



**University of Fort Hare**  
*Together in Excellence*

# **Investigation and Development of an e-Judiciary Service for a Citizen-Oriented Judiciary System for Rural Communities**

A thesis submitted in fulfillment of the requirements of the degree of

**Master of Science**

in

**Computer Science**

by

**Mfundo Shakes Scott**

## **DECLARATION**

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and has not been previously submitted at any educational institution for a similar or any other degree. Information extracted from other sources is acknowledged as well.

**Name:** M.S. Scott

**Date:** March 2010

## ACKNOWLEDGEMENTS

Let me firstly thank the **Lord God Almighty** for listening to my prayers day and night when the going was getting tougher and tougher during my research. You are a wonderful, trustworthy and never disappointing friend. Secondly, I would like to thank the **Department of Computer Science** of the **University of Fort Hare** and the Head of Department, **Prof. J.J. Chadwick** for allowing me to be one of the Masters' Students for the academic period 2008 and 2009.

**Prof. N. H. Muyingi, Prof. A. Terzoli and Dr. M. Thinyane**, I don't know where to start thanking you, but there's one definite thing I know: "*Without you next to me during these two years, this master's would've been a dream that never came true*". Thanks a million times for the support, advice, constructive criticism and meetings, and the time you dedicated to me even beyond your normal working hours.

I would also like to thank **Telkom SA** for sponsoring me throughout my education at Fort Hare University, and especially the following staff members: **Rodney Barnard, Heinrich Ferreira, David Browne, Johan du Plessis, and Maria Nkomo**.

To my family: **Mr. T. D. & Mrs. Z. H. Scott, Miss D. M. Scott, and Mr. L. J. & Mrs. T. P. Pani**, thank you very much for your understanding and support throughout my education. Not forgetting my fiancée, **Miss L. Siyoko** for always encouraging me to do my best throughout the duration of this difficult research period.

Finally, let me thank my friend **Mr. S. Dyakalashe** for all the help and advice he has given me throughout my research. Not forgetting **Miss S. Gumbo (Spooky)** for always making sure that my fee waivers were fully paid and for being a dedicated coordinator in the COE office. To the **Dwesa community, teachers, learners, Chief and Counsellors**, thanks a million times for your time and dedication to my research and the whole COE research.

## PUBLICATIONS

The following are publications that were submitted during the course of this research project:

**M. S. Scott, N. H. Muyingi and M. Thinyane.** *Investigation and Development of an e-Judiciary Service for a Citizen-Oriented Judiciary System in a Rural Community.* Southern Africa Telecommunication Networks and Applications Conference – SATNAC. Wild Coast Sun, Eastern Cape, South Africa, 2008.

**M. S. Scott, M. Thinyane and A. Terzoli.** *Implementation of an e-Judiciary Service for Traditional Justice Administration in Dwesa-Cwebe.* Southern Africa Telecommunications Network and Applications Conference – SATNAC. Swazi Spa, Swaziland, 2009.

# **ABSTRACT**

One of the factors that contribute towards slow rural development is the presence of the digital divide. An area where the digital divide is still prevalent is the administration of justice within traditional contexts. One of the areas affected by this problem is the Dwesa rural community, situated on the Wild Coast of the former homeland of Transkei, in the Eastern Cape Province of South Africa.

To address this problem for the Dwesa community, a research project on developing and implementing an e-Judiciary service was undertaken. The primary objective of this project was to develop a web application to support traditional justice administration in the Dwesa community.

Due to the lack of a proper legal environment in this community, the e-Judiciary service acts as a portal for safe-keeping of judicial information. Such a system also serves as a platform for the administration of minor offences that are solved by the traditional courts. Furthermore, it provides a better working environment for traditional judicial leaders and eliminates the difficulty of accessing legal information by the rest of the community.

Through the availability and use of the service, community members are provided with understanding and knowledge about judiciary operations and services in their community.

# TABLE OF CONTENTS

|                      |                                                 |           |
|----------------------|-------------------------------------------------|-----------|
| <b>Chapter One</b>   | <b>Introduction and Background</b>              | <b>1</b>  |
| 1.1                  | Introduction                                    | 2         |
| 1.2                  | Research Background                             | 2         |
| 1.3                  | Research Problem                                | 3         |
| 1.4                  | Objectives of the Research                      | 4         |
| 1.5                  | Research Context                                | 6         |
| 1.6                  | Outline of the Thesis Structure                 | 7         |
| 1.7                  | Conclusion                                      | 8         |
| <b>Chapter Two</b>   | <b>Literature Review</b>                        | <b>9</b>  |
| 2.1                  | Introduction                                    | 10        |
| 2.2                  | The Research Location: Dwesa                    | 10        |
| 2.3                  | The Siyakhula Living Lab                        | 11        |
| 2.3.1                | The Deployed ICT Platform at Dwesa              | 12        |
| 2.3.2                | Applications for Dwesa                          | 13        |
| 2.3.3                | Applications Currently Under Development        | 14        |
| 2.4                  | SLL Guiding Motivation                          | 15        |
| 2.5                  | Overcoming the Digital Divide                   | 17        |
| 2.6                  | Traditional Justice Administration              | 18        |
| 2.6.1                | Role of the Traditional Court                   | 18        |
| 2.6.2                | Procedure of the Traditional Court              | 19        |
| 2.6.3                | Role of the Traditional Leaders                 | 20        |
| 2.6.4                | Traditional Leadership and the Judiciary        | 20        |
| 2.6.5                | Challenges Faced by Traditional Justice Systems | 21        |
| 2.7                  | ICT and the Judiciary System                    | 22        |
| 2.8                  | The e-Judiciary System                          | 24        |
| 2.8.1                | The Adoption of an e-Judiciary System at Dwesa  | 25        |
| 2.8.2                | The View of the e-Judiciary                     | 26        |
| 2.9                  | Related Case Studies                            | 26        |
| 2.9.1                | The Judicial Service of Bhutan                  | 27        |
| 2.9.2                | The Judicial Service of Ghana                   | 28        |
| 2.9.3                | The Judicial Service of Kenya                   | 29        |
| 2.9.4                | The Judicial Service of Uganda                  | 30        |
| 2.10                 | Conclusion                                      | 32        |
| <b>Chapter Three</b> | <b>Methodology and System Requirements</b>      | <b>33</b> |
| 3.1                  | Introduction                                    | 34        |
| 3.2                  | Methodology                                     | 34        |
| 3.3                  | System Requirements                             | 38        |
| 3.4                  | User Roles and Functionality Diagrams           | 39        |
| 3.4.1                | The Administrator                               | 40        |
| 3.4.2                | The Legal Authorities                           | 41        |
| 3.4.3                | The Citizens                                    | 42        |

|                                                         |                                                       |           |
|---------------------------------------------------------|-------------------------------------------------------|-----------|
| 3.4.4                                                   | Anonymous Users .....                                 | 43        |
| 3.5                                                     | Conclusion .....                                      | 44        |
| <b>Chapter Four System Design and Development .....</b> |                                                       | <b>45</b> |
| 4.1                                                     | Introduction.....                                     | 46        |
| 4.2                                                     | System Back-End Design and Development .....          | 46        |
| 4.2.1                                                   | MySQL Database Design .....                           | 47        |
| 4.2.1.1                                                 | The Pre_Registration and Users Tables .....           | 48        |
| 4.2.1.2                                                 | The Complaints Table .....                            | 49        |
| 4.2.1.3                                                 | The Hearings Table .....                              | 49        |
| 4.2.1.4                                                 | The News Table .....                                  | 50        |
| 4.2.1.5                                                 | The Judicial Information.....                         | 50        |
| 4.2.1.6                                                 | The Local Cases .....                                 | 51        |
| 4.2.1.7                                                 | The Local Crime .....                                 | 52        |
| 4.2.1.8                                                 | The Local Criminal Records .....                      | 52        |
| 4.2.1.9                                                 | The Suggestions Table .....                           | 53        |
| 4.2.1.10                                                | The Languages Table .....                             | 53        |
| 4.3                                                     | Scripting Technologies .....                          | 54        |
| 4.3.1                                                   | Client-Side Scripting.....                            | 54        |
| 4.3.2                                                   | Server-Side Scripting .....                           | 55        |
| 4.4                                                     | System Front-End Design and Development.....          | 56        |
| 4.4.1                                                   | The e-Judiciary Service Website Navigation Menus..... | 58        |
| 4.4.1.1                                                 | The Top Navigation Menu.....                          | 59        |
| 4.4.1.2                                                 | The Right Navigation Menu .....                       | 59        |
| 4.4.1.3                                                 | The Bottom Navigation Menu .....                      | 60        |
| 4.4.2                                                   | The e-Judiciary Service Website Content.....          | 61        |
| 4.4.2.1                                                 | The Administrator Interface.....                      | 61        |
| 4.4.2.2                                                 | The Legal Authorities Interface .....                 | 62        |
| 4.4.2.3                                                 | The Citizens Interface .....                          | 63        |
| 4.5                                                     | The e-Judiciary Service Website .....                 | 64        |
| 4.5.1                                                   | New User Registration Process.....                    | 65        |
| 4.5.2                                                   | About Us .....                                        | 67        |
| 4.5.3                                                   | Contact Us.....                                       | 68        |
| 4.5.4                                                   | Traditional Authorities.....                          | 69        |
| 4.5.5                                                   | Dwesa News.....                                       | 70        |
| 4.5.6                                                   | Dwesa Suggestions .....                               | 71        |
| 4.6                                                     | Conclusion .....                                      | 72        |
| <b>Chapter Five System Implementation .....</b>         |                                                       | <b>73</b> |
| 5.1                                                     | Introduction.....                                     | 74        |
| 5.2                                                     | E-Judiciary System Templates.....                     | 74        |
| 5.3                                                     | System Administration.....                            | 75        |
| 5.4                                                     | MySQL Database.....                                   | 82        |
| 5.4.1                                                   | Connection to MySQL Database .....                    | 82        |
| 5.4.2                                                   | Opening the Connection .....                          | 83        |
| 5.4.3                                                   | Closing the Connection.....                           | 83        |

|                                                       |                                            |            |
|-------------------------------------------------------|--------------------------------------------|------------|
| 5.4.4                                                 | MySQL Database Functions Used.....         | 84         |
| 5.5                                                   | E-Judiciary System Security .....          | 85         |
| 5.5.1                                                 | User Authentication .....                  | 85         |
| 5.5.2                                                 | User and System Communication.....         | 86         |
| 5.5.3                                                 | System Messaging .....                     | 87         |
| 5.6                                                   | System Use by the Community.....           | 89         |
| 5.7                                                   | System Localization.....                   | 93         |
| 5.8                                                   | Conclusion .....                           | 95         |
| <b>Chapter Six Results and Evaluation .....</b>       |                                            | <b>96</b>  |
| 6.1                                                   | Introduction.....                          | 97         |
| 6.2                                                   | System Usability Testing.....              | 97         |
| 6.3                                                   | Testing Results.....                       | 98         |
| 6.3.1                                                 | Participants' Basic Understanding.....     | 100        |
| 6.3.2                                                 | Participants' Interface Understanding..... | 103        |
| 6.3.3                                                 | Participants' Content Understanding.....   | 107        |
| 6.4                                                   | Evaluation of the System .....             | 109        |
| 6.5                                                   | Discussion .....                           | 110        |
| 6.6                                                   | Conclusion .....                           | 111        |
| <b>Chapter Seven Conclusion and Future Work .....</b> |                                            | <b>112</b> |
| 7.1                                                   | Introduction.....                          | 113        |
| 7.2                                                   | Summary .....                              | 113        |
| 7.3                                                   | Addressing the Research Objectives.....    | 114        |
| 7.4                                                   | Challenges Encountered.....                | 116        |
| 7.5                                                   | Future Work .....                          | 117        |
| 7.6                                                   | Conclusion .....                           | 118        |
| <b>REFERENCES.....</b>                                |                                            | <b>119</b> |

# TABLE OF FIGURES

|                                                                                  |            |
|----------------------------------------------------------------------------------|------------|
| <b>FIGURE 2.1: DWESA ICT INFRASTRUCTURE.....</b>                                 | <b>13</b>  |
| <b>FIGURE 2.2: VIEW OF ICT IN JUDICIAL SERVICES .....</b>                        | <b>23</b>  |
| <b>FIGURE 2.3: THE VIEW OF THE E-JUDICIARY.....</b>                              | <b>26</b>  |
| <b>FIGURE 3.2: DWESA E-JUDICIARY SERVICE USE CASE ARCHITECTURE .....</b>         | <b>39</b>  |
| <b>FIGURE 3.3: THE ADMINISTRATOR TASKS IN THE E-JUDICIARY SERVICE .....</b>      | <b>41</b>  |
| <b>FIGURE 3.4: THE LEGAL AUTHORITIES' TASKS IN THE E-JUDICIARY SERVICE .....</b> | <b>42</b>  |
| <b>FIGURE 3.5: THE CITIZEN TASKS IN THE E-JUDICIARY SERVICE.....</b>             | <b>43</b>  |
| <b>FIGURE 3.6: ANONYMOUS USERS IN THE E-JUDICIARY SERVICE.....</b>               | <b>44</b>  |
| <b>FIGURE 4.1: DWESA E-JUDICIARY SYSTEM ARCHITECTURE.....</b>                    | <b>47</b>  |
| <b>FIGURE 4.2: THE TOP NAVIGATION MENU.....</b>                                  | <b>59</b>  |
| <b>FIGURE 4.3: THE RIGHT NAVIGATION MENU .....</b>                               | <b>60</b>  |
| <b>FIGURE 4.4: THE BOTTOM NAVIGATION MENU .....</b>                              | <b>61</b>  |
| <b>FIGURE 4.5: THE ADMINISTRATOR INTERFACE .....</b>                             | <b>62</b>  |
| <b>FIGURE 4.6: THE LEGAL AUTHORITIES INTERFACE.....</b>                          | <b>63</b>  |
| <b>FIGURE 4.7: THE CITIZENS INTERFACE .....</b>                                  | <b>64</b>  |
| <b>FIGURE 4.8: THE E-JUDICIARY SERVICE HOME PAGE .....</b>                       | <b>65</b>  |
| <b>FIGURE 4.9: USER REGISTRATION FORM .....</b>                                  | <b>66</b>  |
| <b>FIGURE 4.10: ABOUT THE E-JUDICIARY SERVICE PAGE .....</b>                     | <b>68</b>  |
| <b>FIGURE 4.11: THE CONTACT PAGE OF THE SERVICE .....</b>                        | <b>69</b>  |
| <b>FIGURE 4.12: THE DWESA TRADITIONAL AUTHORITIES PAGE .....</b>                 | <b>70</b>  |
| <b>FIGURE 4.13: THE DWESA LOCAL NEWS PAGE.....</b>                               | <b>71</b>  |
| <b>FIGURE 4.14: THE SUGGESTIONS PAGE.....</b>                                    | <b>72</b>  |
| <b>FIGURE 6.1: AGE RANGE OF THE PARTICIPANTS CHART .....</b>                     | <b>100</b> |
| <b>FIGURE 6.2: NUMBER OF YEARS USING COMPUTERS CHART .....</b>                   | <b>101</b> |
| <b>FIGURE 6.3: BASIC UNDERSTANDING CHART .....</b>                               | <b>103</b> |
| <b>FIGURE 6.4: E-JUDICIARY SERVICE INTERFACE CHART .....</b>                     | <b>105</b> |
| <b>FIGURE 6.5: INTERFACE UNDERSTANDING CHART.....</b>                            | <b>106</b> |
| <b>FIGURE 6.6: CONTENT UNDERSTANDING CHART .....</b>                             | <b>108</b> |

## LIST OF TABLES

|                                                   |           |
|---------------------------------------------------|-----------|
| <b>TABLE 4.1: PRE_REGISTRATION AND USERS.....</b> | <b>49</b> |
| <b>TABLE 4.2: THE COMPLAINTS .....</b>            | <b>49</b> |
| <b>TABLE 4.3: THE HEARINGS .....</b>              | <b>50</b> |
| <b>TABLE 4.4: THE DWESA NEWS.....</b>             | <b>50</b> |
| <b>TABLE 4.5: THE JUDICIAL INFORMATION .....</b>  | <b>51</b> |
| <b>TABLE 4.6: THE LOCAL CASES.....</b>            | <b>51</b> |
| <b>TABLE 4.7: THE LOCAL CRIME .....</b>           | <b>52</b> |
| <b>TABLE 4.8: THE LOCAL CRIMINAL RECORDS.....</b> | <b>52</b> |
| <b>TABLE 4.9: THE SUGGESTIONS.....</b>            | <b>53</b> |
| <b>TABLE 4.10: THE LANGUAGES .....</b>            | <b>53</b> |

## TABLE OF CODE SEGMENTS

|                                                                             |           |
|-----------------------------------------------------------------------------|-----------|
| <b>CODE SEGMENT 5.1: SWITCHING BETWEEN TEMPLATES.....</b>                   | <b>75</b> |
| <b>CODE SEGMENT 5.2: DISPLAYING THE TEMPLATE .....</b>                      | <b>75</b> |
| <b>CODE SEGMENT 5.3: USER ROLES IN THE SYSTEM.....</b>                      | <b>76</b> |
| <b>CODE SEGMENT 5.4: REQUESTING USER DETAILS FOR ACTIVATION .....</b>       | <b>77</b> |
| <b>CODE SEGMENT 5.5: LOCAL CASE OPENING .....</b>                           | <b>78</b> |
| <b>CODE SEGMENT 5.6: UPLOADING RECORDED COURT HEARINGS.....</b>             | <b>79</b> |
| <b>CODE SEGMENT 5.7: UPDATING HEARING DETAILS.....</b>                      | <b>80</b> |
| <b>CODE SEGMENT 5.8: DELETING LOCAL CRIMES .....</b>                        | <b>81</b> |
| <b>CODE SEGMENT 5.9: DATABASE CONFIGURATION FILE .....</b>                  | <b>82</b> |
| <b>CODE SEGMENT 5.10: OPENING THE DATABASE CONNECTION .....</b>             | <b>83</b> |
| <b>CODE SEGMENT 5.11: CLOSING THE DATABASE CONNECTION .....</b>             | <b>84</b> |
| <b>CODE SEGMENT 5.12: DIRECTING USERS TO THE CORRECT INTERFACE .....</b>    | <b>85</b> |
| <b>CODE SEGMENT 5.13: DENYING WEBPAGE ACCESS TO UNAUTHORIZED USERS.....</b> | <b>86</b> |
| <b>CODE SEGMENT 5.14: CHOOSING A UNIQUE USERNAME .....</b>                  | <b>87</b> |
| <b>CODE SEGMENT 5.15: CHOOSING A CORRECT PASSWORD .....</b>                 | <b>87</b> |

|                                                                |           |
|----------------------------------------------------------------|-----------|
| <b>CODE SEGMENT 5.16: SENDING AN AUTOMATIC EMAIL .....</b>     | <b>88</b> |
| <b>CODE SEGMENT 5.17: VIEWING LOCAL CRIMINAL RECORDS .....</b> | <b>90</b> |
| <b>CODE SEGMENT 5.18: POSTING LOCAL COMPLAINTS .....</b>       | <b>91</b> |
| <b>CODE SEGMENT 5.19: EDIT PERSONAL DETAILS .....</b>          | <b>93</b> |
| <b>CODE SEGMENT 5.20: CHANGING THE SYSTEM LANGUAGE.....</b>    | <b>94</b> |

## LIST OF ACRONYMS

|              |                                                          |
|--------------|----------------------------------------------------------|
| <b>CGI</b>   | Common Gateway Interface                                 |
| <b>CIS</b>   | Case Information System                                  |
| <b>CMS</b>   | Case Management System                                   |
| <b>CSS</b>   | Cascading Style Sheets                                   |
| <b>DHCP</b>  | Dynamic Host Configuration Protocol                      |
| <b>DHTML</b> | Dynamic Hyper Text Markup Language                       |
| <b>FOSS</b>  | Free and Open Source Software                            |
| <b>GSM</b>   | Global System for Mobile Communication                   |
| <b>HTML</b>  | Hyper Text Markup Language                               |
| <b>HTTP</b>  | Hyper Text Transfer Protocol                             |
| <b>ICT</b>   | Information and Communication Technology                 |
| <b>ICTD</b>  | Information and Communication Technology for Development |
| <b>IM</b>    | Instant Messaging                                        |
| <b>JS</b>    | Java Script                                              |
| <b>LAMP</b>  | Linux, Apache, MySQL, PHP                                |
| <b>LAN</b>   | Local Area Network                                       |
| <b>LTSP</b>  | Linux Terminal Server Project                            |
| <b>MMS</b>   | Multimedia Message Service                               |
| <b>PHP</b>   | Hypertext Preprocessor                                   |
| <b>SLL</b>   | Siyakhula Living Lab                                     |
| <b>SMME</b>  | Small to Medium and Micro Enterprise                     |

|              |                                                 |
|--------------|-------------------------------------------------|
| <b>SMS</b>   | Short Message Service                           |
| <b>SSI</b>   | Server Side Includes                            |
| <b>UNDP</b>  | United Nations Development Programme            |
| <b>URL</b>   | Uniform Resource Locator                        |
| <b>VoIP</b>  | Voice over Internet Protocol                    |
| <b>VSAT</b>  | Very Small Apache Terminal                      |
| <b>WiMAX</b> | Worldwide Interoperability for Microwave Access |
| <b>XHTML</b> | Extensible Hyper Text Markup Language           |

# **Chapter One**

## **Introduction and Background**

## **1.1 Introduction**

This chapter begins by discussing the research background for the design and development of an e-Judiciary service application for a disadvantaged marginalized community. It explains the problem domain behind this research and discusses its objectives in detail. Finally, the chapter concludes by providing an outline of the thesis chapters and its structure.

## **1.2 Research Background**

The benefits of Information and Communication Technology (ICT) are numerous and almost all segments of human activity benefit from it (Scott *et al.*, 2008). The development of information and communication technology research projects is changing the way people live and interact with each other. The Internet provides a platform for new and improved services and ways of communication which are of benefit to people at large (PeerPapers, 2009). Rural areas have a great potential to compete successfully worldwide, but unless they embrace the Information and Communication Technologies (ICTs) revolution by rapidly and actively using ICTs for knowledge dissemination, this potential will not be realized.

There are many obstacles hindering the spread of ICT in rural areas, the most important being lack of sufficient knowledge and lack of efficient technological infrastructure. Further obstacles are lack of training for managing ICT platforms, and the unavailability of appropriate ICT tools and applications. Thus there is a general lack of knowledge on the numerous benefits of ICT in everyday life, and in particular with regard to judiciary services, which forms the focus of this research. The implementation of e-Judiciary projects for marginalized communities is generally still not undertaken due to the lack of ICT resources and adequate skills and capacity.

An e-Judiciary is a national policy method and action plan for the embedding and implementation of ICT in judiciary services (Kalam, 2007). The possible benefits of an e-Judiciary service for the rural community include better delivery of justice, better knowledge of the judiciary, improved knowledge of the law, Government policies and ICT. The e-Judiciary portal, an output of this project will be delivered as a supplementary rural community resource that contributes to achieving such benefits. It will also contribute to the existing project by encouraging the utilization of the Internet connectivity already deployed in Dwesa.

The ICTs in South Africa are increasing daily, as there are many projects supporting the implementation of ICTs in marginalized communities for rural development (Akinsola *et al.*, 2005). The goal of these projects is to bridge the digital divide between those who have access to information and communication technologies (in urban areas) and those who have limited or no access to those facilities (in rural areas) due to social and economic reasons (Herselman, 2003). In this way, the members of the marginalized communities can have access to communication services and up-to-date information. The success of these projects is imperative, as they allow the community to participate in the global economy.

### **1.3 Research Problem**

An ICT infrastructure is already present at Dwesa, which is aimed at decreasing the digital divide and improving the knowledge of community members. The Dwesa community operates under customary law with the help of the Chief and Counsellors. In the community, justice is still administered using old procedures which involve using pens and papers to record and safe-keep important judicial information. The Chief's Counsellors are responsible for keeping the necessary records of every judicial operation. This leads to a high possibility of the loss of valuable legal data due to issues such as misplacing of the records.

In the judicial system, records and vital legal information are stored in hard copies and cabinets. The situation at Dwesa is that there are no facilities that may be compared to a magistrate's court. The community uses a local village court that is known as a traditional court. The judicial operations of this rural community are done under a tree or in a kraal (which is the traditional court) at the Chief's house. This situation makes it difficult to safe-keep judicial records for a long time due to the lack of proper legal environment. It also limits the community members from accessing judicial information pertaining to their community.

The main cause of these afore-mentioned problems is that the Dwesa community lacks a legal infrastructure that provides real-time solutions to their judicial operations. As a result, the relationship between the traditional leaders and the community members is not consistent. Thus there is an urgent need for an e-Judiciary service at Dwesa to provide a proper judicial infrastructure. This will lower the divide between the traditional judiciary and the urban judiciary. Therefore, through the help of the ICT infrastructure already existing at Dwesa, the traditional judiciary will have an opportunity of providing the society with the necessary judicial knowledge they require.

## **1.4 Objectives of the Research**

In the past, getting information about judicial matters was difficult because of security reasons, privacy, confidentiality, availability and loss of vital information (Kalam, 2007). The plan and objective of this research project is to design, develop, implement and field-test the prototype of a simple, cost-effective and robust, integrated e-Judiciary software system. Such a system will facilitate the dealings with all the Dwesa legal issues and make them available to the rural community for use.

The objective of the Dwesa e-Judiciary system is to computerize and record judicial information and keep track of the progress of traditional cases from the time the case is registered, till it is disposed of with judgement (Kalam, 2007). It is responsible for

grouping similar law points, traditional court rules, similar traditional cases and related traditional acts (Kalam, 2007). Furthermore, the e-Judiciary system ensures easy search, easy retrieval and grouping of judicial information, judicial record processing and the disposal of cases in a quicker and transparent manner (Kalam, 2007; PIB Press Release & Kalam, 2006; Singai, 2008). The e-Judiciary should uphold the rule of law through effective judicial behaviour and simple procedures that are cost effective, transparent and people oriented (Darshni, 2007 & Timalsena, 2006-2010). Such a system can be provided to the rural community to be accessible at any time as long as there is access to a networked computer (Timalsena, 2006-2010).

This work is planned to provide the necessary e-Judiciary service infrastructure and to concentrate on judicial information processes and procedures. It should occur from case filing to conclusion and finally making the information available and secure online. Implementation of the e- Judiciary service will open up information to the public and will secure information without risking the privacy of the people involved (Kalam, 2007). This research project will create an e-Judiciary system that will act as a local judicial information repository and recording portal. The system will therefore facilitate the operation of the local traditional court (PIB Press Release & Kalam, 2006).

Therefore, in itemizing our research focus we have looked at addressing the following objectives:

- ❖ **Objective 1: Design, develop, implement and field-test an e-Judiciary service for traditional justice administration in that area.**
- ❖ **Objective 2: Investigate the problems encountered by the Dwesa judiciary.**
- ❖ **Objective 3: Investigate how justice is administered in the Dwesa community.**
- ❖ **Objective 4: Produce a system responsible for recording, disseminating and keeping track of judicial information and gatherings.**

- ❖ **Objective 5: Produce a system that would address the digital divide in traditional justice judiciary systems.**
- ❖ **Objective 6: Make sure that the service is accessible and usable to the community.**

## **1.5 Research Context**

This research focuses on investigating and developing an adaptable, sustainable, and usable e-Judiciary service web application for traditional justice administration at Dwesa rural community. The description and location of Dwesa will be discussed in detail in chapter two. The developed application system is meant for use by the community and their traditional leaders to ease their legal and judicial problems and disseminate information about justice in a quicker manner than before. The e-Judiciary service application forms part of the Siyakhula Living Lab (SLL), an existing Information and Communication Technology for Development (ICTD) research project (discussed in chapter two) that is undertaken in Dwesa. SLL is conducted by the University of Fort Hare in a joint venture with Rhodes University.

Some of the key features of this system are for the community members to be able to use the system on their own and for the traditional leaders to be able to perform administrative duties in the system. This requires giving them an adequate training on how to use the system under discussion and gaining their full participation. Such a system, linking the new technology to something known and practiced already, will slowly develop a sense of ownership for the whole ICT installation within the SLL.

The Dwesa community members have been equipped with computer skills by the student researchers from the above-mentioned two universities. This is done through a computer literacy training programme that is undertaken from February to November annually. The purpose of these training sessions is to equip all the community members with computer knowledge such that they can be able to use the developed e-Services (e.g. e-Commerce,

e-Government, and e-Health) to improve their standard of living. This in turn forms part of eliminating the digital divide. Therefore, using the skills acquired from the computer literacy training and on how to use the e-Judiciary service, the community members will have less difficulty in using and sustaining the system.

## **1.6 Outline of the Thesis Structure**

This section highlights the content of the remaining chapters of this thesis.

### **❖ Chapter Two: Literature Review**

This chapter introduces and discusses the research location and the research work that has already been done in the location. The role of ICT in the judiciary system and ways of eliminating the digital divide will also be explained. Traditional justice administration and literature relevant to the development and implementation of an e-Judiciary service are also discussed.

### **❖ Chapter Three: Methodology, Technologies and System Requirements**

This chapter discusses the methodology used in the implementation of the e-Judiciary service research project. It gives details about the system requirements and technologies used in the design and development of the system.

### **❖ Chapter Four: System Design and Development**

Chapter four explains the design and development of the system, which means that the back-end and front-end designs will be discussed. The structure of the database used will also be highlighted. This chapter also shows some of the webpages of the e-Judiciary system that were designed using LAMP (Linux, Apache, MySQL and PHP).

❖ **Chapter Five: System Implementation**

This chapter will explain the implementation of the e-Judiciary service system, connecting the basic functionality of the system to the relevant codes. It will also discuss the templates used in the service and the administration system. The user connection to MySQL database server and the security measures adopted in the system will also be discussed.

❖ **Chapter Six: Results and Evaluation**

This chapter will give an evaluation of this research project and a discussion of the testing of the system based on the usability approach. The chapter will furthermore discuss the results obtained during the training of the users and the testing of the system. This chapter will conclude by giving a discussion of the system based on the results obtained.

