

**Development of an internet based housing demand database
system for the KwaZulu-Natal Department of Human Settlements**

**Submitted in fulfillment of the requirements of the degree of Master of
Technology: Information Technology in the Faculty of Accounting and
Informatics at the Durban University of Technology**

Mamatha Eedara

June 2012

Supervisor: Professor P. Singh (PhD)

Co-supervisor: Professor T. Nepal (PhD)

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by

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**I, Mamatha Eedara, do declare that this dissertation is a representation of my
own work in both conception and execution.**

Signed: 

Date: 23/08/2012

Mamatha Eedara

Approved for final submission.

Signed: 

Date: 23/08/2012

Prof P. Singh (PhD)

ABSTRACT

The introduction of the Integrated Residential Development Programme (IRDP) in 2008 created challenges for the administration of all waiting lists and housing demand databases in South Africa as the provisioning of housing by the National Housing Programme was revised to include a higher earning per household. This resulted in an increase in the number of applications in all provinces. The fact that the KwaZulu-Natal Department of Human Settlements was processing applications manually because their electronic system was obsolete, only served to exacerbate matters. To address this problem of poor service provisioning at KZN-DHS, an automated internet based system was considered a promising solution to facilitate effective communication between the department and its clients. It was therefore important to find out which business activities and functional requirements of the KZN-DHS that when automated as an internet based application would improve housing service provisioning in the province. The purpose of this study therefore was to modify and enhance the old housing demand (electronic) database system for the KZN-DHS as the old system was not meeting their requirements and was not serving the citizens of the province efficiently.

The researcher used Entity Relationship (ER) Model and Unified Modelling Language (UML) as a framework to develop an internet based system to leverage the business process, minimize capturing errors and improve administration processes in the KZN-DHS. Using a JAD session, semi-structured interviews she determined the needs and requirements of the users before developing, implementing and testing the system. Implementation alerted the researcher to errors/issues which were addressed to ensure optimal functioning of the system.

This study makes recommendations for maintenance of the system and discusses implications for further research.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The introduction of the Integrated Residential Development Programme (IRDP) in 2009 marked a fundamental change from the way in which housing projects were implemented and planned in the past (Strategy for the allocation of housing opportunities created through the National Housing Programmes, 2009). This Strategy document explains that the National Housing Programmes (NHP) provides a variety of housing options oriented towards the establishment of sustainable human settlements. Previously the NHP only targeted people who earned less than R3 500.00 per month but the IRDP extended this since 2009 to include households that earn up to R7 000.00 per month. This made more people eligible for housing leading all regions including the KwaZulu-Natal Department of Human Settlement (KZN-DHS) to receive greater volumes of applications.

The provision of housing services in the KwaZulu-Natal province is a shared responsibility between the Department of Human Settlements (DHS) and local authorities like municipalities which gather information related to applicants' personal details, current housing status and future housing requirements (KZN Housing, 2007). They then send this information to the housing demand section in the KZN-DHS.

The KZN-DHS was using a manual system to capture and process applications even though they had an electronic system. According to the KZN-DHS, the electronic system they had, did not serve their purpose and was therefore never used.

Applications were processed manually which meant that collaboration between the departmental staff and municipalities was carried out through telephonic conversations and emails. Subsidized application information was maintained with the help of spreadsheets and there was no audit trail of data modifications. The KZN-DHS mentioned that it was very difficult to draw reliable and accurate information within a short span of time from a manual system and provide reports to their officials. It was also very difficult to track and trace an application physically i.e. in physical file format.

When a citizen submitted an application, the official responsible at the municipality received the application and opened a physical or paper based file. There was no mechanism to track the status of the physical file i.e. whether the file was with the local authorities or with KZN-DHS. The flow of information between municipalities and the KZN-DHS took a long time causing delays in terms of identifying and addressing housing needs within the province. With the manual system there was also the possibility of human errors and an opportunity for fraudulent activities.

The development of an electronic Housing Demand Database System (HDDS) was started in 2003 and completed in 2006 but the development of this database system took much longer than anticipated. As a result, the requirements of KZN-DHS and the format of the municipality's application form changed, but the system remained the same. Also, the electronic system was not on the internet so external users like municipalities and local authorities could not capture, view and print the reports. The department therefore did not use the electronic system which has now become obsolete. The department therefore decided to enhance and modify the old system to meet their requirements and to enable them to communicate with all the

stakeholders efficiently. They also needed to have access to readily available information for their management to take informed decisions. A possible solution therefore was a complete automation of the business processes. They envisaged that the newly implemented system would help to co-ordinate the process of application and the sharing of information between the KZN-DHS and local authorities efficiently to improve efficiency and fast track housing delivery within the province.

1.2 CONTEXT OF THE RESEARCH

The need to develop an internet based HDDS for the KZN-DHS to improve the provisioning of housing services is conspicuous and can be easily justified. According to Brooks (2009), a wave of protests erupted in townships across South Africa in 2008 over shoddy housing and public services adding to pressure on President Jacob Zuma to deliver on promises to fight poverty. Additionally, according to the 2003 Master Systems Plan of the KZN-DHS, the Information Technology (IT) sub-directorate approached the State Information Technology Agency (SITA) to develop a HDDS to meet their needs. SITA could not complete the development of a system within the stipulated time. The purpose of this study therefore was to modify and enhance the old housing demand (electronic) database system for the KZN-DHS as the old system was not meeting their requirements and was not serving the citizens of the province efficiently.

1.3 DEMARCATION OF THE PROBLEM

Quality service provisioning is one of the main focuses of the government of South Africa that all departments must strive to achieve, be it KZN-DHS or any other

department. To address this problem of poor service provisioning at KZN-DHS, an automated internet based system was considered a promising solution to facilitate effective communication between the department and its clients. It was therefore important to find out which business activities and functional requirements of the KZN-DHS that when automated as an internet based application would improve housing service provisioning in the province. The researcher was therefore approached to modify and enhance the old electronic system.

1.4 RESEARCH AIMS AND OBJECTIVES

The aim of this study was to develop an internet based housing demand database system for the KwaZulu-Natal Department of Human Settlements.

In order to achieve the above aim, the following objectives were addressed, to:

- investigate the current business process in DHS to capture the functional requirements of the system;
- investigate the business processes of KZN-DHS to learn how the process could be leveraged for improved housing service provisioning; and
- evaluate the proposed system in a real-life user study to test for business improvement and usability.

It is hoped that the findings of this study will enable the KZN-DHS to provide an efficient service in terms of housing to citizens in KwaZulu-Natal.

1.5 DEFINITION OF KEY TERMS

The following terms are explained as they are used in this study. Detailed definitions and explanations follow in the body of the dissertation.

1.5.1 Entity Relationship (ER)

An Entity Relationship Model is a framework used to model systems for a database. It divides all elements of a system into two categories, namely: entities or relationships (Loney and Koch, 2002:1053).

1.5.2 Unified Modelling Language (UML)

The Unified Modelling Language (UML) is a modelling language for specifying, visualising, constructing, and documenting the artifacts of a system-intensive process. In General UML is used to facilitate following:

- specifying, visualising, understanding, and documenting problems;
- capturing, communicating, and leveraging knowledge in problem solving; and
- specifying, visualising, constructing, and documenting solutions (Alhir, 2004:10).

1.5.3 KwaZulu-Natal Department of Human Settlements

The KZN-DHS derives its mandate from various pieces of legislation. Some of the legislation is specific to the housing sector; other pieces of legislation impact directly on the housing industry, while others impact indirectly on the housing industry (kznhousing, 2007).

1.5.4 Joint Application Development (JAD)

Joint application development (JAD) is a process used in the prototyping life cycle area of the Dynamic Systems Development Method (DSDM) to collect business requirements while developing new information systems for a company. The JAD

process also includes approaches for enhancing user participation, expediting development, and improving the quality of specifications (Haag *et al.*, 2006). It consists of a workshop where knowledge workers and IT specialists meet, sometimes for several days, to define and review the business requirements for the system.

1.5.5 Housing Demand Database System (HDDS)

The housing demand database system contains the details of all housing needs in the province, whether they are area, project or tenure based. On this system, beneficiaries who have benefited from a housing subsidy will be flagged as inactive.

1.5.6 Web Application Level Security Gateway (WALSG)

Application-level web security refers to vulnerabilities inherent in the code of a web-application itself. WALSG is an XML-based solution to web application security (Lv and Yan, 2005).

1.5.7 Extensible Markup Language (XML)

XML (Extensible Markup Language) is a flexible way to create common information formats and share both the format and the data on the World Wide Web, intranets, and elsewhere (Rouse, 2007).

1.5.8 State Information Technology Agency (SITA)

SITA was established in 1999 to consolidate and coordinate the State's information technology resources in order to achieve cost savings through scale, increase delivery capabilities and enhance interoperability. SITA is committed to leveraging

Information Technology (IT) as a strategic resource for government, managing the IT procurement and delivery process to ensure that the Government gets value for money, and using IT to support the delivery of e-government services to all citizens. In short, SITA is the IT business for the largest employer and consumer of IT products and services in South Africa - the Government (SITA website, 2012).

1.6 ABBREVIATIONS USED IN THIS STUDY

| | | |
|---------|---|---|
| HDDS | - | Housing Demand Database System |
| WASLG | - | Web Application Level Security Gateway |
| NHP | - | National Housing Programmes |
| XML | - | Extensible Markup Language |
| UML | - | Unified Modelling Language |
| JAD | - | Joint Application Development |
| DHS | - | Department of Human Settlements |
| KZN-DHS | - | KwaZulu-Natal Department of Human Settlements |

1.7 OVERVIEW OF THIS STUDY

The first chapter outlined the context, rationale and significance of the study and presented a brief overview of the forthcoming chapters.

Chapter two presents a review of the literature pertinent to this study and discusses the theoretical framework underpinning this study.

Chapter three describes the research framework, design and methodology.

Chapter four discusses the findings in this study.

The last chapter presents the research conclusions and makes recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

This chapter provides an overview of the various dimensions related to the development and evaluation of housing information systems in an online platform. It focuses on the nature of systems, concepts and theoretical aspects involved in the design and development of an effective internet based database management system. The past few decades have witnessed rapid transformation in the approach taken by governing bodies to regulate and monitor activities through extended use of internet based applications. The literature review explores the changes, impacts, implications and benefits attached to the use of such applications. The focus is on helping the KZN-DHS recognize the potential benefits and features of the proposed enhancements to the housing information system. This involves the identification of key functional requirements and work processes that can be automated for improved work efficiency and productive outcomes.

2.1 INFORMATION SYSTEMS

A system can be broadly defined as an integrated set of elements that accomplish a defined objective. Different engineering disciplines have different perspectives of what a system is. For example, software engineers often refer to an integrated set of computer programs as a system (International Council on Systems Engineering, 2000). According to Beekman and Quinn (2006:469) a system is a set of interrelated parts that work together to accomplish a purpose through the three basic functions of input, processing, and output. An information system is an organised combination of people, hardware, software, communication networks and data resources that

collects, transforms and disseminates information in an organization. People have relied on information systems to communicate with each other using a variety of physical devices (hardware), information processing instructions and procedures (software), communications channels (networks), and stored data (data resources) since the dawn of civilization (O'Brien, 2000:7).

Information systems provide the communication and analytic power that companies need to conduct trade and manage businesses on a global scale. Controlling the far-flung global corporation, communicating with distributors and suppliers, operating 24 hours a day in different national environments, coordinating global work teams, and serving local international reporting needs, is a major business challenge that requires powerful information systems responses (Laudon and Laudon, 2006:10).

Information systems help the senior management to make strategic decisions, to gather, analyse and summarise the key internal and external information used in the business. Most of the information systems are mainly concerned with internal sources of information and summarise data into a series of management reports. Boddy *et al.* (2002:3) suggests that information systems also make internal processes more efficient, integrate business functions and link an organisation with suppliers and customers. Carter (2005) suggests that business process reengineering (BPR) helps the organizations become more efficient and modernize. BPR transforms an organization in way the directly affect the performance and service delivery.

The use of information systems across all business enterprises, governance structures and institutions has become an accepted reality. A number of researchers

and academics have focused on the potential benefits, applications and challenges faced in the incorporation of these systems. The implementation of such systems in e-governance bodies have helped immensely in streamlining work processes and improving the overall efficiency of departments in delivering the desired outcomes (Prabhu, 2006). A study on developing a land information system for the local government in Naga City Philippines by Rizalino Cruz (2004) highlights the significance of intelligent systems in aligning departmental responsibilities, strengthening collaborative efforts, and streamlining the flow of information across various units and stakeholders. The focus of the study was on analyzing the key requirements of the local government body involved in land use planning and designing an effective information system that helps in achieving departmental goals and long term vision of the local governing bodies.

A recent study by PricewaterhouseCoopers (PwC) (2007) on the role and efficacy of information systems in Department of Housing and Urban Planning observes that an internet based system can help the urban planning and housing department realize their goals and objectives. The primary benefit of such a system lies in its ability to integrate and streamline the flow of vital information within departments, provide its stakeholders with immediate access to relevant details, and enable managers to take prompt decisions based on the readily accessible data and facts.

A legislative audit report on information systems for housing by the State of Montana (2004) highlights the role of such systems in determining the accuracy and reliability of such systems. The information processing capabilities offered by an effective information system cannot be undermined in the face of rapidly advancing technology tools and applications. The use of internet and communication

technologies has greatly enhanced the potentials to receive and process information at the click of a button.

The State of Kerala (2011) of India recently implemented a web-based e-Housing project to improve transparency in the process of providing housing assistance to the scheduled caste beneficiaries. Scheduled caste groups faced several constraints in applying for housing allowance from the government. Apart from the regular delays in receiving disbursements, the complicated procedures combined with no option to track applications make the process cumbersome. The beneficiaries had to skip several days of work and physically visit the department to request for funds at different stages of construction; wasting time and effort. Moreover, there was no transparency as to how much was being disbursed in their account. The use of web based e-Housing project ensures time-bound, efficient, transparent and error-free housing applications. It has sped up application processing and sanctioning of disbursements so that beneficiaries can make payments and build houses on time. The application processing time has reduced drastically to one third of time taken earlier in the manual system.

Similar studies and implementation of such systems across different countries illustrate the benefits and challenges associated with its effective performance and outcomes. The housing and urban planning department in Thailand benefitted immensely from the implementation of similar systems (Urban Forum, 2011). The efforts to develop an effective system to integrate state efforts in financing housing and formulating plans to meet evolving housing needs have been successful and it is strongly felt that such a system has helped the policy makers in framing policies for the housing sector (Urban Forum, 2011). A similar venture in the state of Uttar

Pradesh in India adopted a well-integrated approach involving departmental heads, top executives and participation of general workforce in leading and managing the change process (PwC, 2007).

The success of the implementation of such technology based applications depends on three distinct dimensions: people; processes and technology (PwC, 2007). Any initiative related to the adoption of advanced technology and systems within an organization involves extensive planning and organizing that takes into account the impact of the changes on various functional units and processes. Organizational skills and capabilities play an important role in determining the successful incorporation of such systems and transforming existing work processes for effective results. However, a primary challenge facing the implementation of such systems is the lack of adequate know-how, design gaps and inability to identify key user requirements (PwC, 2007). Rocheleau (2006) claims that while information technology has provided new opportunities to enterprises in terms of improving performance and productivity, the number and speed of new technologies in the IT area can make it difficult for even the most highly-skilled IT professional staff to keep up with innovations in the field.

2.2 E-GOVERNANCE

E-governance is defined as the process of using information technology for automating both the internal operations of the government and its external interactions with citizens and other businesses. E-governance initiatives in South Africa have been ridden with challenges on account of low technology capabilities, political instability and illiteracy prevailing in the community. A study on e-

government prospects, challenges and practices in South Africa (Kitaw, 2006:8) observes:

On the African continent where 40 % of the adult population is illiterate, where PC penetration is the lowest in the world with 2,2 computers per 100 inhabitant, where the Internet tariffs are the highest in the world, where there are only 2,7 telephones per 100 inhabitant, where political instability is widespread, where most governments are autocratic and perceived as corrupt, where the culture of democracy is not fully embraced, where millions of citizens are not empowered in the decision making processes of their government, one could arguably question the relevancy of a discourse on the prospects of e-government in Africa.

The development initiatives have taken wings since Kitaw's observations and subsequent studies in this direction have revealed that such ventures have been restricted in scope and potentials to meet the pre-defined goals and objectives successfully (Kaisara and Pather, 2009; Mutula and Mostert, 2010; Naidoo, 2007). However, work on improving operational efficiency through the use of adept technology tools has gained momentum. The Government of South Africa has launched several e-governance projects to respond to service delivery challenges and efficient work processes (Naidoo, 2007). Some of these projects include inter-alia, the Batho Pele portal, SARS e-filing, the e-Natis system, and departmental websites that cater to public information needs (Kaisara and Pather, 2009). Their work highlights the challenges faced by the e-governance initiatives in South Africa due to the absence of proper frameworks for the design, development and evaluation of information systems.

In its endeavours to establish a strong IT footage across government departments, the State Information Technology Agency (SITA) was founded in the year 1999 to achieve government vision of service excellence. The agency has been instrumental in leveraging Information Technology (IT) as a strategic resource for government, managing the IT procurement and delivery process to ensure that the Government gets value for money, and using IT to support the delivery of e-government services to all citizens (SITA website, 2012). The focus of the agency is hence on reducing costs, maximizing benefits in terms of productivity and ensuring high level of efficiency in service delivery to communities.

Kitaw (2006) in his works on e-governance prospects and challenges in South Africa outlined the strengths, weaknesses, opportunities and threats facing e-government applications in the country. Late adopter of technology and borrowing IT solutions from others were the key strengths of e-governing applications while poor infrastructure, illiteracy rates, political instability, and inadequate IT skills formed its major weaknesses. The opportunities that can be opened through the adequate use of such technology based applications lay in increased citizen participation in governance process, enhanced efficiency of departments, promote a knowledge based economy, and restrict corruptive practices through increased transparency. However, the threats facing such applications were online security, frauds, digital divide across rural and urban communities and loss of privacy for citizens that might lead to potential infringement of individual freedom and expression (Kitaw, 2006).

The e-governance initiatives in South Africa covered three distinct application models comprising of government to government (G2G), government to citizen (G2C), and government to business (G2B) (Kitaw, 2006). The three distinct e-

governance models outline the individual requirements and functionalities that form the base for the design and prototype of application tools. Each of these models present unique functionalities that help in identifying the primary users, stakeholders, information processing and knowledge processing capabilities of the system (Naidoo, 2007).

2.3 DATABASE MANAGEMENT SYSTEMS

The emerging technologies have ushered in a new age of industry and commerce influencing business practices and strategic moves adopted by companies to gain competitive advantage in markets. The advent of the Internet was the turning point for businesses and it provided companies with new opportunities and marketing alternatives that were far beyond the imagination of managers. The online technology platform was responsible for the conceptualization of new business models that were based on the objectives of reaching out to an expanded market that ignored geographical boundaries. The World Wide Web offers enormous potentials for marketing goods and services to the intended audience in global markets (CTO, 2007). Organizations explored this trend by creating their own websites that offered the online users with detailed insights into the company's operations and service offerings. Websites have since been used to showcase company products and services, reach out to millions of potential consumers online and enable online transaction and delivery of services.

Housing projects needs a combination of internet marketing and database information systems which will club together to become a force to reckon with in the global market. All successful projects across the globe are based on an efficient database information system. Housing Database Management System can drive the

entire housing project by providing relevant and highly useful information through structured data which is required by the members of the housing board and the users who want information on the status of their project. A database is a collection of data that is organized so that its contents can be easily accessed, managed and updated (Narang, 2004). In today's world it is very difficult to function on a big scale without a proper database management system. The Internet technology has made the business world more organized and structured adding to the efficiency and productivity of the companies thereby increasing profits. The website becomes the face of the companies and organizations where they project their products and services.

KZN-DHS have showcased their objective and the housing settlement plan through their website but at the same time it is important for the website to be dynamic and interactive with the clients and visitors for them to get all the requisite information at the click of a button. This dynamism and interactive mode can be given only by a proper database information system which drives the internal system as well as the customers and potential customers. Structured information available at the fingertips of the management and the customers are the need of the hour and an efficient database information system does exactly the same.

2.4 REQUIREMENTS IDENTIFICATION

The focus of e-government initiatives is on developing and creating a value based database management system which can streamline the housing requirement of KwaZulu-Natal province. The department's principal responsibility is to finance and plan the housing requirements for the entire province and supplement the municipalities with the requisite support of meeting the housing needs. Throughout

the world, national and local governments are implementing web based information systems to increase citizen orientation, reduce red tape, create one-stop shops, decrease the administrative burden on citizens and corporations, and increase citizens' trust in government (Homburg, 2008).

Requirements identification is the most crucial component in the database management system development life cycle. Identification of the requirement starts with the budgeting of the project, having a detailed plan of execution, identifying the suppliers for the project, dividing the housing project plans across municipalities/blocks in the province. There needs to be proper information displayed in the website to showcase the details, the plan, and the layout of the proposed housing society for the potential customers to see. Pricing needs to be fixed for the various categories of apartments like 1 bed room, 2 bed room and 3 bed room flat with living room/hall, kitchen and washrooms. Various projects under these municipalities and blocks needs to be given a proper start date, time of delivery through phases, status of the work, customer logins to check the status of their respective projects. In order to gather such a huge requirement specification, the process of collection should be very specific. All the departments in the DHS need to identify their respective segment, document it, speak to the concerned members and come up with a project plan. This would become the starting point of development from where the technical team can take up the modules one by one, and make a system design flow/process flow to come up with the requirements in written mode. Nowhere more than in the requirement processes do the interests of all the stakeholders in a software or system project intersect (Wiegers, 2009).

The process has to be a combined effort of the customers, the users, the management, the technical team taking the requirement specification in association with the developers and the database architects. The system should be a web based system with a centralized server which enables all the parties to the project to view the database, query from it and get relevant information across from anywhere in the globe. The user requirement specifications need to be well documented so that a complete Software Development Life Cycle can be prepared. According to a study conducted by global IT company Accenture, SA is lagging in terms of e-government readiness with countries such as Brazil, Mexico and Portugal all ahead of South Africa (Clarkson and Mogaki, 2005). The lagging behind of South Africa for e-governance points out to a complete unorganized effort which needs to be corrected and a more organized effort, planning and execution need to take place. To achieve this, process of all stakeholders to an e-governance project is extremely important where the requirement specification collaborates with the development team and there is no room for any misinterpretation or misinformation over the subject.

