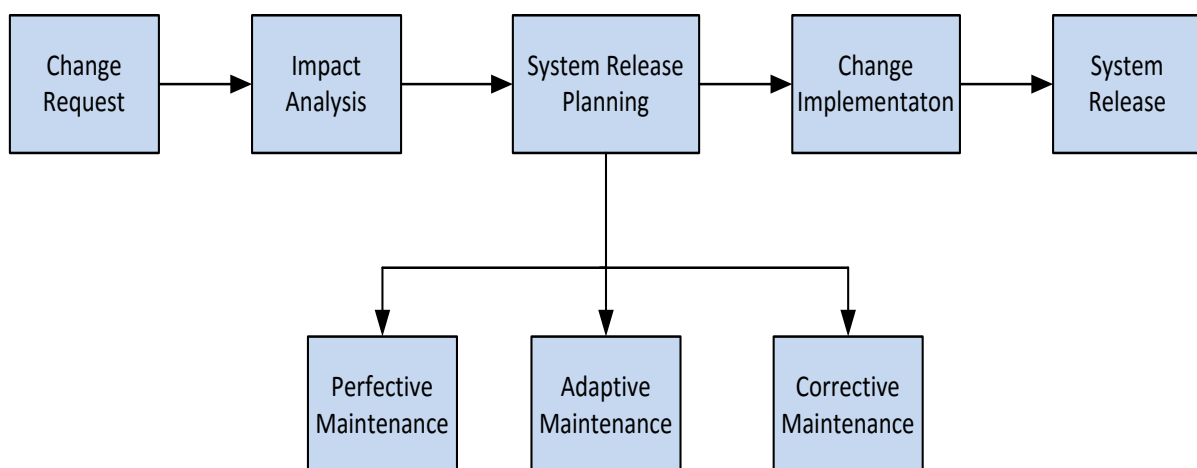
- i). The system administrator creates user accounts for every member of the fund.
- ii). Train the users how to use the system
- iii). Capture data into the system

## 5.7 WAYS OF GAINING ACCESS

- We create a hosting account with [www.godaddy.com](http://www.godaddy.com)
- Purchase a domain name (godigital.com).
- Upload the website pages and database to the domain account
- The users can now visit the url “ [www.godigital.com](http://www.godigital.com) “ and access the system, using any device that have a browser and can access the internet.

## 5.8 MAINTAINANCE

Technology, user expectations and competition are changing rapidly as well as error discovery, Hence there is need to frequently update information, optimising the databases and upgrading the system by adding new features and functionality so as to keep up with the changing environment. System maintenance should be done constantly from to time, it also helps to identify some errors that appear over time that are not identified in the early stages of system development. There are three types of system maintenance namely Corrective, Adaptive and Perfective Maintenance.



**Fig 5.20 System Maintenance**

### **5.8.1 Corrective Maintenance**

This method is about correcting errors as they appear. Once an error is discovered the investigations are conducted to locate the root of the error and an error corrective design is drawn and followed by the implementation of that corrective design.

### **5.8.2 Adaptive Maintenance**

Adaptive maintenance is the implementation of changes against the changes in the environment. Hence the system is modified as the environment changes. The environmental changes are the external factors that affect the system such as government regulations, company policies, change of management, competition, technological changes among others. This approach will be fully undertaken in the maintenance of the board pack system. All changes are to be documented.

### **5.8.3 Perfective Maintenance**

After the system is implemented there is always need to do some few changes on the code functionality or the interface among others so as to perfect the system. Perfective maintenance is done due to changes or new user requirements or just to make faster the system. For example using ajax language to communicate with the database in the background instead of using php, which reloads the page every time something is to be executed. Such changes will not correct the error but will make the system more effectively and more efficiently. The aim is to produce an improved version of what is already in place.

### **5.8.4 Preventive maintenance.**

It involves all activities that can be done to avoid errors to happen and threats to surface. Preventive maintenance aims to reduce software complexity whilst improving system security. It includes code optimisation and code restructuring. Code optimization modifying the programs for faster execution or efficient use of storage space. Code restructuring involves changing the code sequence so as to make it easier to understand.

## **5.9 SOFTWARE SECURITY AND BACKUP SERVICES**

Computer and Network Security requirements address four things:

1. Confidentiality: requires that data should only be accessed by authorized parties
2. Integrity: requires that only authorized parties can modify data.
3. Availability: requires that data is available to authorized parties.
4. Authenticity: requires that a host or server be able to identify the identity of the user.