❖ **Chapter Seven: Conclusion and Future Work**

This is the final chapter of this thesis and provides a conclusion to the project. The chapter will start by giving a summary of the thesis and an outline of the research objectives. An explanation of the challenges that were encountered during the course of this research project will be highlighted. Future work that can be done to improve the current application will be discussed.

## **1.7 Conclusion**

This chapter has introduced the project background and the problem behind this research on judiciary systems. The objectives and reason for deciding to undertake this research project were also explained. The context of the project has also been discussed. Chapter one concluded by giving an outline of the structure of the rest of the thesis.

# **Chapter Two**

## **Literature Review**

## **2.1 Introduction**

This chapter introduces the research location, Dwesa, which is the marginalized rural community where this research project was conducted and applied. In addition to that, it also gives a brief overview of the work that has already been done or is currently being done at Dwesa. A brief explanation on the role of ICT for development in rural marginalized areas and the strategies that can be used to eliminate and overcome the digital divide will also be discussed. This chapter will also explain traditional justice administration and how it differs from urban government justice administration. The role of ICT in judiciary systems will also be discussed, together with the difference between the normal paper judiciary system and the electronic judiciary system. Furthermore, the challenges associated with the e-Judiciary system at Dwesa and the significant role that it can play in the legal administration development of that area will also be briefly highlighted. Finally, there is some discussion of the relevant case studies that were useful in the development and implementation of the e-Judiciary system for Dwesa.

## **2.2 The Research Location: Dwesa**

The location of the e-Judiciary service research project was the Dwesa marginalized rural area, more specifically three villages surrounding the Dwesa nature reserve. This is the place where the e-Judiciary software platform is deployed for utilization by the community and their traditional justice administrators. The e-Judiciary research project is delivered as a supplementary rural community service that forms part of the existing platform through the utilization of the Internet connection already deployed at Dwesa.

The Dwesa rural community is located on the Wild Coast of the former homeland of Transkei, in the Eastern Cape Province of South Africa. The Wild Coast refers to the coastline of the former Transkei and lies between the Mtamvuna River in the north and the Great Kei River in the south (TRALSO, 2007). The Dwesa community is under the Mbashe Municipality which belongs to the Amatole region based in East London.

Willowvale is the nearest town, 50km from Dwesa (Timmermans, 2004). The inhabitants at Dwesa are typically subsistence farmers who depend on the land for their livelihood (Palmer *et al.*, 2002).

The Dwesa region features a coastal nature reserve, an attraction particularly to South African tourists, who however visit almost exclusively during school holidays (Dalvit, 2007). So the nature reserve is a catalyst for tourism, although government social welfare grants seem to be the main source of income for the local community (Dalvit, 2007). The area lacks basic infrastructure such as electricity in homes (it was introduced in schools and clinics at the beginning of 2006), telecommunication facilities, running water and tarred roads (TRALSO, 2007).

### **2.3 The Siyakhula Living Lab**

In South Africa, the unemployment rate is extremely high and is the most significant socio-political problem for the local government (SouthAfrica.info, 2009). An exceptionally large number of unemployed people come from marginalized communities (Statssa, 2009). The government, along with various researchers, has made an effort to motivate members of marginalized communities to be self-dependent. This means that they should find ways of self-employment, and using ICTs might help. In Dwesa, ICT has already been deployed and there are approximately four years of operation at the research location. A number of other services have already been deployed and some are partly running. The Dwesa ICT infrastructure is operating with positive participation from the local community members and researchers from the University of Fort Hare and Rhodes University (Dalvit *et al.*, 2007).

The research environment for the whole Dwesa research project is mainly in a form of a living lab, which is not a Computer Laboratory. This living lab is called the Siyakhula Living Lab and is regarded as the formal conceptualization of the entire Dwesa research project. The main idea behind the Siyakhula Living Lab is to facilitate activities in rural ICT applications and services in a multi-channel environment and deep rural context, and

to promote a user driven and open-innovation based approach to advancing rural innovation (COFISA & DST, 2008).

### **2.3.1 The Deployed ICT Platform at Dwesa**

The existing ICT platform so far is deployed in four schools, Mpume, Ngwane, Mtokwane and Nondobo (Dalvit *et al.*, 2007). Mpume was the first school to be identified by the project researchers due to its location and the availability of electricity, and it was selected as the location for the installation of the VSAT (Very Small Apache Terminal) connection, which has a satellite dish, indoor unit and cabling (Dalvit *et al.*, 2007). In addition to that, there is a WiMAX (Worldwide Interoperability for Microwave Access) station and other equipment that includes: a server running (LTSP, HTTP, and MySQL), 6 personal computers, an 8 port DLink switch and a VoIP (Voice over Internet Protocol) phone (Dalvit *et al.*, 2007).

The second school to be identified was Ngwane, which is downline from Mpume. This school was identified as one of the points of the WiMAX installation. The additional equipment deployed there includes: a WiMAX (Alvarion Breezemax Microbase station, antenna and wall mounting), a switch rack (wall mounted), a 24 port switch, 20 personal computers, a server (Asterisk, DHCP(Dynamic Host Configuration Protocol)) and a VoIP (Voice Over Internet Protocol) phone (Dalvit *et al.*, 2007). Mtokwane and Nondobo are also downline from Mpume, which provides them with VoIP and Internet. The equipment deployed in each of these schools includes: WiMAX (Alvarion Breezemax CPE outdoor unit and CPE indoor unit), a client PC and a VoIP phone (Dalvit *et al.*, 2007).

The following diagram illustrates the infrastructure of the ICT platform already deployed at Dwesa. The diagram also shows the IP addressing scheme of the infrastructure and links between the servers, VoIP phones and the personal computers.

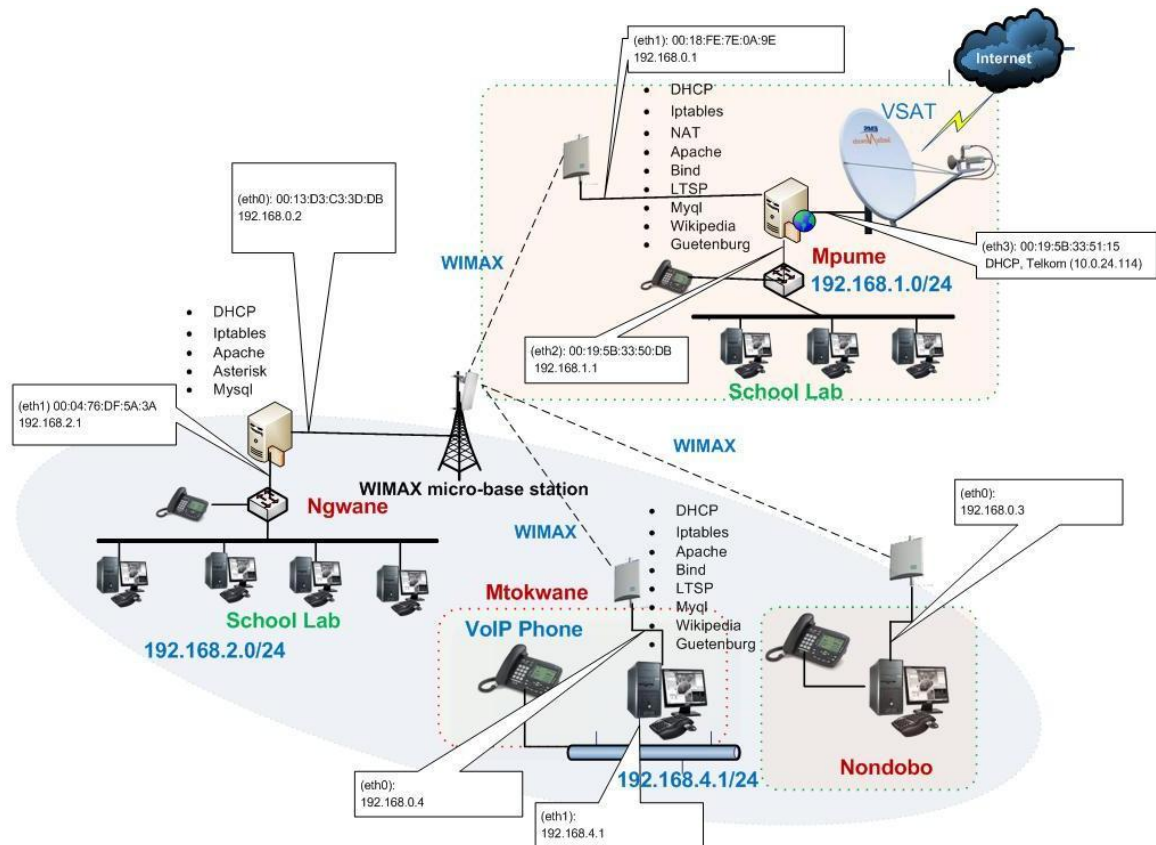


Figure 2.1: Dwesa ICT Infrastructure, Adopted From (Dalvit *et al.*, 2007)

### 2.3.2 Applications for Dwesa

#### ❖ An e-Commerce Platform

This platform aims at making a contribution to rural development and poverty improvement. The platform allows the members of the community (SMMEs women crafters) to advertise their arts and crafts on the global market and be able to monitor their stores online (Njeje, 2007).

#### ❖ An e-Government Platform

This platform provides a service that allows users to access government services online. For example, it allows users to get access to the services of the Department of Home Affairs, since the nearest office is distant from Dwesa (Jakachira *et al.*, 2008).

#### ❖ **Internet Access Cost Management System**

This system enables the exploration of suitable pricing models to generate revenue to make the Dwesa Internet infrastructure economically sustainable. Implementation of the Internet Access Cost Management System at Dwesa is a vital goal that allows experimentation on ways of charging for the use of resources on the network. This system was developed using Free and Open Source Software (FOSS) (Tarwireyi *et al.*, 2007).

#### ❖ **Sustainable Mobile Communication**

The purpose of this service was to implement a user-based rural mobile service that is necessary to fulfill the community's information needs. It is an extension of the already deployed system and aims at interfacing the Global System for Mobile Communication (GSM) component to the active systems at Dwesa. (Mpofu & Muyingi, 2008).

#### ❖ **A Help-Desk System**

The aim behind this system was to implement an intelligent help desk support system for a geographically distributed multi-purpose ICT centre in Dwesa. The system provides essential, effective and continuous end-user support to the Dwesa community. It serves as a knowledge management system that is used for retrieving and redistribution of Dwesa ICT information (Makombe *et al.*, 2008).

### **2.3.3 Applications Currently Under Development**

#### ❖ **Development of an e-Health Component**

The aim of this research project is to make use of ICTs deployed in Dwesa to contribute to improving the health standards of the community. This will be accomplished by implementing a robust e-Health component that will assist them to take care of their health by providing the necessary health information or support they require (Hlungulu & Thinyane, 2009).

#### ❖ **User-Driven Telephony Services**

The objective of this research project is to develop a platform for user-driven audio services. This involves developing the individual audio service building blocks, and providing the tools for users to assemble more complex services from these blocks. In this platform users are expected to develop services using both fixed and mobile devices via audio or visual interaction. Such information and services will later be accessed telephonically (Kunjuzwa *et al.*, 2009).

#### ❖ **Service for Personal Communication, Synchronous and Asynchronous**

The aim of this research project is to design, develop, implement, test and deploy a localized system that will operate as a one-stop shop where different web services will be consumed from a single interface. The system will offer services for personal communication, synchronous and asynchronous such as Short Message Services (SMSs), Multimedia Message Services (MMS), Instant Messaging (IM), Emails and Voice over Internet Protocol (VoIP). These services will be developed and deployed as web services and will be used over the Dwesa network (Samalenge & Thinyane, 2009).

## **2.4 SLL Guiding Motivation**

Knowledge and education are some of the basic resources to promote economic and social development both in developed and under-developed countries, and also in urban and rural areas. The benefits of ICTs are continuous and generally all segments of human activity benefit from them. At present, these benefits remain largely of advantage to the urban areas. ICTs might be a significant enabler of rural development and the enhancement of human knowledge in rural communities. ICT for development in rural communities is a crucial issue that is generally regarded as a multi-dimensional concept referring to:

- ❖ Poverty alleviation in rural areas (Muyingi, 2008 & COFISA, 2008);

- ❖ Development of local economies in rural areas (Muyingi, 2008 & COFISA, 2008);
- ❖ Achievement of basic standards of health, safety and other developmental infrastructure and services in rural areas (COFISA, 2008);
- ❖ Encouragement and empowerment of rural people to invest in themselves and their communities (Muyingi, 2008 & COFISA, 2008);
- ❖ Cultural regeneration, including the development and integration of indigenous knowledge systems into a rural community's 'ways of doing and learning' (COFISA, 2008);
- ❖ Long-term sustainability of livelihoods and improvement in quality of life (COFISA, 2008).

ICTs are essential in advancing knowledge in all sectors of the world, especially in the under-developed sectors. In the hope that rural communities may take advantage of the various benefits of ICTs, information and knowledge will provide them with the ability to make informed choices, and knowing what works best in their communities (Muyingi, 2008). Therefore, the significance of information and knowledge should be recognized, so as to integrate them into development policies and initiatives (Pade, 2006).

Rural development activities are associated with social, political and macroeconomic activities such as education, health, agriculture, markets and strengthening civil society (Pade, 2006). Although these activities are there for rural communities to use and create change for themselves, in actual fact they don't create change for a better life and neither do they advance rural development. Embedding ICTs in these rural development activities can result in a better change in life for rural communities and their rural activities. On the other hand, rural communities should know that ICTs do not create change, but they enable change as a tool in rural development (COFISA, 2008). In addition to that, proponents agree that ICT is not the cure for all problems, but they also believe that the key to participation in the radically changing global economy lies in possessing the right skills to access the right tools.

## **2.5 Overcoming the Digital Divide**

The term “digital divide” refers to the gap between people with effective access to digital and information technology and those with very limited or no access at all, and, it includes the imbalances in physical access to technology as well as imbalances in resources and skills needed to effectively participate as a digital citizen (Wikipedia – Digital Divide, 2008). However, this definition is not comprehensive. According to Smyth (2005), the concept of the digital divide has been around as long as ICT has been publicly available and location, age, culture and background also play a significant role in digital divide.

Many anti-poverty experts believe that closing the digital divide is not a top priority, arguing instead that the poor people need clean water and jobs before they need computers (Sarrigonie, 2009). They do not realize that access to information and digital technology greatly enhances the effectiveness and affordability of efforts to improve the water supply, rural health and education, generate jobs and addresses other related problems of poverty (Sarrigonie, 2009). These issues pose a serious challenge of overcoming or eliminating the digital divide. This is simply because by overcoming the digital divide a large number of people, especially from the under-developed communities, will be able to experience the exciting activities brought forward by digital and information technology.

Closing the digital divide is not a silver bullet for reducing poverty, but there is a much greater likelihood of large-scale and sustainable poverty reduction if it is achieved (Sarrigonie, 2009). To bridge this digital divide and to participate fully in the knowledge economy, developing countries should create an enabling environment through introducing appropriate policies, capacity-building and infrastructure (Economic and Social Commission for Asia and the Pacific, 2003). The Dwesa e-Judiciary service research project forms part of overcoming the digital divide for the legal needs of the Dwesa rural community. Reducing the digital divide requires vision, leadership,

commitment and competency from all the people involved in the struggle of eliminating the digital divide.

There are certain areas where the digital divide is most severe, and one such area is in the administration of justice, especially justice using traditional procedures. In traditional justice administration, not only the digital divide is a problem, but everything that involves the administration of justice is far behind the operations of urban justice administration.

## **2.6 Traditional Justice Administration**

Traditional justice administration is a process that is predominately carried out by the traditional court or Chief's court. The fundamental nature of the traditional justice administration system lies in the participation of rural communities in resolving their disputes, and this is different from the formal judicial system where disputes are referred to the magistrates' courts and supreme courts to be adjudicated upon by judicial officers who pass judgements (South African Government Information, 2007).

### **2.6.1 Role of the Traditional Court**

Traditional courts are generally found in rural areas and are different from the urban magistrate's courts that are normally found in towns and urban areas. These courts administer justice largely on the basis of customary law. The importance of the traditional court system derives from the fact that it is closest to the rural communities and uses the language of the concerned community and methods and procedures that the community understands better than those applied by the normal courts (South African Government Information, 2007). The traditional court deals with all disputes that are brought to it as long as they are not "serious" cases (A Limpopo Case Study, n.d.). Some of the cases that this court resolves include livestock rustling and impregnation of young unmarried women (teenage pregnancy). The court also deals with dissolution of customary

marriages, with the condition that the maintenance of children is referred to the magistrate's court for resolution (A Limpopo Case Study, n.d.).

Examples of serious cases that this court does not deal with are cases like rape, murder and assault with intent to do grievous bodily harm (A Limpopo Case Study, n.d.). The main difference between the traditional court system and the formal court system is that the traditional courts do not adhere to any prescribed or written set of rules, but are guided by the culture and tradition of the community or tribe they operate in, and, this technique dispenses justice easily and quickly (South African Government Information, 2007). Researchers and political organizations have argued that the traditional court approach to justice is restorative (meaning that the traditional court has an ability to restore health, strength, or a feeling of well being) (Tshehla, 2007). The role of traditional courts is not to establish who is wrong and then punish him/her, but instead to find the root causes of the dispute with the objective of restoring relationships that may have suffered as a result of the dispute (Tshehla, 2007). According to Tshehla (2007) the Department of Justice and Constitutional Development has also shown an increased interest in developing the traditional courts.

## **2.6.2 Procedure of the Traditional Court**

The procedure of the traditional court is different from the magistrate's court. In magistrate courts everything is written down and processes usually take a long time to finish due to the number of stages to be considered. In a traditional court the proceedings are not written down but depend on the extent to which the particular members of the court at the given time are familiar with the appropriate procedure (A Limpopo Case Study, n.d.). According to "A Limpopo Case Study" (n.d.), the approach and procedure of the traditional court is mainly inquisitorial and informal in nature, but legislation requires that the traditional court should record in detail the names of the parties, particulars of claim, particulars of the defence, judgement and the date of the judgement.

### **2.6.3 Role of the Traditional Leaders**

Traditional leaders are responsible for the administration of justice in rural areas. The traditional leaders are sometimes called Chiefs or Headmen, depending on the convention used in the rural community. These leaders appeal to the culture (of the concerned rural community) to administer justice. In the olden days and till now traditional leadership was hereditary, for example, if there is a particular father who is a chief and this father had a son, automatically after the death of the father the son would be a chief and lead his father's community. This meant that for a person to be a chief or a headman, he had to inherit chieftaincy from his father.

Among the Bantu-speaking people of South Africa and most other rural African countries, traditional leadership is generally a patriarchal system which limits chieftaincy to male members of a particular family (Hugh, 2004). One responsibility of a traditional leader is to settle disputes in the traditional community (A Limpopo Case Study, n.d.). For many African countries, the role of the traditional leaders hardly changed after colonialism ended and they continued to serve the same functions: local administration; serving as a link between people and the government; chairing tribal courts; and playing a symbolic or religious role (Palmary, 2004). Conversations with traditional leaders (in both the national and provincial houses) reveal that traditional leaders are willing and waiting for the state to engage with them (Tshehla, 2007).

### **2.6.4 Traditional Leadership and the Judiciary**

In any society and any country, the traditional leaders act as judicial officers over matters dealing with and pertaining to customary law and traditional justice administration (Hugh, 2004). According to Hugh (2004) the Black Administration Act gave traditional leaders the power to constitute a traditional court of a chief or headman. Traditional courts and traditional leaders play a vital role in the restorative justice of South Africa, but they need to be strengthened and empowered in order to take their rightful place as contributors (Hlapho, 2005). It is worth noting that not everything can be provided or

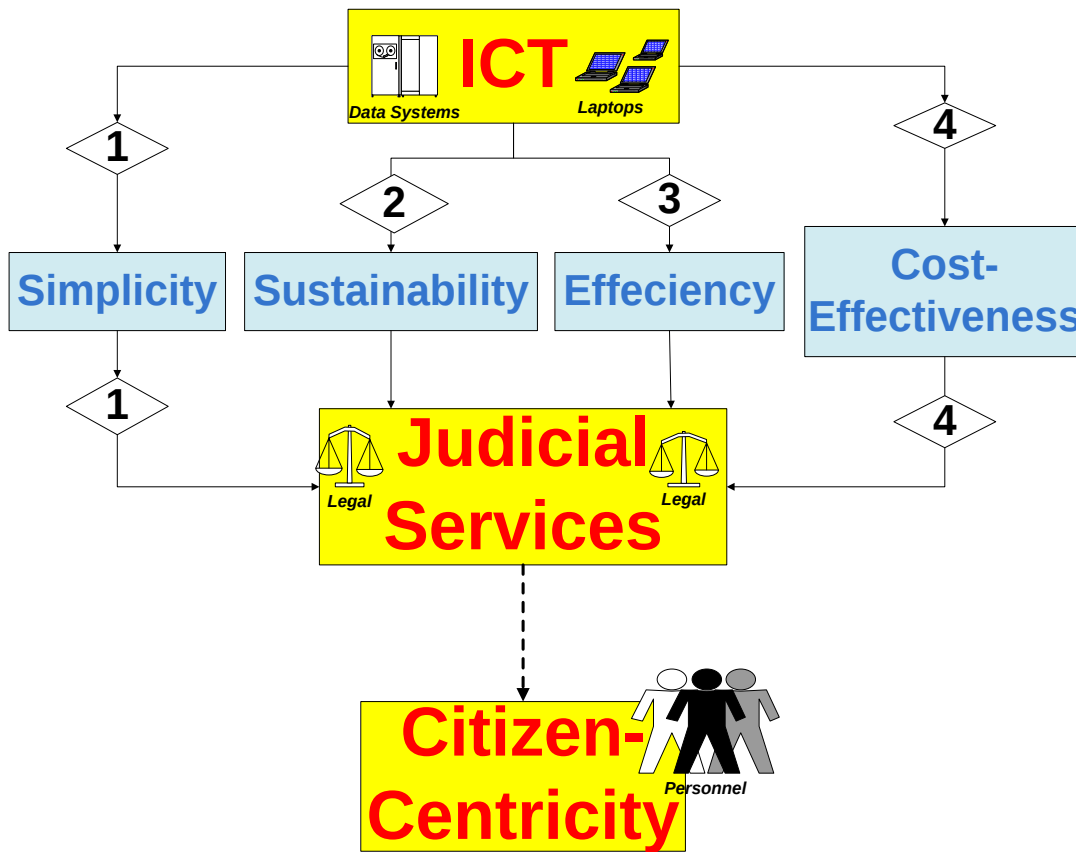
undertaken by the traditional judiciary. Some of the matters that can be undertaken by the traditional judiciary depends on levels of traditional courts and their operation, gender in the composition of traditional courts, sentencing options of traditional courts, procedure and language of the traditional courts, legal representation in traditional courts, and the administration of the traditional court system (Hlapho, 2005).

### **2.6.5 Challenges Faced by Traditional Justice Systems**

Generally rural communities have similar challenges, with variations depending on the particular area of concern. Regardless of the popularity of the traditional systems, these systems have been almost neglected in the developed communities, even at a time when the justice sector has become a rapidly expanding area of assistance (Chirayath *et al.*, 2005). According to Chirayath *et al.* (2005), development organizations tend to ignore traditional systems and to view them in a quite negative manner. Traditional justice systems present a number of key weaknesses which include the lack of safeguards against violations of human rights, inconsistency and lack of certainty of decision making, vulnerability to partiality and corruption of local decision makers, lack of intellectual strictness in investigations, limited enforceability of decisions and the limited ways of punishing offenders (Graydon, 2005). Another challenge faced by traditional justice systems is the lack of proper facilities. As an example, a proper building that will serve as a rural local court for the communities to hold meetings even if it is raining. Proper training on how to keep judicial records is another requirement. An additional challenge that is questionable is whether to include women as part of traditional leaders in traditional courts and in the administration of justice so as to boost the image of the traditional court (A Limpopo Case Study, n.d.).

## **2.7 ICT and the Judiciary System**

There is a big gap between ICT and legal services and this gap is caused by a lack of knowledge about the use information technology by legal authorities and judicial systems. This is a common scenario in almost all parts of the world, especially the under-developed countries, taking into account the rural marginalized areas. The use of ICTs has increased efficiency in the public service and the private sector, although the speed of change is not encouraging (Philemon, 2007). Developing ICT in the judicial system can result in a more efficient system and a better working environment for service providers and the public in general (Philemon, 2007). According to Philemon (2007), these new technologies offer opportunities for judicial systems to deliver justice in a way that is more accessible, transparent and effective. According to Malik (2002), the objectives of the ICT Model are to provide integrated support to judicial and administrative functions, to create an interconnection of internal and external judicial institutions (like rural courts and urban courts), and to develop a medium for monitoring and control of legal services so as to improve efficiency and rationalize resources. The figure below shows the links between ICT and judicial services. It illustrates how a relationship can be formulated between the two and how ICT can simplify the judicial services.



**Figure 2.2: View of ICT in Judicial Services**

In Figure 2.2, number 1 illustrates that the embedding of ICT in judiciary systems can provide simplicity of judicial services and operations. As an example, the citizens are not obliged to attend all judiciary gatherings, they can simply logon to the service and carry out all the judicial operations they feel like performing. They can perform functions such as reporting of suspected crimes and viewing of upcoming court hearings. This means that with ICT, complex judicial operations can be simplified. Number 2 shows that the use of ICT in the judicial services can increase the sustainability of judicial services and operations. For example, the traditional judiciary will be able to maintain the services they provide to the community in a consistent manner without the loss of valuable legal data. Furthermore, number 3 shows that ICT can improve the efficiency of judicial services and operations. Meaning that, with the adaptation of ICT, competence and good

organization between the service providers and the community will be established. Number 4 illustrates that with ICT embedded in judicial services, cost-effectiveness of services is guaranteed through the use of technologies like free and open source software. As an example, the costs of delivering services will be minimal as all judicial proceedings will be made available to the community online. This means that there is no need of publishing proceedings on newspapers which would lead to costs, as the citizens have to travel using money in order to buy papers which may be expensive, as most of them are unemployed. Finally, the dashed line shows how embedding ICT in judicial systems can generate an improved and manageable judicial service that provides a user-friendly connection between citizens and judicial services.

## **2.8 The e-Judiciary System**

In the legal system, the judiciary is a system of courts (local courts or national courts) which administers justice in the name of the sovereign, state or country (Wikipedia – Judiciary, 2007 & Judiciary, 2009). The term judiciary is also used to refer collectively to judges, magistrates and other adjudicators (like traditional leaders) who form the core of the judiciary, as well as the support workforce that keeps the legal system running smoothly (Wikipedia – Judiciary, 2007 & Judiciary, 2009). All process and operations of the judicial system use paper to record and store legal judicial data.

An e-Judiciary system is an electronic representation of the usual judicial system. It supports all operations of the judicial system by utilizing technology, i.e. it uses computing technology to support the recording and storing of legal judicial data. The legal and judicial services are running behind in terms of technological developments and scientific advancements, so the e-Judiciary system serves as a way of setting them into the current technological trends and helps to embed ICT in legal services. The most important function of the e-Judiciary system is to digitize judicial information and keep it safe in order to exchange proceedings between different investigating authorities and make legal information accessible online to the public (Tere, 2008). An e-Judiciary

system is a national policy and action plan for the embedding and implementation of ICT in the judiciary (Kalam, 2007).

### **2.8.1 The Adoption of an e-Judiciary System at Dwesa**

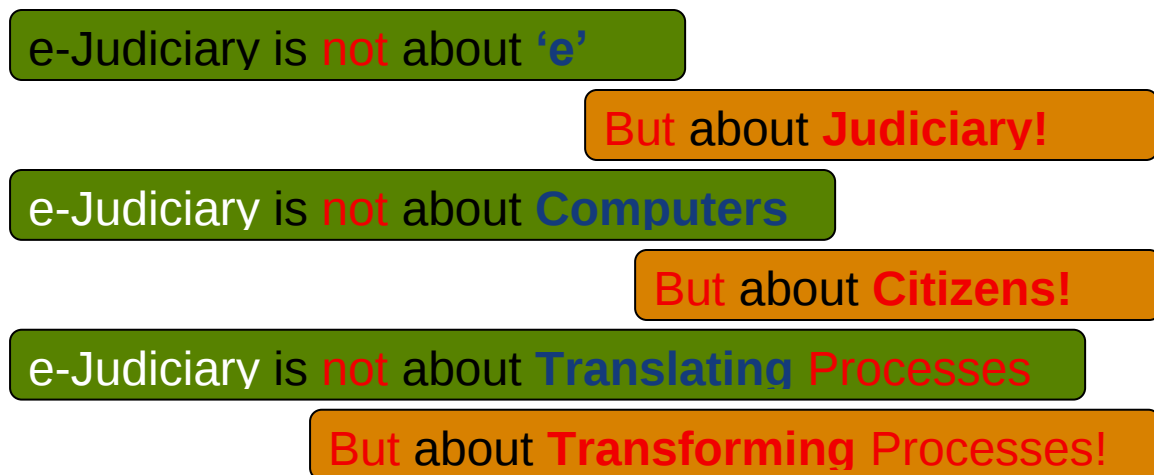
Governments and people around the world have started appreciating the capacity and benefits of ICT to stimulate rapid development in all sectors of human activity (Ajayi, 2003). The adoption of the e-Judiciary system at Dwesa will help facilitate the processes involved in all the community's legal issues and make legal resources available to the community. The e-Judiciary service will provide a legal technological representation that will assist and smooth the processes of the Dwesa traditional court system. The e-Judiciary service provides an environment for the efficient storage and retrieval of judicial documents and all information pertaining to cases is securely stored for citizens to retrieve when needed (NeGSt Global-Digitronics, 2006). The adoption of the e-Judiciary system at Dwesa is essential for the safe-keeping of valuable information because once the information is captured and stored, its persistence and availability is more effectively guaranteed.