2.5 USE OF ENTITY RELATIONSHIP MODEL TO REPRESENT IDENTIFIED REQUIREMENT

The information system design and development process takes into account several aspects that help in defining the relationship existing between two or more system components. Evolving technology tools and applications have focused on in-depth analysis of existing work processes and aligning proposed system functionalities with defined goals and objectives. The systems analysis theory takes into consideration various aspects related to proposed system goals and stakeholder needs that play an important role in defining specific outcomes of the system. According to Laudon

and Laudon (2006:506), systems analysis is the analysis of the problem that the organisation tries to solve with an information system. It thus involves an in-depth assessment of user needs and functional details of existing work processes that help in identifying the relationship between different components of the operational structure. The focus of the system analyst at this stage is to establish the linkages between each work component and streamline processes for an effective information system (Gupta, 2005).

The primary step in designing information systems is analyzing user requirements and the work process so as to identify the information needs and type of information to be stored in the proposed application system. This involves the use of data modelling techniques by system engineers. Schematic diagrams and entity relationship model are commonly used tools by application developers in IT sector (Pratt and Adamski, 2012). It must be noted in this context that database and database management systems are the core features of IT based applications. The database is the primary tool for storing information in its various forms such as numeric data, images, text or audio visual files. The nature of information stored in the databases is used to process raw data fed into systems that supports operational need for processed information. The database requirements are determined by interviewing both the producers and users of data and using the information to produce a formal requirements specification (Teorey, Lightstone, Nadeau and Jagadish, 2011:3).

The Entity Relationship (ER) model helps in conceptualizing and analyzing the key requirements of the database structure and provides a logical representation of data flow between two distinct entities. The ER model can be described as the

diagrammatic representation of the entities, attributes, and relationships that occur in the system to be conceptualized, using semantics that are definable in a data dictionary (Teorey *et al.*, 2011:14). Thus the concept of database modelling in the form of ER diagrams involves the collection of entities and defining the relationship between these entities. Entities refer to objects that have unique attributes and form the building blocks for an information system module. Hoffer, Prescott and Topi in his works on database management systems (2010) defined entity as a person, place, object, event, or concept in the user environment about which the organization wishes to maintain data.

2.6 BENEFITS OF ENTITY RELATIONSHIP MODEL

The essential parameters driving the effectiveness of information system design and development process is the conceptualization of data models as highlighted in the previous sections. However, translating work processes and information flow into schematic diagrams is not an easy task. There are complications faced by designers in the form of multiple lines of information access, hierarchical representation of activities, sequencing of data flow processes, and abstract entities such as regulatory policies and ethical considerations that play a significant role in ensuring the efficacy of systems. Various levels of abstractions, generalizations, and specialization existing between data components and units determine the hierarchical pattern of information flow and system design (Chong, 2002).

In today's world, businesses operate in considerably different ways than they used to. The concept of e-commerce and the different web applications also enable business to behave and regulate differently; this helps them to improve the quality of their goods and increase their speed of service delivery. This helps in reducing the

cost of the business operations as well. The problem arises when the systems being used are complicated and complex. Understanding of the system requirements between the user and the developer also poses a problem. The solution would be presenting the requirements and data flow of the system in a visual form. The visual modelling acts a bridge between the end user and the development team (Wasson, 2006).

Visual modelling is the method of analyzing the problem based on the views pertaining with today's world. There are various advantages of modelling. They are used for understanding the problem, transforming the same to the customers, the team members, the experts etc. Modelling enables good understanding of the needs and the requirements and it eliminates the not so needed details. Those software systems which are based on a good and structured modelling system are easier to maintain. The modelling structure comprises of designing programs and databases, and making the proper documents. Taking the above into account, the design of the internet based HDDS database model in this study was based on ER modelling. The specification of interactions between the data was represented by using UML diagrams.

2.7 APPLICATION OF UML CONCEPTS

The ER model provides the base for illustrating existing co-relations and associations between the defined entities and proposed system components. Developers of information systems make use of diagrammatic schemas or Unified Modelling Language (UML) to outline and identify the key associations existing between the distinct components and data units. The deployment of UML to identify and establish linkages between the data components is highly effective in presenting

a clear picture of how the information will flow from one unit to another, the data processing capabilities of the proposed system and final output available to the users of the system (Douglass, 2004).

The primary benefit of applying the UML model lies in its ability to provide a well-structured database system, define the exchange and flow of information between each data component and its behaviour in context of the overall system. The database schemas illustrated through class diagrams and activity diagrams can contribute to system enhancements for effective results. System designers and developers have used this tool to visualize the system architecture and assess the alternatives that will help in improving the efficiency of work processes through improved integration and streamlining of system modules (Douglass, 2004).

The architectural framework of e-governance systems are defined by its stakeholder needs and user requirements. The focus of governing bodies such as the proposed HDDS for KZN-DHS is on promoting collaboration and accessibility of housing forms, finance information and allotment details from general public and municipal authorities. The effectiveness of the proposed system will be defined by its ability to respond to the public needs and prompt service delivery from KZN-DHS in collaboration with local municipal authorities. The system proponents can be defined and linked with key activities or work processes using the use case diagram and activity diagram concept in UML. Use case diagram and activity diagrams enable the system designer to analyze the functional requirements, distinguish key processes, and evaluate system functionality through simple sketches that illustrate the flow of data and information across various activities. This initiative also helps in eliminating

information redundancy that makes the system comparatively easier to maintain and use (Pastor *et al.*, 2002).

Mendes, Suomi and Passos (2004) in their works on networked societies emphasize the application of UML concepts to translate distinct work processes and exchange of information between distinct data units for effective understanding and development of effective system design prototypes. The focus should be on modelling concepts and abstracts in the work processes through UML diagrams that can be translated to executable code in subsequent stages of systems development (Mendes *et al.*, 2004). The graphical representation of data components contributes to new possibilities and scope of improvement in information exchange and streamlining the processes to align with user needs and expectations (Shoemaker, 2004).

2.8 USABILITY OF THE INFORMATION SYSTEMS

IT tools and applications have become a standardized way of performing business operations today with most organizations seeking enhanced quality in the nature of goods or services provided to the clients and meeting the expectations of the clients in terms of speed of delivery, effectiveness of goods and services and reduced cost of operations for improved profits. IT-enabled operations and business infrastructures are found to be more capable of producing desired results in terms of effectiveness of operations, cost advantage, and quality standards. The application of innovative technologies and tools in diverse industrial sectors has reported an increase in value appreciation and speed of operations that has a positive impact on productivity and profitability of business establishments (CTO, 2007).

IT has assumed increased significance in the business environment today with most organizations adopting innovative technology platforms to enhance operational efficiency. Studies and researches have proved that the use of effective technology applications and tools can contribute to improved business performance and efficiency in work processes. The implementation of IT systems and applications can help organizations in reducing costs, improving speed of operations, adding to service improvements and innovation of products or services, besides promoting high quality standards in meeting market demands and trends (CTO, 2007).

Visualizing the benefits of information systems, countries across the world have focused their strengths on developing new and innovative means of ensuring public participation and increased flexibility in governance sectors. E-government initiatives have gained momentum with more and more public service departments adopting technology applications for long term benefits. Farelo and Morris in their study on e-government practices in South Africa (2006) concluded that implementation of such projects must focus on creating internal efficiencies through adequate training, infrastructural capabilities and governance frameworks that help in simplifying processes contributing to effective information accessibility and service delivery.

2.9 TESTING THE USABILITY OF INFORMATION SYSTEMS

The existing business and economic environment presents new and complex challenges to the successful design and deployment of information systems. The transformations taking place on account of new technology tools and applications in everyday lives have not only increased public expectations from governing bodies, but have also imposed additional pressure to deliver prompt and quality services. Information accessibility is the key aspect driving the efficacy and usability of IT

enabled systems. Public utility services on the online platform focuses on improved scalability, interoperability and reliability for successful application design. Interoperability determines the extent to which the system is adaptable across different platforms and hardware systems.

The flow and exchange of data across various departments and inter-governmental agencies can present complexities resulting in interoperability issues for system designers. The interconnection of governmental organizations that use various platforms and systems is a difficult task requiring easily identifiable and publishable e-services (Bohlen, Gamper, Polasek and Wimmer, 2005). Scalability is also a pertinent requirement owing to the large number of users and their expectations for high quality service delivery (Bohlen *et al.*, 2005). The systems should be flexible and scalable to enable new service delivery, enhanced features that meet the evolving needs of user groups, and improved collaborative tools for extended functionalities. Security and reliability are critical aspects defining the effectiveness of the systems since government agencies must operate in a secure electronic environment to enable safe and reliable exchange of public information, e-documents, and organizational reports (Bohlen *et al.*, 2005). However, the key factor impacting the usability of such information systems is its user-friendliness and easy to use interface.

The usability of systems is determined by the extent to which it caters to the unsophisticated user information needs through an effective interface that is easy to understand, interpret and access relevant details (Bohlen *et al.*, 2005). Rocheleau (2006) outlines three broad categories for information system evaluation which includes: process evaluation; outcome evaluation; and efficiency evaluation.

Process evaluation focuses on methods and work flow structure assessments and intensive study on the efficacy of each processing module may result in business process reengineering involving structural changes for efficient results. Outcome evaluations measure the extent to which the system relates to the goals and objectives of the HDDS. The primary indicators used in this process are customer satisfaction, service delivery, and cost benefit analysis.

Efficiency evaluation helps in measuring the linkages existing between cost, work efficiency and final outcomes (Rocheleau, 2006). However, there are no fixed evaluation strategies that can predict positive outcomes. This mandates a constant monitoring of activities and system operations to identify loopholes and scope for further enhancement.

2.10 SYSTEMS TESTING AND EVALUATION

Zhou, Su, Papazoglou, Orlowska and Jeffery (2004) in their work on designing web information systems, observed that web information systems can play a critical role in enhancing organizational efficiency and contributes to well integrated and cost effective application tools that extend value to system users. While system development for an e-governance agency is a complex process, the usability of the system is defined through its ability to realize system expectations and user requirements (Wijsman, Neelissen and Wauters, 2008). System testing and evaluation plays an important role in determining the usability and the extent to which the designed system meets the pre-defined system goals and objectives. However, the testing procedures are not only time consuming but riddled with complexities (Zhou *et al.*, 2004).

The efficacy of the system determines its scope and ability to meet the operational demands of the organization. System application design and development process is based on an in-depth understanding and knowledge of user requirements and system functionalities (Zhou *et al.*, 2004). The design and development process for web application information systems for e-governance systems assumes increased complexities owing to the wide spectrum of functions, inter-linkages with numerous departmental units and the extended base of users who have different levels of computer proficiency (Dustin, 2008). The system quality hence forms a vital aspect governing the efficacy of such e-governance systems.

According to Dustin (2008) the significance of the testing process lies in the fact that the use and application of software is not just limited to organizational context but has evolved to be a vital aspect of any device or functional unit of authorities and institutions. The widespread use and adoption of these technology based applications mandates a thorough testing and evaluation of the system before and after implementation (Ciolkowski, Laitenberger, Rombach, Shull and Perry, 2002). They added that the usability and the performance of the system depend not only on the theory of system design and application development concepts but its adaptability to different types of situations. It is therefore imperative that before any system application tool is delivered to the client it is tested to identify any existing loopholes or problems in the system (Ciolkowski *et al.*, 2002). The testing process involves checking the software in terms of its conformance to quality parameters, usability features and system design requirements (Ran, Dyerson and Andrews, 2004).

The testing of web based system application tools ensure that the system conforms to the specified goals and requirements identified at the initial stages of the development process (Ran *et al.*, 2004). It is thus important that the person responsible for conducting the tests and assessing the system modules has an in-depth understanding of the system requirements, capability to understand the system integration features, and ability to predict problems that might arise in future. While the system testing procedures are based on clarity in system design elements and organizational requirements, the key factor driving the efficacy of this process is the ability to visualize new possibilities or system enhancements for a streamlined and well integrated system design (Desikan and Ramesh, 2008).

There are number of reasons for which testing of software applications have become important. The primary reasons are quality of software application tool and validation of results or process outcomes. A verification and validation model helps the software engineers in developing application tools that meet the desired goals and objectives (Pan, 1999).

Web application design and development involves complex system functions and diverse technology tools that share common system architecture. The system enables the users to interact through web application interfaces (Zhou *et al.*, 2004). The interface is the user access screen that allows the users to browse and interact with the system modules. An online database system collects input from users that is processed by the system. Hence the web application system functions are supported by a back-end database that is updated every time a user accesses the system and performs any action. The accuracy and performance of the system is defined by the database management structure that underlines the system architecture and design.

The testing of web database systems therefore focus on linkages and flow of information between distinct data elements and the interactions between each unit of data within the system (Myers, Badgett and Sandler, 2011).

The following section outlines the testing approaches used for the KZN-DHS web based housing application and the rationale for selecting these approaches for the online HDDS. The testing approaches are explored and analyzed to determine its role in improving the system design and identifying existing loopholes.

2. 11 TESTING MECHANISM

Testing of software applications enables the designers and developers to evaluate the quality of the application tool. Quality of application design is evaluated through various testing methods that enable the system designers and developers to rate system performance and identify the scope for further enhancement (Luo, 2001). The testing of web-based software applications assumes different dimensions related to technical aspects and non-technical areas of the system component. These include software specification, design, implementation, maintenance, processes, security, performance and management aspects of the overall system. While a number of approaches have evolved over the years in areas of software testing, the effectiveness of testing is in its ability to find errors.

A good test is one that has a high probability of finding an as yet undiscovered error, and a successful test is one that uncovers an as yet undiscovered error (Luo, 2001). A number of software testing methods are used by system developers to test the system functionalities that involve manual and automatic testing approaches.

A combination of testing mechanisms was used for testing and evaluating the efficiency of the online HDDS for KZN-DHS.

Testing approaches today make use of technology based application tools that are used to debug programs and find errors in the system design. However, one single testing procedure is often not sufficient to detect errors and bugs in the system. A combination of manual and automatic testing methods is used to define system errors and possibilities of further enhancements. There are many things that are taken into consideration while testing for efficiency of software application tools. Testing of software is conducted at various levels beginning with unit or component testing that evaluates the basic software architecture and design elements that define system functionalities and performance. Testing process takes into account user specifications, system objectives and design integration elements. Testing process ensures that software meets the requirements of the customer and specifications (Prasad, 2005).

Integration testing is when two or more units that have been tested individually are combined to perform distinct functions. This involves testing the performance of each components and its synchronization with the whole system. The next phase of testing involves quality checking of the entire system that evaluates the system functionalities based on the user requirement specification. The testers evaluate the system performance through accuracy checks, validity and security aspects of the system at this stage to ensure high efficiency in operations. The final phase of testing is done when the system development work is complete and the users can start using the application. The basic objective of this phase of testing is to

acclimatize the users to the system functionalities rather than finding errors (Luo, 2001).

2.12 SUMMARY

The use of IT application and IT governance principles in the public sector has yielded positive results in the past few decades. This is reflected in the gradual shift of public sector departments and service sectors from an aging infrastructural utility to a structured and well organized database information management based system that enables greater collaboration and improved speed of performing various tasks. However, the implementation of IT tools and technologies are not an easy task since it requires huge investment outlays, personnel training and a changed outlook to existing governance practices that adapt to new methods of operation. The advantages and scope of implementation of these tools and technologies must be supported by strong governance practices that support a highly advanced system of work operations. The problem of how to deploy IT in such a way that it adds value to the business is far from new and has been the focal area for information managers for a number of years (Wijsman, Neelissen and Wauters, 2008). Often the implementation of effective IT governance practices within public sectors such as police departments are limited by budgetary constraints, lack of awareness of new and emerging technologies, and the proper planning for optimal use of existing resources.

CHAPTER 3

RESEARCH METHODOLOGY

The previous chapter analyzed literature pertaining to this study. The aim of this chapter is to explain the research methods used in this study. Bhattacharyya (2003:20) explains that the study of research methods provides the researcher with the knowledge and skills needed to solve the problems and meet the challenges of today's modern pace of development. This chapter therefore focuses on the research methodology and design employed to achieve the objectives of this study.

The research methodology employed assisted in obtaining data relating to the current business processes in the DHS, that is to capture the functional requirements of the system and the users' perceptions of the proposed system to develop an internet based HDDS for the KZN-DHS for improved housing service provisioning.

3.1 RESEARCH DESIGN

Cooper and Schindler (2003:81) state that the research design is necessary for fulfilling research objectives and answering research questions. Research design indicates the techniques to be used in gathering data, the type of sampling to be used and how to deal with time and cost constraints, hence the need to focus on a specific research design.

Saunders, Lewis and Thornhill explain that there are two approaches to research, each with its own underlying philosophy and views namely, the quantitative approach and qualitative approach (2000:83). According to Neill (2007), quantitative research is a type of approach that assigns numerical data to answers, confirms evidence and

produces findings based on fixed closed questions. He adds that qualitative data sets are made up of non-numerical material such as transcripts or audio-recordings of interviews, field notes of researcher observations, records of conversations, and any kind of social text such as books, newspapers and advertisements. Qualitative research is typically used to answer questions about the complex nature of phenomena often with the purpose of describing and understanding the phenomena from the participant's point of view (Leedy and Ormrod, 2005:94).

This study employed a qualitative approach to research when collecting, analyzing and interpreting the data for this study. Qualitative research allowed the researcher to identify the users' view of the system and also allowed the researcher the opportunity to understand the users' personal experience of the system. The following section discusses the target population of the study.

3.2 TARGET POPULATION

According to Saunders, Lewis and Thornhill (2009), the population is the full set of cases from which the sample is drawn. The target population for this study was the employees of the housing demand database section, municipality employees and the IT section of the DHS. As it was impossible to focus on the entire population, it was necessary to use a sample to obtain the relevant data.

3.3 SAMPLING

According to Welman and Kruger (2005:18), great care should be taken to obtain a representative sample in order to prevent a biased result. There are two types of sampling namely probability and non-probability sampling. Welman and Kruger (2005: 56) explain that in the case of probability sampling, the probability that any

element or member of the population will be included in the sample can be determined, whereas in non-probability sampling by contrast, this probability cannot be specified. This study used a non-probability sampling method.

The advantage of non-probability sampling is that it is less complicated and more economical in terms of time and cost. The researcher opted for this sampling technique as this allowed her to focus on specific individuals that were familiar with the system (Saunders *et al.*, 2009:237). To develop an IT system, it was necessary to gather the requirements from the users of the system such as data capturers, administrative staff, managers of the housing demand database section and staff from the IT department of the DHS. Data from the users were collected *via* Joint Application Development (JAD) sessions and interviews. The total number of participants for the JAD session was 70. The selection of participants for JAD session was based on their roles and significance in the system development, implementation and application phases (Crabtree, 2008).

3.4 DATA COLLECTION

JAD helped to collect the system requirements simultaneously i.e. the JAD session facilitator who was also the researcher, interacted with multiple people like capture clerks, administrative staff, manager's and different stakeholders to gather the requirements or features of the proposed system. This approach was used to gather existing system functionality, control requirements, input/output requirements, and user interface design requirements and to gather documentation about the existing system. This method was used to brainstorm the requirements for a new system (Adelakun, 2006:24).

3.4.1 Joint Application Development (JAD) sessions

This study made use of JAD, a team based system engineering process to discover functional/critical requirements of the proposed system. Joint application development (JAD) is an information gathering technique that allows the project team, users, and management to work together to identify requirements for the system (Crabtree, 2008). JAD can reduce scope creep by 50% and it avoids the requirements for a system from being too specific or too vague (Dennis, Wixom and Roth, 2006:126).

JAD thus enabled the researcher to:

- elicit useful functional requirements of the system at an initial stage as members of the KZN-DHS were involved in the development process; and to
- directly provide and review the functional requirements of the system.

This helped the researcher to understand the business process in DHS and to capture the functional requirements of the proposed system.

JAD sessions accelerate the process of systems development through improved clarity in understanding system design components and architectural planning (Whitten and Bentley, 2007). JAD sessions require that all the stakeholders, experts, and the managing team who have thorough project information, and information about its precise requirements be available concurrently. Time is thus reduced significantly due to the assembly or attendance of all the essential people who can provide important input to the project. The evaluation of system components and design requirements was assisted by the JAD facilitation team headed by the facilitator who is responsible for organizing and conducting the session.

3.4.2 JAD session planning

The researcher sent out email invitations to administrative staff in the DHS, project managers, and managers in the housing section of the DHS; IT consultants; and system users of the DHS to be a part of the JAD session. The invitation message provided the participants with the purpose and objective behind the JAD session, and time and location details for the session along with an Informed Letter of Consent (*Appendix B*). The participants were asked to sign the Informed Letter of Consent to be a part of this session. The session was conducted on the premises of DHS on a weekend to facilitate the availability of the participants.

The key aspect governing the success of JAD sessions is identifying the purpose and establishing the objectives of the sessions as this helps in defining and specifying the system deliverables, user expectations and architectural components of the proposed application (Dennis, Wixam and Roth, 2008). They added that the facilitator is responsible for carrying out in-depth research of the project goals, operating environment and user profiles for preparing an agenda for the session. Normally the systems analyst facilitates the JAD session but for the purpose of this study, the session was facilitated by the researcher who defined the system requirements and expectations.

An outcome of the JAD session was a document detailing the existing system and consensus on features of the proposed system. The final outcome of the JAD session was documented to present the system architecture detailing input requirements, processing capabilities and final outcomes to help the system developers to design the prototype application. The members of the department served as technical experts to provide the researcher with the necessary information

required thus enabling the management of the complexities inherent in the development of business software application.

The duration of the session was six hours and was attended by 65 out of the 70 people who were invited. It was the responsibility of the facilitator to set the agenda for the sessions; schedule the JAD activities; control and manage the flow of discussions; promote participation of members; avoid misleading or moving away from the focal issue and resolving disputes or disagreements between two or more individuals. The agenda of the JAD session was as follows:

- review existing system, that is, its scope and limitations which included walkthroughs of existing system and existing business processes;
- identify key stakeholders and their operational processes;
- assess user expectations and needs;
- analyze system scope and possibilities of enhancement; and
- define key system performance indicators.