### **5.9.1 System security**

It is a critical aspect of network management comprising of physical, software and network security. It is very essential to protect the system against harm and potential threats such as hacking, physical damage, data modification by unauthorized users. Some security issues are shown below:

### **5.9.2 Physical Security**

Physical security comprises of physical aspects of the system for example computers where the system is installed and where the server resides. Here the system will be protected against physical vandalism, theft and unauthorized access.

### **5.9.3 Software Security and network security**

The system will be protected against viruses and hackers.

- **Data consistence** - This is achieved by inputting valid data into the system by authorized users; failure to adhere to this principle the system will reject such input. Hence data consistence can be captured directly at the system validation.

### **5.9.4 Possible problems**

- Hardware failure: vandalism, disaster and theft.
- Network: congestion, disruption and configuration.
- Software: access, copying, corruption, errors and viruses.
- Data files: accessing, copying, modification and disruption.
- Organization: security, responsibility, separation of functions and staff incompetence.



- User: unauthorized access, hacking and identification.

#### **5.9.4 Preventing unauthorized access**

- Testing the security of the system before the intruder does by:
- Developing a security policy.
- Use of user profile (usernames and passwords).
- Plugging known security wholes.
- Securing network access point.
- Use of firewalls.
- Using encryption

### **5.9 RECOMENDATIONS**

- The major business successes of the Fund can be realized through the adoption of technology. The following are the recommendations to the fund and the board pack system.
- The Fund should hire a full time board pack system maintainer to maintain and upgrade the system as well as their main website. Also must hire a part time license ethical hacker/ security administrator to assess the system if it has security loopholes.
- The Fund must develop a standalone android application board pack system and another standalone 'IOS' apple application board pack system, so that in case the hosting company faces some challenges with their servers that results the system not available online , the meetings will still be executed using the stand alone applications. A temporary database server will be set aside using LAN network when using apple and android tables on standalone board pack applications, then when the main system is back online the databases are then uploaded to the main cloud server.
- The backups must be done every time before and after the meetings. The backup storage devices must be kept at a safe secured place.

### **5.10 CONCLUSION**

The implementation phase have fully explained how the board pack system will be build and how users will be trained as well as exploring the security aspect and setting up maintenance

plans. With all being done the system maintenance is executed throughout the system's life time.

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## Appendix A: User Manual

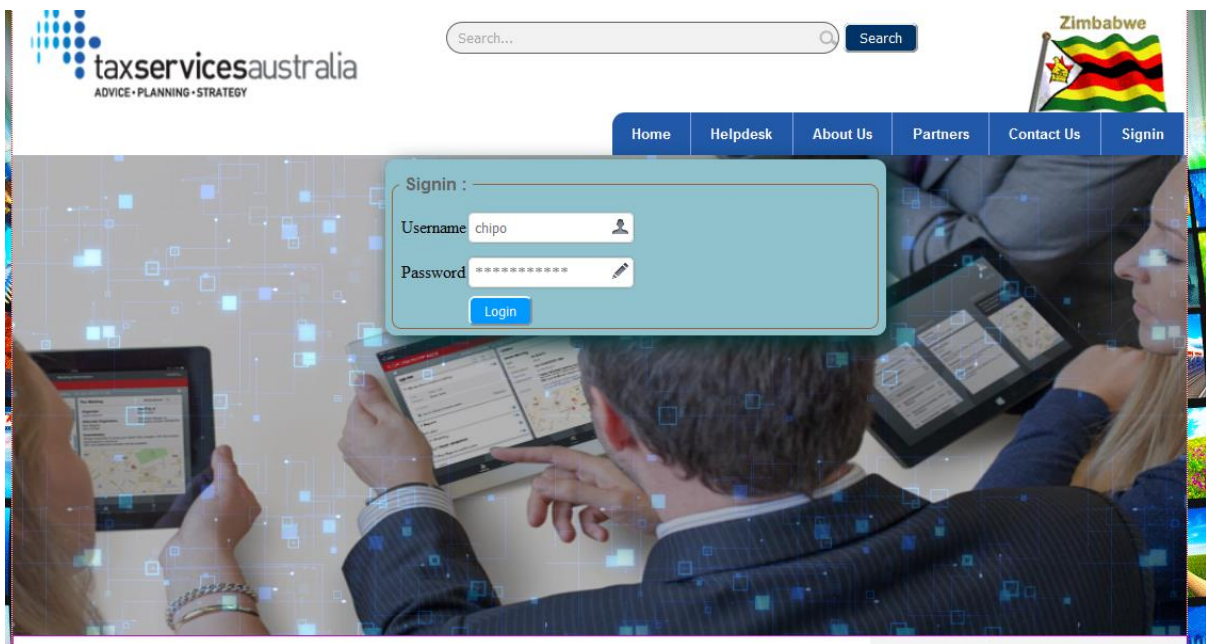
The system administrator creates user accounts. The System has 3 user levels, namely the System Administrator, the secretary and the other meeting members/members. All three levels have different interfaces and different functionality. After account creation an email is sent to the user to notify that the account have been created with a website link and a default username and password. Upon clicking the link the public home page will appear as follows.