Until now judicial systems in most developing countries have been working manually for the filing and monitoring of cases, and this leaves the possibility for corruption at various stages of the legal system (Abidi, 2006). The adoption of an e-Judiciary system at Dwesa (and other rural areas) is essential for improving the working practice and interaction of the different traditional role players involved: traditional courts, police, traditional leaders, rural community members and political parties, while easing the sharing of legal data and judicial information among them. The e-Judiciary system at Dwesa is an important component of a legal system for securing equal justice for all sections of the rural society because the system includes fairness, neutrality and timely delivery of justice (Singai, 2008). Taking up the e-Judiciary service at Dwesa will serve as a method of advocating a systematic analysis of the judiciary (Press Release & Kalam, 2006). This means that the Dwesa e-Judiciary service will break down the judiciary processes into understandable operations. In essence, the e-Judiciary system of Dwesa will act as a local

information repository and judicial information recording centre and it will facilitate the operations of the local court (Press Release & Kalam, 2006).

### 2.8.2 The View of the e-Judiciary

The figure below shows how the e-Judiciary may be seen in a real-life perspective rather than in an electronically and technological perception. It shows that the e-Judiciary service is more about transforming citizen processes to access and exchange legal information within the judiciary system, rather than computers and information technology (Timalsena, 2006-2010).



**Figure 2.3: The View of the e-Judiciary, Adopted From (Timalsena, 2006-2010)**

## 2.9 Related Case Studies

The following is a list of judicial case studies that were useful in the development and implementation of the Dwesa judicial service. Each of these case studies is explained in detail below.

### 2.9.1 The Judicial Service of Bhutan

The following case study was undertaken for the judicial service of Bhutan (Dubgyur, n. d.).

In the past, the judicial service of Bhutan realized that access to judicial proceedings and information takes a long time to reach and be available to people. This has been caused by a number of professional structural procedures that have to be followed during court gatherings and a lack of time management and record keeping. In that sense the judiciary of Bhutan initiated procedural restructuring intended at making things easier for court events by introducing a hearing calendar and time management of the court hearings. This restructuring reduced the time taken in the disposition of cases and increased the effectiveness of the Royal courts. This led to a simplification of the legal requirements of the filing of requests and complaints through the assistance of the courts.

The main objectives of the Bhutan judiciary were to enhance unobstructed access to justice, dispense quality and speedy justice through accountability, transparency and fairness. The Bhutan judiciary strives towards the fulfillment of the following (Bhutan Judiciary):

- ❖ “Producing a trustworthy, reasonable and well-organized justice system”;
- ❖ “To administer justice impartially and fairly irrespective of the language, religion, race or social class”;
- ❖ “Enhance judicial independence and administer justice independently in accordance with the law”;
- ❖ “Improve accessibility to justice by making courts user friendly”;
- ❖ “Uphold and protect due process of law, fair trial, rule of law and review system”;
- ❖ “Build public confidence and respect through continuing professionalism”;
- ❖ “Harness ICT through the use of web-based judicial management systems for courts’ efficiency, accessibility to justice, improve better quality justice, judicial transparency through the sharing of case information and cost effectiveness”;

- ❖ “Improve infrastructures and capacity building to enhance reverence for justice and strengthen structural and institutional independence”;
- ❖ “Make judicial process responsive, effective, faster, better, and easier; and
- ❖ Impart legal education to the general public”.

Among these objectives, the Royal Court of Justice of Bhutan with support from the UNDP (United Nations Development Programme) incorporated the establishment of a LAN (Local Area Network) in the courts, a website for the judiciary, e-mail and Internet access in district courts, enhanced data collection and reporting of case flow, and fully automated the judiciary’s procedures using web-based open standard technologies and Internet architecture (Dubgyur, n. d.).

Due to slow progression of cases, the inauguration of ICT in the Bhutan judiciary resulted in an e-Solution to case management system. This is an electronic system that is used for managing cases online through the use of two applications called Case Information System (CIS) and Case Management System (CMS). The inception of the e-Solution case management system in the judicial service of Bhutan has resulted in an efficient judiciary and quality access to justice. It has also resulted in a functional and applicable judicial system. The website of the judicial service of Bhutan can be accessed at [www.judiciary.gov.bt](http://www.judiciary.gov.bt) and it achieves the objectives of the judicial efficiency, access to justice and quality justice.

## **2.9.2 The Judicial Service of Ghana**

The Republic of Ghana is a country where, despite economic growth, ICTs are largely unavailable to rural communities (Quarcoo, 2009). Although there are many ICTs that are lacking, Ghana is one of the few countries that have an electronic judicial system. This project developed with the judicial service of the government seeking to consolidate good governance in Ghana by promoting a human rights based approach and strengthening the capacity of the Judicial Service. This is done by training staff of the Judicial Service and

proving logistics to support the modernization of facilities at the courts. The project was implemented to help improve its processes and public engagement, to enhance popular awareness of rights and judicial processes, and access to justice especially by women and disadvantaged groups (CHRAJ, 2005). The development of the Ghana judicial service is part of the UNDP to provide support for a high-quality judiciary in Ghana (CHRAJ, 2005).

The reason behind the development of the Ghana judicial service is that there were many problems that threatened its effectiveness. This included poor coordination among the different actors in the sector, long delays and postponements in the hearing of cases, lack of legal aid to help the poor to access justice, overcrowded prisons, and critical allegations of corruption among the police, as well as court staff, including judges and magistrates (AfriMap, 2007). The project of the Ghana judicial service was designed with the intention of monitoring the performance of the judicial branch of the Ghanaian government, and to analyse the key problems of corruption that have a tendency to obstruct the effective and efficient performance of the judiciary (Tema, 2007).

In an approach to solve the judicial problems faced by the judicial service of Ghana a judicial distributed web service was created. The main objective of the web service is to provide a single access point to all information relating to the judicial service of Ghana and this website can be accessed at <http://www.judicial.gov.gh/>.

### **2.9.3 The Judicial Service of Kenya**

The Republic of Kenya is one of the countries affected by scarcity of services. Due to the lack of ICT services in most government sectors of Kenya, its judicial sector has been slow in adopting information technology and this is affecting the quality of justice delivery (Wanjiku, 2008). In the Kenyan government, the judiciary is considered to be one of the worst offenders as far as the law is concerned and this led to a congregation of problems for the Kenyan government (Robitaille, 2006-10). Most of these problems were reportedly caused by some judges who were ruling in favour of the highest bidder,

misinformed litigants missing their court appearances, and lack of court reporting that led to conflicting decisions and lack of precedence (Robitaille, 2006-10). It was evident in the Kenyan government that corruption and dishonesty was undermining the judiciary and the law extremely seriously, and integrity and justice were no longer predictable (Robitaille, 2006-10). The judiciary of Kenya had reached a level where corruption was crippling it and it no longer had the moral standing to deliver justice, honesty and fairness, and civic assurance in the freedom and objectivity of the judiciary had virtually collapsed.

In the past the judiciary has always been criticized for its failure to implement technology, especially for filing cases and maintaining updates (Wanjiku, 2008). There were a number of steps that were taken to solve these problems, including the embedding of ICT in the Kenyan judicial services. Steps taken include the development of a database system for keeping legal precedents which can be accessed at [www.kenyalaw.org](http://www.kenyalaw.org) and the development of an online judicial service which can be accessed at [www.judiciary.go.ke](http://www.judiciary.go.ke). According to Wanjiku (2008), Kenya is the only African country with a database of all legal precedents and due to these developmental steps of improving the law and justice, Kenyans are hoping for first-class services with the help of information and communication technology, as well as improved efficiency in the judiciary. Developments of the two systems with the help of information technology was necessary to make the judiciary quick to respond to transformation, be user oriented, be effective and efficient in its delivery of services to all beneficiaries of the courts services (Kwach, 2003). In addition, these efforts will help the development, implementation, monitoring and strengthening of policies and strategies in the fight against corruption (World Bank / EC Core Course on Governance, 2004).

#### **2.9.4 The Judicial Service of Uganda**

The Republic of Uganda is located in East Africa and is one of many African counties that have various rural marginalized areas. It has a population of approximately 22 million people, of which about 85% live in rural areas (Kartono *et al.*, 2004). This clearly

indicates that Uganda is mostly composed of rural communities. Just like other countries who are struggling to improve their legal services, Uganda was also facing a problem of quicker and transparent justice dissemination. The mission and vision of the Republic of Uganda was to build up and administer an efficient and effective judicial system that will be made accessible to all the people of Uganda, a system that is considerate of their traditions and attentive of their aspirations, and serving the people without favouritism or discrimination (AfDevInfo, 2007). This was an attempt to improve access to justice for all the inhabitants of Uganda.

There were a number of key issues that needed attention before the judicial system could be effectively developed. Some of these issues included improving the structures and procedures of the judicial system, the effectiveness and transparency of case administration, enhancing the effectiveness of judicial officers, maintaining and improving the infrastructure and equipment of the courts, and improving access to justice through reform of the composition as well as supporting the reform of legislation and administration of justice (AfDevInfo, 2007). Due to these circumstances public access to justice, judicial authorities, and judicial information and government officials was difficult and impossible in some cases (Obot *et al.*, 2004). The important solution to these problems was the introduction of information technology to the judicial services of Uganda.

Due to the incorporation of ICTs in the legal services of Uganda there is now a tremendous increase in access to justice, the executive, the judiciary and parliamentarians, and important structures in government judicial services (Obot *et al.*, 2004). These changes were initiated by the development and implementation of an electronic judicial service. The developed judicial service is an online distributed web system and can be accessed at [www.judicature.go.ug](http://www.judicature.go.ug). The aim of this system is to dispense justice to all the people of Uganda. Through this web service the Ugandan judiciary and all of its judicial authorities look forward to providing its users with a platform for quick information collection, an understanding of the judiciary and administration of justice in Uganda, analysis of justice procedures, dissemination and

feedback about the judicial and legal services rendered by it (Ugandan Judicial Service, 2008).

## **2.10 Conclusion**

This chapter first explained the location of the research project and also stated some of the services that are already running from research work that has already been conducted at present. An overview of the work that is currently under development was given. The importance and significance of ICT for development in rural areas was highlighted, and the techniques of how rural communities may eliminate or overcome the digital divide were discussed. Traditional justice administration, its role and relevance, and its levels and boundaries of administering justice were explained. The role of ICT in the judiciary system, the difference between the normal judiciary system and the electronic judiciary system was highlighted. This chapter discussed some relevant case studies of certain countries where the e-Judiciary system has been developed and implemented.

The next chapter will discuss the developmental tools and core technologies that were used to design and develop the e-Judiciary system, and the system users and their rights in the usage of the system will be explained.

# **Chapter Three**

## **Methodology and System Requirements**

## **3.1 Introduction**

The objective of this chapter is to discuss the methodology used in the implementation of the e-Judiciary service. The chapter will explain the method used to investigate the need for an e-Judiciary service within the Dwesa community. It will furthermore discuss the system requirements for the designed service. The chapter concludes with a discussion of the user roles and the functionalities of the system.

## **3.2 Methodology**

The implementation of the Dwesa e-Judiciary service followed an iterative process of development until the final robust software system was fully produced. The methods that were used in the implementation of the system included qualitative research using interviews, questionnaires, literature review, action research, testing and evaluation. The following sections will explain the research methods that were used in the design and implementation of the system.

### **❖ Interviews**

The interviews were based on field visits to Dwesa. A range of people from different backgrounds in the community were interviewed, including school teachers, rural community members, the Chief and his Counsellors. The interviews were conducted in isiXhosa, which is their home language. Some of the questions (and their answers) that were asked during the interviews include the following:

#### **1. How well informed is the community about the judiciary and its services?**

The Dwesa community is not well informed about the term “judiciary” since it is an English word and the majority of the community does not understand English. As such, this issue needed thorough explanation, translation and

linkage to their language, way of living and cultural legal practice. When the whole concept was fully explained, they were able to provide details of what they know about the judiciary and its services.

**2. How is justice administered in the community?**

Justice in the Dwesa community is administered through a process called “traditional justice administration”, which operates under customary law.

**3. Who are their judicial authorities?**

As a place that uses traditional procedures to solve legal problems, their judicial authorities are the Chief (also known as the Headman) and his Counsellors.

**4. How is the Dwesa judiciary connected to the South African law?**

The connection between the Dwesa judiciary and the South African law is that, the Dwesa judicial authorities should be known by the nearest police station and magistrate’s court. Although they are not supposed to report every operation to the police, they are obliged to forward major cases (such as murder) to the police and the magistrate’s court.

**5. What cases do they deal with at Dwesa?**

Due to traditional procedures and legal constraints, Dwesa as a rural community is only allowed to deal with minor cases, such as livestock rustling, teenage pregnancy, minor assaults, minor thefts and marriage disputes.

**6. How do they safeguard judicial information?**

They have no proper protocol of safe-keeping judicial data. The Counsellors who have the skill of writing are the ones responsible for keeping judicial information by writing it in books, diaries and papers, which are kept at the Chief’s place.

## ❖ Questionnaires

The questionnaires were also distributed during the field visits to all the community members who were part of the research interviews. Other questionnaires were left with the Chief, Counsellors and school teachers in order to distribute to all the community members who were unable to attend the research interviews. Assistance on how to fill-in the questionnaires were given to everyone that was present during the research interviews. The community members were also given an opportunity to attempt the questionnaires on their own time and were requested to submit them on the next field visit to Dwesa. The questionnaires were written in their home language which was not a problem for the developer as he speaks the same language as the community members. Some of the questions that were asked in the questionnaires include the following:

- 1. What is their level of education and computer literacy?**
- 2. Will the e-Judiciary service be of good help to them?**
- 3. How do they want to use the system?**
- 4. How do they want the system to be?**
- 5. Will the service improve their judicial standard of practice?**
- 6. What do they expect to find from the system?**

Findings from the interviews and questionnaires indicated that the e-Judiciary service was needed in this rural community. The interviews and questionnaires also indicated the level of knowledge within the rural community members about the judiciary and its services. The developer also got an idea of what kind of system to develop through the interviews and questionnaires.

## ❖ Literature Review

As part of the investigation on how useful will be the design and implementation of the Dwesa e-Judiciary service a literature review was conducted. This literature review was conducted on the basis of finding out what other developing counties have done in terms

of the judiciary system, especially in rural context. This was useful to determine what protocols must be followed in order to make the Dwesa e-Judiciary service a success. Full details of the literature review and what has been discovered have been discussed in the previous chapter, Chapter Two.

### ❖ **Action Research**

Action research is a method of solving problems done by teams or groups of people sharing innovative ideas as a method of solving real time situations. It is done in collaboration with the people who have the skill of solving an existing problem and those who know the problem but have no skill to attempt to solve it. In this situation action research has been done between the developer and the community of Dwesa in order to find ways of eliminating the problem faced by their judiciary. This action research also included the two sections (interviews and questionnaires) already discussed above. Part of it included visiting Dwesa on a regular basis to provide an update on how the development of the system goes and acquiring of new information that might be valuable to the system development. The visits also included the computer literacy training of the intended users as a method of preparing them to be able use the designed service when it is functional.

### ❖ **Testing**

Testing of the designed system was also part of the methods used in the implementation of the e-Judiciary service. Testing of the system was based on the usability type of approach. The testing was done after the system has been fully developed and some of the things that were tested included the user friendliness of the system. Full details about this type of method are discussed in the results and evaluation chapter, Chapter Six.

## ❖ Evaluation

As part of checking whether the implemented system was up to the expectations of the intended users a method called evaluation was considered. This was necessary to determine what the system has achieved and what it has left out, after the testing was conducted. Part of the expectations from the evaluation was to make sure that the citizens are fully satisfied with no major struggles in using the system. Full details about this type of method are discussed in the results and evaluation chapter, Chapter Six.

### 3.3 System Requirements

There were many steps that were taken and considered during the development of the Dwesa e-Judiciary service. Part of the system requirements included a thorough review and understanding of the already existing ICT infrastructure in which the system will be deployed. Based on the survey for the system requirements, the developer found that the Dwesa ICT infrastructure operates using Free and Open Source Software (FOSS). Therefore, the e-Judiciary service was also designed and developed using open source software. It was designed on a Linux Operating System using PHP scripting/programming language, running on an Apache web server and a MySQL database. This is an open source software package that is sometimes called LAMP (Linux, Apache, MySQL, and PHP) and is a very popular architecture used to build a large number of websites.

The reason for choosing open source software is that it is affordable for the communities, meaning that it is a set of free software programs that can be easily obtained by downloading and their source code is freely available (Webopedia, 2007). Another reason is that Linux is a packaged operating system which has Office Applications compatible with MS Office, and it has Mozilla FireFox, Evolution Mail Client and other software packages that are mostly downloaded from the Internet. Since the Dwesa ICT

infrastructure is running open source, the e-Judiciary service will be easily deployed because of its compatibility with the existing platform.

### 3.4 User Roles and Functionality Diagrams

The e-Judiciary service is designed to accommodate three different types of authorized users. These users are the *Administrator*, the *Legal Authorities* and the *Citizens*. Each of these distinct users has their own unique interface, which requires authorization to be accessible for use at any given time. Apart from the three different interfaces for authorized users, the system has an additional interface that does not require authorization to be used. This interface can be utilized by anyone who is not registered on the system. The figure below shows how the three authorized users differ in terms of their functionality in the system.

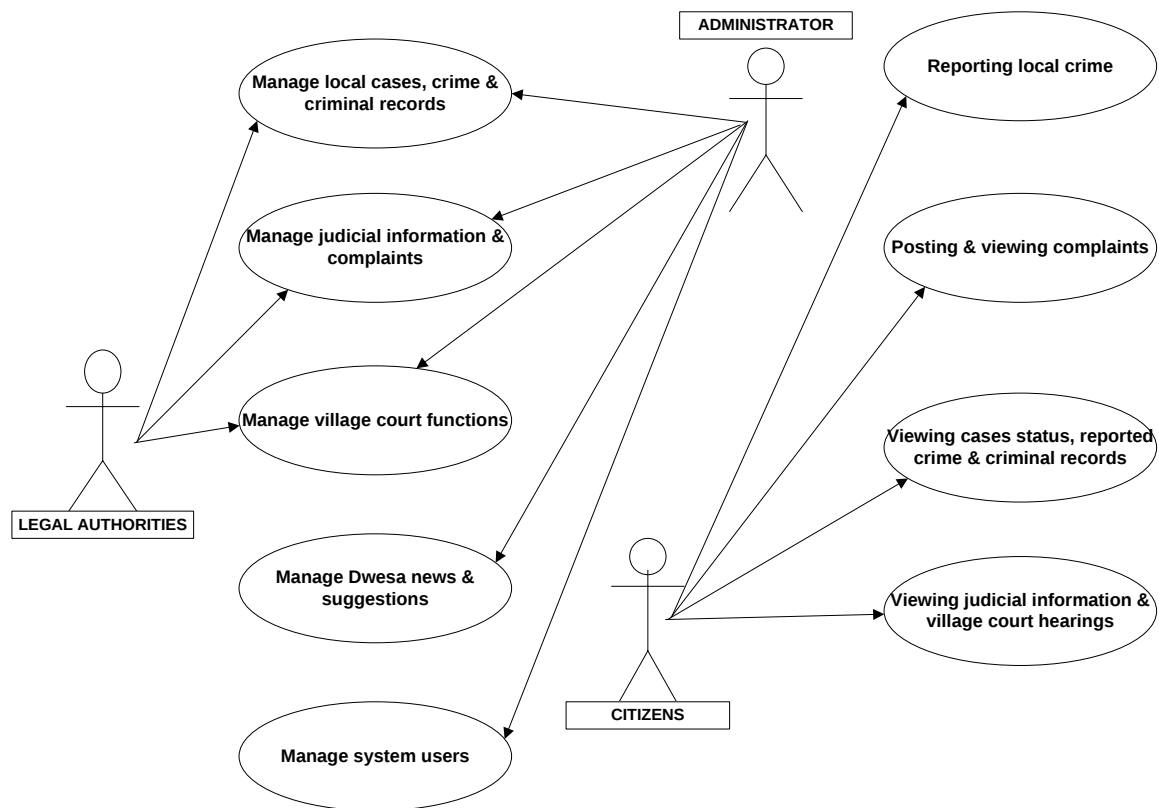


Figure 3.1: Dwesa e-Judiciary Service Use Case Architecture

### **3.4.1 The Administrator**

The administrator is the manager of the system and is responsible for the overall maintenance of the whole system and thus has more tasks than other users of the system. The administrator can add new users to the system when they have difficulties registering themselves, and can also edit users' profiles. The administrator can also activate pre-registered users, giving them access to the service and can also delete users who want to be de-registered from the system. On the side of the judicial functions, the administrator is responsible for recording, viewing, updating and deleting of judicial information, local cases, local criminal records, Dwesa village-court events, local complaints and Dwesa news. The administrator is also accountable for taking into account the suggestions posted by users and internet browsers.

The figure below illustrates the tasks that can be performed by the administrator in the e-Judiciary service:

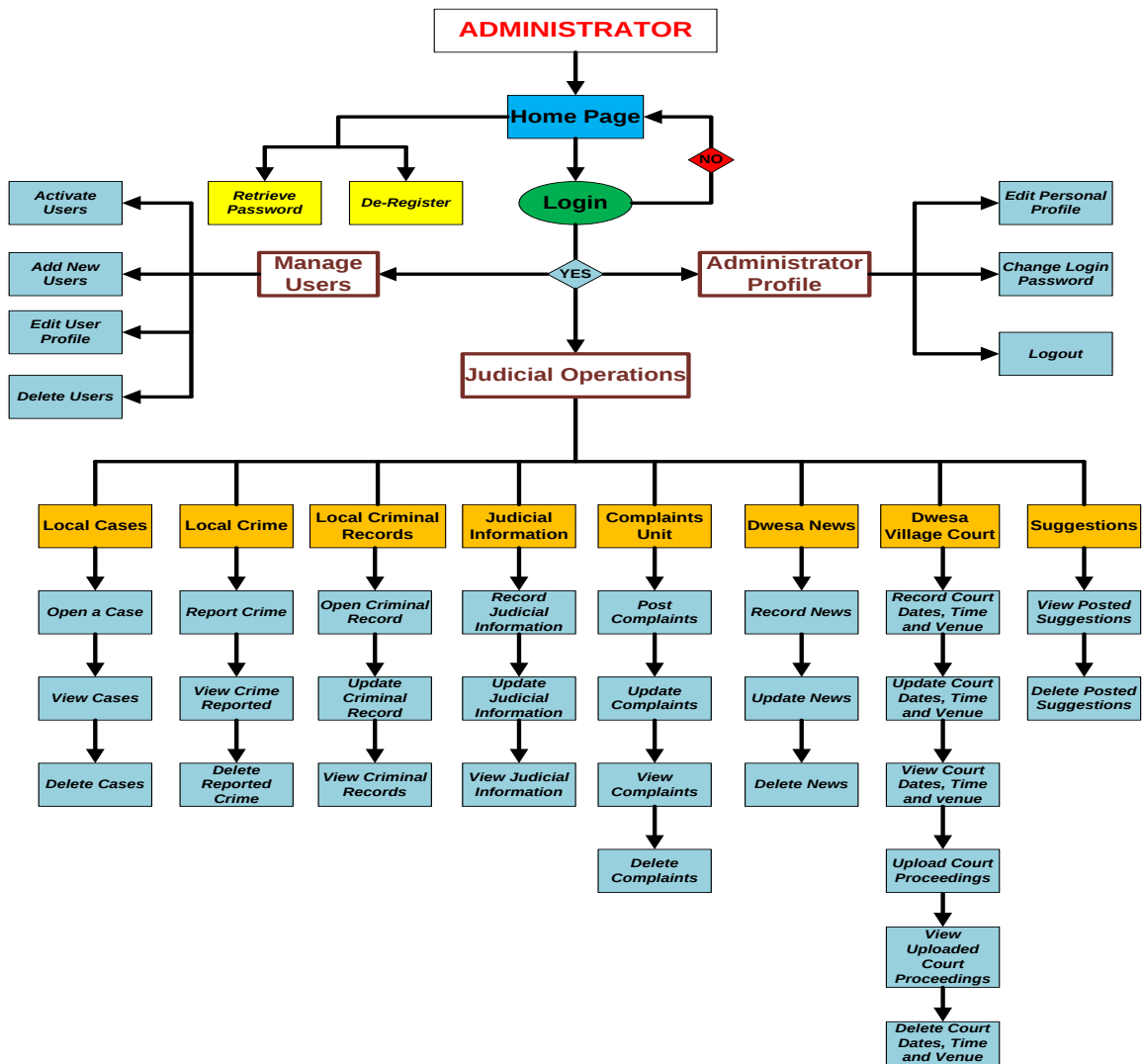
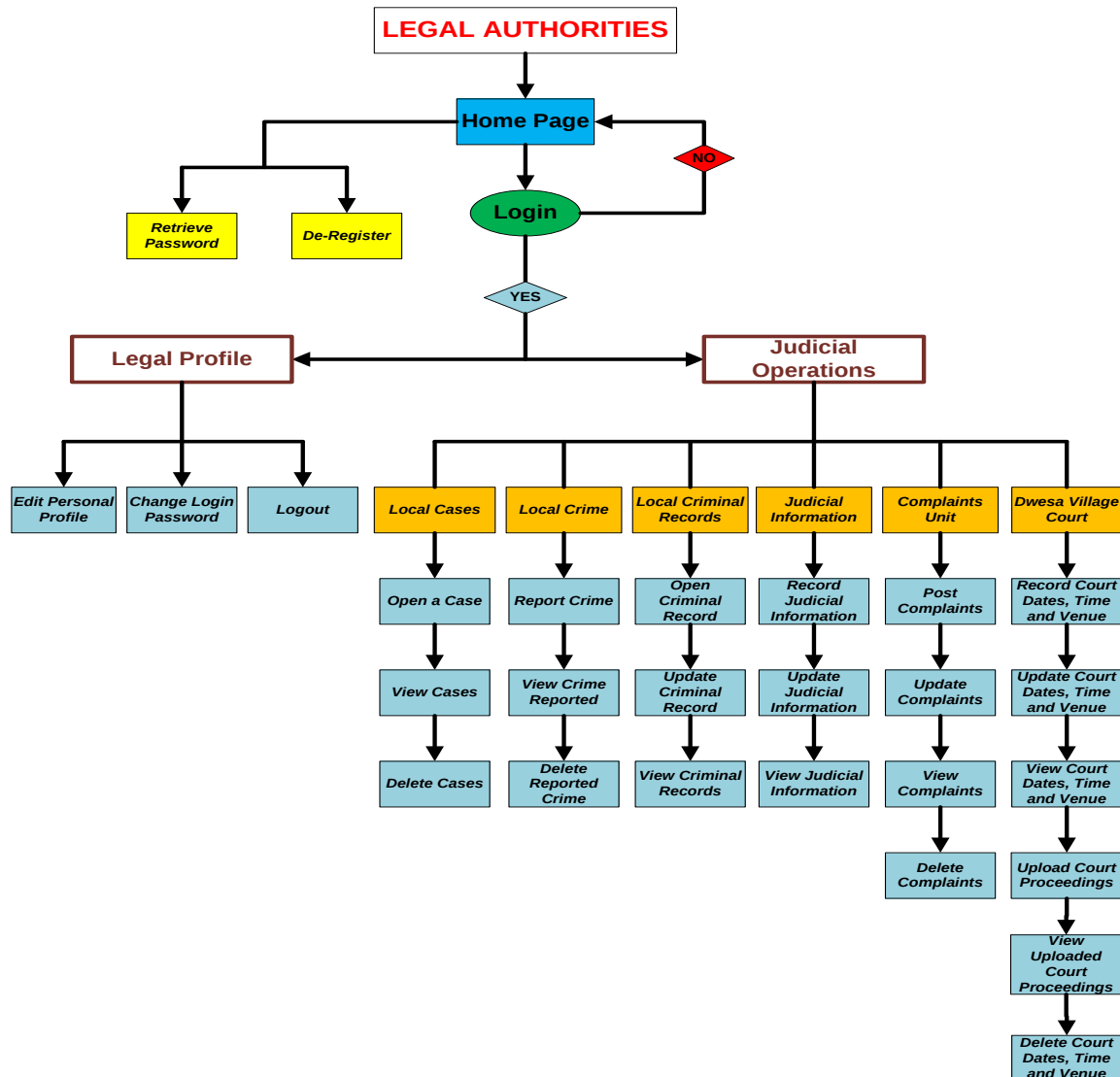


Figure 3.2: The Administrator Tasks in the E-Judiciary Service

### 3.4.2 The Legal Authorities

The Dwesa legal authorities are the Chief (also known as the Headman) and his Counsellors. The Chief and his Counsellors are responsible for administering the law using traditional practice and customary law. They are also responsible for maintaining certain parts of the system and this gives them administrator rights that are limited to their duties only. Since the legal authorities are responsible for controlling law and order, their administrator rights are limited to recording, viewing, updating of judicial information, local cases, local criminal records, Dwesa village-court events and local complaints.