The discussion during the JAD session followed the agenda and to facilitate the discussion the researcher prepared a set of questions for each item on the agenda (*Appendix C*). The participants sat at a round table to enable good discussion. Each participant was asked to provide their views and perceptions in context of their area of operation. The first round of discussion focused on the scope and limitations of the old system, followed by an assessment of what their expectations were from the new system. The key stakeholders and users were asked to explain their work processes and how the information flowed from one work unit to another. Based on the inputs provided by the participants, the researcher explained the scope and possibilities of the new system and defined the key performance indicators that would help in

evaluating the system. The facilitator was also responsible for documenting the decisions and agreements reached by the participants. A copy of the proceedings of the session document was given to everyone present in the session for their records and future reference. The proceedings of the session were noted by the researcher and a final document was prepared at the end of the session.

While the JAD sessions were utilized for collecting system requirement specification, Unified Modelling Language (UML) was used to provide a graphical representation of the system modules and distinct components of the internet based application by the system designers.

3.4.3 UML and Entity Relationship Model

The UML is a standard tool adopted by academia and industry for engineering system design as it allows for quality system realization and is used by system developers to create a blueprint of the proposed application using diagrams that reflect the flow of information across different processes (Douglass, 2004). Database schemas are diagrammatic representations that help in illustrating the flow of information and structure of database design for the system application (Sheldon, Jerath, Pilskalns, Kwon, Kim and Chung, 2001). The UML thus forms an integral part of system analysis process helping in defining the system architecture and establish co-relations among database elements. This is done through the identification of key elements of the database system.

The database schemas helped in conceptualizing the system structure. Based on existing co-relations and flow of information between two distinct data elements, a relational database structure was defined for the HDDS (*Appendix D, Appendix E*

and Appendix F). Kedar (2009) explains that the design of information systems are based on a database management system that comprises of a set of database structures and coded programs that help the users access the relevant data from the database. Hence a database can be compared to a filing cabinet that contains information in various categories. The programmed instructions are the base for accessing the required information from the database. The data elements forming the database have some associations or linkages between each other. This relationship can be logically defined and represented through database schemas that illustrate and establish the connection between two distinct data components (Sumathi and Esakkirajan, 2007).

Based on the system design and architecture defined through this process, the system was then implemented using Microsoft.NET/MS SQL Server database languages to realize a potable web system. System developers use various coding languages or programs to design information system applications. MS SQL and Microsoft.Net are some of the popular development tools used by developers to manage and control database systems. The HDDS system consists of:

- user interface which is the platform that enables the user to interact with the system, input data and retrieve data;
- database tables that store physical data;
- coded instructions that help in managing data, retrieving data and storing data;
- data backup and recovery systems to prevent loss of data; and
- data security features to prevent unauthorized access of data (Petkovic, 2008).

The JAD session helped in identifying system requirements, analyzing system operations and conceptualizing system architecture. The researcher used entity relationship model to design conceptual database design. Researcher examined the data requirements of the HDDS resulting from the requirements analysis section and developed a high level data model.

The outcomes from the JAD, entity relationship model and UML tools for system analysis were further supported by semi-structured interviews with DHS personnel.

3.4.4 Semi-structured Interviews

Semi-structured interviews are used by researchers to gather deeper insights into individual experiences, perceptions and opinions in context; it is more like a conversation than an interview session (Cousin, 2008). This interviewing technique is useful in collecting different perspectives relating to the research context and unlike structured interviewing techniques, this allows the researcher to conduct interviews in an informal setting that allows the respondent to answer to questions more freely.

Semi-structured interviews allowed the researcher to clarify or probe a person's reasoning (Leedy and Ormrod, 2001:196). This helped in eliminating doubts and queries related to the system design and development process. The interviews were carried out informally and hence did not follow an organized approach. Semi-structured interviews were conducted as and when required by the systems analyst i.e. if any clarity was required from the managers for the system requirements and proposed functionalities related to capture clerks, administration staff, IT support or management staff. These interviews served to elicit information on understanding of

business processes and standard operating procedures of the rental housing tribunal sub-directorate (Requirements Gathering Techniques, 2002). The interviews were beneficial as it assessed the emotional and practical difficulties and expectations of the system stakeholders.

The semi-structured interview process contributed to a deeper understanding of the system and its distinct components. The exercise served to explain the:

- purpose of the system data elements identified during the JAD sessions;
- system functionalities and application;
- distinctive functions of each application modules;
- role and responsibilities of each department and its challenges; and the
- information flow requirement between system modules and its contributing to efficient information management system.

The above considerations were essential in giving the researcher in in-depth understanding of the system role and functionalities at different operational levels. The researcher met the respondents to gather additional details for the proposed system and its functionalities. Telephonic interviews were conducted with respondents who were unavailable for the face-to-face interviews. The researcher began the interviews by explaining the purpose of the interaction and assured the respondents of confidentiality and anonymity. She then proceeded to ask pertinent questions regarding the study. The questions were based on the department needs and expectations defined during the JAD sessions. The objective of the whole exercise was to clarify system design elements and identify operational challenges through assessment of personal experience. All responses were transcribed and

respondents were asked to verify the transcriptions at the end of the interviews. The following section explains how the data were analyzed and interpreted.

3.5 DATA ANALYSIS

For the purpose of this study thematic data analysis method was applied. The thematic analysis is one way of addressing qualitative data. According to Aronson (1994) thematic analysis focuses on identifiable themes and patterns of living and/or behavior. This method enabled the researcher to identify common patterns and themes from the interview responses, JAD session proceedings and UML design prototype. The data relating to system architecture and requirements analysis were categorized to provide a clearer picture of the scope and deliverables of the internet based housing demand application system. This enabled the researcher to analyze and discuss the key findings from the research process and provide an improved understanding of system components and suggest measures for developing an effective application for the internet based database system.

The findings from the JAD session and the semi-structured interviews were transcribed by the researcher to provide a detailed system design document that was circulated among key members of management at the KZN-DHS. The document contained details relating to system architecture, database design structure, entity-relationship diagrams and the system functionality tools or modules. Once the system specifications were approved by the DHS, the next step was designing of the system prototype which contained the user interface design prototypes and identified input and output controls information. These were sent for approval to DHS, and based on the feedback received from the department the final design and development work was started. The final system was ready for

implementation in three months. The primary challenge faced during this process was training users on the system application features and its usability aspects. Once implemented, the system had to be tested.

3.6 TESTING OF THE SYSTEM

The significance of the testing phase is important for the system to stand on its own. The system developers and testers followed a strict testing plan where they developed and tested each of the modules. Once they had a beta version of the software published, they needed to share it with the users for the user acceptance level testing. The users needed to test the beta system and point out to the developer the difficulties they were facing in the day to day functioning of the system. The entire testing phase was time bound and was well documented so that the management as well as the developers had a thorough understanding of the flaws of the system and the remedies associated with them.

The JAD team had emphasized that testing should take place at each stage where all forms of testing were important. This started with white box testing, continued with black box testing and culminated in the user level acceptance testing. The developers carried out white box testing to check the system internally and to see that their code structures were in line with the standard coding rules and they were implemented as per the requirement specifications. The users tested the system externally using the black box testing where the system outputs were checked in an external environment depending on the inputs given. The final phase of testing was the user acceptance level so that the user could judge whether the system was helping them to be more effective in the discharge of their duties.

Figure 1 (below) illustrates the testing model for the KZN-DHS software application. It must be noted in this context that the testing of software application tools involves the configuration of proper inputs, execution of the software over the input, and the analysis of the output (Luo, 2001). The testing of the system was carried out by the testers by providing test cases with a definite test plan and tools for evaluating system functions.

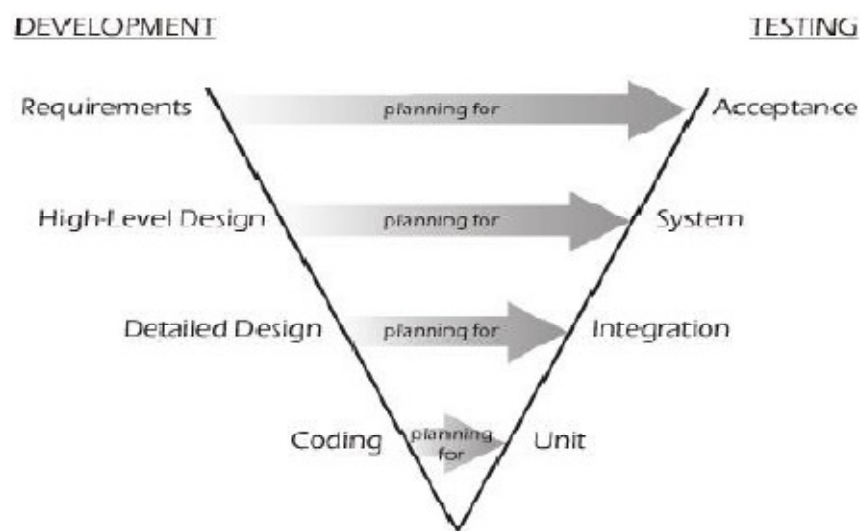


Figure 1: The V-model (Source: Oladimeji, 2010)

The software testing techniques included black box testing, white box testing, walkthroughs, reviews and inspections. Black box testing also known as functional testing refers to the assessment of system output in context of inputs provided to the application. The process execution details are ignored by the tester in this technique. The tester identifies specific test cases based on the system specification and requirement analysis. The test cases are analyzed from the input and output perspective allowing the tester to define the system performance standards based on the system specification. Thus, this form of testing focuses only on the external functionalities of the software application. It was found from this form of testing that

the output result was positive as they got the desired results from the test cases performed.

White box testing or the structural testing in contrast to black box testing focuses only on the internal processing capabilities of the system. The system developers and the testers selection of test cases in white box testing is based on the implementation of the application. Specific test cases were selected to evaluate distinct functionalities of the system and assess the process efficiency through in-depth assessment of process details. This form of testing found certain discrepancies in the relational flow where updates on a lower hierarchical plane where not updated but had shown up in the higher hierarchical panels. This was rectified immediately.

More testing approaches were involved which included reviews, inspections and walkthroughs. A review refers to any kind of testing performed by someone who is not the coder. Reviews can be both formal and informal. Inspections on the other hand are formal reviews that adopt a more systemic approach to testing. Walkthroughs comprise of assessment of the products to determine its usability and effectiveness in meeting defined system goals (Gottesdiener, 2001).

The testing of web based database application system hence focused on different aspects related to the interface and database design that play a vital role in shaping the efficiency of the system in general. Thus the testing for the online database driven housing application for the DHS was conducted in four distinct phases, namely: unit level, integration level, system level, and acceptance level as explained in the previous section. Black box testing at unit level and acceptance level was combined with white box testing at integration level and system level. These testing

techniques were chosen due to their scope in identifying existing errors and potential enhancements that can increase the efficiency of the application tool. The step-by-step testing process helped in identifying the system requirements, expanded the scope for possible enhancements and defined system functionalities for improved application design. The basic purpose of the exercise was to check the system design requirements and explore its potential usage through an in-depth evaluation of the designed application tool. Figure 2 (overleaf) is a diagrammatic representation of the step-by-step testing approach used by the researcher.

The application tool for the internet based HDDS supports various tools for inputting housing demand data, update existing applications, querying for housing specific information, coordinating with municipal authorities for house allotments for defined projects. The unit level testing was conducted by the testing team during the phases of system development. Each component was checked for validity, accuracy and linkages with other data components. The essential aspects for system design and development for database management structure was based on the UML diagrams and system requirements specifications produced at the end of the JAD and interview sessions.

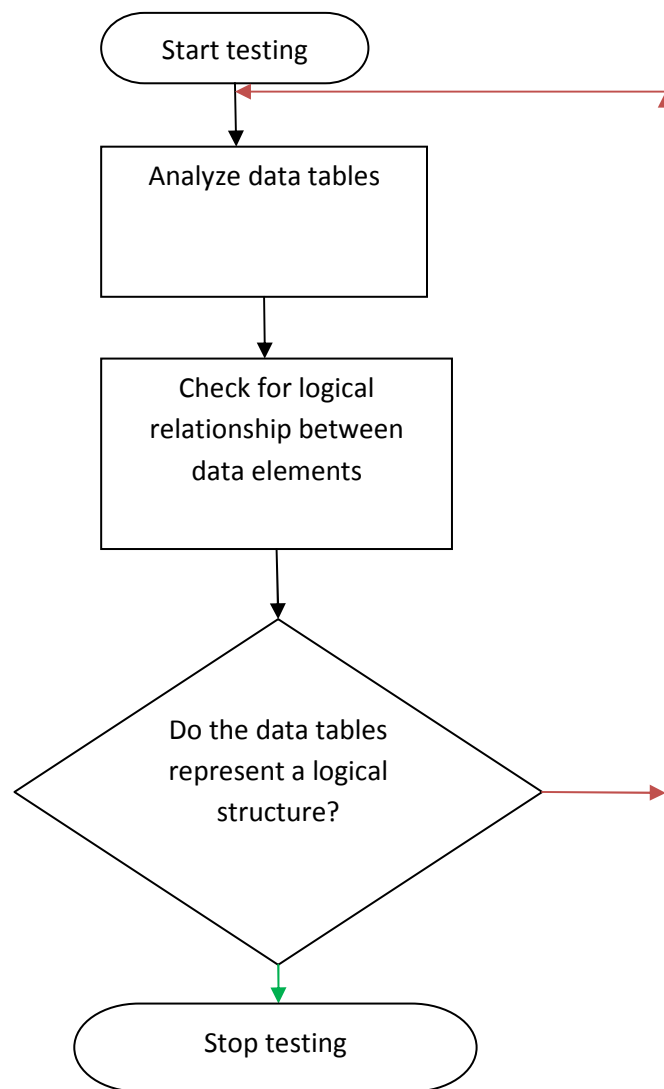


Figure 2: Unit level testing approach used by the researcher

The system testing unit were responsible for checking the linkages and relationship between identified entities of the application. The back-end database management system was inspected through black box testing techniques focusing on inputs and the outputs of the application. The backend database system was found to be effective in terms of validation checks of inputs given to the system, however, the output needs to be systemized and filtered more accurately for relevant information

system processing. The refining areas in this context were identified as the public information reports where additional filters can be added for increased clarity of reports.

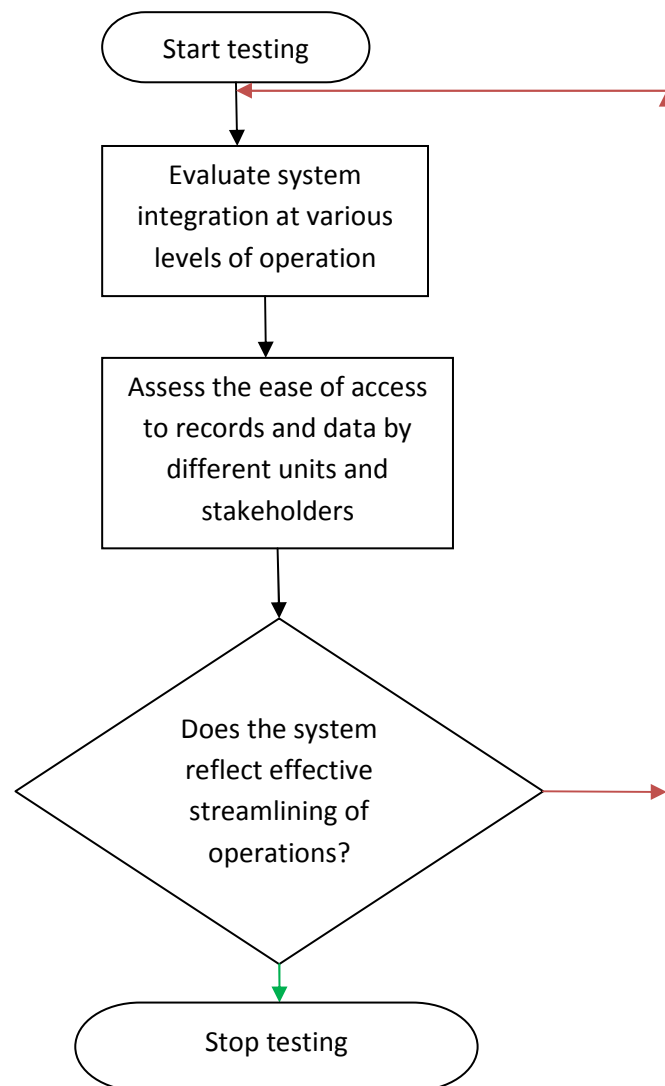


Figure 3: Integration level testing approach used by the researcher

At the integration level testing as shown in Figure 3, the system was subjected to white box testing to analyze the work processes and its streamlining with external stakeholders such as municipal authorities. The integration level testing checked for

loopholes or possible errors in integrating system modules with local municipal authority systems and inter-departmental units at DHS. The system testing results showed possible enhancements in system integration with the local municipal authority systems. Owing to the diversity of existing information systems in the municipal offices, the system developers provided a separate online logging interface for the municipal offices. Once logged in the users in the municipal offices were allowed to access relevant records and data pertaining to housing allotments and planning provisions. The system testers observed that accessing relevant details was a little difficult owing to reduced/slow connectivity and bandwidth issues. Browser compatibility issues were found to reduce the performance and efficiency of the application system. The results of the test were noted for further improvement.

Figure 4 (overleaf) presents the system level testing involved the use of white box techniques for evaluating system performance and operations. At this stage each and every module supported by the application was observed for accuracy in terms of output and validation in terms of inputs. The application design and system deliverables were evaluated against the requirements specification and user needs evaluation documents to determine its performance speed and efficiency. The results of the testing showed that the overall system design and architecture met the requirements specification thus conforming to user needs and expectations from the system on the whole. However, some issues identified during this phase highlighted the lack of adequate browser compatibility, user information security issues, and system vulnerability to hackers. The system testing revealed that unauthorized access to the online application was possible owing to low level of security features.

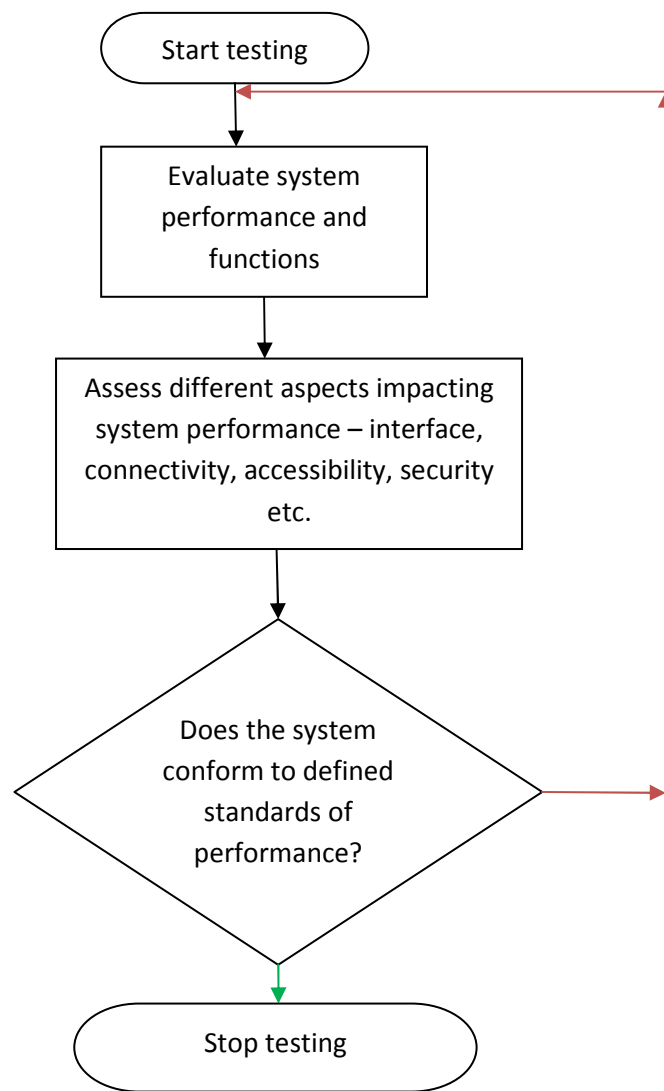


Figure 4: System level testing approach used by the researcher

The security testing involved various stages of checking such as vulnerability checks, password hacking, and system integrity checks. The system test engineers used vulnerability scanners to detect any security loopholes in the system. The scanner highlighted the weakness of the system in terms of accessing user mailing information from the server. The test also revealed that password hacking was possible through hacking systems that can crack passwords and codes easily. The

key aspect of e-governance system is hence to ensure that the system is fool-proof or tamper-proof for effective performance and desired results.

The significance of secured IT systems can be underlined by the fact that online application tools are vulnerable to security attacks and hence the goal of any online based system must be enhanced security for maximized benefit to the organization. The primary reason for testing the security of an operational system is to identify potential vulnerabilities and subsequently repair them (Wack, Tracy and Souppaya, 2003). The system testing process was thus effective in highlighting security issues and vulnerability of the system to hackers and fraudsters.

The last phase of the system testing involved the acceptance level testing (see Figure 5). This involved the evaluation of user response to system features and ability to use the system effectively. The testing was based on the black box testing techniques that evaluated input and output parameters against the defined user specifications and expectations. The results identified the system performance as good but there were scope for improvements in terms of bandwidth, connectivity and processing timelines. The key feature of the system was its high degree of usability defined by its easy to understand interface, user-friendly system messages that elucidated the specific user actions needed at each stage, and the easy navigability of the system. The back-end data updating and accessing features were found to be highly efficient. The user only needed to select the filters to gain access to specific information.