The system homepage shows an overview of the board pack system and the Fund as a whole. Anyone can move around the system to view information about us, contact us, feedback, our partners among other public information.

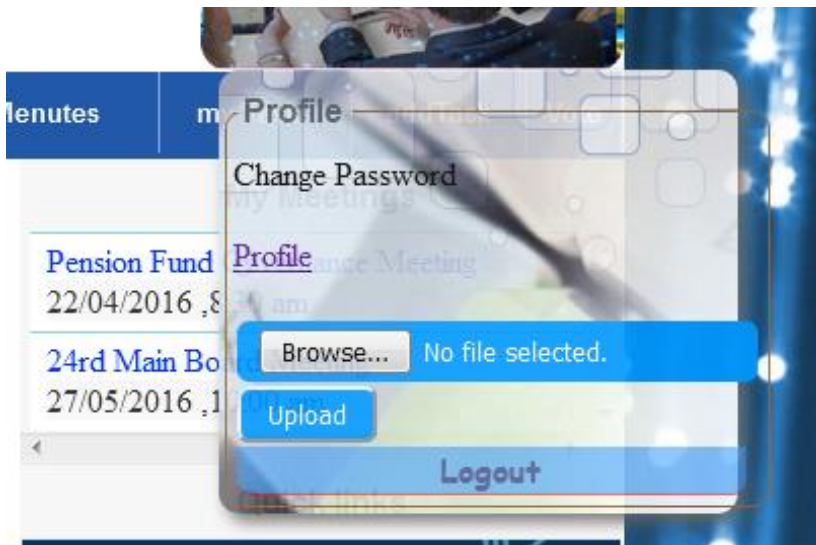
- **Login**

After viewing the home page, to access your account and system resources you press the login tab on the navigation menu and a small login form will toggle down with two fields (username and password fields). The user enters the default username and password that he/she received in the mail. Upon logging in the user is advised to change the password and username. With the correct combination the user logs in, otherwise the user is rejected access.



- **Update Profile:**

The user clicks on the “Profile” link or the profile picture on the top left of the user home page. A small form will toggle slide down as shown below.



- Change profile details

To change the username, password and other profile details the user clicks on the “myProfile” link, then the following form appears as follows. All fields that are read only cannot have anything typed on them, hence cannot be modified. These fields are name surname, department and job position. These fields can only be changed by the system administrator.

### My Profile

Meeting Member
  Secretary

---

**General Details**

Title:

First Name:

Second Name:

Department:

Employment Number:

Job Title:

Home Address:

---

**Contact Details**

Work Extention:

Phone (Cell):

Email Address (work):

Email (personal):

---

**Authentication Details**

Username:

Password:

Confirm Password:

---

To upload personal documents the user clicks the “Upload Document” tab on the right navigation menu, then the following form appears. The fields for description and keywords are not mandatory but they helps to search the document in quick and accurate manner. The upload document form is shown below:



**upload Document**

Description: Cisco System Configuration and Administration

Browse for file:  chapter 001.docx

Also to avoid any duplication of documents, any user who uploads the document can select members who can view the document. To create the share group members the uploader clicks on the view documents, then clicks on share button , then the following form will appear.

Share Point					
EC#	Name	Department	Ext	Email Work	SharePoint
B5651	Ms Blessing Mbweku	External Party	3443	bule@gmail.com	<input type="checkbox"/>
B87043	Mrs Gloria Dube	Management	344	gloria@nrzcpf.com	<input checked="" type="checkbox"/>
B29498	Mrs Chipso Hlabangana	Management	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>
					<input type="button" value="Share"/>

File Shared to 2 people

1. Mrs Gloria Dube
2. Mrs Chipso Hlabangana

**My Meetings**

- Pension Fund Governance Meetin  
22/04/2016 ,8:30 am
- Health and Safety Meeting  
23/04/2016 ,9:00 am
- 24rd Main Board Meeting  
27/05/2016 ,10:00 am
- 23rd Main Board Meeting  
30/04/2016 ,7:00 am

**Quick links**

- Policies and Environment
- Environment
- Policies
- Environment

To share the document the user marks the checkboxes of the selected people then click submit button to share. Only the person who uploads the document can only delete, modify and resubmit the document at will. Pictures, zipped files and other document types can be uploaded, except for videos and executable files.