The figure below demonstrates the tasks that can be performed by the legal authorities of Dwesa:



**Figure 3.3: The Legal Authorities' Tasks in the E-Judiciary Service**

### 3.4.3 The Citizens

The citizens have no rights for maintaining the system and their function is to make use of the service for their judicial and legal needs only. In the citizen portal, users can post and view complaints, can report and view local crime, can check the status of local cases and local criminal records and view the local court hearings. Citizens can also view

judicial information such as common cases dealt with at Dwesa, procedures of the Dwesa village court, laws used in the village court, village court rules, procedure for reporting local crimes, judgements that can be taken at the village court and the connection between the Dwesa village court and the magistrate's court. The following figure shows the possible operations for citizens in the e-Judiciary service:

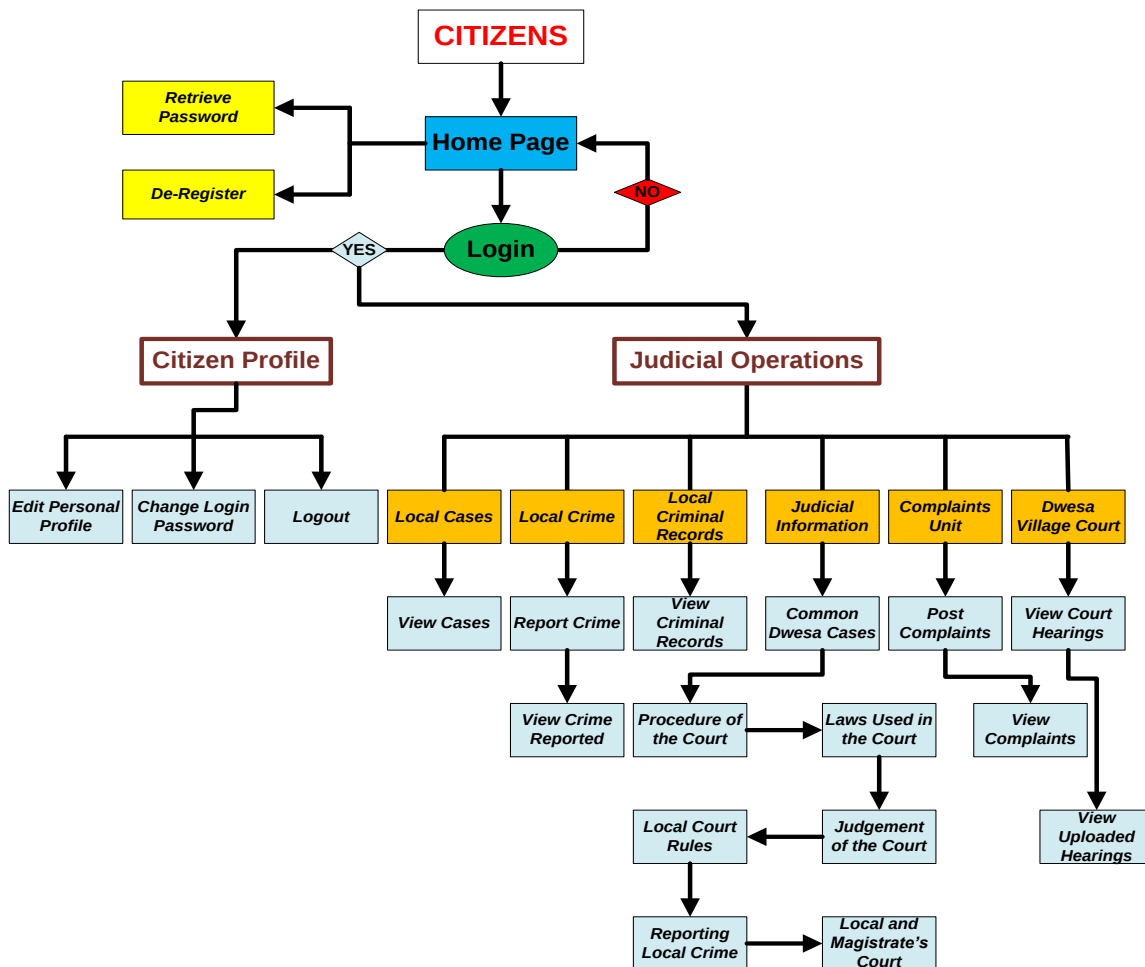
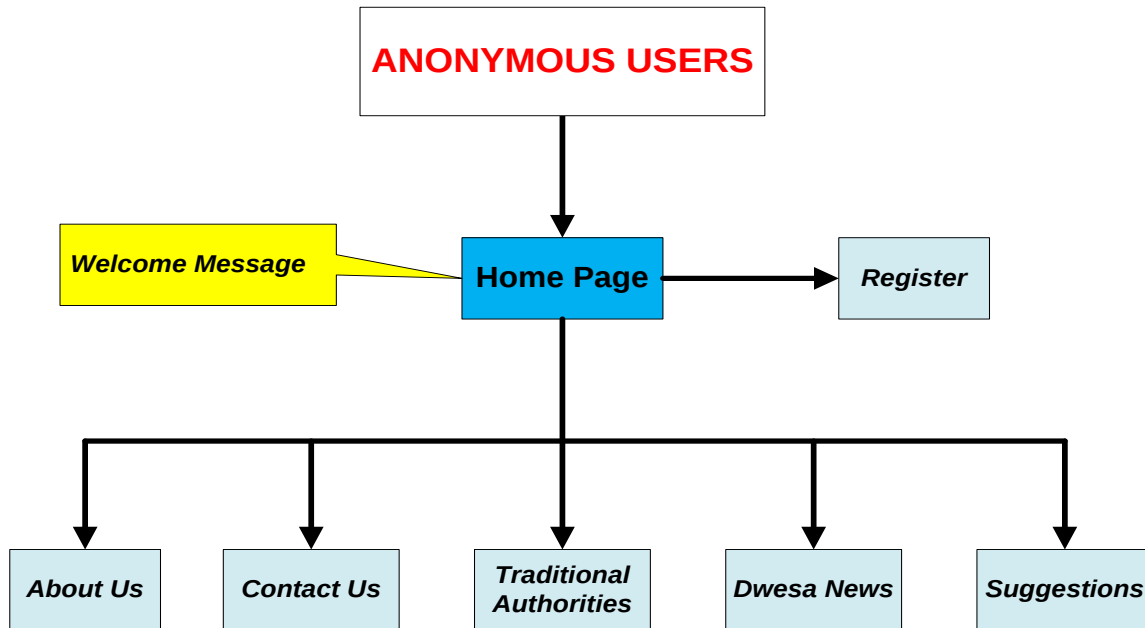


Figure 3.4: The Citizen Tasks in the e-Judiciary Service

### 3.4.4 Anonymous Users

The extra interface gives Internet browsers an opportunity to read about the Dwesa e-Judiciary service, the administrators of justice at Dwesa, ways of contacting the marginalized area, a portal for posting suggestions (questions and comments) and a

chance to read the Dwesa local news. These users can also access the link to register on the system through the link found under the login form of the home page. The figure below shows the tasks that can be performed by unregistered users of the system:



**Figure 3.5: Anonymous Users in the e-Judiciary Service**

## 3.5 Conclusion

This chapter explained the methodology used in the system and the core technologies that were used to design and develop the service. Furthermore, the system requirements and the architecture of the e-Judiciary service were explained. The chapter concluded by discussing the user roles and their functionalities illustrated with diagrams. The next chapter will discuss the design of the Dwesa e-Judiciary service.

# **Chapter Four**

## **System Design and Development**

## **4.1 Introduction**

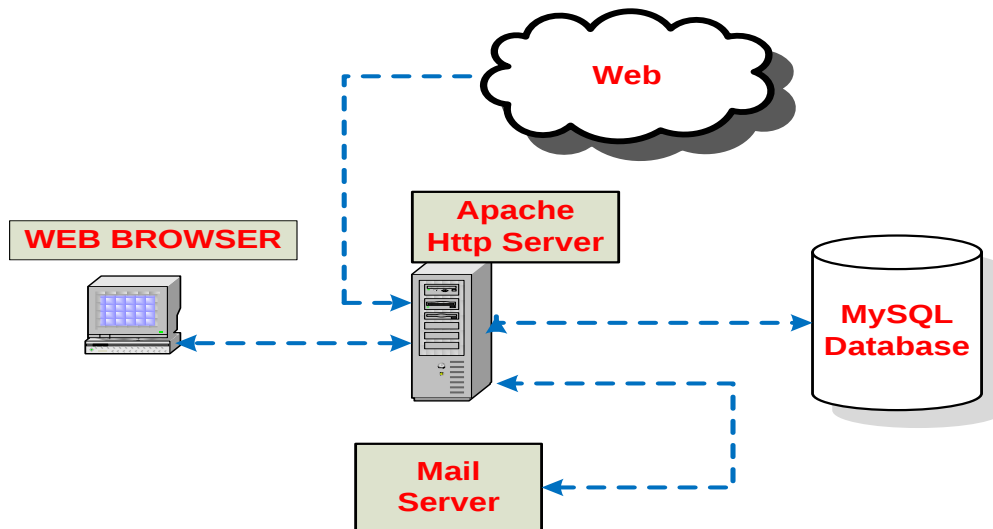
The previous chapter discussed the methodology used in the design and development of the e-Judiciary service. This chapter presents and describes the various designs that were considered in the development of the e-Judiciary service system. It will explain the design and development of the system, namely the back-end and front-end design. The structure of the database used will also be explained. Furthermore, it discusses the scripting technologies used to develop the system. This chapter concludes by presenting an overview of the system.

## **4.2 System Back-End Design and Development**

The website back-end of any system is sometimes usually referred to as a back-end administration portal and it allows control of every aspect of a website from updating to maintenance (Web Design Enterprise, 2009). The purpose of the system back-end is to support front-end services and allow users who interact with applications on the front-end system to make requests on the back-end system (Sheldon & Big Sur Multimedia, 2001). The back-end of the e-Judiciary service is used to control various functionalities of the system and communicates with the front-end by means of an interface. Functions and operations that can be controlled using an interface to communicate with the back-end of the system include the management of system users, Dwesa news, judicial information, local hearings, local cases, local crime, complaints unit and the suggestions (comments and questions) sent by users and web browsers about the content of the service.

In addition, there is also a MySQL database which forms part of the system back-end. Connection and communication with the MySQL database is through the implemented PHP scripts. Direct access and management of the MySQL database was handled by the phpMyAdmin application, which is open source software for administrating MySQL databases (phpMyAdmin, 2009 & Kammarapat, 2008). phpMyAdmin is freely available for download and is included in most Linux distributions (Benoist, 2007). Part of the e-Judiciary system back-end includes an Apache web server responsible for HTTP

transmissions and the Mail server for transmitting electronic mail messages. The Apache software features support HTTPS, virtual hosting, CGI (Common Gateway Interface), SSI (Server Side Includes), easy scripting and database integration, request and response filtering, and many more flexible authentication schemes (Apache, 2009). The following figure demonstrates all these components when they are combined.



**Figure 4.1: Dwesa e-Judiciary System Architecture**

System back-end development focuses on the code that makes a website function and is usually thought of as the database that supports a website, often using server-side code and a database such as MySQL (Manta SEO Solutions, 2005). The following section will explain the database used in the e-Judiciary system.

### **4.2.1 MySQL Database Design**

MySQL is a relational database management system that is useful and successful for long-term management of information and is used in over 4 million installations across the world (Ullman, 2003 & Westphal, 2003). The legal information pertaining to the Dwesa rural community will be captured and stored in a MySQL database called

*ejudiciary\_db*. In this database, the judiciary information will be stored in normalized tables. All the tables contained in the *ejudiciary\_db* database will be explained in this section. The system makes use of eleven MySQL database tables to store all the necessary information about the judicial service for Dwesa.

#### **4.2.1.1 The Pre\_Registration and Users Tables**

The pre\_registration and users tables contain all the personal details of the users of the system. These two tables have identical fields because they both handle user information pertaining to the system registration process. When users fill in the registration form in the system and click on the submit button, their personal details are sent to the pre\_registration table for verification by the administrator. If the user has chosen the correct role during registration, his/her personal details will be sent to the users table, granting full access to the system. However, if the user has chosen the wrong role, the administrator will edit their role into what best fits them and grants the user access to the system. Viewing of user pre\_registration details comes in editable text fields in order to simplify the work of an administrator when approving registration. Soon after that, an email will be sent notifying him/her about the status of his/her registration. The table below shows the pre\_registration and users table together with their fields and descriptions.

| Field               | Type        | Null | Key | Default | Extra |
|---------------------|-------------|------|-----|---------|-------|
| Title               | varchar(10) | YES  |     | NULL    |       |
| Surname             | varchar(50) | YES  |     | NULL    |       |
| Names               | varchar(50) | YES  |     | NULL    |       |
| Date_of_Birth       | varchar(20) | YES  |     | NULL    |       |
| Gender              | varchar(15) | YES  |     | NULL    |       |
| Residential_Address | varchar(50) | YES  |     | NULL    |       |
| Postal_Address      | varchar(50) | YES  |     | NULL    |       |
| Telephone_Number    | varchar(15) | YES  |     | NULL    |       |
| Mobile_Phone_Number | varchar(15) | YES  |     | NULL    |       |
| Email_Address       | varchar(50) | YES  |     | NULL    |       |
| Fax_Number          | varchar(15) | YES  |     | NULL    |       |
| Username            | varchar(50) | NO   | PRI | NULL    |       |
| Password            | varchar(50) | YES  |     | NULL    |       |
| Confirm_Password    | varchar(50) | YES  |     | NULL    |       |
| Question            | varchar(50) | YES  |     | NULL    |       |
| Answer              | varchar(50) | YES  |     | NULL    |       |
| Role                | varchar(30) | YES  |     | NULL    |       |

**Table 4.1: Pre\_Registration and Users**

#### 4.2.1.2 The Complaints Table

The complaints database table stores information about the complaints posted by the users of the system. This table contains the name of the complainant, his/her complaint and the date of the complaint. The figure below shows the complaints table with its fields and description.

| Field          | Type        | Null | Key | Default | Extra          |
|----------------|-------------|------|-----|---------|----------------|
| id             | int(100)    | NO   | PRI | NULL    | auto_increment |
| Complainant    | varchar(50) | NO   |     | NULL    |                |
| Complaint      | text        | NO   |     | NULL    |                |
| Complaint_Date | varchar(50) | NO   |     | NULL    |                |

**Table 4.2: The Complaints**

#### 4.2.1.3 The Hearings Table

The complaints table is responsible for keeping the information about the local court hearings occurring at Dwesa. It stores information such as topic of the hearing, the time

and date, and the venue. The information contained in this table is to be used by all people who are interested in attending the local hearings of the Dwesa community. The following figure demonstrates the local hearings database table.

| Field      | Type        | Null | Key | Default | Extra          |
|------------|-------------|------|-----|---------|----------------|
| id         | int(10)     | NO   | PRI | NULL    | auto_increment |
| Court_Date | varchar(50) | NO   |     | NULL    |                |
| Venue      | varchar(50) | NO   |     | NULL    |                |
| Time       | varchar(50) | NO   |     | NULL    |                |
| Topic      | varchar(50) | NO   |     | NULL    |                |

**Table 4.3: The Hearings**

#### 4.2.1.4 The News Table

The database news table is designed to store all the news pertaining to the Dwesa community. The sources of the news regarding Dwesa vary from the Internet to newspapers, radios and TVs. All the information regarding Dwesa news will be uploaded and stored in this table. This table stores news data, such as the title of the news, description, date when the news was posted, the author and the source. The table below shows the structure of the Dwesa news table, its fields and description.

| Field            | Type        | Null | Key | Default | Extra          |
|------------------|-------------|------|-----|---------|----------------|
| id               | int(10)     | NO   | PRI | NULL    | auto_increment |
| News_Title       | text        | NO   |     | NULL    |                |
| News_Description | text        | NO   |     | NULL    |                |
| News_Posted      | varchar(50) | NO   |     | NULL    |                |
| News_Author      | varchar(50) | NO   |     | NULL    |                |
| News_Source      | text        | NO   |     | NULL    |                |

**Table 4.4: The Dwesa News**

#### 4.2.1.5 The Judicial Information

This database table is responsible for storing all the judicial information pertaining to Dwesa. It keeps information such as types of cases that can be solved at Dwesa, the

procedures of the traditional court, types of laws used in the traditional court, judgements that can be taken by the traditional judiciary, rules of the traditional court, procedures for reporting local crime and the connection between the traditional court and the magistrates court. This information is to be used by the community when they need clarity about their judiciary and its procedures. Below is a figure showing the judicial information database table with its fields and description.

| Field             | Type     | Null | Key | Default | Extra          |
|-------------------|----------|------|-----|---------|----------------|
| id                | int(100) | NO   | PRI | NULL    | auto_increment |
| Dwesa_Cases       | text     | NO   |     | NULL    |                |
| Procedure_Court   | text     | NO   |     | NULL    |                |
| Laws_Court        | text     | NO   |     | NULL    |                |
| Judgement_Court   | text     | NO   |     | NULL    |                |
| Court_Rules       | text     | NO   |     | NULL    |                |
| Reporting_Crime   | text     | NO   |     | NULL    |                |
| Local_Magistrates | text     | NO   |     | NULL    |                |

**Table 4.5: The Judicial Information**

#### 4.2.1.6 The Local Cases

The local cases table is designed to store all the details about the minor cases occurring at Dwesa. This table keeps information such as the name of the accuser, the accused, particulars of claim and defence, judgement decision and date, and the date when the case was opened. The following figure shows the local cases table with its fields and description.

| Field          | Type        | Null | Key | Default | Extra          |
|----------------|-------------|------|-----|---------|----------------|
| id             | int(100)    | NO   | PRI | NULL    | auto_increment |
| Accuser        | varchar(50) | NO   |     | NULL    |                |
| Accused        | varchar(50) | NO   |     | NULL    |                |
| Claim          | text        | NO   |     | NULL    |                |
| Defence        | text        | NO   |     | NULL    |                |
| Judgement      | text        | NO   |     | NULL    |                |
| Date_Opened    | varchar(50) | NO   |     | NULL    |                |
| Judgement_Date | varchar(50) | NO   |     | NULL    |                |

**Table 4.6: The Local Cases**

#### 4.2.1.7 The Local Crime

This table keeps information about the crimes that have been reported at Dwesa. This information is later used by the judicial authorities to decide on whether to open a case and prosecute the suspect or not, depending on the validities and facts of the reported crime. The local crime database table stores information such as the name of the crime reporter and suspect, date of the crime, type of crime committed, and the date when the crime was reported. The table below illustrates the local crimes reported table with its fields and description.

| Field       | Type        | Null | Key | Default | Extra          |
|-------------|-------------|------|-----|---------|----------------|
| id          | int(100)    | NO   | PRI | NULL    | auto_increment |
| Reporter    | varchar(50) | NO   |     | NULL    |                |
| Suspect     | varchar(50) | NO   |     | NULL    |                |
| Crime       | text        | NO   |     | NULL    |                |
| Crime_Date  | varchar(50) | NO   |     | NULL    |                |
| Report_Date | varchar(50) | NO   |     | NULL    |                |

**Table 4.7: The Local Crime**

#### 4.2.1.8 The Local Criminal Records

This table is designed to keep all the local criminal records for minor cases and incidents that were processed by the Dwesa traditional court. This will help the Dwesa judiciary to keep track of the people who are capable of committing crime in their community. This database table keeps information such as the name of the offender, offence committed, date of the offence, decision that was taken as the judgement of the offence, and the date of the judgement. The following figure demonstrates the local criminal records database table with its fields and their description.

| Field             | Type        | Null | Key | Default | Extra          |
|-------------------|-------------|------|-----|---------|----------------|
| id                | int(100)    | NO   | PRI | NULL    | auto_increment |
| Offender_Name     | varchar(50) | NO   |     | NULL    |                |
| Offence_Committed | varchar(50) | NO   |     | NULL    |                |
| Date_Offence      | varchar(50) | NO   |     | NULL    |                |
| Judgement_Offence | text        | NO   |     | NULL    |                |
| Judgement_Date    | varchar(50) | NO   |     | NULL    |                |

**Table 4.8: The Local Criminal Records**

#### 4.2.1.9 The Suggestions Table

The suggestions database table keeps track of the posted suggestions, comments and questions by the users of the e-Judiciary service. The posted suggestions, comments and questions are mostly meant to assist with the status of the system. This table contains information such as the name, surname, email address of the person who posted the suggestion, subject and message of the suggestions, and the date when the suggestion was posted. The figure below shows the suggestions table with its fields and description.

| Field         | Type         | Null | Key | Default | Extra          |
|---------------|--------------|------|-----|---------|----------------|
| id            | int(100)     | NO   | PRI | NULL    | auto_increment |
| Names         | varchar(50)  | NO   |     | NULL    |                |
| Surname       | varchar(50)  | NO   |     | NULL    |                |
| Email_Address | varchar(50)  | NO   |     | NULL    |                |
| Subject       | varchar(250) | NO   |     | NULL    |                |
| Message       | text         | NO   |     | NULL    |                |
| Date_Posted   | varchar(50)  | NO   |     | NULL    |                |

**Table 4.9: The Suggestions**

#### 4.2.1.10 The Languages Table

The languages database table is responsible for storing the languages that are used in the system. Currently, the service has only two languages that users may choose from, English and isiXhosa. This table only contains the language id and the name of the language itself. The figure below shows the language table with its fields and description.

| Field    | Type        | Null | Key | Default | Extra          |
|----------|-------------|------|-----|---------|----------------|
| lang_id  | int(10)     | NO   | PRI | NULL    | auto_increment |
| language | varchar(50) | NO   |     | NULL    |                |

**Table 4.10: The Languages**

## **4.3 Scripting Technologies**

The e-Judiciary service was designed and developed using scripting technologies on both the client and server sides of the system. This section discusses the scripting technologies that were used during the development of the application.

### **4.3.1 Client-Side Scripting**

Client-side scripting runs within a webpage in order to execute requests and display them to the client's web browser (Oultwood Web Technology, 2007). This means that client-side scripting runs directly in the browser. Therefore, client-side scripting is purely for use by clients to get data on any browser and in essence all client-side scripting languages are browser dependant (Wise, 2007). Two client-side scripting languages were used in the design of the e-Judiciary service, namely, Cascading Style Sheets (CSS) and JavaScript (JS).

Cascading style sheet is a styling sheet language used to describe the look, display and formatting of a web page. It is mostly regarded as a mechanism for adding style to a web document (Bos, 2009). Just like PHP, CSS can also be embedded into HTML to control the presentation of a web page. Style sheets are sets of style rules that illustrate how document (such as HTML, XHTML and DHTML) elements are to be displayed on a particular web page (Kurata, 2002). The main purpose of using CSS is to separate the content of the web page from the document's structure (WDVL, 2009).

In the case of the e-Judiciary service, CSS has been used to define how components such as the content of a web page, the frame of a web page and links are displayed. The use of CSS in the design and development of our service helped us to set parameters such as the background colour, font sizes and image positioning of the e-Judiciary web pages. CSS was also useful in our system for setting the level of the frame layout for display purposes

in the web browsers, as web pages with no style sheets tend to display differently on different browsers.

JavaScript is an object-oriented cross-platform client-side scripting language used in dynamic web based applications (Mozilla Developer Centre, 2009 & Crockford, 2001). JavaScript is closely related to the java programming language, but the main difference is that it is embedded within script (<script></script>) tags. It can be embedded into a number of documents, for example, in a PHP or XHTML document. JavaScript adds logic to documents such as HTML, XHTML and DHTML (Kurata, 2002).

In the e-Judiciary service design, JavaScript was used to direct authorized users to their appropriate web pages when they login or logout, and redirect unauthorized users to an error web page denying them access to the system. It was also used to display the day and date in every web page of the system. Application systems may be developed using any client-side scripting, depending on the need and choice of the developer.

### **4.3.2 Server-Side Scripting**

Server-side scripting is a method of coding the behaviour of a web server to handle users' requests and to generate dynamic web pages. Most importantly, the server scripts can edit, change or add any content to a web page, and also provide security since the server code (PHP in this case) cannot be viewed from any browser (W3Schools, 2009 & Bradley, 2009). This is different from client-side scripting where scripts are run in a web browser.

In the case of the e-Judiciary service, server-side scripting allows the application system to display customized feedback to the community, based on their authorization rights, requirements, and queries to the database of stored judicial information. In this way PHP scripts have been used to create dynamic web pages for the clients' requests and to provide a connection to the database on the server-side.

PHP is a server-side scripting language, also known as a hybrid programming language, meaning that it borrows its syntax from other programming languages, for example, C and Perl (Gutmans *et al.*, 2004 & Atkinson *et al.*, 2004). It is a language designed to build web pages or websites and is open source software that provides the opportunity for adaptation to new environments (Converse *et al.*, 2004 & Atkinson *et al.*, 2004). PHP is widely known by programmers for its numerous advantages, which include: ease of use, speed, it is free, secure, provides versatility, customizability, and technical support availability (Valade, 2004).

The e-Judiciary service uses PHP scripts to create dynamic web pages and to perform actions such as querying the database. PHP cannot work on its own because it cannot display data directly, it needs supporting programs for that type of functionality. A supporting program that helps PHP to display data to a client is HTML. So PHP is typically used in an HTML context. HTML generates the embedded PHP codes to produce web pages and send them to the querying browser. Due to the advantages explained here, PHP was considered adequate for the development of the e-Judiciary service.

#### **4.4 System Front-End Design and Development**

The system front-end of a website refers to a series of web pages that are displayed to all the users. It also refers to the overall layout and design, interactivity and intelligence, usability and ease of navigation (Cyber Dynamics, 2003). The purpose of the front-end system is to act as an interface between the user and the back-end system (Wikipedia – Front-end and Back-end, 2009). The e-Judiciary service is designed and developed to be an online web application; it is therefore a collection of web pages that forms a portal that can be accessed via the Internet. The system front-end is responsible for displaying the Dwesa judicial information to its users. Some of the judicial information that can be displayed to the authorized users includes the kinds of cases that can be solved at Dwesa, procedures of administering justice at the village court, laws used in the court,

judgements of the court, court rules, procedures for reporting local crimes, and the connection between the local village court and the magistrate's court. Through the front-end of the system, authorized users can also perform duties such as updating of personal details, retrieving of lost passwords, changing of logging passwords and de-registration when needed.

The front-end of the e-Judiciary service also has a number of web pages that can be used by non-registered users. Those web pages are:-

❖ **Home**

This is the first page of the e-Judiciary service when a person opens the website from the Internet. It contains a welcoming message to the service and links to web pages like the About Us and Contact Us pages.

❖ **About Us**

This is the page that gives information and explanation about the Dwesa e-Judiciary service and its mission and vision.

❖ **Contact Us**

The Contact Us page contains information about the ways that can be used to contact the Dwesa marginalized community. It also contains the location of Dwesa on a map.

❖ **Traditional Authorities**

This web page contains information about the Dwesa judicial administrators of justice, which in this case are the Chief and his Counsellors, who are responsible for maintaining justice using traditional procedures.

❖ **Dwesa News**

The Dwesa News page displays the latest local news to users of the system and Internet browsers. The information contained here are things such as latest developments and events in the Dwesa area.

❖ **Suggestions**

This page allows users of the system and Internet browsers to post their suggestions, questions and comments regarding the status of the service. The posted suggestions will later be viewed by the administrator and made use of where necessary.

❖ **Register Now**

The web page that is displayed with this link allows unregistered users and Internet browsers a chance of registering on the system to become authorized users.

The following section will explain in detail the design and development of the e-Judiciary system front-end. It will explain the contents of the website, the basic interfaces, system navigation, and page heading sections. In the front-end section, the system development is mainly focused on the interfaces used by all the e-Judiciary service users.

#### **4.4.1 The e-Judiciary Service Website Navigation Menus**

Website navigation is the method used on a website to allow visitors to move from one page to another (Web Developers Notes, 2000). The e-Judiciary service web application has three navigation menus, at the top, right and bottom. All three navigation menus will be illustrated and explained in this section.

#### 4.4.1.1 The Top Navigation Menu

The top navigation menu of the e-Judiciary system is located at the top of the website banner and contains links to Home, About Us, Contact Us, Traditional Authorities, Dwesa News, and Suggestions. This navigation menu is usually called the header horizontal website navigation menu (Web Developers Notes, 2000). The figure below shows the top navigation menu of the e-Judiciary service website.



**Figure 4.2: The Top Navigation Menu**

#### 4.4.1.2 The Right Navigation Menu

The right navigation menu contains a search functionality for all users to search regarding the services that are offered by the traditional justice administration of Dwesa. It also has a login panel where authorized users may login to access the system. Furthermore, there are also three links available, the Forgotten Password link that can be used by registered users when they want to retrieve their login passwords. Another link available is the Register Now link for people who want to become authorized members of the system. Lastly, a De-Register link for users who may want to de-register themselves when they no longer want to be part of the service. The right and left navigation menus are usually known as the vertical website navigation menus (Web Developers Notes, 2000). For the e-Judiciary service web application we make use of the right navigation menu, which is available to the webpages that require no authorization details to be accessed.

Finally, the right navigation menu has a menu to show the latest Dwesa News Headlines. The following figure shows the right navigation menu of the e-Judiciary service website.

Search

...Good Afternoon, Today Is...  
Wednesday , 28 October 2009

\*\*\*\*\*

**Authorized Access**

\*\*\*\*\*

Username:-

Password:-

Login

:- **Forgotten Password?**  
:- **Register Now**  
:- **De-Register**

**Dwesa Headlines**

\*\*\*\*\*

→ **August 14, 2008**

Question over Wild Coast .....

Some have been arguing from the outset that the valuation of \$18 million which Xolco have to pay.....**Read More.....**

→ **23 August 2008**

Redevelopment, Operation .....

The Eastern Cape Development Corporation and Dwesa Cwebe Land Trust are partners in the operatio.....**Read More.....**

**Figure 4.3: The Right Navigation Menu**

#### **4.4.1.3 The Bottom Navigation Menu**

The bottom navigation menu is identical to the top one and is located at the bottom of the website or of any webpage. It also contains links to Home, About Us, Contact Us, Traditional Authorities, Dwesa News, and Suggestions. This navigation menu is usually called the footer horizontal website navigation menu (Web Developers Notes, 2000). Its main purpose is to reduce the scrolling up and down of users when they are using the system. It is useful when a certain user is reading at the bottom of the webpage so that he/she does not need to scroll up when wanting to view a different webpage that is part of the top navigation menu. The figure below shows the bottom navigation menu of the e-Judiciary service web system.

**Figure 4.4: The Bottom Navigation Menu**

## **4.4.2 The e-Judiciary Service Website Content**

The e-Judiciary service website contains a variety of information about Dwesa and the types of judicial services that are available in that rural community. It contains links such as Judicial Information, which provides a selection of legal processes that can be carried out at Dwesa. The information ranges from the types of cases dealt with at Dwesa, to procedures of the traditional courts, laws used in the traditional courts, judgement of the traditional courts, rules of the local court, procedures for reporting local crime and the connection between the traditional court and the magistrate's court. This information is only accessible to authorized users of the system. As it has already been mentioned in the previous chapter, unregistered users can access only the welcome page of the system, excluding the Forgotten Password and De-Register links. The content of the website also varies according to the different interfaces that the service provides, which are the Administrator interface, Legal Authorities interface and the Citizens interface.