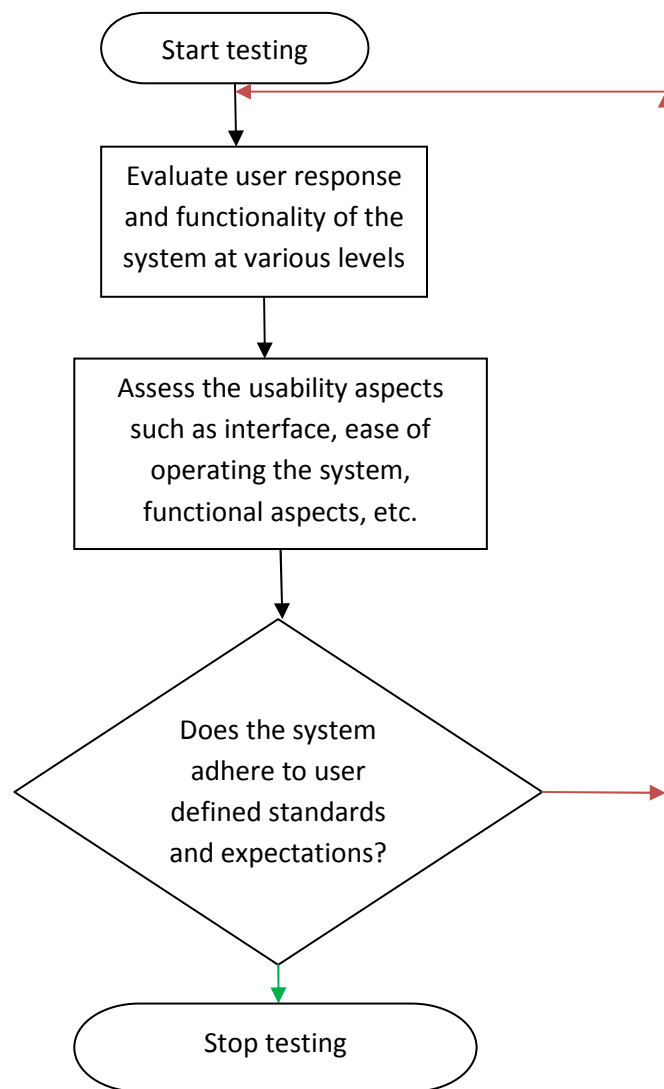


Figure 5: Acceptance level testing approach used by the researcher

A further testing module focused on the system security features to evaluate user authentication, user rights administration, privilege levels and system vulnerabilities (see Figure 6). The testing process evaluated the system architecture at each level and module to test the system security features and vulnerability to possible system attacks. The user accessibility and privilege levels were defined by the user rights and categories of users. However, some departments of the DHS felt that report

filters can be further narrowed to gain access to specific records and generate specific reports only. This feature has been noted as possible enhancement to system design before the final version of the system is rolled out.

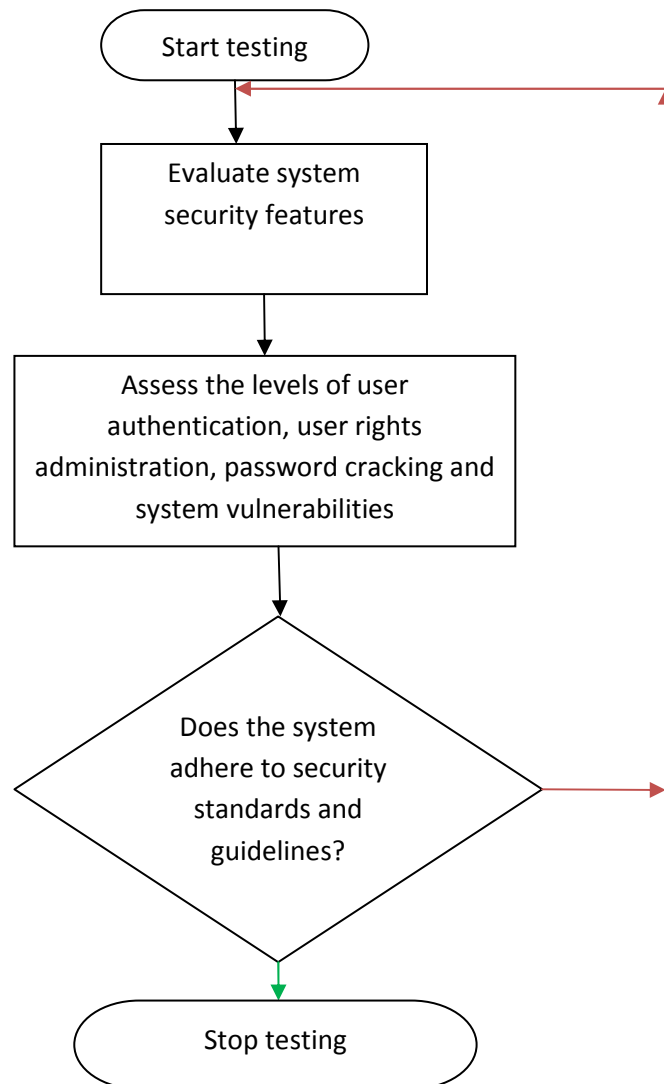


Figure 6: Security level testing approach used by the researcher

The following section discusses reliability and validity.

3.7 VALIDITY AND RELIABILITY

Cooper and Schindler (2003:231) state that validity refers to the extent to which a test measures what the researcher actually wishes to measure, whilst reliability has to do with the accuracy and the precision of a measurement procedure. Validity was maintained by ensuring that the interview questions were aligned to the aims and objectives of the study. The researcher addressed reliability of results by engaging in JAD sessions and conducting face-to-face interviews. The interviews were also personally conducted by the researcher to ensure reliability of results. The findings and evidence from the JAD and interview sessions were open to discussion among the JAD participants to eliminate irrelevant points and identify features that were redundant for the proposed system. Proceedings of the JAD sessions were sent to all participants so they could verify authenticity of the information.

3.8 ETHICAL CONSIDERATIONS

This study ensured that the following ethical considerations were maintained at all times:

- Participation in this study did not expose users to any invasion of their privacy. The anonymity of the participants was maintained at all times.
- Participants were not placed in any danger during the study and neither were they harmed in any way during and from the outcome of the research.
- The researcher clearly explained the objectives of the study to the participants and signed informed consent was obtained from the participants before conducting the study.

- Written permission was obtained from the KZN-DHS (*Appendix A*) to conduct the interviews for the study.
- A draft of the interview schedule was provided to the DHS for approval before the interviews were conducted.

3.9 DELIMITATIONS

The researcher was requested by the KZN-DHS to modify and enhance their old system. This study was therefore limited to the KZN-DHS.

3.10 SUMMARY

The focus of this chapter was on understanding the system requirements and deliverables through a deeper understanding of existing work processes, user expectations and system capabilities that helped in designing an effective system for the DHS. Validation or testing of the system was also explained. Chapter four presents the findings of this study.

CHAPTER 4

FINDINGS, DESIGN AND VALIDATION OF THE SYSTEM

4.1 BACKGROUND

The research methodology in Chapter 3 outlined the key aspects of analyzing system requirements and the potential areas the system could address in order to provide an efficient system. This chapter provides an analysis of the findings from the JAD and the interview sessions conducted at the KZN-DHS. The chapter also discusses the testing process, user requirement analysis and system adaptation process to help in gaining an improved understanding of the system design and development approach.

The system requirements and specifications identified through the JAD and interview sessions at KZN-DHS provided the base for developing system blueprints and subsequent design of the online system prototype. The key challenges faced by the system developers in this case were the wide range of users, and meeting their specific information or transaction requirements online. Web based software applications are driven by the need to define the flow of data and information through distinct user levels. The information system caters to the needs of a wide range of users hence the database design is of paramount importance in ensuring effective outcomes. E-governance models depend on effective linkages between distinct departments and functional units for efficient results.

4.2 NEW SYSTEM REQUIREMENTS – FINDINGS AND ANALYSIS

This section discusses the analysis of the questionnaire and the JAD session which formed the basis of the new system's requirement as they provided insights from the system analysts, database administrators and the development team as to the requirement specifications of KZN-DHS, the municipalities and the users. Before embarking on the requirement specifications, it was important to know why the previous system software failed, what its shortcomings were, and why it was unacceptable for the users. There was a need for detailed understanding of the standard operational process, the principal requirements of the department and the users, the shortcomings of the old system, the relational aspects of the system with respect to the sections or departments and the local municipalities frequent communication and sharing of data which needed to be analyzed at length to come to a systems requirement specifications (Kaner, 1993).

The questionnaire and JAD session also enabled the researcher to get thorough insight into the problems the department and the users were facing as they had knowledge of KZN-DHS day to day business roles, the hierarchical levels and the relational aspects of all the departments concerned. The questions asked helped in gaining in-depth understanding of the system requirements and to produce a blueprint for the system design and development process. Responses gave the researcher a deeper understanding of the system objectives, the main functional areas, the various modules required, user acceptability levels while bearing in mind the system validations and the testing phase required. The developer got firsthand feedback from the department sources and the end users of the proposed new

system as to what was lacking from the old system and what features and functions they wanted in the new system.

Based on the information collected, the researcher who was also the system developer used UML to produce system architecture models, documented the system specification information and shared it with the KZN-DHS in-house IT support, management and administrators to inform users and the development team of the functionalities. This helped in gaining user acceptance and conformance to their requirements from the new application tool (Shelly and Rosenblatt, 2012).

The software requirement specification document was prepared based on the findings from the questionnaire and JAD session. This document provided a module by module analysis of the panels of the new system and the detailed functionality of each and every user in the respective modules. Moreover it was important to analyze the findings in a detailed manner so that the development team could understand the data and process flow requirements. It was also important for the development team to understand the inter-communication between departments to help them in forming the relational database. An entity relationship diagram was given along with the software requirement specifications to all the key users of the system to help them understand inter-departmental communication which would evolve from the new system.

4.3 INTERVIEW RESULTS – FINDINGS AND ANALYSIS

4.3.1 Chief Administrator and Management Personnel

The chief administrator and management indicated that the old system was an application based local program which could not function on the internet. Since the old system used to run on a Local Area Network (LAN), it became impossible to communicate and share data with the different municipalities and the various departments of the housing board. They also felt that the old system had taken an excessive amount of time to get developed from 2003 to 2006 during which time a lot of the standard operational procedures had changed. This had led a lot of loop holes thereby making the entire system obsolete and unacceptable.

The keys reasons for the failure of the old system had been attributed to its:

- redundant features due to changes in key operational areas;
- failure to deliver proper reporting needed for management so that they could plan, know current status and execute their plans in a particular time frame;
- extremely poor user interface; and its
- failure to deliver on time.

Since it was an offline system, it needed a local system running in a LAN which was not desired. Manual processes were thus used but there were huge problems as manual errors were common and it was a time consuming procedure. The absence of a proper system, excessive time consumption and manual errors made the functioning of the system extremely difficult and there was no data integrity.

The standard operational procedures involving KZN-DHS and the municipalities included the following:

- assessment of the housing requirements of the areas in the province;
- getting the applicants to complete online forms or field officers to collect applicant data and give online input;
- processing of the applications enabling the management to identify the housing requirements of the people;
- placing the applicants in various housing schemes;
- budgeting;
- planning;
- execution plans involving allotment of applicants against an allotment fee at government subsidized rates;
- the status of the housing projects to be carried out along with the phase wise completion of the same;
- the delivery status of the housing projects; and
- the checking of legal requirements.

The researcher learned that every department had a specific responsibility which needed to be addressed. Previously one section accepted applications for housing demands; the other processed it; another section was in charge of budgeting and planning, based on the requirements of the people of the province, planning and budgeting was then done.

The process was manual where the applicants filled in a physical form giving all the details of their housing requirements, the province in which they lived and all their

personal details. The processing section gathered all the data and separated the applications according to the different districts/municipalities. They needed to keep a manual count of all the applicants from different areas in the province.

4.3.2 KZN-DHS Clerical Users and Municipality Users

The general users were of the view that an offline system makes it difficult to send and receive information from other departments. The principal reasons for the failure of the old system and its non-acceptance by the users were that:

- it was an offline system;
- key functional operations and procedures were not included;
- there was lack of proper training for the users; and
- there was poor screen interfacing and absence of a help manual.

Other issues which came to the fore for the users not accepting the system were browser incompatibility where the system used to function in Internet Explorer only but did not function on other browsers like Mozilla Firefox and Google Chrome. The inconsistency in browsers confused the users and left them frustrated. Their frustration was also fuelled by the fact that there was a low bandwidth issue with the department not being able to provide proper internet connectivity and this led to difficulties in sending data as an attachment to emails from the software. The users were apprehensive that if such low bandwidth continued in the new proposed system, it would be very difficult to implement. It was therefore absolutely necessary to have a strong internet connection and high bandwidth to ensure the smooth running of the new system. New system is built in such a way that based on the request/response we are pushing data so it optimises the performance.

The participants outlined the organizational structural details of the organization which followed a top down approach and which needed to be followed in the development of a new online system. Maintenance of the hierarchy structure along with the need for a permission based system gave a much needed data security feature where all users could not access important information. Data security remains a priority for the system developers as they need to build data security and integrity features into the system. These security features included IP tracking and the use of captcha images to ensure that data entry and login was done by an authenticated person and not by any hacking program. The surveyors were of the view that constant hacking of the internet based systems by external programs would make the system very vulnerable leading to data loss and compromised data integrity. This requirement gave the system analysts a warning to be very specific regarding security issues to ensure that data integrity was maintained and there would be no loss of data. The design of the system includes below necessary security mechanism for password authentication.

- Must be 8 characters length
- Must contain one capital letter and one numeric
- Is case-sensitive
- Allowable characters are: a-z, A-Z, 0-9, and the symbols !@\$%&*().

The participants further discussed the failure of the old system which was due to an offline system. The developers of the old system did not think about the utility of an internet based system which was realized later. The inability of the system to share data and information across the internet became the biggest problem as it made the system unacceptable to the users, managers and administrators. The researcher

agrees as an online system holds the organization together with reports and data being available at the click of a mouse, leading managers and administrators to have information readily available.

4.4. MAJOR FUNCTIONALITY OF NEW HDDS

The HDDS resides within KZN-DHS' infrastructure. Figure 7 presents a diagrammatic depiction of the functionality of the new system as developed by the researcher.

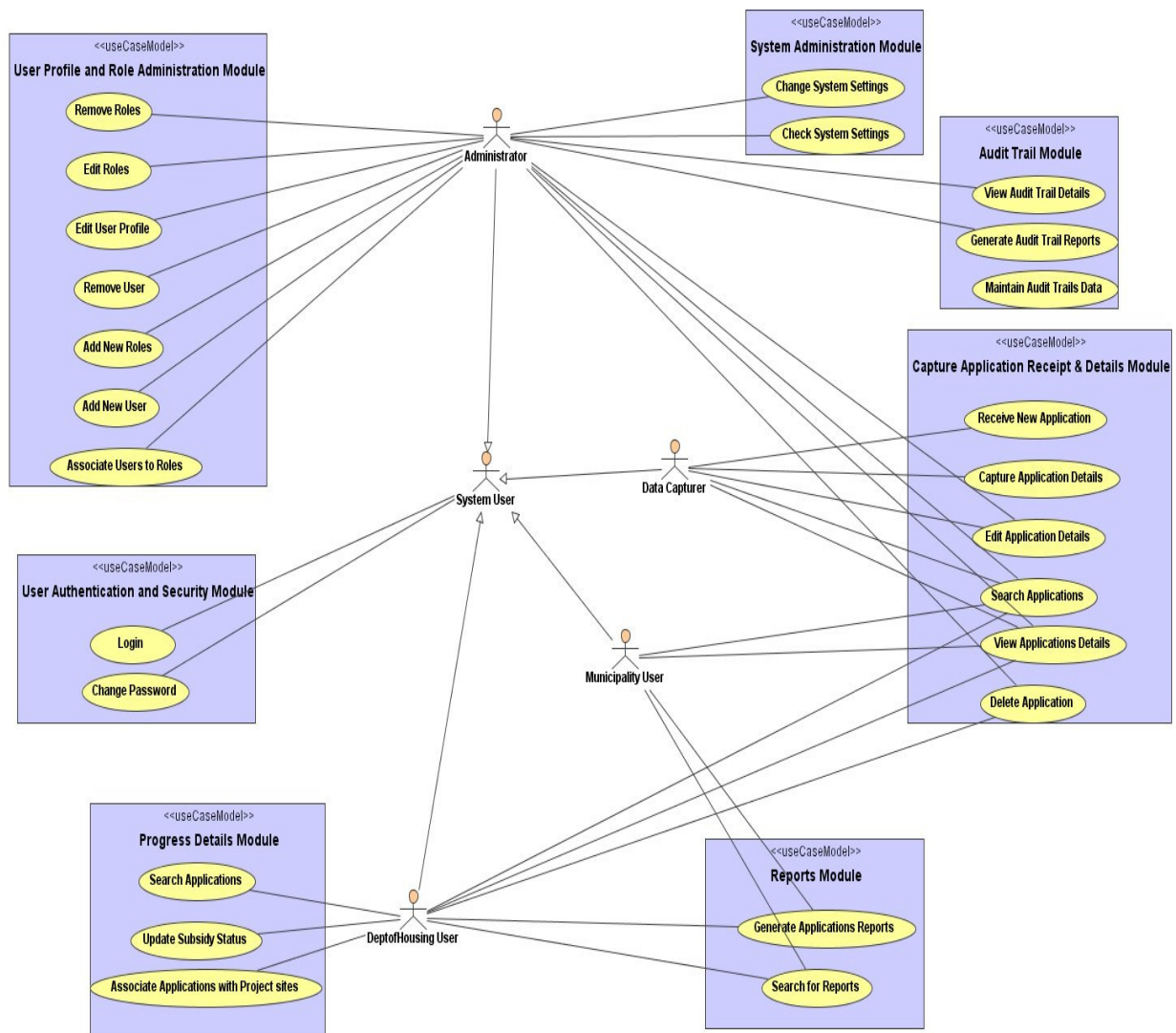


Figure 7: The Functionality of the New System designed by the researcher

The HDDS contains 7 modules, namely:

- User Profile and Role Administration module
- System Administration module
- Audit Trail Module
- User Authentication and Security Module
- Capture Application Receipt and Details Module
- Progress Details Module
- Reports Module

Figure 7 explains the functionality of each module along with the access permissions assigned to identified roles during the requirements gathering session. For Users to access the system, the User must first be created on the system. This function is the responsibility of the System Administrator. User roles exist for the application. The following are the access rights each User role will have:

- Administrator - Has full access to administer the system i.e. to create a new module, form, role, user and menus. The Administrator is responsible for system maintenance.
- Data Capture Clerk - Has access to the capturing and viewing of received applications.
- Municipality User - Has access to the capturing and viewing of received applications and viewing the reports.
- DHS User - Responsible for the approval of applications, subsidy status change as well as modifying the preference details of an applicant and accessing reports.

- Manager - Responsible for capturing new projects details, retrieving the reports and submitting to the National Department of Human Settlements.
- Please refer *Appendix G* for requirements overview.

4.4.1 Launching the HDDS Application

The User can launch the HDDS application by invoking any one of the popular browsers available currently and keying-in the provided **application URL**. Application recognizes the User request and launches the home page in requested browser window as shown in Figure 8. This home page contains the login screen to allow the User to login to the system by providing his/her login credentials as provided by the Administrator of the system. The User needs to provide his/her user name and password (see login screen in Figure 8).

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Login

User Name * :
 ex: laxman@example.com

Password * :

Login **Reset**

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Figure 8: Login screen

Once the User has keyed-in his/her credentials and clicked on the **Login** button, the system cross checks the User credentials against the values saved in the database. If the credentials match; the User will be logged in to the system; this will launch the Welcome page (Figure 9). The User will be provided with different vertical menus and submenus based on the User's role and the level of access permitted on various system functionalities set by the Administrator of the system.



Figure 9: Welcome screen

From the Welcome page, the User may proceed with accessing various functionalities of the system by clicking on the corresponding menu items as shown in Figure 10.



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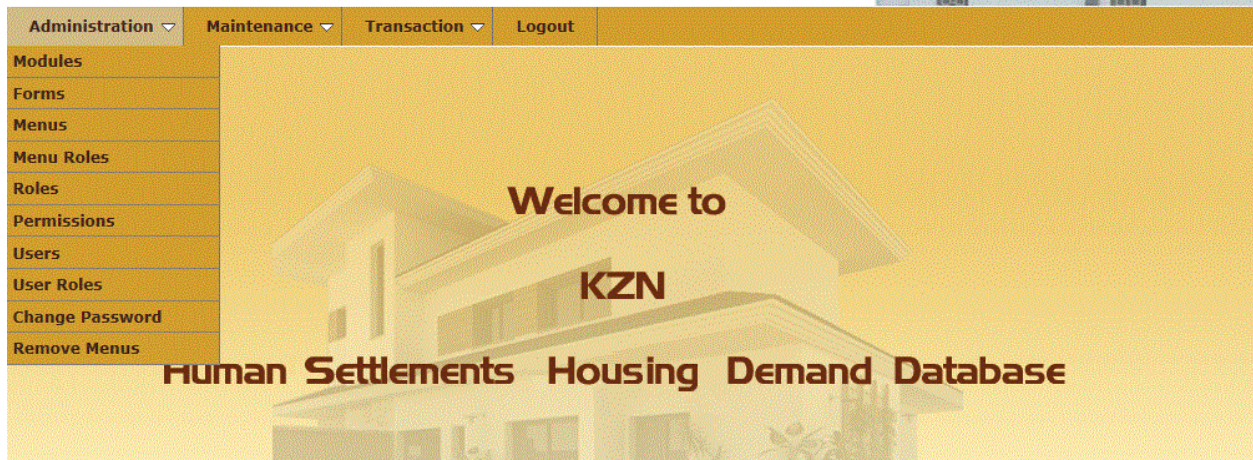


Figure 10: Administration Menus screen

The section below explains the Administration Module functionality. The Administration Module helps the Administrator to manage the system administration functions.

4.4.2 Administration Module

4.4.2.1 Module Details [Menu Item: Administration →Modules]

A Module is a part of an application. The Module menu item helps the User to manage the Modules in the HDDS which contains 3 modules, namely:

- Administration Module
- Maintenance Module
- Transaction Module

The Modules menu item allows the User to search for an existing Module, add a new Module, edit existing Module details, and modify the status of existing Module. The User clicks on the *Modules* menu item to display the Search Modules screen as shown in Figure 11.



Figure 11: Module Menu screen

The Modules menu displays the Search Module details screen as shown in Figure 12. From the Search Modules screen, the system allows the User to perform the following functions: add a new Module; edit existing Module; change the status of an existing Module; paging; sorting and exporting to Excel. All these functions are explained below.

Search Module

The Search Module screen allows the User to search for the modules that exist in the system. Initially the Search Module screen displays all the existing modules in the Result List. The system displays all the records if the User searches for the

modules without entering/selecting any data (as shown in Figure 12). The User can search for existing modules in the HDDS by providing the Module title or status; the system then displays a list of records to match the criteria entered.