**i) THE ADMINISTRATOR’S MANUAL :**

The system administrator has exclusive powers over the system. His duties are to manage users, add announcements, create new meetings, add agenda items, upload associated and un associated meeting documents as well as how to search and view system reports. Also he/she

is responsible for creating group community of members who are allowed to attend and view meeting documents for that meeting.

- **Adding users.**

The system administrator moves mouse on the users tab on the navigation menu, then clicks on the add user tab. The following page will appear.

**ADD NEW USER**

Meeting Member       Administrator

**General Details**

Title: Mr ▾

First Name: first name ✎

Second Name: surname ✎

Department: Trustes ▾

Employment Number: ecnum ✎

Job Title: job title ✎

Home Address: physical address ✎

**Contact Details**

Work Extention: work Extention ✎

Phone (Cell): Cellphone details ✎

Email Address (work): eg example@nrzcpf.co.za ✎

Email (personal): eg example@domain.com ✎

**Authentication Details**

Username: username ✎

Password: \*\*\*\*\* ✎

Confirm Password: \*\*\*\*\* ✎

**Submit**

First he/she should select the user level, and fill the details in the fields above. All the fields marked with a red star are mandatory and should not be left empty. Upon clicking the submit button all the data is submitted into the database and an email will be send to the user

notifying his/her about the account creation attached with username and the password. The system is well validated so only valid data will be submitted to the database.

- Suspending and activating users

The system administrator moves mouse on the users tab on the navigation menu, then clicks on the add user tab. The following page will appear.

EC#	Name	Department	User level	Ext	Email Work	Status	un/Suspend
kuku323	Mr Kukukwashe mbweku	Management	admin	4332	kuku@gmail.com	Activated	
B87043	Mrs Gloria Dube	Management	user	344	gloria@nrzcpf.com	Activated	
B29498	Mrs Chipo Hlabangana	Management	user	432	chipo@nrzcpf.co.zw	Deactivated	
B60574	Mr busi ncube	Finance	user	432	chipo@nrzcpf.co.zw	Deactivated	
B04225211	Mr ddj3434 dhd637	Management	user	work	dee@me.com	Deactivated	
B04321860	Ms deon hama	IT	user	5483	deon@nrzcpf.com	Deactivated	
B04165836	Mr hellen golahp	Finance	user	900	pearson@gmail.com	Activated	

To suspend the user you just click the “suspend icon” then the user is suspended instantly. To activate the user you click the green tick (activate icon) then the user will be unsuspended. Once the user is suspended he or she can no longer access the system until activated.

- Create meeting:

The system administrator clicks on the create meeting tab on the navigation menu. The following form will appear. All fields are mandatory.

[Home](#) | [View Users](#) | [Create Group](#)

### Create Meeting

**Meeting Title**

**Sub\_Title**

**Description**

**Committee**

**Start Date**  **Start Time**

**End Date**  **End Time**

**Location**

- Add meeting agenda items:

To add the meeting agenda items the admin first opens the meeting by clicking the designated meeting on the right pane of the page. On the page that displays meeting details, there is a big green button that reads “add agenda” ,upon clicking that button the agenda form will be displayed as shown below.

# Pension Fund Governance Meeting

Yearly strategy and policy review

22/04/2016 : 8:30 am ~ : 9:00 am





Location: Company Co : Mezzaine Floor, Packade center 5st & 9th ave. Bulawayo Email: nrzpension@nrzcpf.co.zw Phone: (263)-9-71