### **4.4.2.1 The Administrator Interface**

This section will highlight the design and development of the administrator interface. The administrator is responsible for providing the necessary overall management of all the interface resources of the e-Judiciary service system. He/she acts like a webmaster and is responsible for publishing and managing content, managing users and accounts, interacting with system users and educating them about the system, and securing the website (Borelli, 2009). The administrator interface offers all the administrative functions that occur in the system and that are interlinked to other interfaces of the system. Furthermore, the administrator is responsible for viewing all the judicial operations that

occur in the system. The following figure illustrates the interface of the administrator portal.

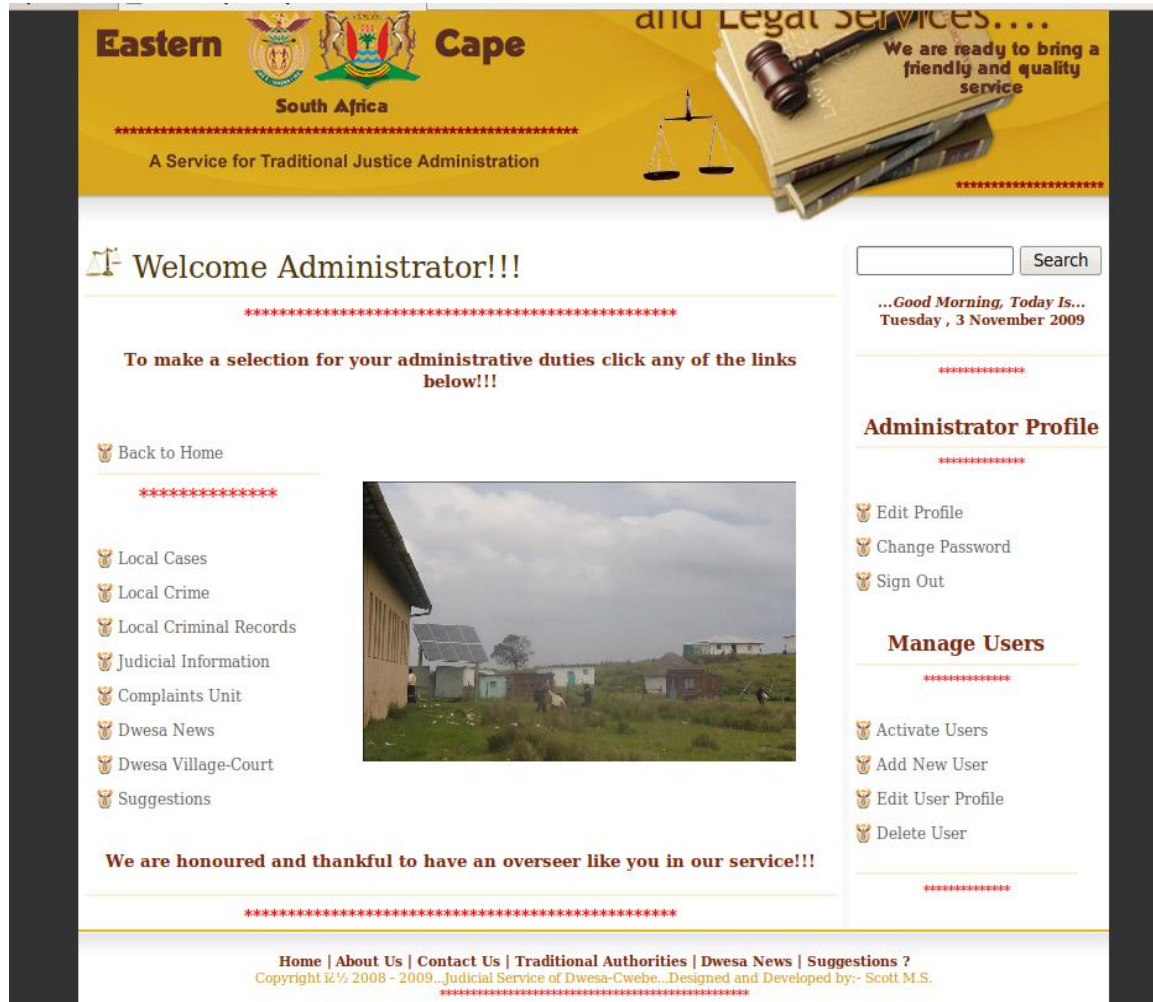


Figure 4.5: The Administrator Interface

#### 4.4.2.2 The Legal Authorities Interface

This part will highlight the interface for the judicial officers or the legal authorities. Since the system is designed for traditional justice administration, the judicial officers or the legal authorities we are referring to are the Chief (also known as the Headman) and his Counsellors (Scott *et al.*, 2009). As it has been mentioned in the previous chapter, the legal authorities also have administrator rights, but their rights are limited to legal or

judicial operations occurring in the e-Judiciary service system. The figure below shows the interface which the judicial authorities use to operate judicial functions in order to control the local law.



**Figure 4.6: The Legal Authorities Interface**

#### 4.4.2.3 The Citizens Interface

There are no administration operations that can be performed on this interface. Citizens make use of this portal for their local judicial needs only. The citizen portal allow users to view the status of local cases, report and view local crime, view local criminal records, post and view complaints, view local court dates; times and venues, and an opportunity to view the uploaded court proceedings. This interface also gives the users an opportunity to

read about all about the judicial information of their rural community. Using this interface, all registered users can change their login passwords and edit their personal profiles.

The following figure shows an interface for the registered citizens of the e-Judiciary service.



Figure 4.7: The Citizens Interface

## 4.5 The e-Judiciary Service Website

The webpage below portrays the home page of the e-Judiciary service website.



Figure 4.8: The e-Judiciary Service Home Page

#### 4.5.1 New User Registration Process

The new user registration process is designed to grant access to users who want to be part of the authorized system of users so that they are able to get more functionality from the system (Grants.Gov, 2009). In the case of the e-Judiciary system there are two methods of registration a user may follow to gain authorization in order to access system. The first method is to contact the system administrator to do the registration on behalf of a particular user. This is done by providing full personal details to the administrator, such as the full names and addresses, all contact details, proposed username and password, and security hits in the case of losing the authorization password. Then the system administrator will register the particular interested person via the administrator interface.

The second method available to use is self-registration. In this method a user may simply click on the Register Now link on the welcome page of the system. Thereafter a registration form will be displayed and the user will simply fill in the required details in order to be registered. The figure below illustrates the registration form for a new user.

**....Please note that all fields are compulsory....**

|                      |                                                                                                                                                       |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Title:               | .....Select Your Title From The List.....                                                                                                             |
| Surname:             | <input type="text"/>                                                                                                                                  |
| Names:               | <input type="text"/>                                                                                                                                  |
| Date of Birth:       | <div>...Select Day... <input type="text"/></div> <div>...Select Month... <input type="text"/></div> <div>...Select Year... <input type="text"/></div> |
| Gender:              | .....Select Your Gender From The List.....                                                                                                            |
| Residential Address: | <input type="text"/>                                                                                                                                  |
| Postal Address:      | <input type="text"/>                                                                                                                                  |
| Telephone Number:    | <input type="text"/>                                                                                                                                  |
| Mobile Phone Number: | <input type="text"/>                                                                                                                                  |
| Email Address:       | <input type="text"/>                                                                                                                                  |
| Fax Number:          | <input type="text"/>                                                                                                                                  |
| Username:            | <input type="text"/>                                                                                                                                  |
| Password:            | <input type="password"/>                                                                                                                              |
| Confirm Password:    | <input type="password"/>                                                                                                                              |
| Security Question:   | .....Select a Question from the list for Security Reasons.....                                                                                        |
| Answer:              | <input type="text"/>                                                                                                                                  |
| Role:                | .....Select Your Role From The List.....                                                                                                              |

**Authorized Access**

\*\*\*\*\*

Username:-

Password:-

[:- Forgotten Password?](#)  
[:- Register Now](#)  
[:- De-Register](#)

**Dwesa Headlines**

\*\*\*\*\*

August 14, 2008  
[Question over Wild Coast ....](#)  
 Some have been arguing from the outset that the valuation of \$18 million which Xolco have to pay.....[Read More.....](#)

23 August 2008  
[Redevelopment, Operation ....](#)  
 The Eastern Cape Development Corporation and Dwesa Cwebe Land Trust are partners in the operatio.....[Read More.....](#)

**Figure 4.9: User Registration Form**

After new users have filled in all the required details, they must click on the submit button to have their details recorded in order to grant then access to the service. However this is not an automatic process: there are certain verification stages that need to be followed before the user can be granted access to the system. The last text field to fill in on the registration form requires a user to select his/her role in a drop-down menu

between a Legal Authority and a Citizen. When the submit button is click, all the entered information is sent to a database table called *pre\_registration* for verification clarity.

After that, the system administrator will verify if the role that is chosen really agrees with the user that has filled the registration form. If the chosen role is correct, then that particular user will be granted access to the system and an e-mail notification message will be sent to the user telling him/her about the status of the registration. The correct registration details will then be sent to a database table called *users* in order to be recognized when the user attempts to login to the system.

If the chosen role is incorrect, the user will be denied access to the system and an e-mail notification message will also be sent. The system administrator may also edit the user's registration choice and grant him/her access to the system. All in all, this means that direct system access after user registration does not apply in this system. This is a method of differentiating between standard users and judicial officers and it also serves as part of the security features of the system.

#### **4.5.2 About Us**

The purpose of the About Us link of a website is to explain the organization's or website's purpose and what it provides to the users (Nielsen, 2008). The About Us link of our system explains the judicial vision and mission of the Dwesa e-Judiciary service. The mission of this link is to tell users about the services that are delivered to the rural community of Dwesa by this system. It also talks about the vision of this service in terms of what Dwesa judiciary would want to achieve in the struggle to deliver transparent justice to the community. The figure below shows the About Us page of the e-Judiciary service.



Figure 4.10: About the e-Judiciary Service Page

### 4.5.3 Contact Us

The purpose of the Contact Us Page is to help users of a certain website contact the particular organization, but what is contained on the webpage differs depending on the need of the concerned organization and developer (Wells, 2003). In the case of the e-Judiciary service, this webpage provides users with a map that shows where Dwesa is situated in the Eastern Cape Province of South Africa and contact details of the location. It also provides users with the physical and postal addresses, contact numbers and e-mail address so that a user can contact the Dwesa judiciary. The page furthermore displays the house of the Headman/Chief as it is the place where the judiciary operations occur, which is a situation that has already been discussed in the previous chapters. The following figure illustrates the Contact Us page of the system.

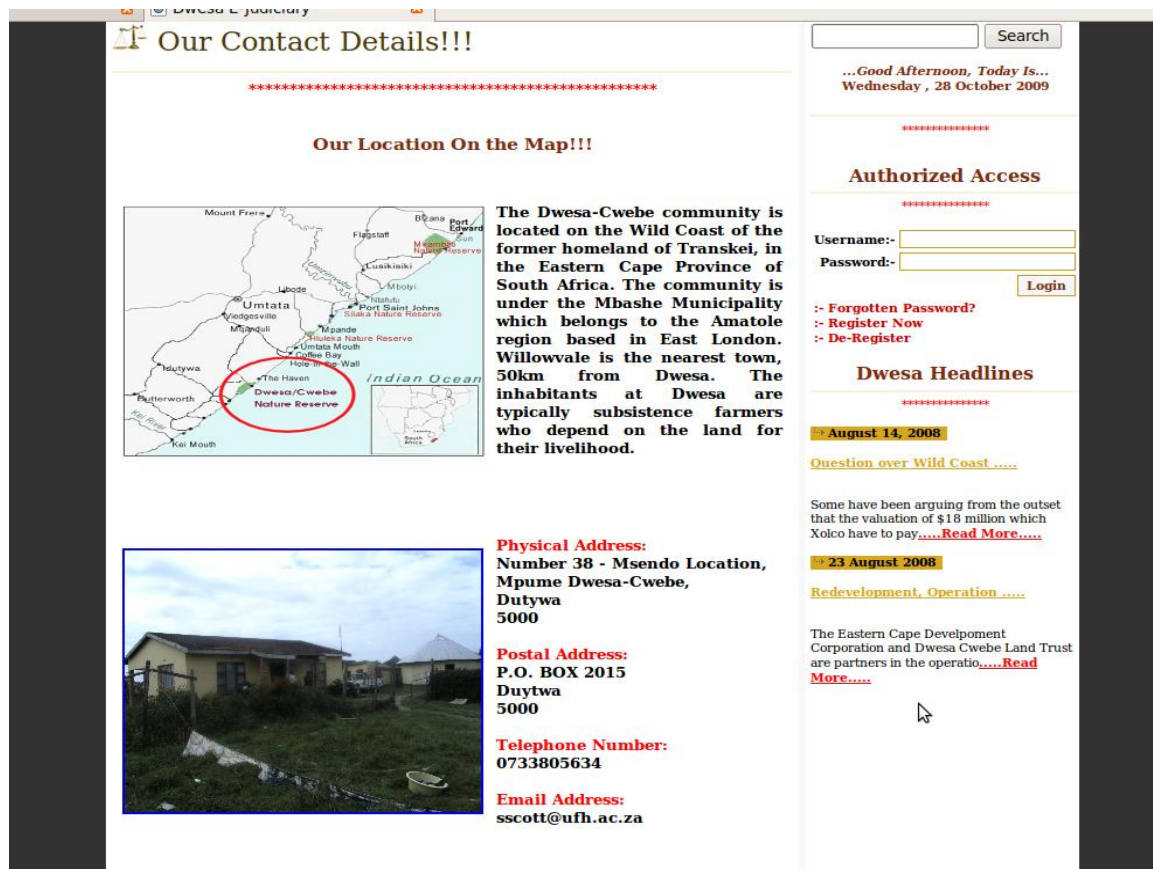
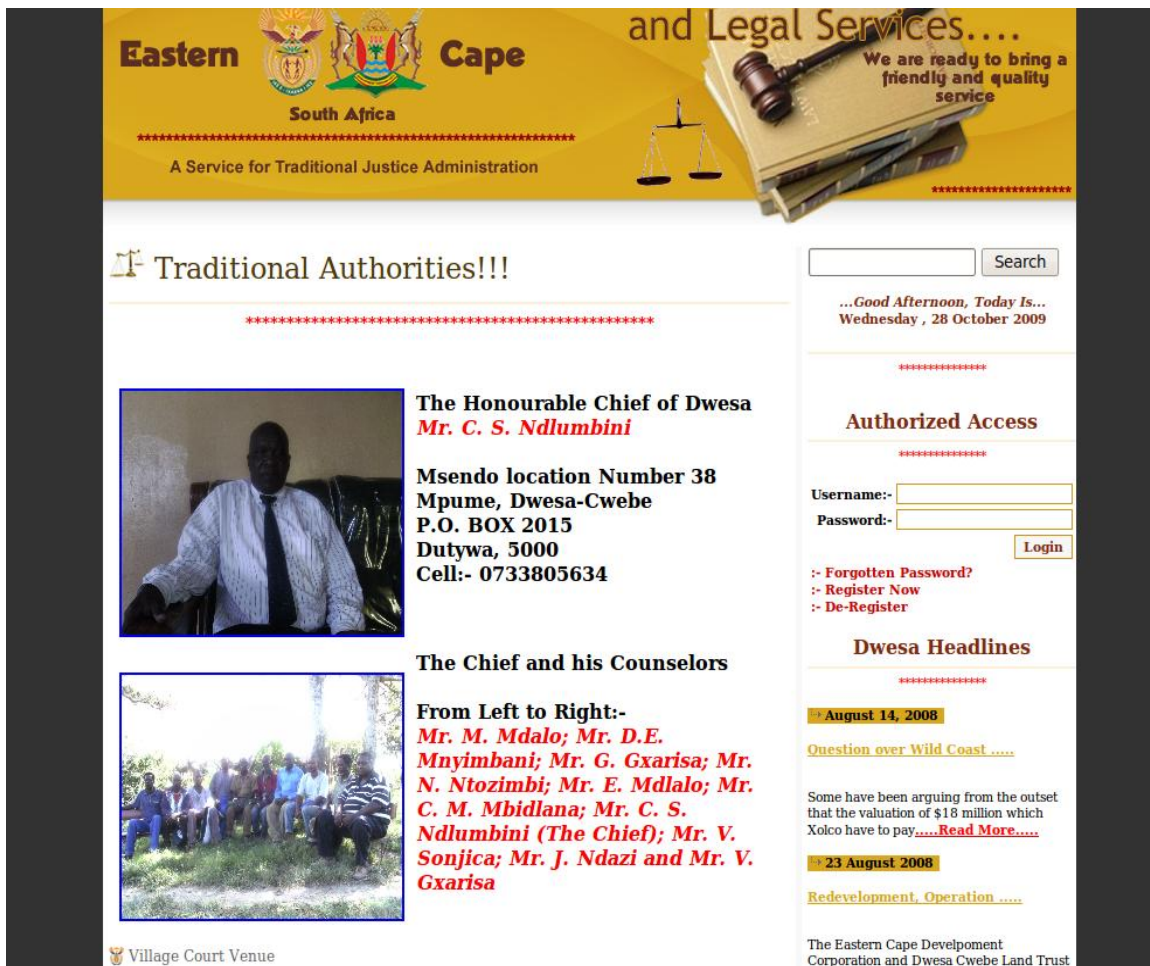


Figure 4.11: The Contact Page of the Service

#### 4.5.4 Traditional Authorities

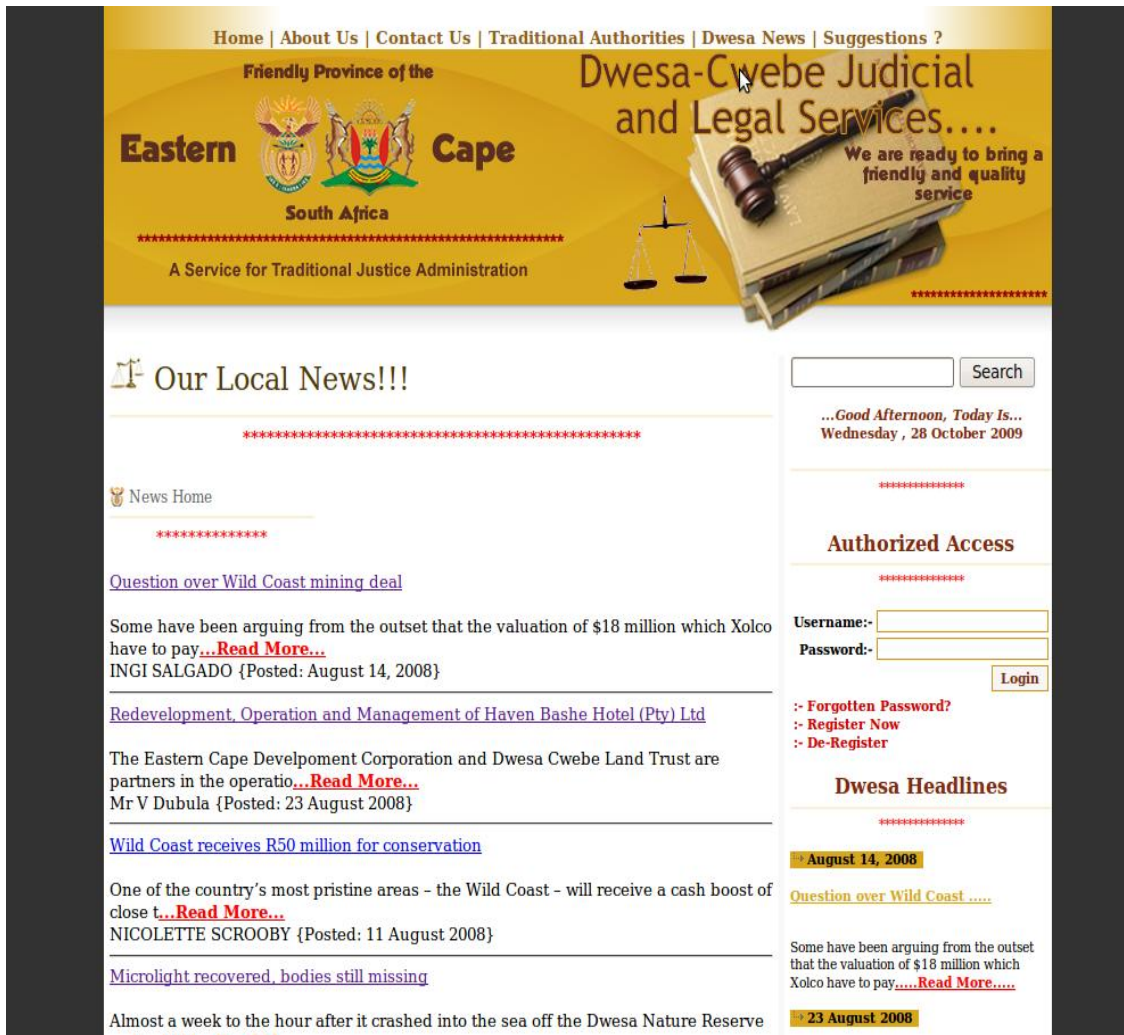
This link provides the users of the system with details of the traditional judicial authorities of Dwesa. It shows the picture, name, surname, full address and contact numbers of the Chief of Dwesa. In addition to this, the photographs and names of the Chief's Counsellors are also displayed. All the people that appear in the displayed picture are the right-hand men to the Chief and they all have different tasks in the traditional administration of justice at Dwesa. Their duties range from investigation to prosecution, if I may use the magistrate's court language. The following figure illustrates the webpage of the Dwesa traditional/judicial authorities.



**Figure 4.12: The Dwesa Traditional Authorities Page**

#### 4.5.5 Dwesa News

The Dwesa News link is responsible for providing users of the service with news about current events in the community. It distributes information about events that may be held at the nature reserve, local developments, and government initiatives that involve the local community members, information about Dwesa that appears in newspapers that are not accessible to the rural community, information announced on radio and TV and other interesting actions that may be possible. The following figure shows the Dwesa News page of the e-Judiciary service system.



**Figure 4.13: The Dwesa Local News Page**

### 4.5.6 Dwesa Suggestions

This link allows all users of the service to make queries, comments, suggestions, and ask questions about anything that relates to the service or the website. By clicking on the suggestions link, a form that requires the name, surname, e-mail address, subject and full message of the suggested query, comment, suggestion or question, together with the date will be displayed. After a user has completed the form and clicked on the submit button, the information will be sent to a database table called *suggestions*. The system administrator will take a good look at the posted suggestions and respond to the sender

after the suggestions have been dealt with accordingly. The following figure illustrates the form for posting suggestions regarding the e-Judiciary service.

**Eastern Cape South Africa**  
A Service for Traditional Justice Administration

**Dwesa e-Judiciary and Legal Services...**  
We are ready to bring a friendly and quality service

**Suggestions!!!**

.....Please send us a Comment, a Suggestion or a Question regarding our service. All fields are compulsory.....

|                      |                      |
|----------------------|----------------------|
| <b>Surname:-</b>     | <input type="text"/> |
| <b>Names:-</b>       | <input type="text"/> |
| <b>Email:-</b>       | <input type="text"/> |
| <b>Subject:-</b>     | <input type="text"/> |
| <b>Message:-</b>     | <input type="text"/> |
| <b>Date Posted:-</b> | <input type="text"/> |

**Authorized Access**

Username:-   
Password:-

[Forgotten Password?](#)  
[Register Now](#)  
[De-Register](#)

**Dwesa Headlines**

**August 14, 2008**  
**Question over Wild Coast .....**  
Some have been arguing from the outset that the valuation of \$18 million which Xolco have to pay....[Read More.....](#)

**23 August 2008**  
**Redevelopment, Operation .....**

The Eastern Cape Development

Figure 4.14: The Suggestions Page

## 4.6 Conclusion

This chapter has discussed how the e-Judiciary service system was designed and developed. The database tables with their fields and description were explained. The chapter furthermore discussed the back-end and front-end of the system. Scripting methods (client-side and server-side) were discussed as well. Finally, this chapter has given details about the structure and functionality of the different user interfaces.

# **Chapter Five**

## **System Implementation**

## 5.1 Introduction

The previous chapter explained the design and development of the e-Judiciary service. This chapter will explain the implementation of the e-Judiciary service system, connecting the basic functionality of the system to the relevant codes. It will discuss the templates used in the service, the administration system and the user connection to the MySQL database server. The security measures adopted in the system will also be discussed as well as how sessions are maintained. Finally, the usage of the system by community members and the system localization will be explained.

## 5.2 E-Judiciary System Templates

The system has three types of authorized users, as discussed in chapters 3 and 4. Templates are used to differentiate between these three users in terms of the allowed functionality in the system. Templating makes code simpler and shorter because the scripts are split into two, PHP and HTML (Sean, 2004). Furthermore, separating the two makes it easier to change the layout, because a web template is just a tool used to separate content from presentation in web design (Zeronese, 2008). A PHP template file is used on PHP web developments with two extensions, .tpl and .template extensions (ICRA, 2009).

The e-Judiciary system uses three different web templates for the three different authorized users, the *Admin.template* for the administrator, *Legal\_Authority.template* for the legal authorities, and *Citizen.template* for the citizens. There is an additional template used in all the webpages that require no authentication for the system. This is used as the default template of the system, for purposes such as redirecting users to the home page when they logoff the system. The default template is called *web.template*. Whenever one of the authorized users logs in to the system, he/she is directed to his/her own interface for operating, using this templating method. Redirecting and switching between the different user interfaces is done using PHP code. The following code segment shows how switching around the templates to reach the required interface is done.

```

<?php
$user_role = $_SESSION['Role'];
$included_template = "Admin.template";

switch ($user_role)
{
case Administrator:
$included_template = "Admin.template";
break;
case Citizen:
$included_template = "Citizen.template";
break;
case Legal_Authority:
$included_template = "Legal_Authority.template";
break;
default:
$included_template = "web.template";
}
?>

```

**Code Segment 5.1: Switching Between Templates**

The piece of code above uses a switch statement to check all the possible available templates and redirect the user to the appropriate template. Thereafter, when the appropriate template has been identified based on the role of the user, it is displayed as a web interface using the following code segment.

```

<?php
$BodyContentPane = ob_get_contents();
ob_end_clean();
include("$included_template");
?>

```

**Code Segment 5.2: Displaying the Template**

Therefore, all e-Judiciary system events that require users to authenticate themselves pass through this method to be granted access to their required web interfaces.

## 5.3 System Administration

As has already been discussed in chapters 3 and 4, the administrator is the overall manager of the e-Judiciary service and is responsible for controlling all the actions and operations occurring in the system. Furthermore, there are some administration rights that

are shared between the administrator and the judicial authorities, but the registration of users in the system is via the approval and activation of an administrator only. The administrator can add a new user to the system as an Administrator, Legal Authority or Citizen, depending on which role the particular user falls under. The following code segment illustrates the roles that an administrator may choose when he/she adds a new user to the system.

```
<tr>
  <td><label for="user"><strong>Role:</strong><br></label></td>
  <td><select name ="Role">
    <option value="...Select Role..." selected>.....Select Role.....</option>
    <option value="Citizen">Administrator</option>
    <option value="Legal_Authority">Legal_Authority</option>
    <option value="Citizen">Citizen</option>
  </select></td>
</tr>
```

### Code Segment 5.3: User Roles in the System

The above case is when self registration is difficult for users and an administrator is required to do the registration on their behalf. Another scenario is when users are registering themselves via the Register Now link on the home page of the system. In this case, users fill in their personal details themselves and wait for the administrator to verify if the chosen roles are correct or not. If the chosen role is incorrect, the administrator corrects it to what it is supposed to be, because the information appears as editable text fields on the administrator interface. This eliminates the delay of trying to communicate with the person who did the registration in order to change user details. If the chosen role is correct, the administrator activates the user to grant him/her access as an authorized member of the system.

When the administrator is about to activate users who have registered themselves in the system, he/she logs in to his/her interface and clicks on the Activate Users link under Manage Users. Thereafter, a table appears with the *Title*, *Surname*, *Names* and a *View* option to view the full details of each person. This is where the administrator does his/her

registration verification. The following code segment shows how the administrator requests user details for activation.

```
<?php
    $db_host = "localhost";
    $db_name = "ejudiciary_db";
    $db_user = "root";
    $db_pass = "bantu5522";

    $db_conn = mysql_connect($db_host,$db_user,$db_pass);
    if(!$db_conn){ die('Could not connect: ' . mysql_error());}
    mysql_select_db($db_name, $db_conn);

    $result = mysql_query("SELECT * FROM pre_registration");
?>
<?php
    echo "<table border='3'>
    <tr>
    <th>Title</th>
    <th>Surname</th>
    <th>Names</th>
    <th>View</th>
    </tr>";

?>
<?php
    while($row = mysql_fetch_array($result))
    {
        echo "<tr>";
        echo "<td>" . $row['Title'] . "</td>";
        echo "<td>" . $row['Surname'] . "</td>";
        echo "<td>" . $row['Names'] . "</td>";
        echo "<td>" . $row['View'] . "<a href='View_Full_Details.php?id=".$row['Mobile_Phone_Number']."'><b><font
color=#FF0000>Full Details</font></b></a></td>";
        echo "</tr>";
    }

?>
<?php
    echo "</table>";
    mysql_close($db_conn);
?>
```

#### Code Segment 5.4: Requesting User Details for Activation

If the administrator is satisfied with the registration after viewing the full details, the new user gets activated immediately.