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Administration Maintenance Transaction Logout

Module Search Details Add

Module Title:

Status: -- Select All --

Search Cancel

No. of Records : 5

| MODULE ACRONYM | MODULE TITLE | LAST UPDATED BY | STATUS | EDIT |
|----------------|--------------|-----------------------|--------|------|
| ADBC | kjk | Lakshmana Rao Madgula | | |
| FFSD | sdd | Lakshmana Rao Madgula | | |
| FFBM | acron | Lakshmana Rao Madgula | | |
| REPJ | Report | Lakshmana Rao Madgula | | |
| FFBM | Maintenance | Lakshmana Rao Madgula | | |

1 2 3 4

Export To Excel

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Figure 12: Search Module screen

The Result List contains different columns with the status and option to edit the corresponding Module details. The User can sort the Result List in ascending/descending order by clicking on the relevant column. The Result List allows the User to navigate to the desired page by clicking on a page number or by clicking on *first*, *next*, *previous* and *last* page options.

Screen Inputs:

- **Module Title:** This is a free formatted text field. This field allows the User to capture any characters.
- **Status:** This field of dropdown type and allows the User to select *Active/Inactive/Select All*.

After providing the required/desired values for the input fields, the User clicks on the **Search** button to display the records that match with the provided values in the Result List as shown in Figure 12.

Add Module

The Add Module screen is designed to add a new module to the HDDS. This screen helps the Administrator to add a new module without contacting the system developer. The Administrator follows the procedure below to add a new module:

- click on **Add** link (as shown in Figure 12) to display the Add Module Details screen as shown in Figure 13.
- enter/select inputs such as Module Acronym, Module Title and Module URL.
- after capturing the required details, the User clicks on the **Submit** button to save the module information to the HDDS.
- click on **Cancel** button to clear the content entered in the input fields.
- click on **Search** link to display the Module Search details screen to perform a Search Module operation.

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Administration Maintenance Transaction Logout

Add Module Details Search

Module Acronym * :
Module Title * :
Module URL * :

Submit Cancel

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Figure 13: Add Module screen

Screen Inputs:

- **Module Acronym:** This is a mandatory field which describes the Module Acronym with an alphanumeric of 4 characters length ex: TRAN, ADMN. Module Acronym is a unique code that helps the User to identify each module uniquely.
- **Module Title:** This field is to provide the title of the module; it is mandatory and only accepts strings. A string is a collection of a sequence of characters e.g.: Transaction, Administration etc.
- **Module URL:** This field is to provide the **Uniform Resource Locator (URL)** of the module. The URL is the global address of the documents or other resources on the internet/intranet.

Edit Module

The Edit Module screen is designed to edit existing modules. The User follows the procedure below to edit the module.

- click on the **Edit** link (Figure 12) to redirect the User to the Module Edit details screen as shown in Figure 14.
- enter/select/modify the inputs such as the Module Acronym, Module Title and Module URL.
- After modifying the required details, the User clicks on the **Update** button to update the module information to the HDDS.
- click on the **Cancel** button to clear the content entered in the input fields.
- click on the **Search** link to display the Module Search details screen.

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Module Edit Details

Module Acronym *:

Module Title *:

Module URL *:

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Figure 14: Edit Module screen

The Screen Inputs: The Module Acronym, Module Title and Module URL are the same as in the Add Module screen.

Change Status

The Change Status screen helps the User to change the status of the module to either *active* or *inactive*. To change the status, the User follows the following steps:

- click on the **Status** icon (in Figure 12) to change the status of the corresponding record. The system displays a confirmation message as shown in Figure 15.
- click on the **Yes/No** button depending on the User choice to change the status of the module.

Based on the User selection, the system performs the corresponding operation and modifies the status from *active* to *inactive* or *vice versa*.

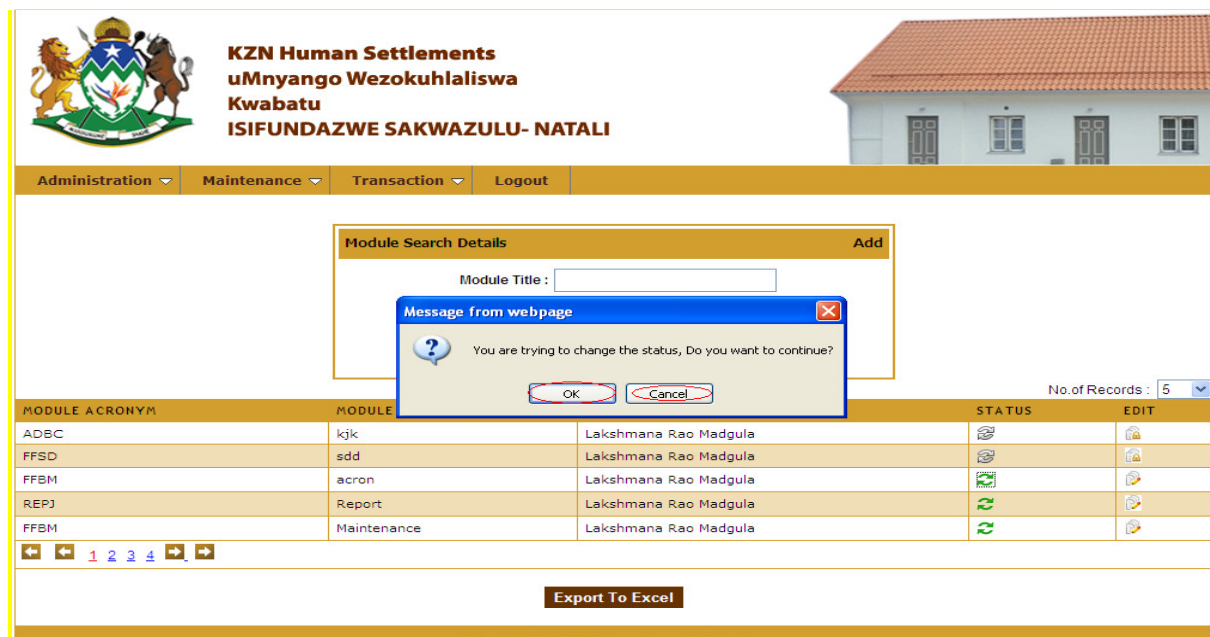


Figure 15: Module Status Change screen

If the User tries to change the status of any record(module) which is already in use by the transaction data, the system displays a message as “the module has child records” without changing the status as shown in Figure 16.

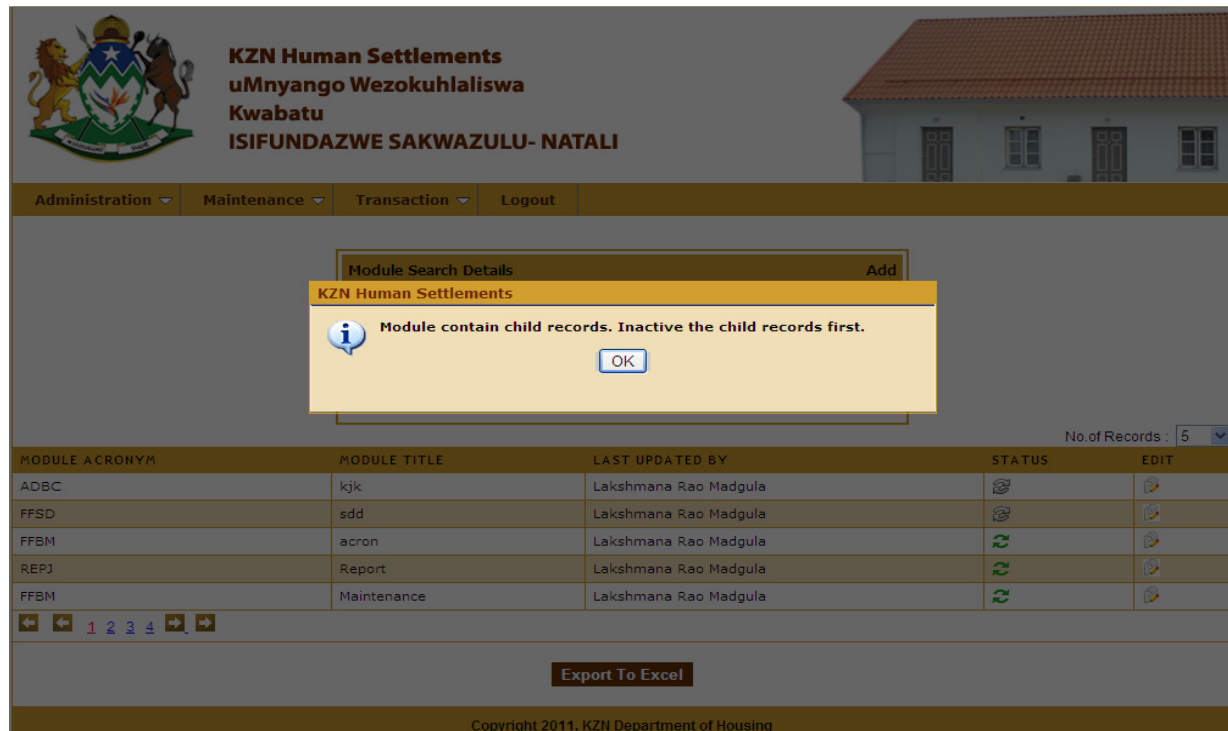



Figure 16: Status Change – Inactive Module screen

Paging

The Result List contains multiple pages of data as shown in Figure 17. The User can navigate to the desired pages of the Result List by using *paging* options such as *first*, *previous*, *next* and *last*. The *No. of Records* select box allows the User to choose the number of records to display per page as shown in Figure 18. The User clicks on *page numbers* or on *first*, *next*, *previous* and *last* icons to navigate to the relevant page as shown in Figure 17.



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Module Search Details Add

Module Title :
Status : -- Select All --
Search Cancel

No. of Records : 5

| MODULE ACRONYM | MODULE TITLE | LAST UPDATED BY | STATUS | EDIT |
|----------------|--------------|-----------------------|--------|------|
| ADBC | kjk | Lakshmana Rao Madgula | | |
| FFSD | sdd | Lakshmana Rao Madgula | | |
| FFBM | acron | Lakshmana Rao Madgula | | |
| REPJ | Report | Lakshmana Rao Madgula | | |
| FFBM | Maintenance | Lakshmana Rao Madgula | | |

1 2 3 4

Export To Excel

Figure 17: Paging option in Module Search screen

The system reads the *No. of Records* field value to display the number of records in the Result List. The User selects the relevant value for *No. of Records* field to increase/decrease the number of records the system displays in the Result List as shown in Figure 18.



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Module Search Details Add

Module Title :
Status : -- Select All --
Search Cancel

No. of Records : 5

| MODULE ACRONYM | MODULE TITLE | LAST UPDATED BY | STATUS | EDIT |
|----------------|--------------|-----------------------|--------|------|
| ADBC | kjk | Lakshmana Rao Madgula | | |
| FFSD | sdd | Lakshmana Rao Madgula | | |
| FFBM | acron | Lakshmana Rao Madgula | | |
| REPJ | Report | Lakshmana Rao Madgula | | |
| FFBM | Maintenance | Lakshmana Rao Madgula | | |

1 2 3 4

Export To Excel

Figure 18: Number of Records Selection in Module Search screen

Sorting

The User can sort the data in the Result List in ascending/descending order by clicking on the relevant column heading. The System displays the data of the Result List in the sorted order in the selected column. The User can use *Module Acronym*, *Module Title*, *Last Updated by* and *Status* columns as possible sort options. The User clicks on the heading of the relevant column in the Result List to sort the results in ascending/descending order as shown in Figure 19.

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Module Search Details Add

Module Title :

Status : -- Select All --

Search Cancel

No. of Records : 5

| MODULE ACRONYM | MODULE TITLE | LAST UPDATED BY | STATUS | EDIT |
|----------------|--------------|-----------------------|--------|------|
| ADBC | kjk | Lakshmana Rao Madgula | | |
| FFSD | sdd | Lakshmana Rao Madgula | | |
| FFBM | acron | Lakshmana Rao Madgula | | |
| REPJ | Report | Lakshmana Rao Madgula | | |
| FFBM | Maintenance | Lakshmana Rao Madgula | | |

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Figure 19: Sorting in Module Search screen

Export to excel

The User clicks on Export to Excel to export the data/records that exist in the Result List to an Excel sheet as shown in the Figure 20.

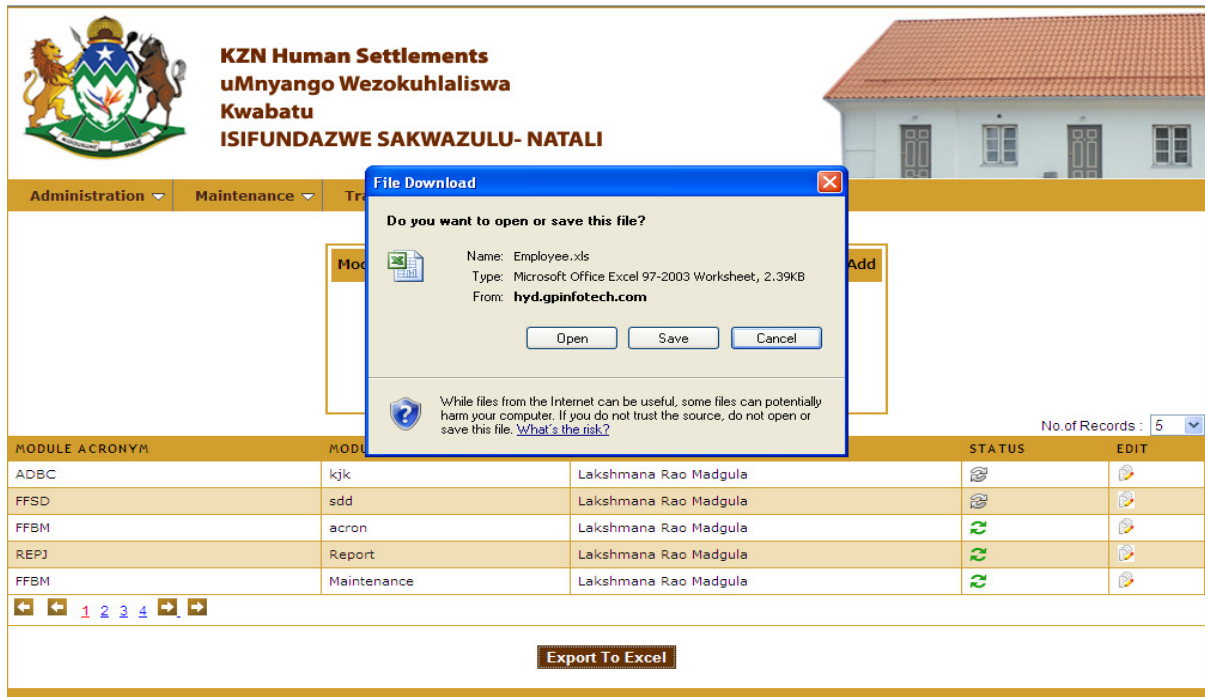



Figure 20: Export to Excel in Module Search screen

The *change status*, *paging*, *sorting* and *export to Excel* functionality for all the menus are implemented in a similar manner.


The section below explains the functionality of the Form Details menu item.

4.4.2.2 Form Details [Menu Item: Administration → Forms]

The Forms functionality allows the User to add a new screen/page to the HDDS. The Administrator can add a new screen to the system with the help of a Forms menu item. The Forms menu item displays the Search Forms details screen as shown in Figure 21. From the Search Forms screen, the system allows the User to perform the following functions: *add a new form*; *edit existing form*; *change the status of an existing form*; *paging*; *sorting*; and *exporting to Excel*.



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Form Search Details Add

Form Name :

Status : --- Select All ---

Search Cancel

No of Records : 5

| MODULE NAME | FORM NAME | SERVICE PAGE | UPDATED BY | STATUS | EDIT |
|----------------|-------------------|----------------------|-----------------------|--------|------|
| Tanstation | TranactionDetails | Pal_Transaction.aspx | Lakshmana Rao Madgula | | |
| Administration | ffff | ffffdd | Lakshmana Rao Madgula | | |
| Administration | ff | ffdd | Lakshmana Rao Madgula | | |
| Administration | abxcd | fgrtyugn | Lakshmana Rao Madgula | | |
| year | xyza | xyz23 | Lakshmana Rao Madgula | | |

Export To Excel

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Figure 21: Search Forms screen

All the functions are explained in the following sections.

Search Forms Details:

The Search Forms screen allows the User to search for the forms that exist in the system. Initially the Search Forms screen displays all the existing forms in the Result List. The system displays all the records if the User searches for the forms without entering/selecting any data (as shown in Figure 21). The User can search for existing forms in the HDDS by providing the Form name or status.

Inputs:

- Form Name: This is a free formatted text field which allows the user to capture any characters
- Status: This field is of dropdown type allows the User to select *Active/Inactive/Select All*.

After providing the required/desired values for the input fields, the User clicks on the **Search** button to display the records that match with the provided values in the Result List as shown in Figure 21. The Result List contains the *sorting* and *paging* options as explained in the previous section.

Add Form

- The Add Form screen is designed to add a new form to the HDDS.
- click on the **Add** link as shown in Figure 21 to display the Add Forms details screen as shown in Figure 22.
- enter/select the inputs such as the *Module*, *Form Name* and *Service Page*.
- after capturing the required details, the User clicks on the **Submit** button to save the Forms information to the HDDS.
- click on the **Cancel** button to clear the content entered in the input fields.
- Click on the **Search** link to display the Forms Search details screen to perform the Search Forms operation.

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Add Form Details Search

Module *: Select Module

Form Name *:

Service Page *:

Save Cancel

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Figure 22: Add Forms screen

Screen Inputs:

- **Module:** This is a mandatory field. This field is of dropdown type and displays all the active modules that exist in the system. The User selects the module from the list of available modules.
- **Form Name:** This field is to provide the name of the form; it is mandatory and only accepts strings.
- **Service Page:** This field is to provide the actual name of the Form given by the developer. This field is mandatory and only accepts strings.

Edit Form

The Edit Form screen is designed to edit existing forms. The User follows the procedure below to edit the Form.

- click on the **Edit** link (as shown in Figure 21) to redirect the User to the Edit Form details screen as shown in Figure 23.
- enter/select/modify the inputs such as *Module*, *Form Name* and *Service Page*.
- After modifying the required details, the User clicks on **Update** button to update the Form information to the HDDS.
- click on the **Cancel** button to clear the content entered in the input fields.
- click on the **Search** link to display Form Search details screen.

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Form Edit Details

Module Name *: Tanstation

Form Name *: TransactionDetails

Service Page *: Pal_Transaction.aspx

Update Cancel

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Figure 23: Edit Forms screen

Screen Inputs: The Module Name, Form Name and Service Page are the same as in the Add Form screen.

The section below explains the functionality of the Roles Details menu item.

4.4.2.3 Roles Details [Menu Item: Administration → Roles]

The Roles functionality allows the User to add a new role to the HDDS. The Administrator can add a new role to the system with the help of the Roles menu item. After adding a new role; the Administrator assigns menus to the roles to generalise the permission levels. The Administrator assigns the generalized roles to the users to assign all the role permissions easily. The Roles menu item displays the Search Roles details screen as shown in Figure 24. From the Search Roles screen, the system allows the user to perform the following functions: add a new role; edit

existing role; change the status of an existing role; paging; sorting; and export to Excel.

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Role Search Details Add

Role Name :

Status : --Select All--

Search Cancel

No of Records : 5

| ROLE ACRONYM | ROLE NAME | UPDATED BY | STATUS | EDIT |
|--------------|---------------|-----------------------|--------|------|
| TSAS | Transaction | Lakshmana Rao Madgula | | |
| ACJV | admin | Lakshmana Rao Madgula | | |
| FDSF | Administrator | Lakshmana Rao Madgula | | |
| ARYC | arcy | Lakshmana Rao Madgula | | |
| ASSI | CLEARK | Lakshmana Rao Madgula | | |

1 2

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Figure 24: Roles screen

Search Roles:

The Search Roles screen allows the User to search for the roles that exist in the system. Initially the Search Roles screen displays all the existing roles in the Result List. The system displays all the records if the User searches for the roles without entering/selecting any data (as shown in Figure 24). The User can search for existing roles in the HDDS by providing a role name or status.

Screen Inputs:

- Role Name: This is a free formatted text field which allows the user to capture any characters.

- Status: This field of dropdown type allows the User to select *Active/Inactive/Select All*.

After providing the required/desired values for the input fields, the User clicks on the **Search** to display the records that match with the provided values in the Result List as shown in Figure 24. The Result List contains the sorting and paging options as explained in the previous sections. The User follows the same procedure to add/edit the Roles Details as explained in the Menus section 4.4.2.

The section below explains the functionality of the Menu Roles menu item.

4.4.2.4 Menu Roles [Menu Item: Administration →Menu Roles]

The Menu Roles functionality allows the User to map the menu items with existing roles. This screen helps the Administrator to manage the assigned/allocated menu items to an existing role. The Menu Roles menu item displays the Menu Roles screen as shown in Figure 25. The Menu Roles screen allows the user to map one or more menus with *read*, *write*, *modify* and *delete* permissions to a selected role.

Procedure to map Menus to a Role:

The Administrator can map one or multiple menus to a particular Role with *read*, *write*, *modify* and *delete* permissions as shown in Figure 25.

- select a Role from the list of available roles.
- after selection of a Role, the system loads all the menus that are already mapped with the selected role with the specified permissions as shown in Figure 25.
- select one or more menus for the Role as shown in Figure 25.

- add/modify menus to the specific role by clicking on the **Update** as shown in Figure 25.

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Menu Role Map

Role Name: Administrator

| Menu Name | Read | Write | Modify | Delete |
|-----------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Ward | | | | |
| gender | | | | |
| Administration | | | | |
| Modules | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Forms | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| menus | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Menu Roles | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Roles | | | | |
| Permissions | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Users | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| User Roles | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Change Password | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Remove Menu | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Maintenance | | | | |
| Transaction | | | | |
| Logout | | | | |

Update

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Figure 25: Menu Roles Menu screen

The system assigns the selected menus to the identified roles with the specified permissions. The Administrator can assign the mapped roles to one or more Users. The Users inherit all the permissions of the roles assigned to them.

The following section explains the functionality of the Permissions menu item.