+ Agenda Items

### Add Agenda Item 1

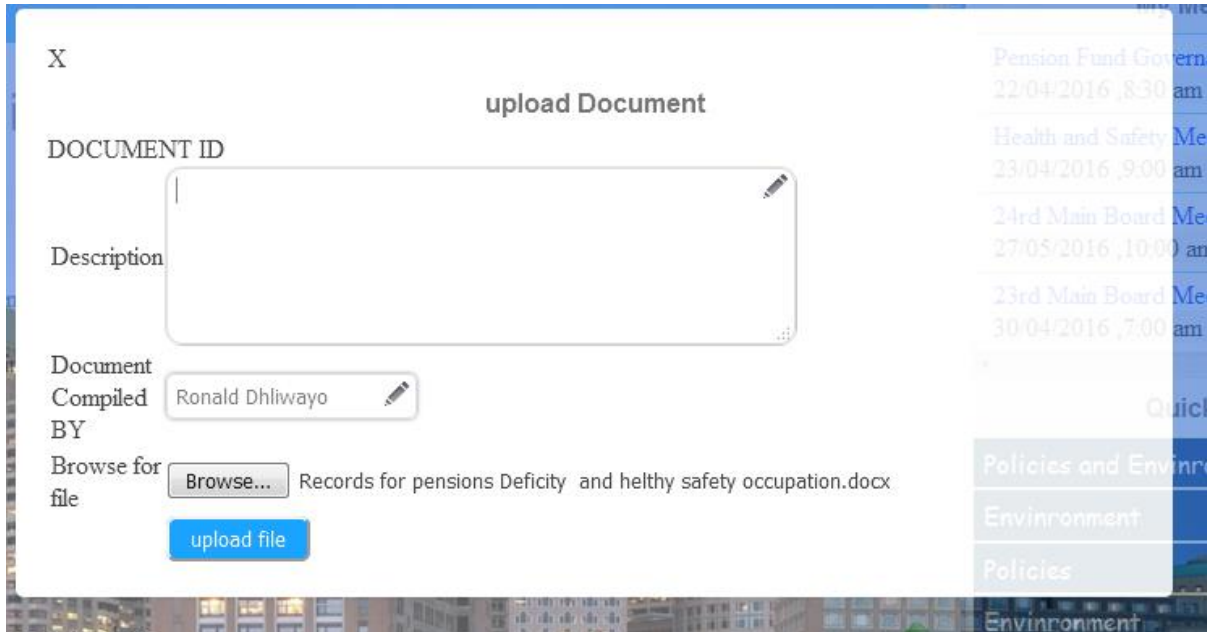
- **Upload meeting documents:**

After uploading agenda items, you may want to upload documents associated with a specific agenda, to upload you click the upload icon on the designated agenda then an upload form will pop up and you can enter description of the document. Description is not mandatory though. After uploading, the documents uploaded will be hidden behind the agenda item, to unhide them you just click on the agenda and you click the agenda again to hide them. To delete any document you click on the delete icon on the target document, then it will be deleted.

Chief s Executive S Report	
Strategic Management and Quality Assurance	
Records for pensions Deficity and helthy safety occupation.docx	
New Businesses	

- **Uploading associated document**

Some documents are not even associated with a specific agenda or they are associated with all the agenda items eg the previous minutes. These documents can be uploaded by clicking the upload button on the bottom of the page. Then the upload form will pop up as follows.



- **Create group community**

Not all the system users are supposed to view all meeting materials. The system administrator will create a group community for any meeting that is created. Any system user that is not in the group cannot see the meeting materials. To create a group the admin click the group icon on the top left, then the table with all the users will be displayed. Group members will be marked with the green tick, and to remove the user from the group the admin will just click the green tick again to remove it. The admin can select a meeting secretary from the users by clicking the green tick on the choose secretary column.

**Share Point : Create group community**

EC#	Name	Department	Ext	Email Work	Group Members	Secretary
B5651	Ms Blessing Mbweku	External Party	3443	bule@gmail.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B87043	Mrs Gloria Dube	Management	344	gloria@nrzcpf.com	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B29498	Mrs Chipo Hlabangana	Management	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="button" value="Share"/>