The administration of the system also involves recording of legal information. Information that can be recorded in the system includes local cases, local criminal records, local judicial information, complaints, Dwesa news and information regarding

the Dwesa village court. Opening a local case, for example, may be done with the following code segment.

```
<?php
if($_POST['action']) {
    $Accuser=$_POST['Accuser']; $Accused=$_POST['Accused']; $Claim=$_POST['Claim'];$Defence=$_POST['Defence'];
    $Judgement=$_POST['Judgement'];$Day=$_POST['Day']; $Month=$_POST['Month']; $Year=$_POST['Year'];
    $Day1=$_POST['Day1']; $Month1=$_POST['Month1']; $Year1=$_POST['Year1'];

    $Date_Opened=$Day. $Month. $Year;
    $Judgement_Date=$Day1. $Month1. $Year1;

    if($Accuser == NULL || $Accused == NULL || $Claim == NULL || $Defence == NULL || $Judgement == NULL || $Date_Opened == NULL ||
    $Judgement_Date == NULL){?>
<br />
        <center><b><font color="red"><h2>TEXT REQUIRED!!!</h2></font></b></center>
        <center><b><br>You did not fill all the required entries.<br><br />Make sure that you fill the required fields,<br>
        Because all the fields are compulsory<br></b><p>
        <form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></center>
    <?php}
    else{
        include("config.php");
        include("opendb.php");

        $query1="SELECT Accused,Claim FROM LOCAL_CASES where Accused='$Accused' AND Claim='$Claim'";
        $usertest=mysql_query($query1);
        $num=mysql_numrows($usertest);

        if($num >0)
            $found=true;
        else
            $found=false;
        if($found==true) {
            ?>
<br />
            <center><b><font color="red"><h2>CASE ERROR!!!</h2></font></b></center>
            <center><b><br>Case with the person and claim you have entered already exist in the system...<br>Make sure that you open a
            different case..<br><br />
            <form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></b></center>
        <?php}
    else {
        $query = "INSERT INTO local_cases(Accuser, Accused, Claim, Defence, Judgement, Date Opened, Judgement_Date)
        VALUES('$Accuser', '$Accused', '$Claim', '$Defence', '$Judgement', '$Date_Opened', '$Judgement_Date')";
        mysql_query($query) or die('Error, inserting details failed');
    }
    ?>
<br /><br />
    <center><b>Thank you</b>
    <b>for successfully opening a new local case at the Dwesa judicial service...<br><br>

```

### Code Segment 5.5: Local Case Opening

Part of recording judicial information includes uploading recorded court hearings to the system. This is done by recording the hearings using a mobile phone or an mp3 recorder

and uploading the audio file. The recorded court hearings can be uploaded in the system with the following PHP code segment.

```
<?php
$directory_self = str_replace(basename($_SERVER['PHP_SELF']), '', $_SERVER['PHP_SELF']);
$uploadsDirectory = $_SERVER['DOCUMENT_ROOT'] . $directory_self . 'uploaded_files/';
$uploadForm = 'http://' . $_SERVER['HTTP_HOST'] . $directory_self . 'Upload_Form.php';
$uploadSuccess = 'http://' . $_SERVER['HTTP_HOST'] . $directory_self . 'Upload_Success.php';
$fieldname = 'file';
$errors = array(1 => 'php.ini max file size exceeded',
                2 => 'html form max file size exceeded',
                3 => 'file upload was only partial',
                4 => 'no file was attached');

isset($_POST['submit'])
    or error('the upload form is needed', $uploadForm);

($_FILES[$fieldname]['error'] == 0)
    or error($errors[$_FILES[$fieldname]['error']], $uploadForm);

@is_uploaded_file($_FILES[$fieldname]['tmp_name'])
    or error('not an HTTP upload', $uploadForm);
//@getimagesize($_FILES[$fieldname]['tmp_name'])
//or error('only image uploads are allowed', $uploadForm);
$now = time();
while(file_exists($uploadFilename = $uploadsDirectory.$now.'-'. $_FILES[$fieldname]['name'])) {
    $now++;
}
@move_uploaded_file($_FILES[$fieldname]['tmp_name'], $uploadFilename)
    or error('receiving directory insufficient permission', $uploadForm);
header('Location: ' . $uploadSuccess);
function error($error, $location, $seconds = 5){
    header("Refresh: $seconds; URL=\"$location\"");
    echo "<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN\".\"\\n\".
    \"http://www.w3.org/TR/html4/strict.dtd\">\".\"\\n\".
    '<html lang="en">\".\"\\n\".
    '    <head>\".\"\\n\".
    '        <meta http-equiv="content-type" content="text/html; charset=iso-8859-1">\".\"\\n\".
    '        <link rel="stylesheet" type="text/css" href="stylesheet.css">\".\"\\n\".
    '    <title>Upload error</title>\".\"\\n\".
    '    </head>\".\"\\n\".
    '    <body>\".\"\\n\".
    '        <div id="Upload">\".\"\\n\".
    '            <h1>Upload failure</h1>\".\"\\n\".
    '            <p>An error has occurred: ' . $error . '...</span>\".\"\\n\".
    '            <span class="red">\".\"\\n\".
    '                The upload form is reloading</p>\".\"\\n\".
    '        </div>\".\"\\n\".
    '    </html>\".\"\\n\".
    '    </html>\".\"\\n\".
    exit;
} // end error handler
?>
```

**Code Segment 5.6: Uploading Recorded Court Hearings**

The information in the system can also be updated in the case of typing errors and changes in the data due to investigation and other factors. Taking the Dwesa village court information as an example, if the contained information requires to be updated, the code segment below shows how this can be done.

```
<?php
    $Court_Date=$_POST['Court_Date'];
    $Venue=$_POST['Venue'];
    $Time=$_POST['Time'];
    $Topic=$_POST['Topic'];

    if($Court_Date == NULL || $Venue == NULL || $Time == NULL || $Topic == NULL)
    {
?>
<br />
        <center><b><font color="red"><h3>TEXT REQUIRED!!!</h3></font></b></center>
        <center><b><br>You did not fill all the required entries.<br>Make sure that you fill the required fields,<br></b>
        <form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></center>
    <?php
    }
    else {

        include("config.php");
        include("opendb.php");

        $query = "UPDATE hearings SET Court_Date='$Court_Date', Venue='$Venue', Time='$Time', Topic='$Topic' WHERE
        Venue='$Venue'";

        mysql_query($query) or die('Error, inserting details failed');
    ?>
    <br /><br />
    <center><b>You have successfully updated the Dwesa court hearing details....</b></center>
    <center><b>These are the newly updated court hearing details....</b></center>
    <center>
    <h3><font color="#FF0000">Court Date:-</font> <?php echo($Court_Date); ?></h3>

    <h3><font color="#FF0000">Venue:-</font> <?php echo($Venue);?></h3>

    <h3><font color="#FF0000">Time:-</font> <?php echo($Time);?></h3>

    <h3><font color="#FF0000">Topic:-</font> <?php echo($Topic);?></h3>

    </center><br>
    <b>Feel free to update the court hearing details at any time...<br><br></b>
    <?php
        include("closedb.php");
    }
?>
```

**Code Segment 5.7: Updating Hearing Details**

Information that is no longer needed can also be deleted from the system. Taking local crimes, as an example, when the reported crimes have been in the system for longer than necessary, the administrator can delete them. In this case only the suspect and the crime date are necessary to perform the deletion from the system. The code segment below shows how crimes can be deleted from the system.

```
<?php
    $Suspect=$_POST['Suspect'];
    $Crime_Date=$_POST['Crime_Date'];

    if($Suspect == NULL || $Crime_Date == NULL ){
?>
        <center><b><font color="red"><h3>TEXT REQUIRED!!!</h3></font></b></center>
        <center><b><br>You did not fill all the required entries.<br>Make sure that you fill the required fields,<br>
        Because both the fields are compulsory<br></b></p>
        <form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></b></center>
    <?php }
    else {
        include("config.php");
        include("opendb.php");

        $query1="SELECT Suspect,Crime Date FROM local_crime WHERE Suspect='$Suspect' AND Crime_Date='$Crime_Date'";
        $usertest=mysql_query($query1);
        $num1=mysql_numrows($usertest);

        if($num1 >0)
            $found=false;
        else
            $found=true;
        if($found==false){
?>
            <center><b><font color="red"><h2>CRIME DELETION ERROR!!!</h2></font></b></center>
            <p align="center"><font color="black"><strong>There is an error in the crime details you have entered!!!</strong></font></p>
            <p align="center"><font color="black"><strong>It appears that you have either entered the wrong <font color="red"><i>Name of the
            Suspect</i></font> and or the <font color="red"><i>Date when the crime was reported</i></font>...</strong></font></p>
            <p align="center"><font color="black"><strong>Please re-check your details carefully and re-type them again...</strong></font></p>
            <center><form><input type="button" value="Back" class="formbutton" onClick="history.back()">
            </form></center>
        <?php }
    else {
        $delete_query="DELETE FROM local_crime WHERE Suspect='$Suspect'";
        mysql_query($delete_query) or die('Error, deleting details failed');
?>
        <br /><br />
        <center><b>Thank you</b>
        <b>for successfully deleting old reported local crime at the Dwesa judicial service and the particulars of the local crime you
        have deleted are...<br><br></b>
```

### Code Segment 5.8: Deleting Local Crimes

## 5.4 MySQL Database

As has already been mentioned in chapter 4 we make use of a MySQL database server to safeguard all Dwesa judicial information. The MySQL database is the world's most popular open source database because of its fast performance, high reliability, ease of use, and high cost savings (Sun Microsystems, 2009 & WebMediaBrands, 2002). These advantages contributed to the choice of the MySQL database as the database component of the e-Judiciary system. The following sub-sections will focus on explaining the database component of the system.

### 5.4.1 Connection to MySQL Database

In the e-Judiciary system, the connection between the web server and the database is handled by PHP files. The first file used when handling the database connection is called **config.php** and is the first file to be called whenever there is a connection required to the database. It is called with the following instruction.

```
include("config.php");
```

This file defines the database name and authentication required to access the database. The segment of code below shows the system's database configuration file.

```
<?php  
$dbhost='localhost';  
$dbuser='root';  
$dbpass='bantu5522';  
$database='ejudiciary_db';  
?>
```

**Code Segment 5.9: Database Configuration File**

**\$dbhost** is the name of the MySQL server, **\$dbuser** is the username, **\$dbpass** is the password valid for authentication when accessing MySQL and **\$database** is the MySQL database name (Telligent Systems, 2009). This is the database where all the judicial

information is kept. When the Web Server is on the same machine with the MySQL server, as in this implementation, localhost or 127.0.0.1 is used as the value of **\$dbhost**. For use with a remote database, the database location has to be specified (Telligent Systems, 2009).

## 5.4.2 Opening the Connection

When the required connection to the database has been established, it needs to be opened. This is done with a small segment of PHP code. The file that is used to open the established connection is called **opendb.php**. This file is called immediately after the web server has run through the connection file and is called with the following instruction.

```
include("opendb.php");
```

There are two possible constraints to the ‘opening’ operation. The first is that the authentication details found from **config.php** are correct. The second constraint is that the file exists and cannot be opened. The error message displayed is “Error connecting to mysql” and the following segment of code shows the file for opening the database connection.

```
<?php
$conn = mysql_connect($dbhost, $dbuser,$dbpass);
@mysql_select_db($database) or die ('Error connecting to mysql');
?>
```

### Code Segment 5.10: Opening the Database Connection

## 5.4.3 Closing the Connection

After the required execution of the PHP script has been done, the connection must be ended by closing the database. This is done by a file called **closedb.php** and is called with the following include function.

```
include("closedb.php");
```

Below is the segment of code for how the database connection is closed. It uses **\$conn**, which is the variable used to open the database when opening the connection from **opendb.php** (Telligent Systems, 2009).

```
<?php  
mysql_close($conn);  
?>
```

#### Code Segment 5.11: Closing the Database Connection

### 5.4.4 MySQL Database Functions Used

MySQL functions allow users to access the database server using PHP scripts (The PHP Group, 2009). Users access the MySQL database server through a web application sitting on an end-user workstation. In this scenario, the MySQL database server is accessed remotely. The connection between end-user workstation and the database server is done through a web server. There were a number of MySQL functions that were used during the design and development of the e-Judiciary service.

- ❖ **mysql\_connect():** This functions opens a connection to the MySQL database server (Ippolito, 2009).
- ❖ **mysql\_query():** This function sends an SQL query to the MySQL database server (Ippolito, 2009).
- ❖ **mysql\_select\_db:** This function selects a MySQL database to use (Ippolito, 2009).
- ❖ **mysql\_numrows():** This function returns the number of rows in results (Ippolito, 2009).
- ❖ **mysql\_result():** This function returns the contents of one cell from a MySQL result set (Ippolito, 2009).

## 5.5 E-Judiciary System Security

When the system has been fully designed and the communication has been established, the most important security aspect to consider is to ensure privacy and authenticity of the information available in the system. The following sub-section will explain the security measures that were implemented in the service.

### 5.5.1 User Authentication

The role of the users of the e-Judiciary service differs and is given during the registration process. All authorized system users should authenticate themselves using the correct username and password. As already discussed in chapter 3, users have different privileges on the system, determined by their role. When the user logs in, the role is retrieved from the users table. The following segment of code will open the PHP webpage that corresponds to the role of the user that has logged onto the system.

```
$_SESSION['Role'] = $UserRole;

if($UserRole=='Administrator'){ ?>
<script language="javascript">
window.location = 'Administrator.php';
</script>
<?php }
elseif($UserRole=='Legal_Authority'){ ?>
<script language="javascript">
window.location = 'Legal_Authorities.php';
</script>
<?php }
elseif($UserRole=='Citizen') { ?>
<script language="javascript">
    window.location = 'Citizens.php';
</script>
<?php }
```

**Code Segment 5.12: Directing Users to the Correct Interface**

The session role in this code is used to differentiate the roles of different users. Once a user has successfully logged onto the system, the session role is created.

In the e-Judiciary service, users might be prevented from accessing certain webpages of the system. This is done using the user role and the sessions. The code below shows how users can be denied access from webpages which they have no right to access.

```
<?php
    if (!isset($_SESSION['Role'])){
        header("Location:index.php");
    }
    else if ($_SESSION['Role'] != 'Administrator'){
        header("Location:".$_SESSION['Role'].".php");
    }
?>
```

#### **Code Segment 5.13: Denying Webpage Access to Unauthorized Users**

This previous segment of PHP code helps to keep track of authenticated system users with the help of sessions (Zonneveld, 2006). In this code, the user role is the administrator, meaning that if a certain user attempts to access some of the webpages of the administrator portal without authorization, say by typing the name of the webpage he/she wants to access on the URL, that person will automatically be redirected to the home page (*index.php*) of the system, denying him/her access.

### **5.5.2 User and System Communication**

All authorized users make use of a username and a password to communicate with the system. This is part of the security measures of the system. The username for all users must be unique in the system. During registration, the proposed username is searched for in the users table in the database to avoid duplications. If it is not there, then it is unique. The code below shows how a unique username can be chosen by comparing it with the ones available in the system.

```

include("config.php");
include("opendb.php");
$query1="SELECT Username FROM users WHERE Username='$Username'";
$user_test=mysql_query($query1);
$num=mysql_numrows($user_test);

    if($num >0)
        $found=true;
    else
        $found=false;
    if($found==true) {
?>
<br />
<center><b><font color="red"><h2>USERNAME ERROR!!!</h2></font></b></center>
    <p align="center"><font color="black"><strong>The Username you have chosen is already being used by someone else.</
strong></font></p>
    <p align="center"><font color="black"><strong>Please register again and try to use different Username</strong></font></p>
    <center><form><input type="button" value="Back" class="formbutton" onClick="history.back()">
    </form></center>

```

**Code Segment 5.14: Choosing a Unique Username**

The password does not need to be unique. The only important feature is that a user must enter the password twice and the two instances must be exactly the same. If they are not the same, an error will be displayed to the user. The segment of code below shows how the matching of passwords is done.

```

<?php
}
elseif($Password != $Confirm_Password){
?>
<br />
<center><b><font color="red"><h2>PASSWORD ERROR!!!</h2></font></b></center>
<center><b><br>The passwords you have entered do not match.<br>Make sure that you fill similar password values<br><br />
<form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></b></center>

```

**Code Segment 5.15: Choosing a Correct Password**

### 5.5.3 System Messaging

The e-Judiciary service uses automatic messaging to send private information to designated users. This is a way of ensuring the security of the users' information.

Automatic messaging was chosen because the information sent to the user must only be read by that particular user. In the system, this type of messaging service is used, for example, to send forgotten passwords to an email address.

The automatic email messaging service required the installation of two PHP modules to work effectively, *php mail* and *php-net-smtp* (nixCraft, 2004). The segment of code below shows how the automatic email is generated.

```
<?php
/*sending automatic e-mail for password*/

require_once "Mail.php";

$from = "sscott@ufh.ac.za"; $to = $email; $subject = "Your login password";

$greet='Hello, '.$Username;
$stmt="\n\n Thank you for asking for your password. Your password is ";
$motivation="\n The Dwesa E-Judiciary is willing to give you reliable services.
Make sure that you dont forget your login password again.\n\n
Contact us at :\n email address: sscott@ufh.ac.za\n Telephone number: 0406022464";

$body = $greet. $stmt. $password. $motivation;

$host = "al-tsc-cl01-ex.ufh-domain.local";
$username = "sscott@ufh.ac.za"; $password = "bantu";

$headers = array ('From' => $from, 'To' => $to, 'Subject' => $subject);
$mail = Mail::factory('smtp', array ('host' => $host, 'auth' => true, 'Username' => $Username, 'Password' => $Password));

$mail = $smtp->send($to, $headers, $body);

if (PEAR::isError($mail)) {
    echo("<p>" . $mail->getMessage() . "</p>");
} else {
    echo("<p><center>Your password has been sent to your e-mail<br>Please check your e-mail !!!</center></p>");
}
}

if($found==False)
    echo('<center><font color="red"><b><h2>Your input details do not match !!!</h2></b></font><br><b> Please try again and enter
the correct details</b></center>');
}
}
?>
```

**Code Segment 5.16: Sending an Automatic Email**

## 5.6 System Use by the Community

The Dwesa e-Judiciary system was designed to be used by all community members, provided that they register themselves on the system. This means that all authorized users are responsible for all interactions and occurrences on the system. As already discussed in chapter 3 and 4, community members have no rights of performing administrative duties in the system and their duty is to make use of the service for their legal needs only. Community members can also perform recording of legal information in the system. For example, they can post their complaints and they can report suspected crime using the web interface. However, the main tasks they can perform on the system involve viewing legal information pertaining to their judicial needs.

Taking local criminal records as an example, the following PHP code segment shows how the information can be viewed from the system.

```

<?php
    include("config.php");
    include("opendb.php");
    $query="SELECT * FROM local_criminal_records";
    $result=mysql_query($query);
    $num=mysql_numrows($result);
    if($num >0)
        $found=true;
    else
        $found=false;
    if($found==false) {
?>
<center><b><font color="red"><h2>LOCAL CRIMINAL RECORDS!!!</h2></font></b></center>
<p align="center"><font color="black"><strong>There are no Local Criminal Records available in the system...</strong></font></p>
<p align="center"><font color="black"><strong>Please check again later...</strong></font></p>
<center><form><input type="button" value="Back" class="formbutton" onClick="history.back()">
</form></center>
<?php }
    else {
        $i=0;
        while ($i < $num) {
            $Offender_Name=mysql_result($result,$i,"Offender Name");
            $Offence_Committed=mysql_result($result,$i,"Offence Committed");
            $Date_Offence=mysql_result($result,$i,"Date Offence");
            $Judgement_Offence=mysql_result($result,$i,"Judgement Offence");
            $Judgement_Date=mysql_result($result,$i,"Judgement Date");
?>
<table width="100%" border="3" cellpadding="3" style="font-size:8pt;">
    <tr><td width="96"><label for="user"><strong>Name of Offender:-</strong><br></label></td>
    <td><?php echo($Offender Name); ?></td></tr>
    <tr><td><label for="user"><strong>Offence Committed:-</strong><br></label></td>
    <td><?php echo($Offence_Committed); ?></td></tr>
    <tr><td><label for="user"><strong>Date of Offence:-</strong><br></label></td>
    <td><?php echo($Date_Offence); ?></td></tr>
    <tr><td><label for="user"><strong>Judgement of Offence:-</strong><br></label></td>
    <td><?php echo($Judgement_Offence); ?></td></tr>
    <tr><td><label for="user"><strong>Judgement Date:-</strong><br></label></td>
    <td><?php echo($Judgement_Date); ?></td></tr>
</table><br>
<?php
    $i++;
    }
}
include("closedb.php");
?>

```

### Code Segment 5.17: Viewing Local Criminal Records

The contents that will be displayed by this code to the user are the name of the offender, the type of offence committed, the date when the offence was committed, the judgement that was given for that offence, and the date when the judgement was given. When community members are unhappy about certain things happening in their area, for example the operation and certain procedures of their traditional judiciary, they can login to the system and post a complaint. That particular complaint will later be viewed and

attended to by the legal authorities. The following code shows how complaints can be posted and recorded in the system.

```
<?php
if($_POST['action']) {
    $Complainant=$_POST['Complainant'];
    $Complaint=$_POST['Complaint'];
    $Day=$_POST['Day']; $Month=$_POST['Month']; $Year=$_POST['Year'];

    $Complaint_Date=$Day. $Month. $Year;

    if($Complainant == NULL || $Complaint == NULL || $Complaint_Date == NULL ){
    ?>
    <br />
        <center><b><font color="red"><h2>TEXT REQUIRED!!!</h2></font></b></center>
        <center><b><br>You did not fill all the required entries.<br>Make sure that you fill the required fields,<br>
        Because all the fields are compulsory<br></b></p>
        <form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></center>
    <?php
    }
    else{
        include("config.php");
        include("opendb.php");
        $query1="SELECT Complainant,Complaint FROM COMPLAINTS where Complainant='$Complainant' AND Complaint='$Complaint'";
        $usertest=mysql_query($query1);
        $num=mysql_numrows($usertest);
        if($num >0)
            $found=true;
        else
            $found=false;
        if($found==true) {
    ?><br />
    <center><b><font color="red"><h2>COMPLAINTS ERROR!!!</h2></font></b></center>
    <center><b><br>The complaint you have entered already exist in the system...<br>Make sure that you post a different
    complaint...<br><br />
    <form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form></b></center>
    <?php }
        else {
            $query = "INSERT INTO complaints(Complainant, Complaint, Complaint_Date)
                VALUES('$Complainant', '$Complaint', '$Complaint_Date')";

            mysql_query($query) or die('Error, inserting details failed');
    ?>
    <br /><br />
    <center><b>Thank you</b>
    <b>for successfully posting a complaint at the Dwesa judicial service...<br><br>
    The particulars of your complaint are:-</b>
    <h3><font color="#FF0000">
```

**Code Segment 5.18: Posting Local Complaints**

The information that is posted in the system and sent to the legal authorities by this code is the name of the complainant, the type of complaint, and the date when the complaint was posted. These complaints help the Dwesa traditional judiciary to have a sense of how community members feel about the service they deliver to them. To the community members these complaints serve as a method of articulating needs that cause dissatisfaction. In essence, this method helps them to communicate with their judiciary without having to make appointments to voice their concerns.

The community members are also responsible for managing their own user accounts. This is done by clicking the Edit Profile link on the citizen's web interface after logging on. To change the user's login password there is a separate link called Change Password. The code below illustrates how a community member can edit his/her profile.

```

<?php
    include("config.php");
    include("opendb.php");
    $Username = $_SESSION['user'];
    $query1="SELECT * FROM users WHERE Username='$Username' ";
    $result=mysql_query($query1);$num=mysql_numrows($result);$i=0;
    while ($i < $num) {
        $Title=mysql_result($result,$i,"Title");$Surname=mysql_result($result,$i,"Surname");
        $Names=mysql_result($result,$i,"Names");$Date_of_Birth=mysql_result($result,$i,"Date_of_Birth");
        $Gender=mysql_result($result,$i,"Gender");$Residential_Address=mysql_result($result,$i,"Residential_Address");
        $Postal_Address=mysql_result($result,$i,"Postal_Address");$Telephone_Number=mysql_result($result,$i,"Telephone_Number");
        $Mobile_Phone_Number=mysql_result($result,$i,"Mobile_Phone_Number");
        $Email_Address=mysql_result($result,$i,"Email_Address");$Fax_Number=mysql_result($result,$i,"Fax_Number");
    }
?>
<form method="post" class="submit" action="Insert Edited Details.php">
<table width="100%" border="3" cellpadding="3" style="font-size:10pt;">
    <tr><td width="96%"><label for="user"><strong>Title:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Title" value="'. $Title.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Surname:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Surname" value="'. $Surname.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Names:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Names" value="'. $Names.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Date of Birth:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Date_of_Birth" value="'. $Date_of_Birth.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Gender:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Gender" value="'. $Gender.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Residential Address:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Residential_Address" value="'. $Residential_Address.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Postal Address:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Postal_Address" value="'. $Postal_Address.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Telephone Number:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Telephone_Number" value="'. $Telephone_Number.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Mobile Phone Number:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Mobile_Phone_Number" value="'. $Mobile_Phone_Number.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Email Address:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Email_Address" value="'. $Email_Address.'" size="45" >'); ?></td></tr>
    <tr><td><label for="user"><strong>Fax Number:</strong><br></label></td>
    <td><?php echo('<input type="text" name="Fax_Number" value="'. $Fax_Number.'" size="45" >'); ?></td></tr>
</table><br><center>
<input type="submit" value=" SUBMIT " class="formbutton" onclick="return confirm('Your details will be changed and make sure
that the data you have entered in the fields is correct. Do you want to continue?')" >
<form><input type="button" value="Back" class="formbutton" onClick="history.back()"></form>
</center></form>
<?php $i++; } include("closedb.php"); ?>

```

**Code Segment 5.19: Edit Personal Details**

## 5.7 System Localization

The e-Judiciary service has been translated into the home language of the Dwesa community, which is isiXhosa. This has been done to accommodate all the community members because a majority of them cannot read English, but they can read their home language. This effort was also necessary to make sure that the system is understandable and usable by the targeted community. Language localization of the system also made it

easy to market the system to its intended users. This was a very useful strategy to decrease user problems regarding the system and its contents because everything they want to know in the service is there, written in a language they understand.

At the current moment the e-Judiciary service is available in two languages, English and isiXhosa. The two languages are stored in a database table called languages. The segment of code below shows how the system language can be changed from the languages that are available in the database table.

```
<form method="post" action="language.php">
<div align="right">
<select name="language" >
<?php
    include("config.php");
    include("opendb.php");
    $query="SELECT language FROM languages";
    $result=mysql_query($query);
    $rows=mysql_fetch_array($result);
    while($rows=mysql_fetch_array($result)){
?>
<option value=<?php echo $rows['language'];?><?php echo $rows['language'];?></option>
</select>
<input type="submit" name="button" id="button" value="Select">
</div>
</form>
```

#### **Code Segment 5.20: Changing the System Language**

The above code connects to the database to locate the required language. Thereafter, it makes use of the instruction in the first line of the above code to open the required language configuration file. These files are called *English.config* and *isiXhosa.config*. The English configuration file contains all the words that are supposed to be translated into isiXhosa and their translated version appears in the isiXhosa configuration file.

## **5.8 Conclusion**

This chapter has introduced and discussed the implementation of the e-Judiciary service web application. It has discussed the implementation of the system templates and the major components of the system administration. Connecting users to the MySQL database server has also been explained. The security measures that were taken during the implementation of the system were also discussed in detail. This chapter concluded by explaining the usage of the system by the community members and the system localization.

# **Chapter Six**

## **Results and Evaluation**

## **6.1 Introduction**

The previous chapter introduced and explained the implementation of the e-Judiciary service application with the focus on highlighting the connection of the basic functionality of the system to the relevant programming code. This chapter starts with a discussion of the results obtained from the initial testing of the system. Thereafter, it discusses the evaluation and system usability testing. The chapter concludes by giving a discussion of the system after the initial usability testing results.

## **6.2 System Usability Testing**

The testing of the e-Judiciary service was mainly based on the usability of the system and this was a necessary step to accomplish before releasing the system for public use. Key areas that were followed when the testing was conducted included enabling the participants to analyse the information obtained in the system and be able to make changes according to their needs. Another important feature was the involvement of real users of the system in the testing, which was important to improve the system usability. During the testing sessions, users of the system were given tasks to accomplish as a method of observing and recording their actions in order to observe how well were they listening during the training.

There were a number of factors that were observed from the tasks given to the users to accomplish. Some of the factors included the speed at which the given task is performed, the time for users to learn specific functions, the time to read instructions, and the rate and type of errors made by the users. Based on the approach used to test the system, it has been noted that web application usability testing needs to be performed with the real users of the end product. It has also been noted that usability testing takes more time to be accomplished as intended users take a long time trying to familiarize them with the system, and also trying to find that there is no missing information based on what the service was designed to produce.

Conducting the usability testing in the e-Judiciary service helped to validate the design and implementation of the system. In the process the developer was also informed about how easy or difficult it is to make use of the system and what the users were expecting from the system. Furthermore, the users of the service also developed a sense of ownership for the system and this is provided that more time and training may be dedicated to them in order to fully understand the e-Judiciary web system. Based on that point, the developer found that with more training conducted with willing users, the system can be integrated into the environment more easily and quickly. In essence, other community members will depend on those who fully understand how the e-Judiciary service works and can later be trained by them on how to use the system.

### **6.3 Testing Results**

The system testing required four steps. The first step was to explain thoroughly to the users how the system was designed, its functionality and what was contained in it. In the second step, the users were taught and trained on how to make use of the system. In the third step, the users were given a chance to make use of the system on their own, with minimal assistance from the developer. Finally, the users were given questionnaires to go through and fill them in with the assistance of the developer. The questionnaires were designed in their own language, which is isiXhosa, and were made part of the test in order to allow users to evaluate the e-Judiciary system anonymously. This method was also meant to allow them to raise issues they feel are necessary, but are afraid to express.

The training of the users and testing of the system was a challenging task to accomplish because the majority of the users who were present during the test required more time to be trained as they were old age. Another challenge that was faced by the developer was that some of the users do not practice computer literacy skills on a regular basis and required to be reminded some of the basic functions of the keyboard and mouse. One important thing about the users who were present during the testing is that, a majority of

them can actually read their language quite fluently which made it easy for them to follow the system a little bit faster than expected.

After training the users, the system was tested successfully and most those who were present throughout the duration of the training were slowly able to do the following:

- ❖ Read information available in the system, e.g. Home page message.
- ❖ Register in the system.
- ❖ Login and logout in the system.
- ❖ Request forgotten passwords.
- ❖ De-register themselves.