4.4.2.5 Permissions [Menu Item: Administration →Permissions]

This screen helps the Administrator to assign specific permissions to a User on a selected menu item with the relevant permissions. The Permission screen allows the Administrator to search for existing permissions, add a new permission, and edit

existing permission details to a User on a selected menu item. The User clicks on the Permissions menu item in the Administration menu to display the Search Permission details screen. From the Search Permission screen, the system allows the user to perform the following functions: add a new permission; edit existing permission; change the status of an existing permission; paging; sorting; and export to Excel.


Search Permission Details:

Search Permission screen allows the user to search for the permissions that exist in the system. Initially the Search Permission screen displays all the existing permissions in the Result List. The system displays all the records if the User searches for the permissions without entering/selecting any data (as shown in Figure 26). The User can search for existing permissions in the HDDS by providing the user name or menu title.


Screen Inputs:

- User Name: This field is to provide the user name details and only accepts strings.
- Menu Title: This field is to provide menu title details and only accepts strings.

After providing the required/desired values for the input fields, the User clicks on the **Search** button to display the records that match with the provided values in the Result List as shown in Figure 26. The Result List contains the sorting and paging options as explained in the previous sections.



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Permissions Search Details Add

User Name :
Menu Title :
Search Cancel

No of Records : 5

| USER NAME | MENU TITLE | READ | WRITE | MODIFY | DELETE | LAST UPDATED BY | EDIT |
|--------------------|-------------------|------|-------|--------|--------|-----------------------|------|
| srinivasu dandamui | Types of Marriage | | | | | Lakshmana Rao Madgula | |
| Srinivasu D | Types of Marriage | | | | | Lakshmana Rao Madgula | |
| Kalis Jake | Roles | | | | | Lakshmana Rao Madgula | |
| Kalis Jake | Remove Menus | | | | | Lakshmana Rao Madgula | |
| Srinivasu D | User Roles | | | | | Lakshmana Rao Madgula | |

Export To Excel

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Figure 26: Search Permissions screen

Add Permission

The Add Form screen is designed to add a new permission to the HDDS. The User clicks on the **Add** link as shown in Figure 26 to display the Add Permission details screen as shown in Figure 27.



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Permissions Add Details Search

User Name :
Menu Item :
Permissions: Read : ☐ ☐ ☐ ☐
Write : ☐ ☐ ☐ ☐
Modify : ☐ ☐ ☐ ☐
Delete : ☐ ☐ ☐ ☐
Save Cancel

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Figure 27: Add Permissions screen

Screen Inputs:

- User name: This is a mandatory field. This field is of dropdown type and displays all the active Users that exist in the system. The User selects the user name from the list of available user names.
- Menu item: This is a mandatory field. This field is of dropdown type and displays all the active menu items that exist in the system. The User selects one menu name from the list of available menus.
- The User selects the desired permissions (i.e. read, write, modify and delete) for a User on the selected menu item. The User needs to select a minimum of one permission to add a new entry to the HDDS.
- If the User selects *write/modify/delete* permissions without selecting the *read* permission then the system displays a validation message as “Read permission is mandatory”.
- click on the **Save** by selecting user name, menu name and at least one permission to save the permissions to the system as shown in Figure 27.
- click on the **Cancel** button to clear the captured/selected inputs.
- click on the **Search** link to display Permissions Search details screen.

The User follows a similar procedure to edit the existing permissions. The following section explains the process of the User Details functionality.

4.4.2.6 User Details [Menu Item: Administration →Users]

The Users functionality allows the Administrator to add a new User to the HDDS. From the Search Users screen, the system allows the Administrator/Users to perform the following functions: add a new user; edit existing user details; change

the status of an existing user; paging; sorting; and exporting to Excel. All the functions are explained in the following sections. The User clicks on the **Users** menu item in the administration menu to display Search User details Screen as shown in Figure 28.

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User Search Details **Add**

Name:

Surname:

Role:

Status: -- Select All --

Search **Cancel**

No. of Records : 5

| NAME | SURNAME | ROLE | EMAIL | DISTRICT | MUNICIPALITY | UPDATED BY | STATUS | EDIT |
|-----------|------------|--------------|-----------------------------------|---------------|---------------------------------------|-----------------------|--------|------|
| Test User | Test User1 | Administator | test@gmail.com | Amajuba1 | hnh | Lakshmana Rao Madgula | | |
| hdgh | fghgf | admn | gfd@sadjkhfjk.com | Umgungundlovu | uMngeni Local Municipality(KZN222) | Lakshmana Rao Madgula | | |
| vijay | pailla | admn | vijay@gmail.com | Amajuba1 | Umdoni Local Municipality(KZN212) | Lakshmana Rao Madgula | | |
| rhodes | jonty | SystemUser | rhodes@gmail.com | Umgungundlovu | uMshwathi Local Municipality (KZN221) | Lakshmana Rao Madgula | | |
| vijay | miriyala | admn | ashokbabu.miriyala@gpinfotech.com | distric13 | aaa | Lakshmana Rao Madgula | | |

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Figure 28: Search User Details screen

Add User

The Add User screen is designed to add a new User to the HDDS. The Administrator follows the steps below to add a new User to the system.

- click on the **Add** link (as shown in Figure 28)to redirect the User to the Add User details screen as shown in Figure 29.
- enter/select the inputs such as *Name*, *Surname*, *Email*, *Role*, *District* and *Municipality*.

- click on the **Save** button to save the captured User information to the system.
- click on the **Cancel** button to clear the content entered in inputs.
- click on the **Search** link to display the User Search details.

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Add User Details Search

Name * :

Surname * :

Email * :

Role * : -- Select Role --

District * : -- Select District --

Municipality * : -- Select Municipality --

Save Cancel

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Figure 29: Add User Details screen

The newly added User receives an automatic welcome email with user name and password details to his/her registered email address as shown Figure 30.

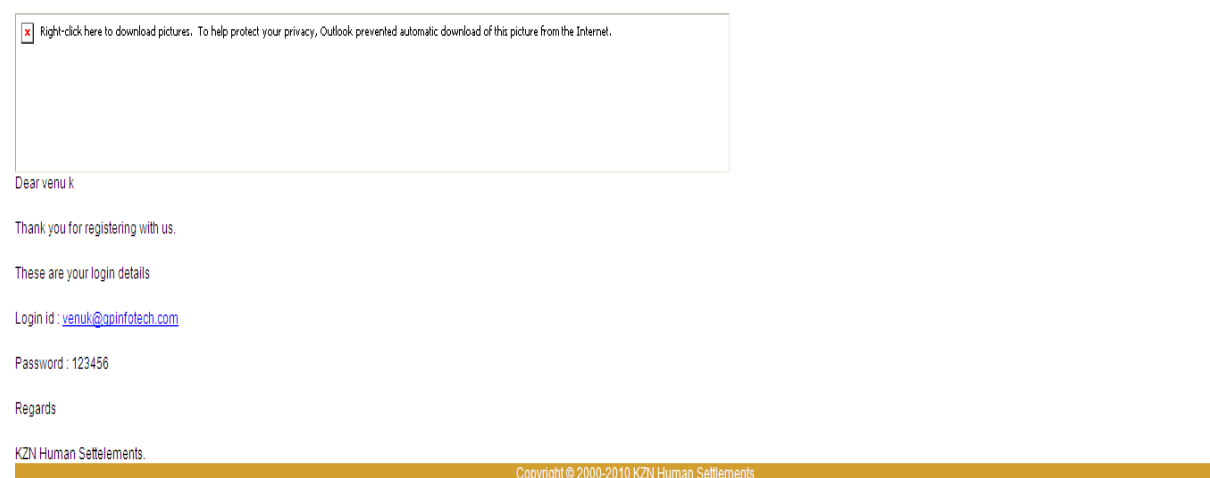


Figure 30: Confirmation Email for Newly Added User

The following section explains the process of assigning one or more roles to the Users.

4.4.2.7 User Roles [Menu Item: Administration → User Roles]

The User Roles screen allows the user to map a User to one or more roles. The User clicks on User Roles menu item in the administration menu to navigate to User Roles as shown in Figure 31.

Below are the input fields in the User Roles screen:

- User name is mandatory. The system displays all the active Users in the system.
- select one or more roles for the selected User and click on **Save** to map the selected roles to the identified User.
- click on **Cancel** to reset all the inputs.

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User Role Map

User Name *: Kalis Jake

Select Role *: ☒ Administrator ☐ administration ☒ Administrator ☐ admin ☐ arcy ☒ CLEARK ☐ fdg ☒ SystemUser ☐ Transaction

Save Cancel

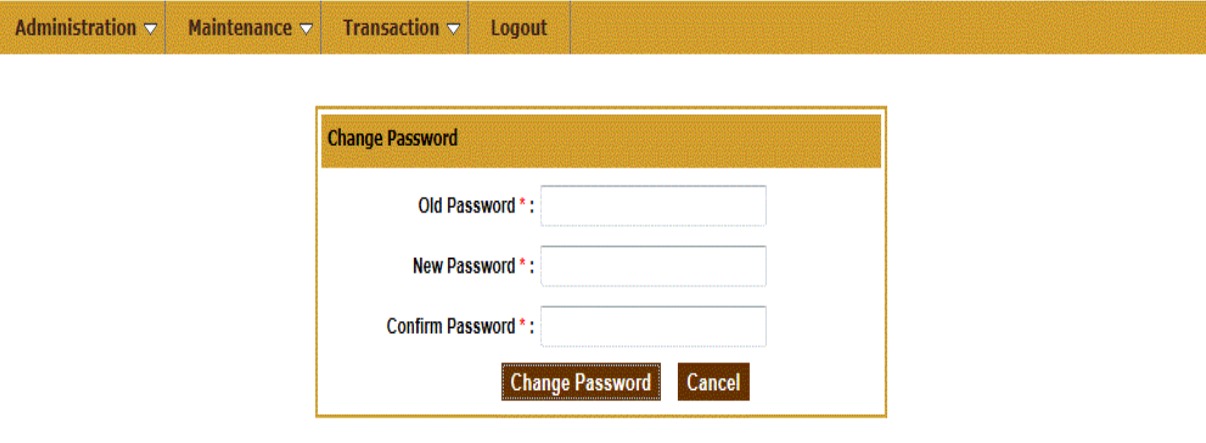
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Figure 31: User Roles mapping screen

The section below explains the process to change the password details.

4.4.2.8 Change Password [Menu Item: Administration → Change Password]

The Change Password screen allows the User to change his current/existing password as shown in Figure 32. The User clicks on the Change Password menu item to display the Change Password screen.



The screenshot shows a web application interface. At the top is a yellow navigation bar with four items: 'Administration', 'Maintenance', 'Transaction', and 'Logout', each followed by a small downward arrow. Below this bar is a white rectangular area. In the center of this area is a smaller white box with a yellow border and a yellow header. The header of this inner box is labeled 'Change Password'. Inside the white box, there are three text input fields, each preceded by a label and an asterisk: 'Old Password *', 'New Password *', and 'Confirm Password *'. At the bottom of the white box, there are two buttons: a yellow button labeled 'Change Password' and a white button labeled 'Cancel'.

Figure 32: Change Password screen

The following section explains the Maintenance Module functionality. The Maintenance Module helps the Administrator/authorized User to manage the system maintenance functions. These maintenance screens help to manage the master data of the system i.e. *add/edit/delete* the master data.

4.4.3 MAINTENANCE MODULE

This module contains the functionality to manage the master data. Master data is used in all the transaction screens and helps to improve the data quality and minimise capturing errors. The section below explains the Municipalities details menu item functionality.

4.4.3.1 Municipalities [Menu Item: Maintenance →Municipalities Details]

The Municipalities screen allows the User to maintain municipalities for the selected province for which the current system is being implemented. To capture municipality information, the User needs to provide the *district*, *municipality code* and *municipality name*. This data will be displayed in the municipality drop down field.

Municipality Search Details

After selecting the Municipalities Details menu item, the system displays Municipality Search details screen with a list of municipalities that exist in the system as shown in Figure 33.

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Municipality Search Details Add

Municipality Name :

Status : --- Select All ---

Search Cancel

No of Records : 5

| DISTRICT NAME | MUNICIPALITY NAME | UPDATED BY | STATUS | EDIT |
|---------------|-------------------|-----------------------|--------|------|
| Amajuba1 | Amin9 | Lakshmana Rao Madgula | | |
| Umkhanyakude | kjlk123 | Lakshmana Rao Madgula | | |
| Amajuba1 | augr11 | Lakshmana Rao Madgula | | |
| ggfgv | Mbhashe | Lakshmana Rao Madgula | | |
| Amajuba1 | humin | Lakshmana Rao Madgula | | |

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Figure 33: Municipality Search screen


The Municipality Search details screen helps the User to find existing municipality entries based on the values captured/selected in one or more search fields provided.

The **Add** link located at the top right corner of Figure 33 launches the Add municipality details screen that allows the User to add new municipality details to the HDDS.

The User can search for existing municipality details by providing the municipality name or status and clicking on the **Search**. The system displays all the records if the User searches for the municipalities without entering/selecting any data. The system displays the matching entries in a Result List with sorting and paging options. The **Cancel** button helps the User to clear the values in the search filter(s). The User can navigate to the pages in the Result List using the navigation buttons provided below the Result List and sorting the Result List contents by clicking on the relevant column headings. The User clicks on the **Edit** icon to edit the corresponding municipality entry. The section below explains the process of adding a new municipality to the system.

Add municipality Details

The Add municipality details screen allows the User to add new municipality details to the HDDS by providing the values for *District Name*, *Municipality Code* and *Municipality Name* as shown in Figure 34. After capturing the values for the above fields; the User clicks on the **Save** to save the details to the database which raises a confirmation message stating that the entry has been successfully saved. User click on the **Cancel** to clear the captured values for the above mentioned fields.



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Add Municipality Details
Search

District Name * : --- Select District ---

Municipality Code * :

Municipality Name * :

Save Cancel

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Figure 34: Add Municipality Details screen

Edit Municipality Details

The User clicks on **Edit** against captured entry from the Result List of the Municipality Search details screen to navigate to Edit Municipality details screen with all the existing values populated in the fields and allows the User to change the values as shown in Figure 35.



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Edit Municipality Details

District Name * : Amajuba1

Municipality Code * : wq

Municipality Name * : Amin9

Update Cancel

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Figure 35: Edit Municipality Details screen

After modifying the required fields' data, the User clicks on the **Update** button to update the changed values onto the HDDS. On successful updating of the record, the system displays a confirmation message stating that the entry has been successfully updated. The User clicks on the **Cancel** button to cancel all the changes and the system launches the Municipality Search details screen without affecting the data being edited.

The following section explains the Marital Status details screen functionality.

4.4.3.2 Marital Status Details [Menu Item: Maintenance →Marital Status Details]

This screen allows the User to maintain Marital Status details in the HDDS. This data will be displayed in the marital status drop down field in the Application Received details screen of the transaction module. To capture marital status information, the User captures the Marital Status and Description fields details. An explanation of the process to search for existing marital status details follows.

Marital Status Search Details

After selecting the Marital Status details menu item, the system displays the Marital Status Search details screen and displays the Result List with the list of marital statuses that exist in the system.

The Marital Status Search details screen helps the User to find existing marital status entries based on the values captured/selected in one or more of the search fields provided. The **Add** link located at the top right corner of the Marital Search details screen launches the Add Marital Status screen that allows the User to add new marital status details to the HDDS.

The User can search for existing marital status details in the system by typing in marital status or status and clicking on the **Search** button. The system displays all the records if the User searches for marital status details without entering/selecting any data in the search fields. The system displays the matching entries in a Result List with sorting and paging options. The **Cancel** button helps the User to clear values in search filter(s). The User can navigate to the pages in the Result List by using navigation buttons provided below the Result List and the Sort Result List contents by clicking on the relevant column headings. The User clicks on the **Edit** icon to edit the corresponding marital status entry.

Add Marital Status

The Add Marital Status details screen allows the User to add new marital status details to the HDDS by providing values for *Marital Status* and *Description*. After capturing the values for the above fields'; user clicks on the **Save** button to save the details to the database. Thus raises a confirmation message stating that the entry has been successfully saved. The User clicks on the **Cancel** button to clear the captured values for the above mentioned fields. The section below explains the process of editing existing marital status details.

Edit Marital Status

The User clicks on the **Edit** icon against a captured entry from the Result List in the Marital Status Search details screen to navigate to the Edit Marital Status details screen with all existing values populated in the fields and allow the User to change the values. After making the required changes, the User clicks on the **Update** button to update the changed values onto the HDDS. On successful updating of the record,

the system displays a confirmation message stating that the entry has been successfully updated. The User clicks on the ***Cancel*** button to cancel all changes and the system launches the Marital Status Search details screen without affecting the data being edited.

Functionality of the Race Details screen is explained below.

4.4.3.3 Race Details [Menu Item: Maintenance →Race Details]

The Race Details screen allows the User to maintain race details. This functionality allows the User to add a new race, modify an existing race, and change the status of existing race details. To capture race information, the User needs to provide *race name* and *description*. These details will be used while capturing the personal details of an applicant in the transaction module. The following section explains the process of capturing Gender details.

4.4.3.4 Gender Details [Menu Item: Maintenance →Gender Details]

The Gender Details screen allows the User to maintain gender details. This functionality allows the User to add a new gender, modify an existing gender, and change the status of existing gender details. To capture gender information, the user needs to provide *gender type* and *description*. These details will be used while capturing the personal details of an applicant in the transaction module. Functionality of the Employment Status screen appears below.

4.4.3.5 Employment Status [Menu Item: Maintenance →Employment Status]

The Employment Status screen allows the User to maintain employment status details. This functionality allows the user to add a new employment status, edit an

existing employment status, and change the status of an existing employment status. To capture employment status level information, the User needs to capture *employment status* and *description*. These details will be used while capturing the employment status of an applicant in the transaction module. Explanation of the functionality of the Preferred Subsidy Program screen is given below.

4.4.3.6 Preferred Subsidy Program [Menu Item: Maintenance → Preferred Subsidy Program]

The Preferred Subsidy Program screen allows the User to maintain subsidy programs details. To capture subsidy information, the User needs to provide *preferred subsidy* and *description*. The Administrator captures the subsidy programs available by the department. The Data Capturer selects the preferred subsidy program of an applicant while capturing an application into the HDDS. The next section explains the functionality of the Subsidy Type screen.

4.4.3.7 Subsidy Type [Menu Item: Maintenance → Subsidy Type]

The Subsidy Type screen allows the User to maintain subsidy type details. To capture subsidy type information, the User needs to provide *subsidy program*, *subsidy type* and *description*. These details will be used in the Preference Details tab of application capture process. The following section explains the functionality of the Type of Marriage screen.

4.4.3.8 Type of Marriage [Menu Item: Maintenance → Type of Marriage]

The Type of Marriage screen allows the User to maintain the marriage types. To capture marriage type information, the User needs to provide *marriage type* and

description. These details will be used while capturing the application details of an applicant in the transaction module. Functionality of Relationship Type screen appears next.

4.4.3.9 Relationship Type [Menu Item: Maintenance → Relationship Type]

The Relationship Type screen allows the User to maintain relationship types of the applicant and his/her spouse. To capture relationship type information, the User needs to provide *relationship type* and *description*. These details will be used while capturing the dependent details of an applicant in the transaction module. Below is an explanation of the functionality of the District Details screen.

4.4.3.10 District Details [Menu Item: Maintenance → District Details]

The District Details screen allows the User to maintain the district details of the province for the current system is being implemented. To capture district information, the User needs to provide *district code* and *district name*. These details will be used while capturing the personal details of an applicant in the transaction module. Functionality of Transaction Module follows.

4.4.4 TRANSACTION MODULE

This module contains the functionality to *receive an application*, *capture complete application details*, *modify subsidy status*, and *add project details*. The Data Capturer captures the application details. The Administrator/Manager maintains the projects details and can change the subsidy status and approval of an application.

4.4.4.1 Search Receive Application [Menu Item: Transaction→Search Receive Application]

Search Receive Application screen allows the User to perform the following functionalities, that is, to:

- capture an application onto the system by providing basic information;
- search for an application that is already captured in the system; and
- select an application to capture the completed details.

Search Receive Application

After selecting the Search Receive Application menu item, the system displays the Search Receive Application screen along with Result List and the list of applications that exist in the system as shown in Figure 36.

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Search receive application Add

From Date: To Date: ID Number: Surname: First Name: Application Number: Status: --- Select All ---

Search Cancel

No of Records: 5

| ID NUMBER | SURNAME | FIRST NAME | RECEIVED DATE | APPLICATION NUMBER | LAST UPDATED BY | ADD NEW APPLICATION | STATUS | EDIT |
|---------------|-----------|---------------|---------------|--------------------|-----------------------|---------------------|--------|------|
| 8001015006525 | Jaems | Robin | 01-May-2011 | 9441 | Lakshmana Rao Madgula | New application | ✓ | ✕ |
| 8001015003574 | mandalapu | narasimha rao | 18-Dec-2011 | 8578 | Lakshmana Rao Madgula | New application | ✓ | ✕ |
| 8001015006544 | asdf | asdfsdf | 11-Aug-2011 | 3374 | Lakshmana Rao Madgula | New application | ✓ | ✕ |
| 8001015006578 | Jaems | Robert | 01-May-2011 | 3214 | Lakshmana Rao Madgula | New application | ✓ | ✕ |
| 8001015006575 | Ronald | James | 05-May-2011 | 7389 | Lakshmana Rao Madgula | New application | ✓ | ✕ |

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Figure 36: Search Receive Application screen

The Search Receive Application screen helps the User to find the captured application entries based on the values captured/selected in one or more of the search filters provided. The **Add** link located at the top right corner launches the Receive an Application screen that allows the User to input receive an application details onto the system.

The User can search for existing applications in the HDDS by providing the: *from date*; *to date*; *id number*; *surname*; *first name*; *application number*; and *status* and clicking on the **Search** button. The system displays all the records if the User searches for the applications without entering/selecting any data in the search filters. The system displays the matching entries in a Result List with sorting and paging options. The **Cancel** button helps the User to clear the values in search filter(s). The User can navigate the pages in the Result List using the navigation buttons provided below the Result List and sorting the Result List contents by clicking on the relevant column headings. The User clicks on the **Edit** icon to edit the corresponding application entry. The **New Application** link in the Result List allows the User to capture complete details of the received application. The section below explains the process of the Receive an Application screen.