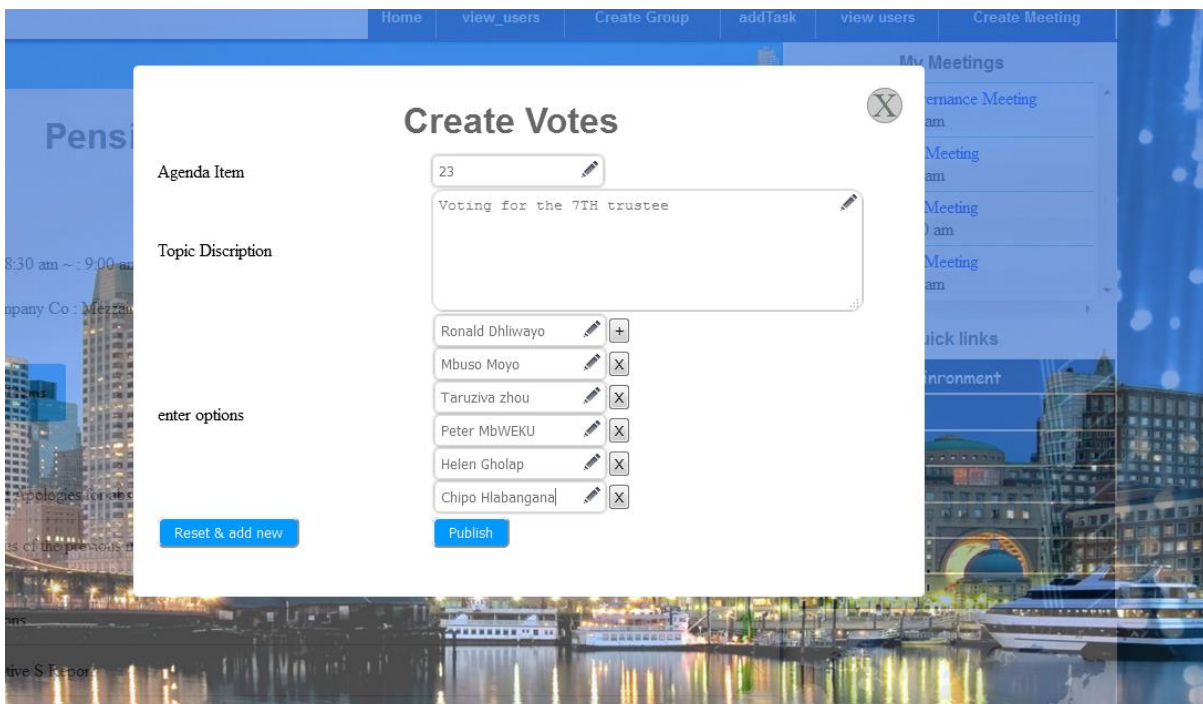
**File Shared to 3 people**

1. Mrs Chipo Hlabangana As Secretary
2. Mrs Gloria Dube
3. Ms Blessing Mbweku

**System Configuration and Administration :**

**Create votes:**

To create votes the system administrator clicks on the create votes button on the bottom of the page, then the form to create votes will appear as shown below:



All the fields must be mandatory. Voting options are dynamic. You can add and remove options, there must be at least two options.

## ii) THE SECRETARY'S MANUAL

The duties of the secretary are to write all minutes discussed in the meeting. The minutes includes all the decisions, tasks assigned, new risks as well as recording all topics discussed during the meeting.

- **Creating minutes:**

The secretary can click on the plus icon on any agenda so as to write minutes concerned with that specific agenda. upon clicking the add minutes icon the following window will pop up.

The screenshot shows a form titled "Minutes" with a blue header. The form contains the following fields and controls:

- Agenda Item:** A text input field with a pencil icon on the right.
- Minutes \*:** A large text area with a pencil icon in the top right corner.
- Decision (Discription):** A text area with a pencil icon in the top right corner.
- Final Decision:** A text area with a pencil icon in the top right corner.
- Task:** A text area with a pencil icon in the top right corner.
- Assigned to:** A dropdown menu currently showing "Person responsible".
- Submit:** A blue button at the bottom of the form.



Only the minute's field is mandatory. If one enters the decision then he/she must enter the description to that decision. Once a task is assigned to anyone the secretary must enter the description of the task as well as the person responsible.

### **Risk analysis:**

To enter a new risk the secretary clicks on the red box on the agenda item being discussed. The following form the board pack system the risks will be recorded as well as the description, risk level and the person to monitor the risk. The form to record new risks is shown on the diagram below.

The screenshot shows a web form titled "Enter New Risk" with a blue header. The form contains the following fields and controls:

- Risk Name:** A text input field with a pencil icon for editing.
- Description:** A large text area with a pencil icon for editing.
- Likelihood:** A dropdown menu with the value "1" selected.
- Risk Impact:** A dropdown menu with the value "1" selected.
- Counter measure:** A large text area with a pencil icon for editing.
- Person responsible:** A dropdown menu with "Ms Blessing Mbweku" selected.
- Submit:** A blue button at the bottom of the form.