Although the computer literacy training still needs to be improved by these users, room for improvement is possible provided that they practice using the system on a daily basis until they are perfect. The legal authorities (the Chief and some of his Counsellors) require more training on how to use the system because their interface has a lot of information recording which involves a certain portion of administration duties. For now they are slowly able to do the following:

- ❖ Record, view, update and delete local cases
- ❖ Record, view and update local criminal records
- ❖ Record, view, update and delete village court dates and hearings

The citizens' interface is the simplest of the system because it mostly consists of links for viewing information and has only two links for recording data, which are for posting complaints and reporting suspected local crime, as already mentioned under the evaluation section. All the users who make use of the citizen's interface are able to view all kinds of judicial information that is available in the system. The fact that the system is written in isiXhosa makes browsing of the system easy and allows the users to search for what they need with minimal assistance. This makes the system interesting to the users.

### 6.3.1 Participants' Basic Understanding

As already mentioned earlier in section 6.4, the last stage of the system testing was based on giving the participants questionnaires to fill in order to give feedback to the developer about the system. The purpose of the questionnaires was to check what the participants have understood during the testing sessions and what needs to be fixed from the system. The following are questions that were asked from the questionnaires and the answers that were provided by the participants:

#### ❖ What is the range of their age?

As already mentioned their ages range between thirty and over sixty. The graph below shows the age range of the participants. It shows that there were two participants that were less than thirty years of age and there were four who ranged between thirty and forty years. Another four participants were ranging between forty and fifty years, whilst five of them were between fifty and sixty years old. There were only three participants that were over the age of sixty years.

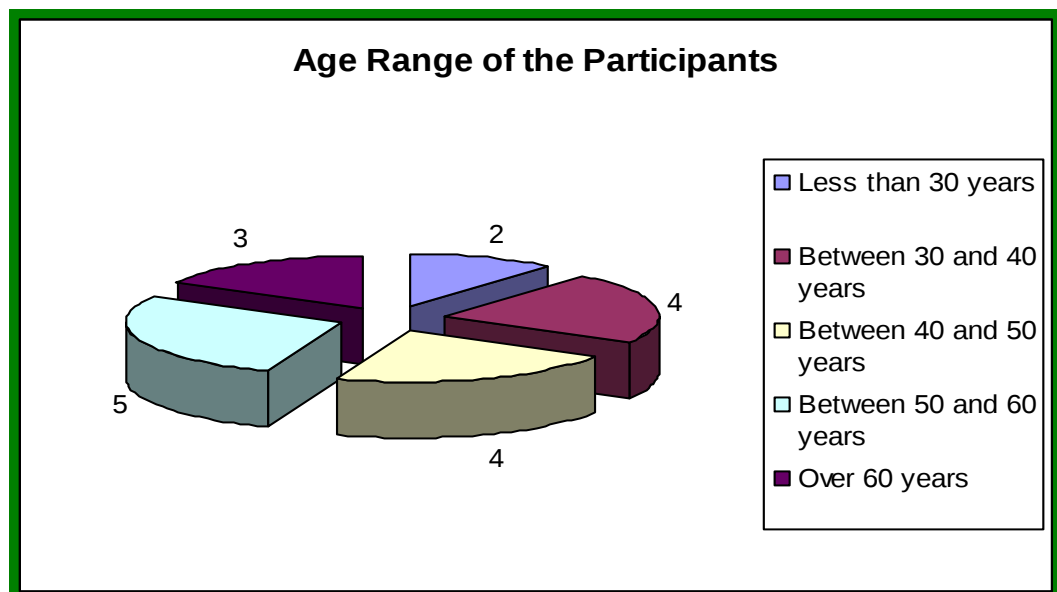
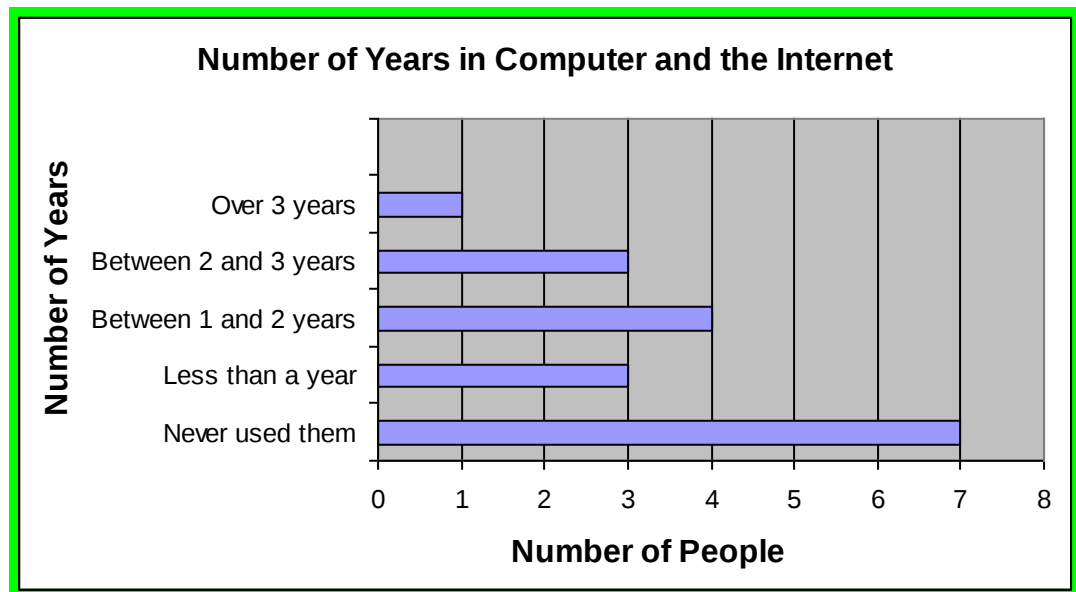


Figure 6.1: Age Range of the Participants Chart

❖ **How many years have they been using computers and the Internet?**

Four of the participants have used computers for a period of one to two years and three of them for a period of less than a year. There were only three participants that have used computers for period of two to three years and only one of them has used computers for more than three years. Seven of the remaining participants have not used computers at all. The following graph illustrates how frequently the participants have been using computers and the Internet.



**Figure 6.2: Number of Years using Computers Chart**

❖ **What is their home language?**

All of them speak isiXhosa.

❖ **Which language do they use frequently?**

They all use isiXhosa.

❖ **Is the language they have chosen above the one they use to communicate with other community members?**

They all answered yes.

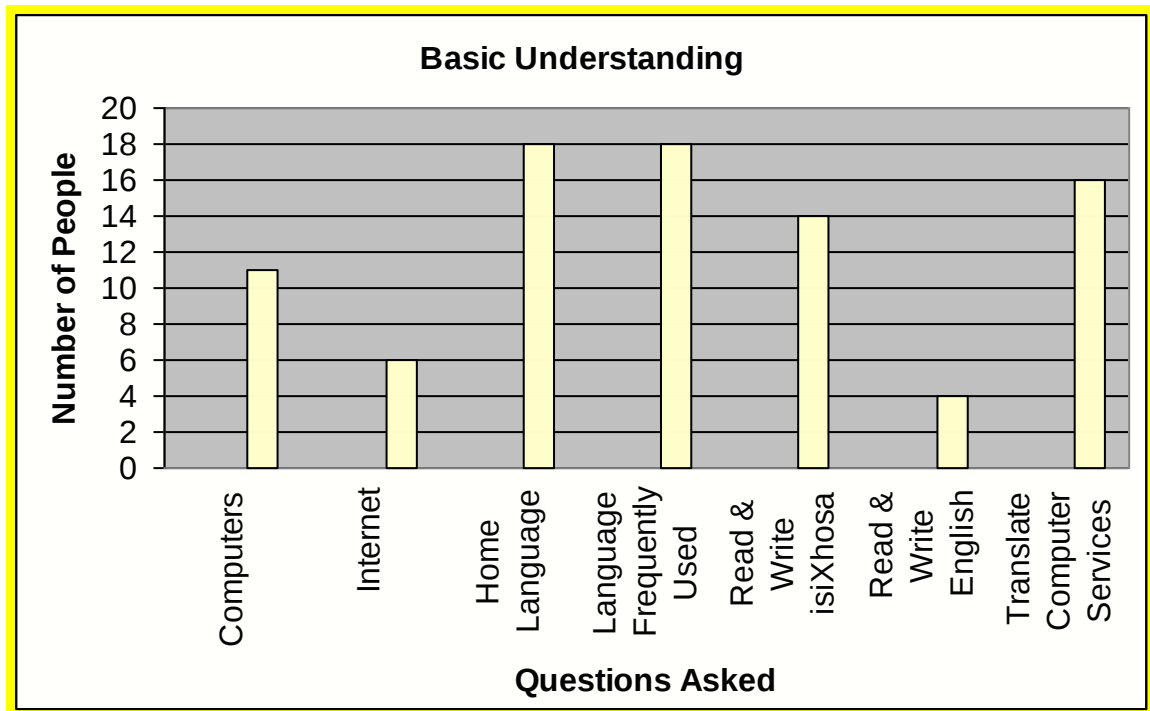
- ❖ **Do they think if computers and the Internet were using their language it would make it more interesting to use them?**

They all answered yes.

- ❖ **Do they think computer services should be translated into different languages in order to ease their use?**

All said yes, because if computers may use different languages all people may have a chance to use them, and that would make people choose the language they prefer to use. This would also give an opportunity to those who cannot read other languages like English, but can read their home language.

The above questions were the introduction of the questionnaire and were meant to check the basic understanding of the participants. These basic questions formed a very important part of the training and testing sessions because they gave the developer an idea of how to train the participants. They also showed which parts from the tests needed serious attention. The chart below is an overall graph of all the questions that were based on the basic understanding of the participants and shows how they answered the above questions.



**Figure 6.3: Basic Understanding Chart**

The total number of participants was eighteen during the evaluation. The graph shows that there were eleven people who have been using computers and six of them have used the Internet before. The graph also shows that all the participants' home language is isiXhosa and it is the language they use most frequently in their everyday lives. It also appears from the total number that, fourteen of the participants can read and write isiXhosa, and four of them can read and write English. In the participants sixteen of them strongly felt that the computer services need to be translated into different languages to allow access to everyone. Although the majority felt the same, there were two participants who were not completely sure of what the language translation would change as they are absolutely illiterate. This gave the developer the idea of an accessibility option via audio based services as a future extension to the system.

### **6.3.2 Participants' Interface Understanding**

This section of the questions was based on checking whether how the participants understood the interfaces of the e-Judiciary service.

❖ **Do they think that the Dwesa judicial information stored in a computer would be useful to the community?**

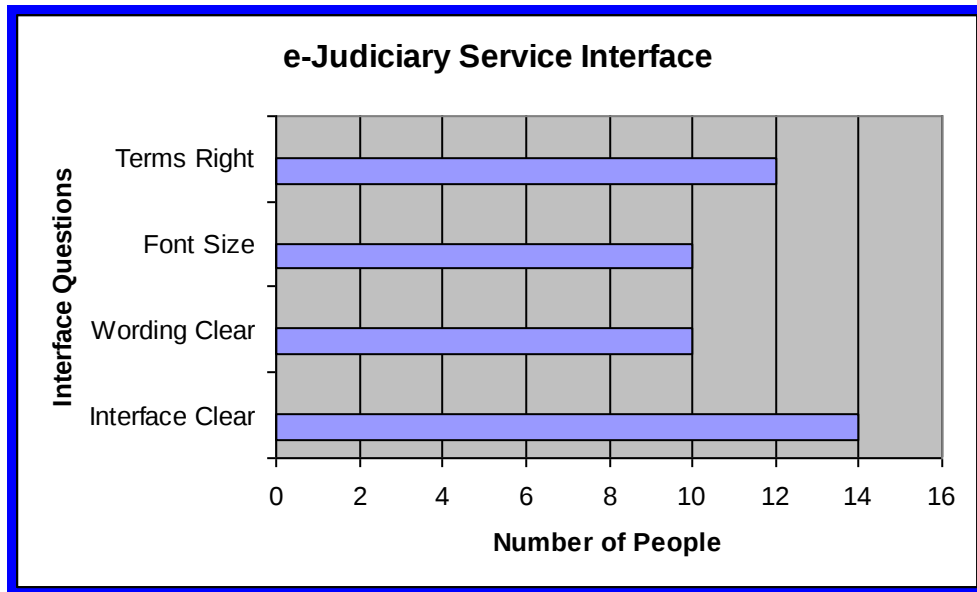
They all answered yes, because their valuable judicial information will no longer be lost and will always be available at any time for many years to come. They also said the community will now have a place to refresh their memories in the case of forgotten procedures and operations.

❖ **Does the Dwesa e-Judiciary service interface look good for the service it provides?**

They all answered yes, because it clearly shows the name of their community which is Dwesa and of their Province which is the Eastern Cape and the colours that were used are not too dull or too bright for their eyes.

❖ **Is the wording and font size from the Dwesa e-Judiciary service interface clear?**

Ten of them replied with a yes and eight of them who use spectacles said some of the font sizes are a little bit small and need to be increased, or otherwise a person needs to be closer to the monitor to see them clearly. This was quickly dealt with by the developer by increasing the font size. Twelve of the participants were happy with the terms used, although six of them were not very sure about the correct meaning of the terms. The following graph shows how the participants felt about the interface and its wording.



**Figure 6.4: e-Judiciary Service Interface Chart**

❖ **Is the meaning of the words or terms used in the service understandable?**

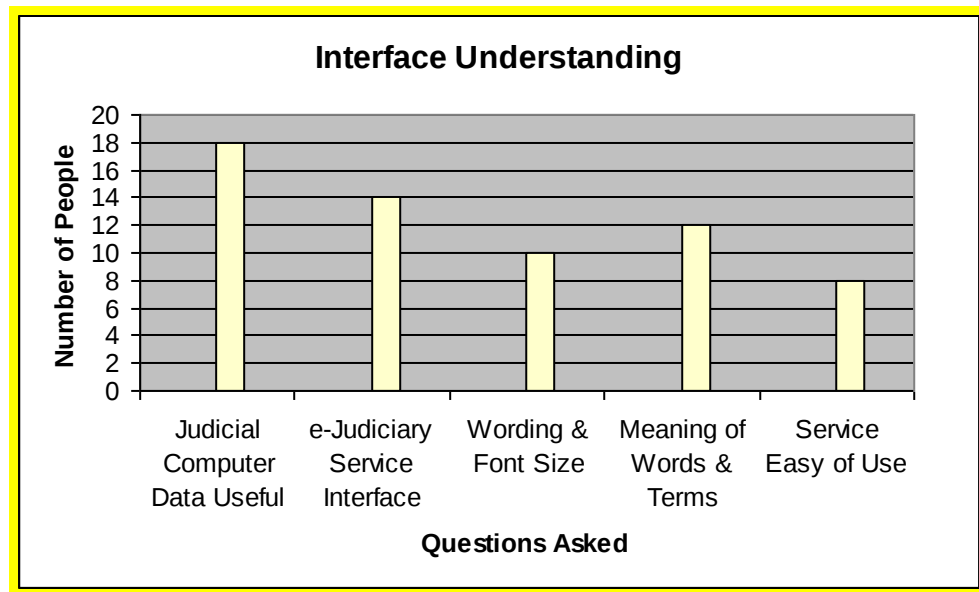
All replied with a yes, because all the words were translated into simple isiXhosa which was never a problem to them because they are used to deeper isiXhosa than what has been used.

❖ **Is it easy to use the e-Judiciary service?**

The ones that are used to using a computer said yes because the service is written in their home language, but they also require more use of the system in order to be more familiar with it. The others said they are not very sure because they still need more computer literacy training and time to use the service. Thereafter, only time will tell whether the system is easy to use or not. However, they further said with the system using their language and them getting enough practice, they see no problem in using the system daily.

The questions above tested the participants on how to use the interface and its features. In this case the number of participants is still the same as the previous scenario. These questions were designed to give the developer an idea of which parts of the system needs to be modified according to the needs of the Dwesa judiciary and community members.

The chart below is an overall graph of the second phase of the questionnaire, which was meant to test how the participants understood the interface. It illustrates how the questions above were answered.



**Figure 6.5: Interface Understanding Chart**

The graph shows that all the participants who were present in the testing and training sessions felt that the digitized judicial information would be of great help to the community. The graph also shows that fourteen of the participants felt that the interface looks good for the service it provides and using it was a pleasant experience. However, four of them were not so sure since they could hardly use the system interface. It also represented that ten participants were happy with the meaning of the words and terms used in the service and the font size was correct. On the other hand eight participants felt that the font size needs to be increased. Because not all of them had attended the computer literacy trainings conducted in nearby schools the graph shows that eight participants felt that it was easy to use the e-Judiciary service. Other participants said it will be easier after they received further computer literacy training and system practice.

### 6.3.3 Participants' Content Understanding

The questions below formed the third and the final section of the questionnaire and were designed to test how the content of the service was understood by the participants.

❖ **Are there any places that need to be modified in the service?**

Fourteen participants said no for the current moment and only time will tell whether the system needs to be modified or not. The others four said yes, because they want the system to accommodate all community members, if it is possible, illiterate or not.

❖ **Are there any things that need to be removed from the service?**

No was the response, because they wanted firstly to be perfect with the system, and later on, they might see what needs to be removed, otherwise not for now.

❖ **Is this service going to reduce the judicial problems regarding justice dissemination they are experiencing in their rural community?**

All replied with a yes, because they felt that the solution that was needed regarding the judiciary problems they had for a long period of time has arrived.

❖ **Are they happy about this service and can the developer continue to deploy it over the Internet?**

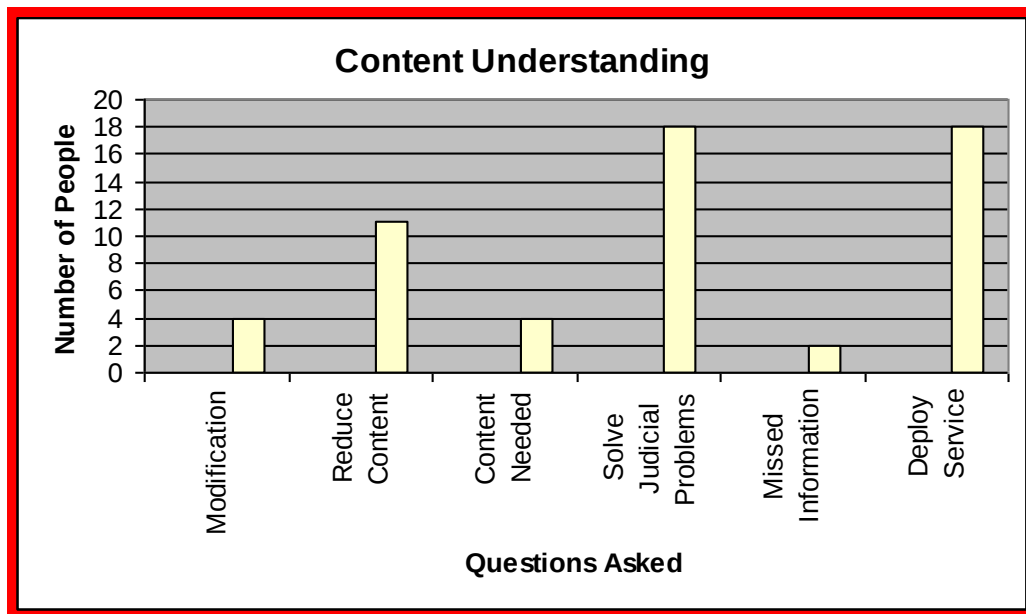
A strong yes was the answer from every participant that was present during the training and testing sessions.

❖ **Is there anything else that the developer is forgetting that requires attention or needs to be addressed regarding the e-Judiciary service?**

No was the response from fourteen participants who were comfortable with the system. They were happy with everything that was presented to them. If

there is something that is forgotten they will tell the developer in writing. But, the four that are completely illiterate felt that they were not accommodated during the design and still need to be accommodated.

The objective of these questions was to let the participants to express what they want and do not want from the service, and whether they want the service or not. The following graph shows how they answered the questions.



**Figure 6.6: Content Understanding Chart**

The graph shows that from the total number of participants only four people wanted the service to be modified. Looking back to the basic understanding graph, there were only four people who were completely illiterate, and these are the same people as in this case. They feel that the system has not accommodated their status and therefore feel that it should be modified to cater for them too. The graph also shows that eleven participants felt that the content was enough in the service and does not need to be reduced. The remaining participants were not very sure as they were still not flexible and fluent enough in using the system. It is also shown on the graph that about four people felt that there is some content that needs to be added in the service. They said the content needed is information on giving warnings to tourists and visitors about committing local crime in

the community, for example, if tourists are involved in committing crime, they also have to appear in front of the Dwesa traditional judiciary. All the participants felt that the service will reduce the problems they have been experiencing on delivering law and order in the community and the system may be freely deployed for use by everyone at Dwesa.

## **6.4 Evaluation of the System**

The e-Judiciary system underwent a usability test that was based on its intended users, the Dwesa traditional authorities and their community members. The evaluation of the system was based on four characteristics: user friendliness, flexibility, usability and performance of the system. This evaluation first involved training the Dwesa traditional authorities and their community members on how to use the system. Login account credentials were created for the traditional authorities and community members in order to make use of the system for testing purposes.

Thereafter, the participants were trained on how to login and use the system and later to logout when they have finished using the service. They were further trained on how to manage their authorization accounts by changing login passwords and editing personal profiles. The legal authorities were successfully trained on how to operate on their web interface to record village court cases, suspected local crimes, judicial information, local criminal records, local complaints, village court hearings and proceedings. They were also taught how to view and update the information they have recorded, and to delete non-required information in the system.

The community members were taught how to make use of their web interface to report suspected local crimes and post complaints regarding the operations and procedures of the traditional judiciary. In addition, they were trained how to view the available cases in the system and the status of each case. Viewing of judicial information, local criminal records, posted complaints, reported local crimes, village court dates and hearings, and recorded court proceedings were also taught to them. After successful training of all the aforementioned sections, all the present participants were later trained how to register

themselves on the system and retrieve their forgotten passwords. They were also taught how to de-register themselves from the system when they feel that they no longer want to be part of the Dwesa e-Judiciary service.

After each training session, discussions, comments, questions and answers were allowed and feedback was collected from the participants. There were eighteen participants who attended the training and testing sessions. It was noted that the participants range between the ages of thirty and over sixty years, which led to and necessitated more patience and attention when conducting the training sessions. One notable feature that is of great importance in the e-Judiciary system is that the interface language has been translated into their traditional language, which is isiXhosa. This worked to their advantage as the majority of the participants were unable to read the English language. Another advantage that worked on their benefit was that the developer of the system speaks isiXhosa and was the one who was conducting all the testing and training sessions. Part of the struggles of the system testing and training was that most participants were unable to correctly make use of the computer and required more attention and time.

Based on their feedback after the testing and training sessions, most participants felt that the content of the training was useful. The fact that the developed system and the training session were all conducted and done using isiXhosa also made it an enjoyable task to perform. Additionally, thirteen of the participants also believed that the time of the training was sufficient and some of them felt that more time was required for them to continue practicing what they have learnt. Overall the participants agreed that they gained knowledge on how to use the system and are happy with the new adventure that is delivered to them to improve their standard of living.

## **6.5 Discussion**

The results of this research project plotted in the previous graphs (section 6.3) indicate that the tests of the e-Judiciary system are favourable to the conditions of operation for the Dwesa traditional judiciary and its community. The results also indicate that the

community was dedicated to the training and testing sessions and were also happy about the delivered resource. Furthermore, they give an indication that the community will make full use of the service and will acquaint themselves with the service. The development of the system, training sessions and user testing has provided an ability to bridge the digital divide and has allowed access to information and communication technology. Although the testing of the system went according to plan, the success of the e-Judiciary service will be determined by time and dedication of the Dwesa traditional judiciary and its community members.

Meanwhile, a simple, robust, cost-effective, and user friendly e-Judiciary service has been developed for the Dwesa traditional justice administration and is ready to be deployed and used. The system is fully secured from unauthorized users and privacy of information is guaranteed, for example, if a certain user has reported a suspected local crime, his/her credentials will be hidden from users who are viewing reported crimes. This was designed to avoid conflicts amongst the community members and make sure that justice is preserved by not fearing to report suspected wrong doings.

## **6.6 Conclusion**

This chapter started by discussing the results obtained in training the users and testing the system. Thereafter explained the evaluation and testing of the system based on the usability approach. Finally, the chapter concluded by giving a brief discussion of the system based on the initial results obtained.

# **Chapter Seven**

## **Conclusion and Future Work**

## **7.1 Introduction**

The previous chapter discussed the evaluation and testing of the system based on the usability approach and the results obtained after the initial tests. This chapter begins by giving a summary of this thesis and addressing the objectives of this research project. The challenges that were encountered during the design and development of the system will be explained. The chapter concludes by highlighting possible future extensions to the system.

## **7.2 Summary**

This research project has developed and produced an electronic judiciary service web application which has been designed and developed in an open source environment using the LAMP architecture. The reason for choosing and using free and open source software is that, it puts full control and ownership of the developed system into the hands of the intended users. This is a very important feature about open source because it allows future extensions and developments, easy adaptation and customization. The e-Judiciary system supports three types of users which are the administrator, legal authorities and the citizens. The system is made up of the front-end and back-end interfaces where the front-end interface is accessible to the citizens and the back-end to the administrator and the legal authorities. The security of the system is based on certain restrictions depending on the role of a particular user and the user information is kept private and cannot be accessed by any unauthorized person.

The motivation behind the development of the e-Judiciary service for Dwesa is that this rural area lacks a formal legal infrastructure that can be used as a judiciary information repository. This system was meant for local legal use by any interested and authorized Dwesa community member. It may be used by a number of users simultaneously even if they perform the same operation at a given time. The main objective of this thesis was to explain the design, development, implementation, testing and deployment of the e-

Judiciary service for a citizen-oriented judiciary system in the Dwesa rural community. This was achieved by designing and developing a well structured and secure web application.

### **7.3 Addressing the Research Objectives**

This section will discuss the research objectives that were addressed by this project and how those objectives were achieved. There were six objectives stated for this research project. Below is how they were addressed.

❖ **Objective 1: Design, develop, implement and field-test an e-Judiciary service for traditional justice administration in that area.**

Based on the investigations conducted, an e- Judiciary service that would help to facilitate all the judicial problems the community was facing, was designed and developed. Before the field-testing of the system, users were firstly trained on how to use the system. Later on, the system was field-tested with the Chief, Counsellors and community members.

❖ **Objective 2: Investigate the problems encountered by the Dwesa judiciary.**

During this research project it was investigated and discovered that the Dwesa traditional judiciary and the community were facing problems when it came to legal matters. This was done by conducting interviews and meetings with the Chief, Counsellors and community members. Based on the meetings and interviews, it was discovered that there is no method used to safeguard their judicial information. The issue of designing an e-Judiciary service that would help in eliminating their problems was discussed and explained thoroughly. Thereafter, it was agreed that they need such a system and it should be developed and given to them to use.

❖ **Objective 3: Investigate how justice is administered in the Dwesa community.**

In this case the aim was to find out how justice is delivered to the community and how the community responds to such a service. This was useful to help the developer to know how the system should be, in order to fit the way justice is delivered at Dwesa. Based on the investigations, it was discovered that the Dwesa community depends on the Chief and Counsellors to administer justice and preserve law and order in the area.

❖ **Objective 4: Produce a system responsible for recording, disseminating and keeping track of judicial information and gatherings.**

This objective was met successfully because an e-Judiciary system that is responsible for recording of judicial information was produced. The system can successfully record local cases, local criminal records, complaints, suspected crimes, village court hearings and local news. Users can also use the system to keep track of judicial information such as the status of local cases and recorded village court hearings. The system can also dispose judicial information such as the procedures of the traditional court and how the village court is linked to the magistrates' court. This is also a great benefit to the community as the problem of not having a proper environment for keeping judicial data is no longer a concern.

❖ **Objective 5: Produce a system that would address the digital divide in traditional justice judiciary systems.**

This objective was also met successfully because the produced e-Judiciary system has formed part of eliminating the digital divide in the traditional judiciary system. This is because the traditional judiciary and the community are now benefiting from information and communication technology.

❖ **Objective 6: Make sure that the service is accessible and usable to the community.**

The e-Judiciary service was designed and developed to be a web application, this was made to allow the community to access the service at any time, as long as there is access to a networked computer. The system was also translated into the language that is most frequently used by the community in order to make the system is usable, as most of the people in the area cannot read English but can read their language.

## **7.4 Challenges Encountered**

There were a number of challenges that were encountered during the development of this research project. Firstly, this research project is a combination of information science and legal affairs. Designing and developing an e-Judiciary service application was a challenge because the developer had no legal background to perform such an operation. Secondly, the targeted users had no idea about the issue of an electronic judiciary system and computers, and also what difference it might make, since many of them were illiterate. The developer had to find a means of convincing the Chief, Counsellors and community members about the benefits of the designed system although he knew little about the law and legal affairs.

When the system had been fully designed, the developer also struggled to fully translate the system into what may be understood by the community as some of the English words cannot be directly translated into isiXhosa. Although some of the users of the system were averagely computer literate, the developer struggled to teach them how to use the system because a majority of them were clueless about using web services. Another challenge that was faced by the developer was that there were certain individuals who were completely illiterate but were very interested in using the system during the testing sessions. These users found it interesting to use such a system based on what had been explained to them by friends and colleagues. Unfortunately, all of them suffered because the system did not accommodate such cases during the time of design.

Another challenge was to develop a system simple enough to accommodate the different age groups that would be using the service frequently and also accommodate rural life and the level of literacy, educationally and computer-wise. The main challenge that was faced by the developer throughout this research project was to make sure that the system that is designed is easy to maintain and usable by the community of Dwesa.

## **7.5 Future Work**

There are a number of possible future plans and extensions for the e-Judiciary system. Firstly, as already discussed under the challenges encountered, the system only accommodates users who are able to read. A possible future extension to this challenge is to implement different access modalities, for example, audio-based interfaces. This access modality can be implemented in the form of links where if a user points to a certain link with a mouse pointer a voice prompt should indicate or give information about the link he/she has pointed to. Then if the user is happy with the link that is pointed to he/she may proceed and click, otherwise if he/she is not satisfied he/she may continue moving the mouse to all different links until what is required pops up.

Another possible future extension to the system is the ability to access the e-Judiciary service via a mobile phone, which also forms part of the access modality extensions. This may also result in authorized users of the system being notified of upcoming judiciary events via SMS.