Receive an Application

The Receive an Application Details screen allows the User to capture minimum details of an application onto the HDDS by providing the values for *id number*, *surname*, *first name* and *received date*. After capturing the values for the above fields, the User clicks on the **Save** button to save the details to the database as shown in Figure 37. After saving the details, the system raises a confirmation message stating that the entry has been successfully saved and launches a new

screen to capture the remaining details of the application. The User clicks on the **Cancel** button to clear the captured values for the above mentioned fields.

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Receive an application Search

ID Number * :
(Ex:8001015006574)

Surname * :

First Name * :

Received Date * :

Save & Continue Cancel

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Figure 37: Receive an Application screen

New Application

Once an application has been received from the *Receive an Application* screen, the received application will appear in the Result List. Each application in the Result List has a *New Application* link. The system displays the screen (as shown in Figure 38) to capture complete details of an application once the User clicks on the New Application link.

New application
Dependent details
Income details
Preference details
Declaration details

Add Application Details

Application Number * : 9441

Surname : Jaems

First Name * : Robin

Maiden Surname :

Occupation * :

Gender * : --- Select gender ---

Race * : --- Select race ---

Postal Address

Address1 * :

Address2 :

City * :

Pincode * :

Mailing Address
☐ Same as postal address

Address1 * :

Address2 :

City * :

Pincode * :

Current Residential Status * : --- Select current residential ---

Cell Number * :

(Ex:0848298477)

Telephone Number * :

(Ex:0333872119)

Marital Status * : --- Select marital status ---

Is any family member disable :
☐ Yes ☒ No

You have a savings account/provident fund?
☐ Yes ☒ No

You invest in stokvels/other?
☒ Yes ☐ No

Monthly Contribution *

Save & Continue
Cancel

Figure 38: Add Application Details screen

The system shows the application details that are captured during the time of receiving an application along with the unique application number allocated and allows the User to capture the rest of the application data.

The User needs to capture the personal data of the applicants, eg. *maiden surname, occupation, gender, race, current residential status, cell number, telephone number, marital status, postal address and mailing address*. The User also selects *disability level, saving account/provident fund and/or investments details*. If *investment details* is selected, the User needs to capture the monthly contribution details. If the applicant is married, the User needs to capture the spouse details as well.

After capturing the values for the above fields'; the User clicks on the **Save & Continue** button to save the details to the database. After saving the details, the system raises a confirmation message stating that the details have been successfully saved. Upon saving the captured details, the system launches the Dependent Details screen as shown in Figure 39 to capture the dependent details.

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New application Dependent details Income details Preference details Declaration details

Dependent Details

Surname *: First Name *: Relationship to Applicant *: --- Select Relation --- Dependents ID Number *: (Ex:8001015007574)

Save & Continue Cancel

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Figure 39: Dependent Details screen

The User needs to capture, the dependent persons details into the system by providing values for the: *surname*; *first name*; *relationship to applicant*; and *dependent identity number*. The system allows the User to capture multiple dependent details.

After capturing the values for the above fields, the User clicks on the **Save & Continue** button to save the details to the database. The system then raises a confirmation message stating that the details have been successfully saved. The User may repeat the above steps to capture multiple dependent details. Upon saving the captured details, the system launches the Income Details screen as shown in Figure 40 to capture income details.

Income Details

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New application Dependent details Income details Preference details Declaration details

Monthly Income Details

Employment Status * : --- Select Employment Stat

Spouse Employment Status * : --- Select Employment Stat

Monthly Income of Applicant * :

Pension or Disability Grant Amount of Applicant :

Other Income :

Total Amount for Spouse :

Total Amount for Applicant :

Total Amount for Applicant & Spouse :

Save & Continue Cancel

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Figure 40: Monthly Income Details screen

The User needs to select/capture values for the: *employment status*; *spouse employment status*; *monthly income of applicant*; *pension or disability grant amount of applicant*; *other Income*; and *total amount for spouse*. The system calculates the total amount for the applicant and the total amount for the applicant and the spouse. After capturing the values for the above fields, the User clicks on the **Save & Continue** button to save the details to the database. The system then raises a confirmation message stating that the details have been successfully saved. Upon saving the captured details, the system launches the Add Preference Details screen as shown Figure 41 to capture the preference details into the system.

Preference Details

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→ New application → Dependent details → Income details → Preference details → Declaration details

Add Preference Details

Preference1 * : -- Select Preference Name - ▾ Preference2 * : -- Select Preference Name - ▾

Preference3 * : -- Select Preference Name - ▾ Subsidy Program * : -- Select Subsidy Program - ▾

Project Details : Authority * :

Subsidy Type * : -- Select Subsidy Program ▾ Site Number Details * :

Township * :

Save & Continue Cancel

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Figure 41: Preference Details screen

The User needs to select *three preference locations, subsidy program, authority, subsidy type, site number details, and township*. Optionally the User may capture project information. After capturing the values for the above fields, the User clicks on the **Save & Continue** button to save the details to the database. The system then raises a confirmation message stating that the details have been successfully saved. Upon saving the captured details, the system launches the Add Declaration Details screen as shown Figure 42 to capture the declaration details.

Declaration Details

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New application Dependent details Income details Preference details Declaration details

Declaration Details

Applicant signed date * :

Upload the original application signed by applicant * : Browse...

Upload all supporting documents : Browse...

Save Cancel

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Figure 42: Declaration Details screen

The User needs to select *applicant signed date, upload original application signed by applicant and upload all supporting documents*. While uploading the signed

application/documents, the User needs to ensure that the file should be one of the supported formats like: .JPG; .JPEG; .TIFF; .DOC; .DOCX; .XLS; XLSX or .BMP.

After selecting and uploading the relevant scanned files for the above fields, the User clicks on the **Save** button to save and upload the details to the database. The system then raises a confirmation message stating that the details have been successfully saved.

Edit Received Application

If the User clicks on the **Edit** icon against the captured entry in the Result List of the Search Receive Application screen, the User will be presented with the **Edit Receive Application** screen with all the captured values and allows the User to change the values as shown in Figure 43.

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Edit receive application

ID number *: 8001015006525

Surname *: Jaems

First name *: Robin

Received date *: 01-May-2011

Update **Cancel**

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Figure 43: Edit Receive Application Details screen

After making the required changes, the User clicks on the **Update** button to update the changed values to the HDDS. On successful updating of the record, the system displays a confirmation message stating that the entry has been successfully updated. The User clicks on the **Cancel** button to clear the changes and launches the Search Receive Application screen without affecting the data being edited.

The following section explains the process of the Search Captured Application process.

4.4.4.2 Search Captured Application [Menu Item: Transaction → Search Captured Application]

Search Captured Application

After selecting the Search Captured Application menu item, the system displays the Search Captured Application Details screen and displays the Result List with a list of captured applications that exist in the system as shown Figure 44.

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Search captured application details

Captured From Date: Captured To Date:

Received From Date: Received To Date:

Applicant ID Number: Surname:

Application Number: Project Name:

Subsidy Program: Subsidy Type Application:

Search Cancel

| ID NUMBER | APPLICANT NAME | RECEIVED DATE | CAPTURED DATE | APPLICATION NUMBER | PREFERRED SUBSIDY PROGRAM | SUBSIDY TYPE | PROJECT NAME | HISTORY | LAST UPDATED BY | EDIT |
|---------------|------------------------|---------------|---------------|--------------------|---------------------------|-------------------|----------------|-------------------------|-----------------------|------|
| 8001015006525 | Jaems Robin | 01-May-2011 | 04-Jun-2012 | 9441 | Normal | other | indira gandhii | History | Lakshmana Rao Madgula | |
| 8001015006564 | maheshbabu gattamaneni | 02-Aug-2011 | 15-May-2012 | 2416 | contract | For Non Govt | indira gandhii | History | Lakshmana Rao Madgula | |
| 8001014006574 | asdf asdfasdf | 09-May-2011 | 15-May-2012 | 2722 | Normal | other | | History | Lakshmana Rao Madgula | |
| 8001065289543 | jp duminy | 10-May-2011 | 19-May-2011 | 9098 | GOV Subsidy | For govt employes | Indirama | History | Lakshmana Rao Madgula | |
| 8001015006592 | Thomas obyoo | 09-May-2011 | 26-May-2011 | 9344 | contract | For Non Govt | rajiv | History | Lakshmana Rao Madgula | |

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Figure 44: Search Captured Application Details screen

The Search Captured Application details screen helps the User to find the captured application entries based on the values captured/selected in one or more of the search filters provided.

The User can search for existing captured application details in the HDDS by providing: *captured from date; captured to date; received from date; received to date; applicant id number; surname; application number; project name; subsidy program; and subsidy type application* and clicking on the **Search** button. The system displays all the records if the User searches for applications without capturing/selecting any data. The system displays the matching entries in a Result List with sorting and paging options. The **Cancel** button helps the User to clear the values of the search filter(s). The User can navigate the pages in the Result List using the navigation buttons provided below the Result List and sort the Result List contents by clicking on the relevant column headings.


The Edit icon is used to edit the corresponding line entry. Clicking on the **Edit** icon, the system shows the Captured Application Details and allows the User to modify the exiting values. The User may also capture/edit the *dependent details, income details, preference details and declaration details*.

The History link in the Result List allows the User to view Captured Application details, Dependent details, Income details, Preference details and Declaration details. The section below explains the process of changing the Subsidy Status of an application.

4.4.4.3 Subsidy Status Change [Menu Item: Transaction → Subsidy Status Change]

Subsidy Status Change

After selecting the Subsidy Status Change menu item, the system displays the *Search Subsidy Status Change* details screen and displays the Result List with a list of captured applications that exist in the system as shown in Figure 45.



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Search subsidy status change details

Captured From Date : Captured To Date :

Received From Date : Received To Date :

Applicant ID Number : Surname :

Application Number : Project Name :

Subsidy Program : Subsidy Type Application :

Search **Cancel**

No of Records : 5 ▾

| ID NUMBER | APPLICANT NAME | RECEIVED DATE | CAPTURED DATE | APPLICATION NUMBER | PREFERRED SUBSIDY PROGRAM | SUBSIDY TYPE | LAST UPDATED BY | PROJECT NAME | SUBSIDY STATUS CHANGE |
|---------------|-------------------------|---------------|---------------|--------------------|---------------------------|-------------------|-----------------------|-------------------|--------------------------------------|
| 8001015006525 | Jaems Robin | 01-May-2011 | 04-Jun-2012 | 9441 | Normal | other | Lakshmana Rao Madgula | Subsidy Project 2 | Susidv status change |
| 8001015006564 | maheshbabuq gattamaneni | 02-Aug-2011 | 15-May-2012 | 2416 | contract | For Non Govt | Lakshmana Rao Madgula | indira gandhhi | Susidv status change |
| 8001014006574 | asdf asdfsadf | 09-May-2011 | 15-May-2012 | 2722 | Normal | other | Lakshmana Rao Madgula | | Susidv status change |
| 8001065289543 | jp duminy | 10-May-2011 | 19-May-2011 | 9098 | GOV Subsidy | For govt employes | Lakshmana Rao Madgula | Indirama | Susidv status change |
| 8001015006592 | Thomas obyoy | 09-May-2011 | 26-May-2011 | 9344 | contract | For Non Govt | Lakshmana Rao Madgula | rajiv | Susidv status change |

◀ ▶ 1 2 3 4 ▶ ▶

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Figure 45: Search Subsidy Status Change screen

The Search Captured Application Details screen helps the User to find the captured application entries based on the values captured/selected in one or more of the search filters provided. The User can search for existing captured application details in the HDDS by providing: *captured from date*; *captured to date*; *received from date*; *received to date*; *applicant id number*; *surname*; *application number*; *project name*; *subsidy program*; and *subsidy type application* and clicking on the **Search** button. The system displays all the records if the User searches for the applications without capturing/selecting any of the search filters. The system displays the matching entries in a Result List. The **Cancel** button helps the User to clear the values of the search filter(s). The User can navigate to the pages in the Result List using the navigation buttons provided below the Result List and sort the Result List contents by clicking on the relevant column headings.

The Subsidy Status Change link in the Result List will only be in the enabled mode if all the details (i.e. Application details, Dependent details, Income details, Preference details and Declaration details) of the application have been captured onto the system.

Clicking on the Subsidy Status Change, the system shows the screen in Figure 46 with the Preference details of an application and allows the User to select/modify the subsidy status of the application.


Figure 46: Subsidy Status Change screen

On completion of the required change, the User clicks on the **Update** button to update the changed values. On successful updating of the record, the system displays a confirmation message stating that the entry has been successfully updated. The **Cancel** button helps the User to cancel all the changes and launches the Search Subsidy Status Change details screen without affecting the entry being edited.


4.4.4.4 Add Project Details [Menu Item: Transaction-> Add Project Details]

Add / Edit Project Details

After selecting the Add Project Details menu item, the system displays the Search Project Details screen and displays the Result List with the list of captured applications that exist in the system as shown in Figure 47.



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Search project details

Captured From Date :

Captured To Date :

Received From Date :

Received To Date :

Applicant ID Number :

Surname :

Application Number :

Project Name :

Subsidy Program :

Subsidy Type Application :

Search Cancel

No of Records : 5

| ID NUMBER | APPLICANT NAME | RECEIVED DATE | CAPTURED DATE | APPLICATION NUMBER | PREFERRED SUBSIDY PROGRAM | SUBSIDY TYPE | LAST UPDATED BY | PROJECT NAME | PROJECT DETAILS |
|---------------|-------------------------|---------------|---------------|--------------------|---------------------------|--------------------|-----------------------|-------------------|--------------------------------------|
| 8001015006525 | Jaems Robin | 01-May-2011 | 04-Jun-2012 | 9441 | Normal | other | Lakshmana Rao Madgula | Subsidy Project 2 | Edit Project Details |
| 8001015006564 | maheshbabuq gattamaneni | 02-Aug-2011 | 15-May-2012 | 2416 | contract | For Non Govt | Lakshmana Rao Madgula | indira gandhi | Edit Project Details |
| 8001014006574 | asdf asdfsadf | 09-May-2011 | 15-May-2012 | 2722 | Normal | other | Lakshmana Rao Madgula | | Add Project Details |
| 8001065289543 | jp duminy | 10-May-2011 | 19-May-2011 | 9098 | GOV Subsidy | For govt employees | Lakshmana Rao Madgula | Indirama | Edit Project Details |
| 8001015006592 | Thomas obyoo | 09-May-2011 | 26-May-2011 | 9344 | contract | For Non Govt | Lakshmana Rao Madgula | rajiv | Edit Project Details |

1 2 3 4

Export To Excel

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Figure 47: Search Project Details screen

The Search Captured Application Details screen helps the User to find the captured application entries based on the values captured/selected in one or more of the search filters provided.

The User can search for existing captured application details in the HDDS by providing: *captured from date*; *captured to date*; *received from date*; *received to date*; *applicant id number*; *surname*; *application number*; *project name*; *subsidy program*; and *subsidy type application* and clicking on the **Search** button. The system displays all the records if the User searches for the applications without capturing/selecting any data. The system displays the matching entries in a Result List. The **Cancel** button helps the User to clear the values of the search filter(s). The User can navigate the pages in the Result List using the navigation buttons provided below the

Result List and sort the Result List contents by clicking on the relevant column headings.

On clicking of the Add Project Details link or Edit Project Details link, the system shows the screen in Figure 48 with the Preference details of an application and allows the User to capture/modify the project details of the application.

KZN Human Settlements
uMnyango Wezokuhlaliswa
Kwabatu
ISIFUNDAZWE SAKWAZULU- NATALI

Administration Maintenance Transaction Logout

New application Dependent details Income details Preference details Declaration details

Edit Preference Details

Preference1 * : Preference three Preference2 * : other

Preference3 * : pre22

Project Details :

Project : Subsidy Project 2

Subsidy Type * : other Subsidy Program * : Normal

Township * : Durban Authority * : Municipal

Site Number Details * : Municipal

Update Cancel

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Figure 48: Edit Preference Details screen

On completion of the required change, the User clicks on the **Update** button to update the modified values in the system. On successful updating of the record, the system displays a confirmation message stating that the entry has been successfully updated. The **Cancel** button helps the User to cancel all the changes and launches the Search Project details screen without affecting the entry being edited.

4.5 SYSTEM TESTING AND VALIDATION

The findings of the JAD session and interviews were that the users were very specific as to the requirement specifications of the new system where they wanted it to be robust enough to gather data of the housing demand database from all the districts and municipalities. The team discussed the need to have structural divisions of the province into districts or municipalities and metro municipalities so they could filter their search and make sure that all places in the region were covered. The team were also vocal about their need for the system to communicate between departments, share reports and assign tasks to subordinates. The communication process needed to be built up in the new system to fasten the work by providing faster communication.

The significance of the testing phase is important for the system to stand on its own; the system developers and testers therefore followed a strict testing plan where they developed and tested the modules. Once they had a beta version of the software published, they shared with the users for the user acceptance level testing. The users tested the beta system and pointed out to the developer the difficulties they were facing in the day to day functioning of the system. The entire testing phase was time bound and was well documented so that the management as well as the developers had a thorough understanding of the flaws of the system and the remedies associated with them.

The JAD team had emphasized that testing should take place at each stage where all forms of testing were important. This started with white box testing, continued with black box testing and culminated with the user level acceptance testing. The developers carried out white box testing to check the system internally and to see

that their code structures were in line with the standard coding rules and they were implemented as per the requirement specifications. The users tested the system externally using the black box testing where the system outputs were checked in an external environment depending on the inputs given. The final phase of testing was the user acceptance level so that the user could judge whether the system was helping them to be more effective in the discharge of their duties.

4.5.1 Problems Identified During the Testing Phase

This section explains problems identified during the testing phase of the system and the steps that were taken to solve or address them.

4.5.1.1 Bugs/Flaws/Issues identified in Search Receive Application Screen:

The Date Validation in the **from date** field did not work as expected - The developer resolved this issue by implementing a validation so that *the from date* field value is always greater than the **to date** field.

The Users suggested that the label/name of the *Submit* button be changed to *Search* in the Search Receive Application screen. The developer modified the label of the button as suggested.

The Wild Card search was not working for *identity (id) number* i.e. if the User entered *id number* as 800 and clicked on the Search button, the system did not display all the id numbers that contain 800; instead the system displayed a validation message as “enter valid Id number” - The developer modified the code to support a wild card search for the *id number* field.

Users requested that a space be provided between “First” and “Name” and between “Update” and “By” in the corresponding column heading of the Result List as shown in Figure 49. The developer modified the column headings of the Result List as suggested.

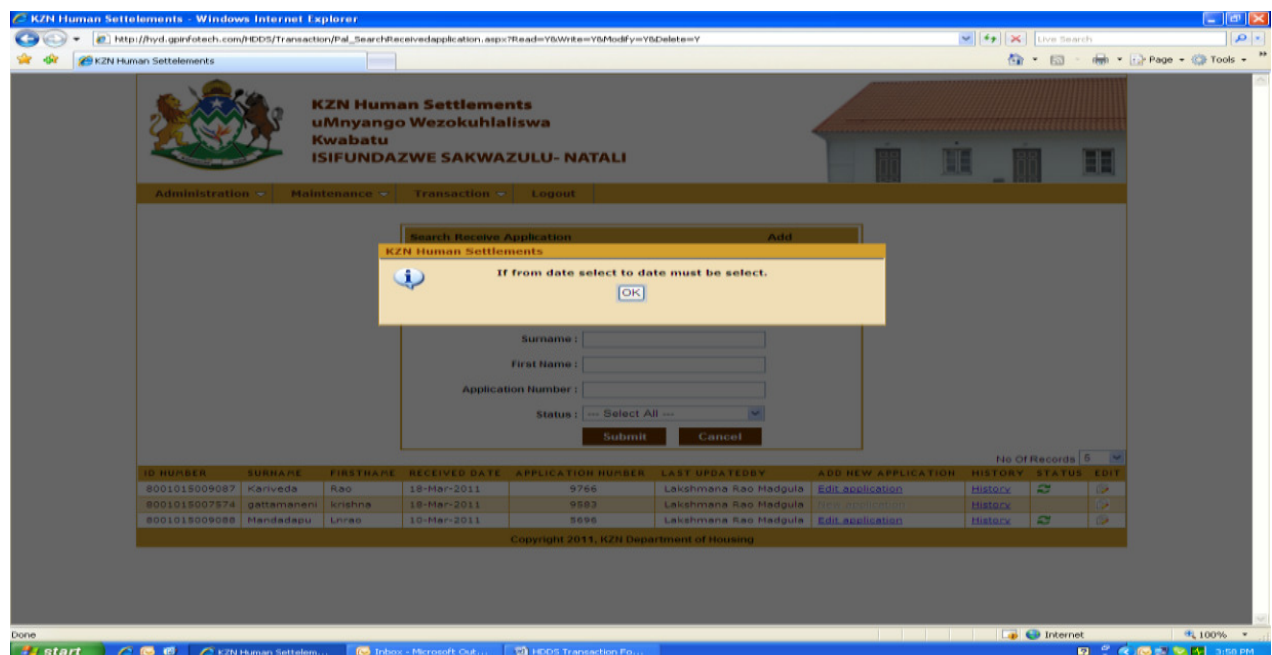


Figure 49: Search Receive Application Screen with Errors

On the expiry of the session, the system was displaying an error message as shown in Figure 50.

Server Error in '/HDDS' Application.

The resource cannot be found.

Description: HTTP 404. The resource you are looking for (or one of its dependencies) could have been removed, had its name changed, or is temporarily unavailable. Please review the following URL and make sure that it is spelled correctly.

Requested URL: /HDDS/Transaction/Session.aspx

Figure 50: Error Screen after expiring the session in Search Receive Application Screen

The developer rectified the above issue by including a new web page called Session.aspx in the Transaction forms folder.

The Date validation was not working in **Receive Application** add screen. If the User entered a date greater than the current date for the Application Received Date, the system did not raise an alert message stating that the “Receive Application date cannot be greater than today’s date”- the developer rectified this by implementing a validation control for the application received date field.

On completion of adding the Application Received Details, the system was not displaying a confirmation message to the user - This problem was rectified by putting in a **confirmation message** after saving the captured details to the database.

4.5.1.2 Bugs/Flaws/Issues identified in Capture New Application Screen:

The type of marriage was not a required field if the user selected the marital status value as “unmarried” - The developer implemented a condition to implement the above requirement. Currently the system automatically marks the type of marriage as a non compulsory field if the User selects the marital status value as “unmarried”.