### **iii) THE OTHER MEETING ATTENDEES:**

Their roles are concurrently executed by the both the secretary and the system administrator. Their role is to participate in the discussion, make decision, taking personal notes, as well as recording tasks assigned to them. To view the meeting the user clicks on the meeting on the right pane of the page then the meeting will be displayed as follow.







# Pension Fund Governance Meeting

Yearly strategy and policy review

22/04/2016 : 8:30 am ~ : 9:00 am

Location: Company Co : Mezzaine Floor, Packade center 5st & 9th ave. Bulawayo Email: nrzpension@nrzcpf.co.zw Phone: (263)-9-71

+ Agenda Items

Wellcome and Apologies for absence members	
Review minutes of the previous meeting	
Public Questions	
Chief s Executive S Report	
Strategic Management and Quality Assuarance	
New Businesses	

In order to vote on the navigation pane, there is a tab written vote with the number of votes created, normally it's just one at a time. The user clicks on it then the following voting page will appear.

**Vote**

---

Vote for the next CEO kn

---

: chipo hlabangana  
 : peter mbweku  
 : Ronald Dhliwayo  
 : Darlington Siziba  
 : Resmond Madzivire  
 : Vernon Kaudze

Once the user votes, the voting page will disappear. Hence no one will vote more than once.

- Upload documents

Every system user have the privilege to upload any documents to the website, without having to share with anyone. This is a platform for safe and secured document storage. On the navigation pane tab written “myDocs”, upon clicking the tab the following upload page appears.

- Document live sharing in the meeting:

Microsoft office 2016 have the privileges to easily share documents in a group view. Hence once document can be viewed by the group at the same time whilst enabling live editing. When the group members are using tablets they can make use of annotation tools that are part of the android and Ios package.

- Document sharing:

Share Point					
EC#	Name	Department	Ext	Email Work	SharePoint
B5651	Ms Blessing Mbweku	External Party	3443	bule@gmail.com	<input type="checkbox"/>
B87043	Mrs Gloria Dube	Management	344	gloria@nrzcpf.com	<input checked="" type="checkbox"/>
B29498	Mrs Chipso Hlabangana	Management	432	chipo@nrzcpf.co.zw	<input checked="" type="checkbox"/>
					Share

File Shared to 2 people

1. Mrs Gloria Dube
2. Mrs Chipso Hlabangana

My Meetings

[Pension Fund Governance Meetin](#)  
22/04/2016 ,8:30 am

[Health and Safety Meeting](#)  
23/04/2016 ,9:00 am

[24rd Main Board Meeting](#)  
27/05/2016 ,10:00 am

[23rd Main Board Meeting](#)  
30/04/2016 ,7:00 am

---

Quick links

[Policies and Environment](#)

[Environment](#)

[Policies](#)

[Environment](#)

Description and some keywords will aid for easy and fast searching in the future. The user can choose to ignore those field the system will search using the document name as the search key.

## Appendix B: Interview Checklist

### Interview Details

1. Name of Interviewer \_\_\_\_\_
2. Position of Interviewee \_\_\_\_\_
3. Department of Interviewee \_\_\_\_\_

### Interview Questions

1. For how long have you worked for? \_\_\_\_\_
2. How would you rate the current system in record keeping and retrieval?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. What are the problems that are arising from this current system?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. What is the average time taken in making decisions?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. Do you manage to keep track of all your tasks and decisions activities?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
6. How long does it take to compile to organise documents for the upcoming meeting?  
\_\_\_\_\_

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7. Do you think everyone is comfortable with the current system?

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8. What do you suggest be done to improve the current system?

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9. Do you think the introduction of an online system would be appropriate? Why?

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10. How well do you think the above change will be accepted by the other employees?

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11. Do you think this change will overcome the problems that the current system has?

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12. Any other comments or additions?

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Signature \_\_\_\_\_

### Appendix C: Questionnaire Checklist

#### QUESTIONNAIRE

*NOTE: PLEASE TRY TO ANSWER ALL QUESTIONS SINCE THERE IS CONFIDENTIALITY AND TICK ONE BOX WHERE APPROPRIATE.*

- |   | Yes                      | No                       |
|---|--------------------------|--------------------------|
| 1. Are you satisfied with the current system?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Do you think board pack systems that are made using the current system are accurate? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Do you experience any difficulties with the current system?                          | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Do you keep track of all meeting discussions, decisions and assigned tasks ?         | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Do are you satisfied with the current boar pack procedure? Why?                      | <input type="checkbox"/> | <input type="checkbox"/> |

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6. How do you feel about introducing an internet based system?