Another possible future extension is to create video tutorials in isiXhosa that can be used to inform first time users of the system about how to use the service. These videos may also form part of training for users in the absence of the developer or any other informed person.

The e-Judiciary system may also be extended for use to other neighbouring rural villages that may be operating under the same traditional procedures and have an ICT platform

running. The system may also be linked with CONTRALESA (the Congress of Traditional Leaders) and the Department of Local Government and Traditional Affairs as a method of investigating how the law is administered at Dwesa.

## **7.6 Conclusion**

This chapter started by giving a brief summary of this thesis and addressed the objectives of this research, based on the findings from the system testing. The challenges encountered during this research project were specified. The chapter concluded by highlighting possible future extensions of the system.

## REFERENCES

- A Limpopo Case Study. (n.d.). *Administration of Justice in the Traditional Court*. Traditional Justice in Practice. [Online]. Available at: <http://www.iss.co.za/pubs/Monographs/No115/Chap3.pdf> [Last Accessed: December 2009]
- Abidi, N. (2006). *IT Accelerated Judicial Administration – from Fiction to Fact*. HP E-Governance Center of Excellence, Gurgaon, Haryana, India. [Online]. Available at: <http://egovonline.net/articles-list/45-cover-story/3785-it-accelerated-judicial-administration-from-fiction-to-fact.html> [Last Accessed: December 2009]
- AfDevInfo. (2007). *Organization Record, Uganda Courts of Judicature*. Government of Uganda. [Online]. Available at: [http://www.afdevinfo.com/htmlreports/org/org\\_31218.html](http://www.afdevinfo.com/htmlreports/org/org_31218.html) [Last Accessed: December 2009]
- AfriMap. (2007). *Open Society Initiative for West Africa and Institute for Democratic Governance*. Ghana, Justice Sector and the Rule of Law. An Open Institute Network Publication, Johannesburg, South Africa. [Online]. Available at: [http://www.afri-map.org/english/images/report/AfriMAP\\_Ghana%20JusticeDD.pdf](http://www.afri-map.org/english/images/report/AfriMAP_Ghana%20JusticeDD.pdf) [Last Accessed: December 2009]
- Ajayi, G. O. (2003). *Round Table on Developing Countries Access to Scientific Knowledge, the Abdus Salam ICTP, Trieste, Italy*. NITDA and ICT in Nigeria. [Online]. Available at: <http://www.ejds.org/meeting2003/ictp/papers/Ajayi.pdf> [Last Accessed: December 2009]
- Akinsola, O. S., Herselman, M. E. & Jacobs, S. J. (2005). *ICT Provision to Disadvantaged Urban Communities: A Study in South Africa and Nigeria*. International Journal of Education and Development using Information and Communication Technology (IJEDICT), Vol. 1, Issue 3, pp. 19-41. Tshwane University of Technology, South Africa.
- Apache. (2009). *Apache Tutorial: Introduction to Server Side Includes*. [Online]. Available at: <http://httpd.apache.org/docs/1.3/howto/ssi.html> [Last Accessed: December 2009]
- Atkinson, L., Suraski, Z. & Gutmans, A. (2004). *Core PHP Programming*. Fully Revised For PHP 5, 3<sup>rd</sup> Edition. Professional Technical Reference. Upper Saddle River, NJ.

- Benoist, E. (2006-2007). *PHP and MySQL*. Berner Fachhochschule – HTI, Winter Term. [Online]. Available at: [www.benoist.ch/coursPHP/slides/databases/slides2005-beamer.pdf](http://www.benoist.ch/coursPHP/slides/databases/slides2005-beamer.pdf) [Last Accessed: December 2009]
- Bhutan Judiciary. (2008). *The Mission and Objectives of the Judiciary*. [Online]. Available at: <http://www.judiciary.gov.bt/html/judiciary/mission.php> [Last Accessed: December 2009]
- Borelli, D. (2009). *Webmaster Resources and Website Administration Tool*. Website Administration Center. [Online]. Available at: <http://www.websiteadministrationcenter.com/html/webmaster-website-admin-work.html> [Last Accessed: December 2009]
- Bos, B. (2009). *Cascading Style Sheets*. W3C CSS Contact. [Online]. Available at: <http://www.w3.org/Style/CSS/> [Last Accessed: December 2009]
- Bradley, A. (2009). *Server – Side Scripting*. About.Com: PHP/MySQL. [Online]. Available at: [http://php.about.com/od/programmingglossary/g/server\\_side.htm](http://php.about.com/od/programmingglossary/g/server_side.htm) [Last Accessed: December 2009]
- Chapman, R. & Slaymaker, T. (2002). *ICTs and Rural Development: Review of the Literature, Current Interventions and Opportunities for Actions*. Overseas Development Institute, UK. [Online]. Available at: <http://www.odi.org.uk/resources/download/1985.pdf> [Last Accessed: December 2009]
- Chirayath, L., Sage, C. & Woolcock, M. (2005). *Customary Law and Policy Reforms: Engaging with the Plurality of Justice Systems*. [Online]. Available at: [http://siteresources.worldbank.org/INTWDR2006/Resources/477383-1118673432908/Customary\\_Law\\_and\\_Policy\\_Reform.pdf](http://siteresources.worldbank.org/INTWDR2006/Resources/477383-1118673432908/Customary_Law_and_Policy_Reform.pdf) [Last Accessed: December 2009]
- CHRAJ. (2005). *Judicial Service and Legal Aid Scheme*. Judicial Service – United Nations Development Programme. [Online]. Available at: <http://www.undp-gha.org/mainpages.php?page=GHRAJ> [Last Accessed: December 2009]
- COFISA. (2008). *Using ICTs to Optimize Rural Development*. [Online]. Available at: [http://www.cofisa.org.za/pdfs/ict\\_optimise\\_may2008.pdf](http://www.cofisa.org.za/pdfs/ict_optimise_may2008.pdf) [Last Accessed: December 2009]
- Converse, T., Park, J. & Morgan, C. (2004). *PHP 5 and MySQL Bible*, 3<sup>rd</sup> Edition. Indianapolis: Wiley.

- Crockford, D. (2001). *JavaScript: The World's Most Misunderstood Programming Language*. 2001. [Online]. Available at: <http://javascript.crockford.com/javascript.html> [Last Accessed: December 2009]
- Cyber Dynamics. (2003). *Website Front-Ends*. Better Building Blocks, Technology to Support your Business Strategy. [Online]. Available at: <http://www.cyber-dynamics.net/CDDScbuildfront.shtml> [Last Accessed: December 2009]
- Dalvit, L., Muyingi, N. H., Terzoli, A. & Thinyane, M. (2007). The Deployment of an e-Commerce Platform and Related Projects in a Rural Area in South Africa. SREC-07, *ACM International Journal of Computing and ICT Research*. Vol. 1 No. 1, pg. 9-17.
- Darshni, S. (2007). *E-Judiciary to Go Nationwide*. PUTRAJAYA: Delays, Postponements and Huge Case Backlogs will be Greatly Reduced when Courts go Nationwide Online. New Straits Time. [Online]. Available at: [http://www.ico-op.net/icoop\\_news\\_2007.htm#\\_article2](http://www.ico-op.net/icoop_news_2007.htm#_article2) [Last Accessed: December 2009]
- Dubgyur, L. (n.d.) *Judicial Reforms and Access to Justice Trough the Use of Information and Communication Technology (ICT) in Bhutan*. IT Management and Judicial Reforms in Bhutan. [Online]. Available at: <http://www.judiciary.gov.bt/html/education/publication/IT%20Paper-Lungten.pdf> [Last Accessed: December 2009]
- COFISA & DST. (2008). *Evaluation of Selected Projects in the Eastern Cape and Western Cape*. Dwesa e-Commerce Platform (Siyakhula Living Lab). [Online]. Available at: [http://www.cofisa.org.za/pdfs/siyakhula\\_living\\_lab\\_09.pdf](http://www.cofisa.org.za/pdfs/siyakhula_living_lab_09.pdf) [Last Accessed: December 2009]
- Economic and Social Commission for Asia and the Pacific. (2003). *Managing Globalization: Selected Cross-Cutting Issues: Role of ICT in Bridging the Digital Divide in Selected Areas*. Committee on Managing Globalization, Bangkok. [Online]. Available at: [http://www.unescap.org/cmfg/2003/English/CMG\\_3E.pdf](http://www.unescap.org/cmfg/2003/English/CMG_3E.pdf) [Last Accessed: December 2009]
- Grants.Gov. (2009). *New Grantor Registration Process/Login Process*. Grantor Registration Process Update. [Online]. Available at: <http://www.grants.gov/assets/NewGrantorRegistrationProcess.pdf> [Last Accessed: December 2009]
- Graydon, C. (2005). *Local Justice Systems in Timor-Leste: Washed up, or Watch this Space?* Development Bulletin, Asian Law Centre, University of Melbourne. [Online]. Available at: [http://devnet.anu.edu.au/GenderPacific/pdfs/09\\_gen\\_legal\\_graydon.pdf](http://devnet.anu.edu.au/GenderPacific/pdfs/09_gen_legal_graydon.pdf) [Last Accessed: December 2009]

- Gutmans, A., Bakken, S. S. & Rethans, D. (2004). *PHP 5 Power Programming*, 3<sup>rd</sup> Edition. Bruce Perens' Open Source Series. Indianapolis: Prentice Hall, Professional Technical Reference.
- Herselman, M. E. (2003). ICT in Rural Areas in South Africa: Various Case Studies. Informing Science, InSITE "Where Parallels Intersect". Technikon Pretoria, Faculty of ICT Pretoria, South Africa. [Online]. Available at: <http://www.informingscience.org/proceedings/IS2003Proceedings/docs/120Herse.pdf> [Last Accessed: December 2009]
- Hlapo, T. (2005). The Judicial Function of Traditional Leaders: A Contribution to Restorative Justice? Association of Law Reform Agencies of Eastern and Southern Africa (ALRAESA), Vineyard Hotel, Cape Town. [Online]. Available at: [http://www.doj.gov.za/alraesa/conferences/papers/s3B\\_nhlapo.pdf](http://www.doj.gov.za/alraesa/conferences/papers/s3B_nhlapo.pdf) [Last Accessed: December 2009]
- Hlungulu, B. & Thinyane, M. (2009). An Investigation and Development of an e-Health Component for the Dwesa-Cwebe Rural Area. Southern Africa Telecommunications Network and Applications Conference – SATNAC. Swazi Spa, Swaziland.
- Hugh, B. A. (2004). Traditional Leadership in South Africa: A Critical Evaluation of the Constitutional Recognition of Customary Law and Traditional Leadership. Magister Legum Dissertation, Faculty of Law, University of the Western Cape.
- ICRA. (2009). File Extension TPL – PHP Template File. File Extensions.org. The Source of File Extensions Information. [Online]. Available at: <http://www.file-extensions.org/tpl-file-extension-php-template-file> [Last Accessed: December 2009]
- Ippolito, G. (2009). MySQL on Linux Tutorial. YoLinux.com. [Online]. Available at: <http://www.yolinux.com/TUTORIALS/LinuxTutorialMySQL.html> [Last Accessed: December 2009]
- Jakachira, B. T., Muyingi, N. H. & Wartlen, R. (2008). Implementation of a Web-Based e-Government Proxy for a Marginalized Rural Population. Southern Africa Telecommunication Networks and Applications Conference – SATNAC. Wild Coast Sun, Eastern Cape, South Africa.
- Judiciary. (2009). Free Online Dictionary. [Online]. Available at: <http://www.thefreedictionary.com/judiciary> [Last Accessed: December 2009]
- Kalam, A. P. J. (2007). Evolution of e-Judiciary. Address During the Launch of the Computerization of Courts, New Delhi. [Online]. Available at: [http://www.taxindiaonline.com/RC2/pdfdocs/pres\\_ejudiciary.pdf](http://www.taxindiaonline.com/RC2/pdfdocs/pres_ejudiciary.pdf) [Last Accessed: December 2009]

- Kammarapat, S. (2008). PHP and MySQL. PHP and MySQL Training. [Online]. Available at: [http://bizcom.dusit.ac.th/download/training\\_160851/php\\_training300851\\_color.pdf](http://bizcom.dusit.ac.th/download/training_160851/php_training300851_color.pdf) [Last Accessed: December 2009]
- Kartono, K., James, T. & Musisi, C. (2004). ICT Investment Opportunities in East Africa. Country Specific Market Analysis Uganda. [Online]. Available at: <http://www.trigrammic.com/downloads/new2005/Uganda%20Report.pdf> [Last Accessed: December 2009]
- Kunjuzwa, D. T., Thinyane, M. & Terzoli, A. (2009). Exploring User-Driven Telephony Services in an Information and Communication Telephony for Development Context. Southern Africa Telecommunications Network and Applications Conference – SATNAC. Swazi Spa, Swaziland.
- Kurata, D. (2002). *Doing Web Development: Client-Side Techniques*. The Expert's Voice. Berkeley, CA: Apress.
- Kwach, J. O. (2003). Judicial Reform in Kenya. Kenya Case Study. [Online]. Available at: <http://www.victoria.ac.nz/commonwealthseminar/Papers/2003/Kenya%20Case%20Study%202003.pdf> [Last Accessed: December 2009]
- Makombe, F., Muyingi, N. H. & Thinyane, M. (2008). Developing a Help-Desk System for a Multi-Purpose ICT Platform in a Marginalized Setting. Southern Africa Telecommunication Networks and Applications Conference – SATNAC. Wild Coast Sun, Eastern Cape, South Africa.
- Malik, W. H. (2002) E-Justice: Towards a Strategic Use of ICT in Judicial Reform. Annex: ICT Experiences. United Nations Development Programme. [Online]. Available at: <http://www.pogar.org/publications/judiciary/wmalik/annex.html> [Last Accessed: December 2009]
- Manta SEO Solutions. (2005). Website Design and Development. Internet Marketing Search Engine Optimization SEO South Africa. [Online]. Available at: <http://www.mantaseosolutions.com/solutions-websitedevelopment.php> [Last Accessed: December 2009]
- Mission and objective of the Royal Court of Justice – Judiciary of Bhutan. (2008). [Online]. Available at: <http://www.judiciary.gov.bt/html/judiciary/mission.php> [Last Accessed: December 2009]
- Mozilla Developer Centre. (2009). About JavaScript. MindTouch Deki. [Online]. Available at: [https://developer.mozilla.org/en/about\\_javascript](https://developer.mozilla.org/en/about_javascript) [Last Accessed: December 2009]

- Mpofu, H. C. & Muyingi, N. H. (2008). Development of Sustainable Mobile Service Contents for a Wireless Village. Southern Africa Telecommunication Networks and Applications Conference – SATNAC. Wild Coast Sun, Eastern Cape, South Africa.
- Muyingi, N. H. (2008). Dwesa Living Lab Research. Presentation at Village Connection Meeting, Vodacom Acres. Port Elizabeth, South Africa.
- NeGSt Global – Digitronics. (2006). Proposal on Digitronics eJudiciary for the Judiciary. In Support of the Judiciary and Citizen Seamless Interaction Efforts, Magodo, Lagos, Nigeria. [Online]. Available at: <http://www.digitronicsng.com/slides/ejudiciary.pdf> [Last Accessed: December 2009]
- Nielsen, J. (2008). About Us Information on Websites. About Us Usability, 2<sup>nd</sup> Study, ISSN 1548-5552. [Online]. Available at: <http://www.useit.com/alertbox/about-us-pages.html> [Last Accessed: December 2009]
- nixCraft. (2004). PHP Send Email Using Authenticated SMTP Mail Server in Real Time. Insight into Linux Admin Work, IDG Tech Network. [Online]. Available at: <http://www.cyberciti.biz/tips/howto-php-send-email-via-smtp-authentication.html> [Last Accessed: December 2009]
- Njeje, S. G. (2007). Implementing a Robust, Cost Effective, e-Commerce Platform for a Disadvantaged Community of the Eastern Cape, South Africa. MSc Thesis, Department of Computer Science: University of Fort Hare, South Africa.
- Obot, D., Kintu, F. & Elder, L. (2004). Chapter 16. The Uganda Knowledge and Information Society: Early Lessons from ICT Projects. ICT and Governance. [Online]. Available at: [http://www.idrc.ca/en/ev-93065-201-1-DO\\_TOPIC.html](http://www.idrc.ca/en/ev-93065-201-1-DO_TOPIC.html) [Last Accessed: December 2009]
- Oultwood Web Technology. (2007). Website Scripting. [Online]. Available at: <http://www.oultwood.org/scripting/index.php> [Last Accessed: December 2009]
- Pade, C. I. (2006). An Investigation of ICT Project Management Techniques for Sustainable ICT Projects in Rural Development. M.Com Thesis, Department of Information Systems: Rhodes University, South Africa.
- Palmary, I. (2004). Traditional Leaders in eThekweni Metropolitan Region: Their Role in Crime Prevention and Safety Promotion. Centre for Study Violence and Reconciliation and Midlands Women's Group. [Online]. Available at: <http://www.csvr.org.za/docs/urbansafety/traditionalleaders.pdf> [Last Accessed: December 2009]
- Palmer, R., Timmermans, H. & Fay, D. (2002). From Conflict to Negotiation, Human Science Research Council & Institute of Social and Economic Research, Rhodes

- University. [Online]. Available at: <http://dwesa.coe.ru.ac.za/wiki/Resources> [Last Accessed: December 2009]
- PeerPapers. (2009). Benefits of the Internet. PeerPapers.com. [Online]. Available at: <http://www.peerpapers.com/essays/Benfits-Internet/92956.html?topic> [Last Accessed: December 2009]
- Philemon, L. (2007). Technological Advancement to Streamline the Judiciary. IPPmedia. [Online]. Available at: <http://kurayangu.com/ipp/guardian/2007/10/05/99796.html> [Last Accessed: December 2009]
- PhpMyAdmin. (2009). Effective MySQL Management. [Online]. Available at: [http://www.phpmyadmin.net/home\\_page/index.php](http://www.phpmyadmin.net/home_page/index.php) [Last Accessed: December 2009]
- PIB Press Release & Kalam, A. P. J. (2006). Search for truth is the Foundation of Judiciary. Dynamics of Justice Delivery System. President's Address at the Golden Jubilee Year of the High Court of Madhya Pradesh, Jabalpur, and Madhya Pradesh. [Online]. Available at: [http://pib.nic.in/release/rel\\_print\\_page.asp?relid=21289](http://pib.nic.in/release/rel_print_page.asp?relid=21289) [Last Accessed: December 2009]
- Quarcoo, G. (2009). Government to Promote ICT Nationwide. [Online]. Available at: <http://www.ghanadistricts.com/news/?read=30504> [Last Accessed: December 2009]
- Robitaille, N. (2006 – 10). Rehabilitating Kenya's Judicial System. The International Development Research Centre, Science for Humanity. [Online]. Available at: [http://www.idrc.ca/en/ev-104828-201-1-DO\\_TOPIC.html](http://www.idrc.ca/en/ev-104828-201-1-DO_TOPIC.html) [Last Accessed: December 2009]
- Samalenge, J. & Thinyane, M. (2009). Deploying Web Services in Rural Communities for Services of Personal Communication Synchronous and Asynchronous. Southern Africa Telecommunications Network and Applications Conference – SATNAC. Swazi Spa, Swaziland.
- Sarrigonie. (2009). Policy Brief: Access, the Digital Divide, and Specific Populations. [Online]. Available at: [http://sarrigonie.blogspot.com/2009/07/access-digital-divide-and-special\\_07.html](http://sarrigonie.blogspot.com/2009/07/access-digital-divide-and-special_07.html) [Last Accessed: December 2009]
- Sean. (2004). Creating Template Based Website Using phpBB Templating Engine. Aurorapod, Source of PHP Scripts and Tutorials, myWebland Group. [Online]. Available at: <http://aurorapod.com/tutorial.php?id=19> [Last Accessed: December 2009]
- Sheldon, T. & Big Sur Multimedia. (2001). Back-End Systems. Tom Sheldon's Linktionary.com. [Online]. Available at: [http://www.linktionary.com/b/back\\_end.html](http://www.linktionary.com/b/back_end.html) [Last Accessed: December 2009]

- Singai, C. B. (2008). Access to Justice for 'All': Impact of Information Communication Technologies (ICTs) on Judiciary in India. Centre for the Study of Law and Governance, Jawaharlal Nehru University, New Delhi. [Online]. Available at: <http://d.scribd.com/docs/1vijzlc9nlomavccuwt.pdf> [Last Accessed: December 2009]
- Smyth, G. (2005). Wireless Technologies Bridging the Digital Divide in Education. IT Innovation, Intel Ireland Leixlip, Co. Kildare. Ireland. [Online]. Available at: <http://www.mlearn.org.za/CD/papers/Smyth.pdf> [Last Accessed: December 2009]
- South African Government Information. (2007). Department of Justice and Constitutional Development to Host Provincial Consultative Workshop on Traditional Justice System. [Online]. Available at: <http://www.info.gov.za/speeches/2007/07111411451001.htm> [Last Accessed: December 2009]
- SouthAfrica.info. (2009). South African Information. [Online]. Available at: [http://www.safica.info/ess\\_info/sa\\_glance/demographics/population.htm](http://www.safica.info/ess_info/sa_glance/demographics/population.htm) [Last Accessed: December 2009]
- Statssa. (2009). Statistics South Africa. [Online]. Available at: <http://www.statssa.gov.za/publications/statsdownload.asp?PPN=P0302&SCH=4437> [Last Accessed: December 2009]
- Sun Microsystems. (2009). MySQL. Ultimate Scalability for the Web Economy. [Online]. Available at: <http://www.sun.com/software/products/mysql/index.jsp> [Last Accessed: December 2009]
- Tarwireyi, P. (2007). Design and Implementation of a Network Revenue Management Architecture for Marginalized Communities. MSc, Department of Computer Science: University of Fort Hare, South Africa.
- Tarwireyi, P., Terzoli, A. & Thinyane, M. (2007). Implementation of an Internet Access Cost Management System for Disadvantaged Communities. Southern Africa Telecommunication Networks and Applications Conference – SATNAC. Mauritius.
- Telligent Systems. (2009). PHP MySQL Tutorial, Learn PHP and MySQL. Connect to MySQL Database. [Online]. Available at: <http://www.php-mysql-tutorial.com/wikis/mysql-tutorials/connect-to-mysql-database.aspx> [Last Accessed: December 2009]
- Tema, A. (2007). Report on Judicial Corruption Monitoring Exercise in Ghana. Produced by Ghana Integrity Initiative (GII). Sponsored by German Technical Cooperation (GTC). [Online]. Available at: [http://www.tighana.org/Report\\_on\\_judicial\\_corruption\\_monitoring\\_exercise\\_in\\_Ghana.pdf](http://www.tighana.org/Report_on_judicial_corruption_monitoring_exercise_in_Ghana.pdf) [Last Accessed: December 2009]

- Tere, J. (2008). E-Judicial Records System is Launched in Estonia. Economic/Business | Permalink. [Online]. Available at: <http://shaan.typepad.com/shaanou/2008/07/e-judicial-reco.html> [Last Accessed: December 2009]
- The PHP Group. (2009). PHP – MySQL. MySQL Functions. [Online]. Available at: <http://php.net/manual/en/book.mysql.php> [Last Accessed: December 2009]
- The Web System for the Judicial Service of Ghana. (2008). [Online]. Available at: [www.judicial.gov.gh](http://www.judicial.gov.gh) [Last Accessed: December 2009]
- The Web System for the Judicial Service of Kenya. (2008). [Online]. Available at: [www.judiciary.go.ke](http://www.judiciary.go.ke) [Last Accessed: December 2009]
- The Web System for the Judicial Service of Bhutan. (2008). [Online]. Available at: [www.judiciary.gov.bt](http://www.judiciary.gov.bt) [Last Accessed: December 2009]
- The Web System for the Judicial Service of Uganda. (2008). [Online]. Available at: [www.judicature.go.ug](http://www.judicature.go.ug) [Last Accessed: December 2009]
- Timalsena, D. (2006 – 2010). E-Judiciary, ICT Strategy for the Courts Service Plans, Prospects and Problems. Technology for Better Governance. [Online]. Available at: [www.supremecourt.gov.np/pages/news/undp\\_workshop.ppt](http://www.supremecourt.gov.np/pages/news/undp_workshop.ppt) [Last Accessed: December 2009]
- Timmermans, H. G. (2004). Rural Livelihood at Dwesa-Cwebe: Poverty, Development and Natural Resource Use on the Wild Coast, South Africa. MA Thesis, Department of Social Anthropology: Rhodes University, South Africa.
- TRALSO. (2007). Rights Enshrined but Right Denied? Transkei Land Service Organization, Post-Settlement Struggles in Dwesa-Cwebe in the Eastern Cape. [Online]. Available at: [http://www.landcoalition.org/pdf/07\\_ev\\_wsf\\_tralso\\_pres.pdf](http://www.landcoalition.org/pdf/07_ev_wsf_tralso_pres.pdf) [Last Accessed: December 2009]
- Tshehla, B. (2007). The South African Traditional Court – Time for Decisive Action? Institute for Security Studies, Tshwane (Pretoria). [Online]. Available at: [http://www.iss.co.za/static/templates/tmpl\\_html.php?node\\_id=2579&slink\\_id=4918&slink\\_type=12&link\\_id=24](http://www.iss.co.za/static/templates/tmpl_html.php?node_id=2579&slink_id=4918&slink_type=12&link_id=24) [Last Accessed: December 2009]
- Ullman, L. (2003). MySQL Database Design. Pearson Education, Peachpit Press. [Online]. Available at: <http://www.peachpit.com/articles/article.aspx?p=30885> [Last Accessed: December 2009]
- Valade, J. (2004). *PHP 5 for Dummies*. A Reference for the Rest of Us. Indianapolis: Wiley.

- van Zonneveld, K. (2006). Enhance PHP Session Management. IT Related Articles and How Tos. [Online]. Available at:  
[http://kevin.vanzonneveld.net/techblog/article/enhance\\_php\\_session\\_management/](http://kevin.vanzonneveld.net/techblog/article/enhance_php_session_management/)  
 [Last Accessed: December 2009]
- Wanjiku, R. (2008). *Kenyan Judicial Sector Aims to Improve IT*. CIO Business Technology Leadership, IDG News Service. [Online]. Available at:  
[http://www.cio.com/article/351313/Kenyan\\_Judicial\\_Sector\\_Aims\\_to\\_ImproveIT](http://www.cio.com/article/351313/Kenyan_Judicial_Sector_Aims_to_ImproveIT)  
 [Last Accessed: December 2009]
- Web Developers Virtual Library (WDVL). (2009). Cascading Style Sheets. Jupitermedia Corporation. [Online]. Available at: <http://www.wdvl.com/Authoring/Style/Sheets/>  
 [Last Accessed: December 2009]
- Web Design Enterprise. (2009). Backend Administration Platform. Headquarters Web Design Enterprise Corp 5600 SW 135 Ave, Suite 100 Miami FL 33183. [Online]. Available at: <http://www.webdesignenterprise.com/backend-administration-platform.html> [Last Accessed: December 2009]
- Web Developers Notes. (2000). What is Website Navigation? Web Design Tips and Tricks. [Online]. Available at:  
[http://www.webdevelopersnotes.com/tips/webdesign/web\\_site\\_navigation.php3](http://www.webdevelopersnotes.com/tips/webdesign/web_site_navigation.php3)  
 [Last Accessed: December 2009]
- WebMediaBrands. (2002). Using MySQL Database with PHP. The Knowledge Center for Database Professionals, Database Journals. [Online]. Available at:  
<http://www.databasejournal.com/features/mysql/article.php/1469211/Using-a-MySQL-database-with-PHP.htm> [Last Accessed: December 2009]
- Webopedia. (2007). *Understanding LAMP and its Effect on Web Development*. [Online]. Available at:  
[http://www.webopedia.com/DidYouKnow/Computer\\_Science/2007/LAMP.asp](http://www.webopedia.com/DidYouKnow/Computer_Science/2007/LAMP.asp) [Last Accessed: December 2009]
- Wells, T. (2003). Website Marketing. Clean Up Your Contact Us Page. Developer Shed. [Online]. Available at: <http://www.seochat.com/c/a/Website-Marketing-Help/Clean-Up-Your-Contact-Us-Page/> [Last Accessed: December 2009]
- Westphal, K. (2003). Secure MySQL Database Design. Security Focus. [Online]. Available at: <http://www.securityfocus.com/infocus/1667> [Last Accessed: December 2009]
- Wikipedia. (2007). Judiciary. [Online]. Available at:  
<http://en.wikipedia.org/wiki/Judiciary> [Last Accessed: December 2009]

- Wikipedia. (2008). *Digital Divide*. [Online]. Available at:  
[http://en.wikipedia.org/wiki/Digital\\_divide](http://en.wikipedia.org/wiki/Digital_divide) [Last Accessed: December 2009]
- Wikipedia. (2009). Front-End and Back-End. [Online]. Available at:  
[http://en.wikipedia.org/wiki/Front-end\\_and\\_back-end](http://en.wikipedia.org/wiki/Front-end_and_back-end) [Last Accessed: December 2009]
- Wise, R. (2007). Client-Side or Server-Side? [Online]. Available at:  
<http://websiteowner.info/articles/cgi/whichside.asp> [Last Accessed: December 2009]
- World Bank / EC Core Course on Governance. (2004). The Challenges of Reducing Corruption in a Changing Environment: The Case Study of Kenya. Transparency International Kenya. [Online]. Available at:  
<http://www.u4.no/helpdesk/helpdesk/queries/queryattach/q42Kenya2004.pdf> [Last Accessed: December 2009]
- W3Schools. (2009). Server-Side Scripting. [Online]. Available at:  
[http://www.w3schools.com/web/web\\_scripting.asp](http://www.w3schools.com/web/web_scripting.asp) [Last Accessed: December 2009]
- Zeronese. (2008). Creating a Website Design Templating System using PHP. The Zeronese Webmaster Resources Directory. [Online]. Available at:  
<http://www.zeronese.net/knowledge-base/questions/1029/Creating-a-Website-Design-Templating-System-Using-PHP> [Last Accessed: December 2009]