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7. What do you think will be the benefit/s of having an internet based system?

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8. Any further comments or suggestions?

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## Appendix E: Snippet of Code

### Login

```
<?php
include_once('unicode/unicode.php');
$username = $_POST['username'];
$password = $_POST['password'];
$sha1pass = sha1($password);
$md5pass = md5($sha1pass);
$status = "online";
$loginDate = date('d/m/Y , h:i:s');
$month = date('F');
$year = date('Y');

$tafi = mysql_query("SELECT * FROM users WHERE username = '$username' and password = '$md5pass' and status = '1'") or die (mysql_error());
$count = mysql_num_rows($tafi);
if($count != 1){
    echo "Wrong authentication details";
}
else if($count == 1){

    $fetch = mysql_fetch_object($tafi);
    $level = $fetch->level;
    session_start();
    switch($level)
    {
```



```

        case "user":

            $_SESSION['useruser'] = $username;

            $_SESSION['iduser'] = $fetch->userid;

            $_SESSION['nameuser'] = $fetch->name;

            $_SESSION['logid'] = $loginDate.md5("tzhou".rand(0,10000000));

            $update = mysql_query("insert into
loglog(userid,name,loginDate,status,logid,month,year)
values('$_SESSION[iduser]',$_SESSION[nameuser'],$loginDate',$status',$_SESSION[logid]','$month','$year')")or die(mysql_error());

            echo ("<script> window.location.href='boardpack/users/index.php'; </script>");

            break;

        case "admin":

            $_SESSION['useradmin'] = $username;

            $_SESSION['idadmin'] = $fetch->userid;

            $_SESSION['nameadmin'] = $fetch->name;

            $_SESSION['logid'] = $loginDate.md5("tzhou".rand(0,90000000));

            $update = mysql_query("insert into
loglog(userid,name,loginDate,status,logid,month,year)

            values('$_SESSION[idadmin]',$_SESSION[nameadmin'],$loginDate',$status',$_SESSION[logid]','$month','$year')")or die(mysql_error());

            echo ("<SCRIPT LANGUAGE='JavaScript'>
window.location.href='boardpack/admin/index.php'; </SCRIPT>");

            break;

        default:

            echo "Unexpected error, please contact the administrator if the problem persists";

            session_destroy();

```

```

                break;
            }
        } else {
            echo "contact the system administrator"; // is there are 2 or more peters
            session_destroy();
        }
    }
?>

```

### **Database connection**

```

<?php
mysql_connect("localhost","root","")or die(mysql_query());
mysql_select_db("helpdesk")or die(mysql_error());

function message($msg){
    die('<script>alert("'.$msg.'"); </script>');
}
?>

```

### **Create meeting**

```

<?php
@$tittle= $_POST['tittle'];
@$subtitle = $_POST['subtitle'];
@$description = $_POST['description'];
@$committee = $_POST['committee'];
@$start_Date = $_POST['start_Date'];
@$end_Date = $_POST['end_Date'];
@$start_Time = $_POST['start_Time'];
@$end_Time = $_POST['end_Time'];

```

```

if(isset($_POST['Submit'])){

    $insert = mysql_query("INSERT INTO
meetings(id,id2,location,status,tittle,subtitle,description,committee,start_Date,end_Date,start_Time,e
nd_Time)values(','.$id2,'$location','$status','$tittle','$subtitle','$description','$committee','$start_Date',
'$end_Date','$start_Time','$end_Time')")or die(mysql_error());

    if($insert){

        message("success");

    }

}

?>

```

### Add agenda items

```

<?php
include_once('../../unicode/unicode.php');
@$id2 = $_REQUEST['peteID'];
@$agenda_item = $_POST['agenda_item'];
@$selecto = mysql_query("select* from agenda where id2 = '$id2' and name = '$agenda_item'")or
die(mysql_error());
$count = mysql_num_rows($selecto);
$uniqueID = date('hias').rand(0,90000000000);
if(empty($agenda_item)){

    echo "Enter Agenda Item";

}

else if(is_numeric($agenda_item)){

    echo "Enter something meaningful";

}

else if($count != 0){

```

```
        echo "You have already submitted this item";
    }
    else{
        @$inserto = mysql_query("INSERT INTO
agenda(id2,uniqueID,name,item_number)VALUES('$id2','$uniqueID','$agenda_item','$item_number'
)")or die(mysql_error());
        if($inserto){
            echo "Success";
        }
    else {
        echo "Unexpected Error Please try again";
    }
}
?>
```