The system was displaying a Java Script error during the process of capturing an Application as shown in Figure 51.

The developer rectified the script error by specifying the right object name as a reference.

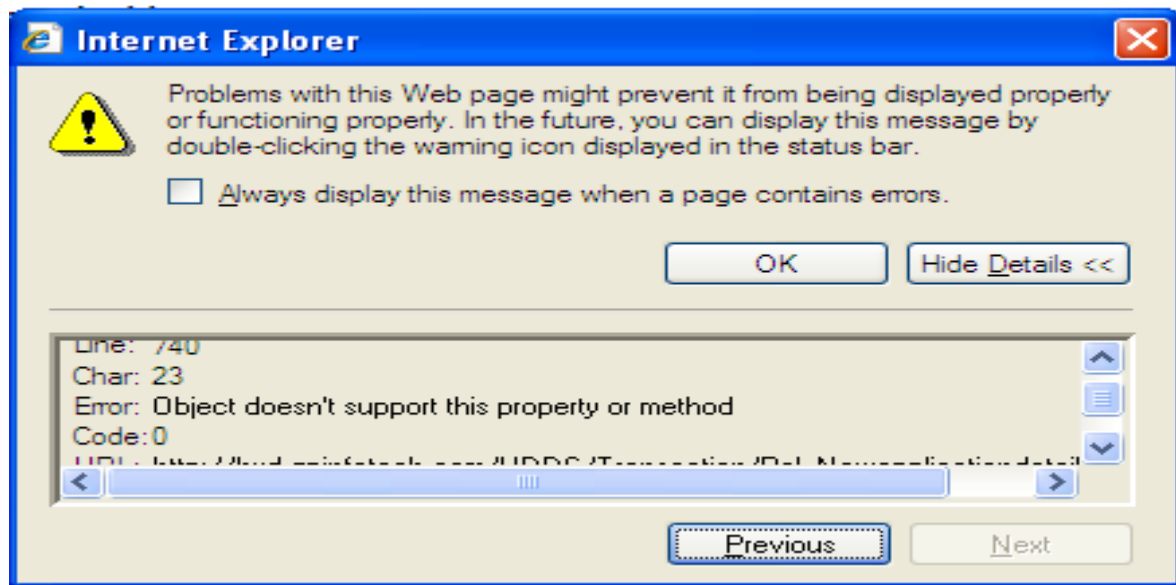


Figure 51: Java Script Error in Capture New Application Screen

After capturing the application details, the system was moving the cursor to the Dependent Details tab without displaying any confirmation message for the first tab details. Instead the system should show the confirmation message before moving the cursor to the Dependent Details tab. The developer implemented a code to display a confirmation message after saving the captured details to the database in the first tab. After the User clicks on the confirmation box, the system now moves the cursor to the next tab i.e. the dependent details tab.

The Users suggested that *marriage date* should be a compulsory field if the User selects marital status as “married”. The developer therefore made the marriage date as a compulsory field if the user selects marital status as “married”.

The Users suggested that *occupation*, *identity number*, *race* and *gender* be mandatory fields in the Spouse Details tab. The developer thus implemented the validation controls to make *occupation*, *identity number*, *gender* and *race* fields as compulsory in the Spouse Details tab.

The system was allowing two radio buttons to be selected in the Spouse Details tab as shown in Figure 52.

The screenshot shows a form titled "Spouse" with the following fields: Surname* (James), Maiden surname* (James), Full Name* (July), Occupation* (House Wife), Identification Number* (8001015009085), Gender* (Female), and Race* (White). Below these fields are two questions, each with two radio buttons: "Have you or your spouse owned property before?" and "You or your spouse own a property?". In both cases, the "Yes" and "No" radio buttons are both selected, which is an error. A red box highlights the "Yes" and "No" radio buttons for the second question.

Figure 52: Radio Button Selection Error in Capture New Application Screen

The developer corrected the error by including them as part of a unique radio button group. As such, these radio button groups do not allow the User to select more than one radio button.

The Mailing Address checkbox was not being displaying in the checked state even though the mailing address was equal to the postal address (see Figure 53).

The screenshot shows a form with two sections: "Postal Address" and "Mailing Address". The "Postal Address" section has fields for Address1* (101), Address2*, City* (Durban), and Pincode* (5205). The "Mailing Address" section has a checkbox labeled "Same as postal address" which is not checked, and fields for Address1* (101), Address2*, City* (Durban), and Pincode* (5205). A red box highlights the "Same as postal address" checkbox.

Figure 53: Address Error in Capture New Application Screen

The developer corrected this error by implementing a code to check the values of the mailing address and the postal address and display the checkbox in a checked state if all the field values are equal.

In the Dependent Details tab, the mandatory messages were not in the specified/arranged tab order - The developer corrected the identified issue by displaying the validation messages in the correct tab order.

The Users requested that the minimum and maximum characters validation for *first name* and *surname* fields be added in the Dependent Details tab. The developer implemented the maximum characters validation for *first name* and *surname* fields in the Dependent Details tab. The maximum number of characters allowed for the *first name* field is 150 and for the *surname* is 75 (*Appendix F*).

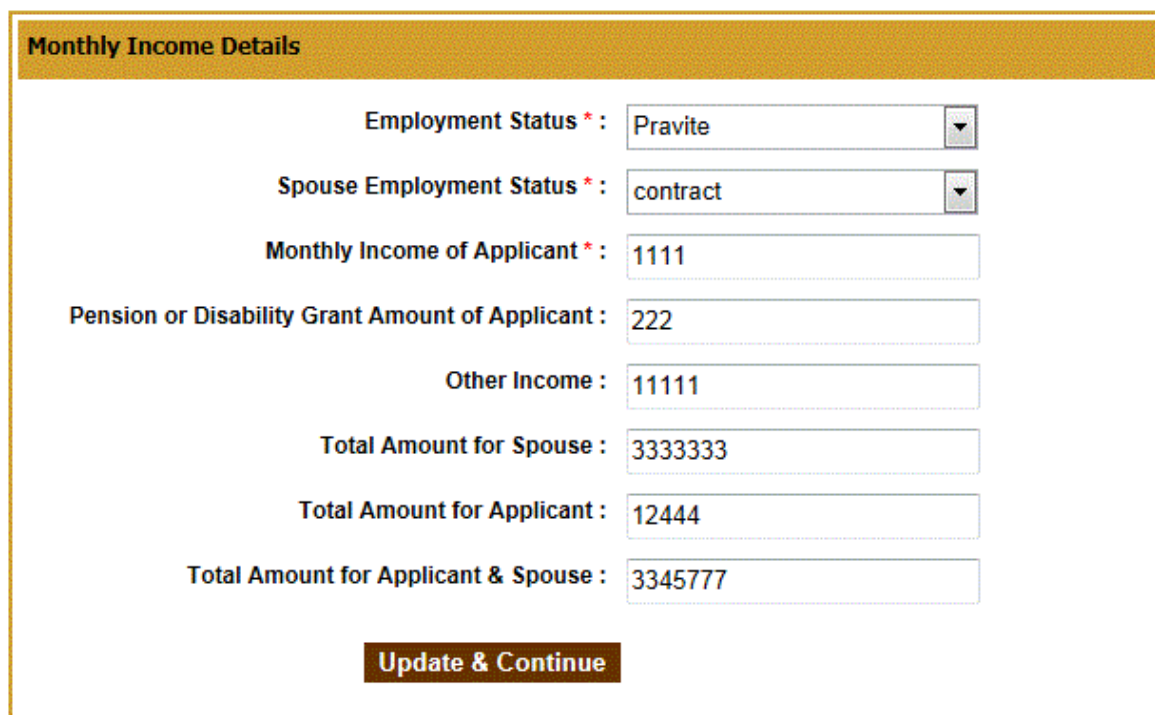
The spelling of 'spouse' in the highlighted field in the Income Details tab was incorrect as indicated in Figure 54.

The identified spelling error was corrected by the developer.

The screenshot displays a form titled "Monthly Income Details" with a yellow header. The form contains several fields and labels. A red rectangular box highlights the label "Spous Employment Status *:" and the corresponding dropdown menu. The dropdown menu is currently set to "-- Select Employment Stati". Other fields include "Employment Status *:" (dropdown), "Monthly Income of Applicant *:" (text input), "Pension or Disability Grant Amount of Applicant:" (text input), "Other Income:" (text input), "Total Amount for Spouse:" (text input), "Total Amount for Applicant:" (text input), and "Total Amount for Applicant & Spouse:" (text input). At the bottom right, there are two buttons: "Save&Continue" and "Cancel".

Figure 54: Spelling and Design Errors in Income Details Tab of Capture New Application

The Users requested that the design of the highlighted controls in Figure 55 be corrected. They requested that the Label text and Text box control should be displayed next to each other and that the design of the buttons as shown in Figure 54 be changed. The developer corrected the identified design issues in the Income Details tab. After correcting the issues, the Income Details tab appears as shown in Figure 55.



The screenshot displays a web form titled "Monthly Income Details" with a yellow header. The form contains several input fields and a button. The fields are arranged vertically, each with a label and a corresponding input control. The labels include an asterisk for required fields. The input controls are a combination of dropdown menus and text boxes. The values entered in the text boxes are: 1111, 222, 11111, 3333333, 12444, and 3345777. The button is labeled "Update & Continue".

| Field Label | Value |
|---|----------|
| Employment Status * | Private |
| Spouse Employment Status * | contract |
| Monthly Income of Applicant * | 1111 |
| Pension or Disability Grant Amount of Applicant | 222 |
| Other Income | 11111 |
| Total Amount for Spouse | 3333333 |
| Total Amount for Applicant | 12444 |
| Total Amount for Applicant & Spouse | 3345777 |

Update & Continue

Figure 55: Income Details Tab after the Correction of Design Issues

When the User uses the tab button to move the control in the Income Details tab, the Total Amount for the Applicant text box control was displaying the value as "NaN" as shown in Figure 56. The developer corrected the identified calculation error.

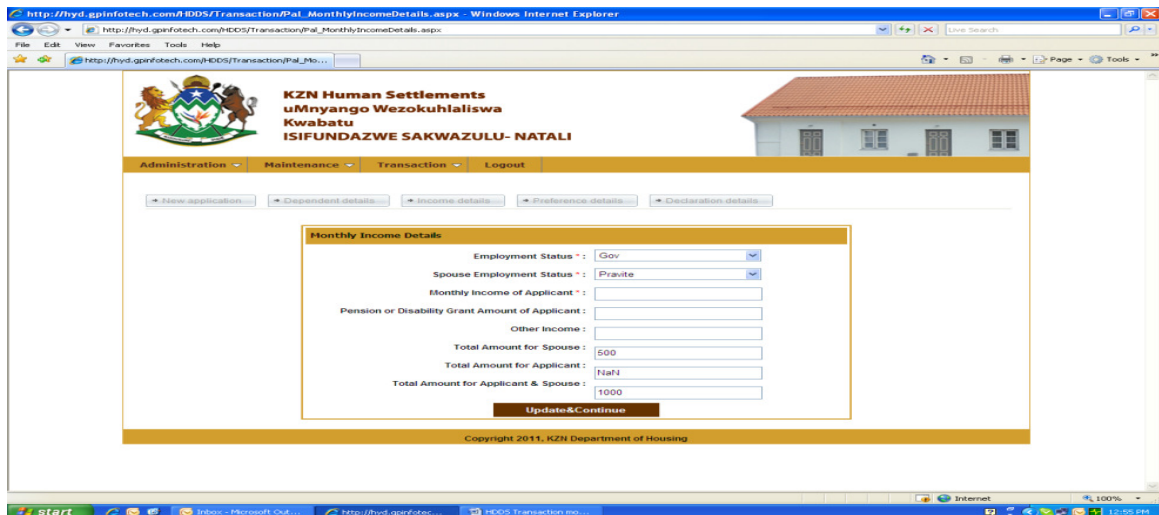


Figure 56: Calculation Error in Income Details Tab of Capture New Application

After capturing the value for “monthly income of applicant” and clicking on the **Save** button to save the details, the system was not displaying the same amount in the Total Amount for the Applicant field as shown in Figure 57. The developer corrected the identified calculation errors in the income details tab.

Figure 57: Calculation Error related to monthly income of applicant in Income Details Tab of Capture New Application

The tab order was not working properly in the Preference Details tab - The developer corrected the tab order in the Preference Details tab.

The Users requested that the developer check the mandatory alert message for the Preference 1 field. The system was displaying as “select subsidy details” if the User did not select any value for the Preference 1 field. This issue was corrected by the developer.

The Users requested that the label “applicant signed date” be changed to “select applicant signed date” in the Declaration tab. The developer changed the label of the *date field* in the Declaration tab as specified by the users.

The *applicant signed date* must be less than or equal to the *current date* but the system was displaying the wrong validation message as indicated in Figure 58. The validation message was corrected by the developer. Currently the system does not allow the User to choose the *applicant signed date* field with a value greater than today’s date.

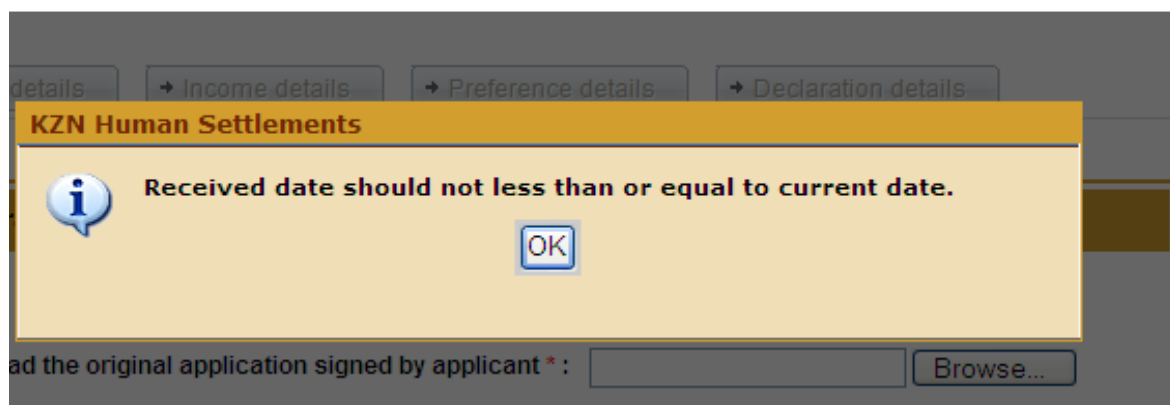


Figure 58: Validation Error in Declaration Tab of Capture New Application

The system was displaying an “SQL Server exception message” after the User uploaded three supporting document files and clicked on *upload button* to save the uploaded files as shown in Figure 59. The developer corrected the code to support the number of parameters passed from the user interface.

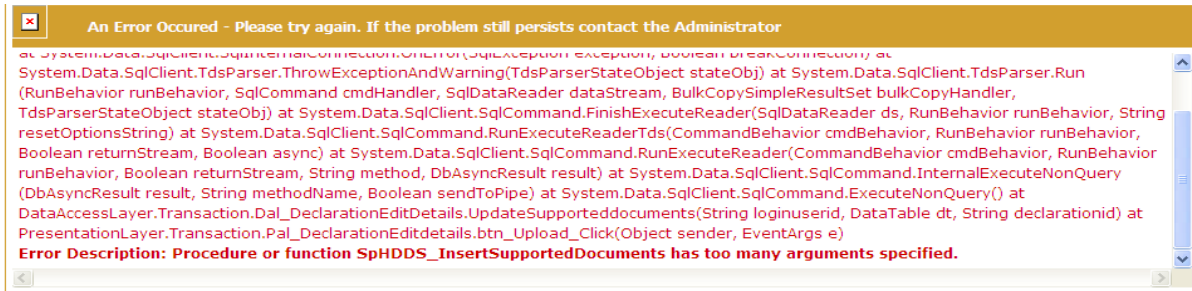


Figure 59: System Error in Declaration Tab of Capture New Application

4.5.1.3 Bugs/Flaws/Issues identified in Subsidy Status Change Screen:

The system was displaying a sys.web forms error when the User clicked on any column of the Result List to sort the data by the selected column (see Figure 60).

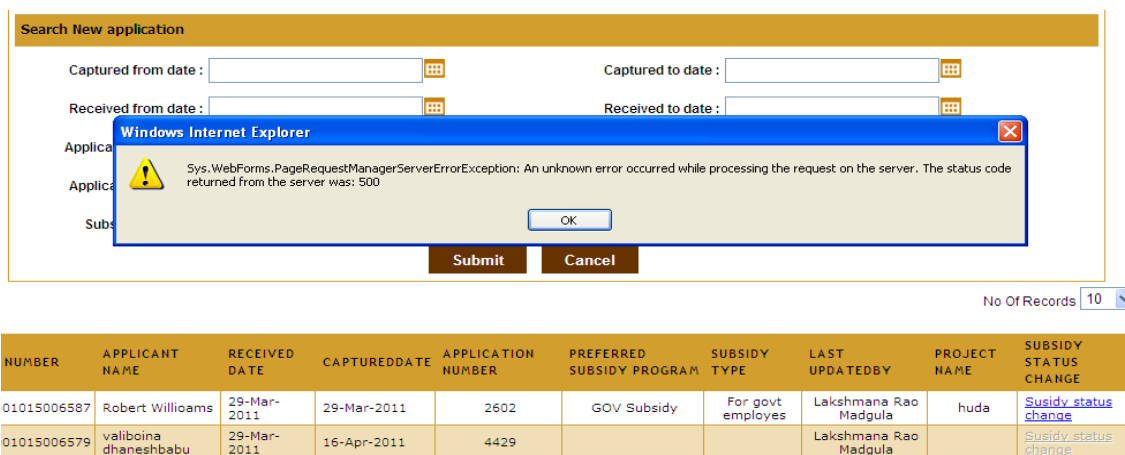


Figure 60: Error in Subsidy Status Change Screen

The identified bug was corrected by the developer and the system now allows the User to click on any column of the Result List to sort the data in ascending/descending order.

The sorting function was not working properly for the *Received Date* and *Captured Date* columns. Sorting should be done by *year*, *month* and *date*. The developer implemented the code to sort the date field data as specified by the user.

All the above bugs/errors/issues were rectified by the system developers after which the testers/users performed further testing. For the complete test cases please refer *Appendix H*. On completion the above processes, the system was implemented in KZN-DHS server location.

This system may be tested by using the following login details:

URL: <http://hyd.gpinfotech.com/hdds/index.aspx>

User name: mamathae.eedara@gmail.com

Password: Mamatha1

This will enable the user access to the Test site as the HDDS is the property of the KZN-DHS and therefore has restricted/secure access.

4.6 SUMMARY

This chapter discussed the findings of the JAD session and the interviews. Analysis of the data and use of the ER model enabled the design of the HDDS. The design and detailed functionality of the system in this chapter included discussion of the step-by-step approach used to capture data onto the system. Inputs and procedures were explained with the aid of screen dumps or shots (and labelled as figures) to show the real life application of the internet based system. Validation or testing of the system was explained in detail. Bugs/flaws/issues identified during the testing process were explained together with the steps that the developer/researcher took to address same. These were also explained with the aid of screen shots from the HDDS. The next chapter presents the research conclusions and recommendations.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 BACKGROUND

The previous chapters discussed the literature review, research methodology and research findings of the study. This chapter presents the conclusions and recommendations of this study.

Internet based applications have contributed to greater efficiency in the workplace owing to their readily accessible information and data processing capabilities. The South African government too understands the need to develop an Information Society and harness the power of ICTs for economic and social development for the benefit of the country and its citizens and the need for reform and the transformation of its core activities to make processes more effective, efficient and more citizen-oriented (Farelo and Morris, 2006). The Governments of Ghana and South Africa have prioritized the implementation of ICT infrastructure and processes for effective government-to-government e-governance (Global Summary Report, 2008). As such, governments and public sector enterprises in South Africa have focused their efforts on acquiring advanced state of the art internet based application tools to simplify and manage their day-to-day work processes effectively. The benefits of such applications are realized in terms of improved access to desired information, prompt service, simplification of complex government procedures and expanded reach to the general public. The Global Summary Report (2008) further states that the concept of e-governance has changed the scope and potential of government services through its extended capabilities and enhanced functionalities that empower the citizens and

government bodies to regulate their operations effectively, the KZN-DHS is no exception.

The KZN-DHS initiative regarding the development of an online housing demand database is an attempt to assist the department to acquire data in a scientific manner; to help in allocating homes for their citizens; and to streamline their processes through technology in an effort to better serve the public. The success of the implementation of such a technology based application depends on three distinct dimensions, namely: people, processes and technology (PwC, 2007). This study explained the current position of South Africa in terms of technology and how difficult it is to implement e-governance. Kitaw (2006) points out that in Africa itself 40% of the population is illiterate, computer penetration is at a record low of 2, 2 per 100 inhabitants, and poor and autocratic governance has made e-governance a far off objective. The KZN-DHS department got the idea of developing an internet based system for HDDS from the e-government procedures initiated by the government.

This study found that the government had distinct models for implementation of e-governance projects which were: government to government (G2G); government to citizen (G2C); and government to business (G2B) (Kitaw, 2006). KZN-DHS now has a G2G model as far as the intra-departmental features of the online database are concerned, that is, between the department and the municipalities. They also have the G2C model to: keep citizens informed of the housing facilities being built in their region; track their application status; and to check the allotment procedures. The ability to track the development of housing colonies and the procurement of the same is now available for all citizens.

The system allows the citizens to query their application status online thereby making it easier for them to reach the department. The municipalities also have the

ease of handling the queries related to housing subsidy applications with the help of a track and trace system. .

5.2 ACHIEVEMENT OF THE OBJECTIVES

This study focused on: investigating the existing information system in DHS; analysing its functional requirements; developing an internet based HDDS to leverage the business activities of KZN-DHS; and evaluating the new system for its utility and functional benefits.

Objective One: To investigate the current business process in KZN-DHS to capture the functional requirements of the system.

The current business process in the KZN-DHS is to gather information from the intra government agencies and municipalities in the province. The data is captured in physical files and stored according to districts and sub-districts. To gather data, a number of survey teams from the municipalities physically go to villages and towns to determine how many people own a piece of land or home.

The survey teams are distributed according to the zones assigned to each of them. They do their field work and then relay the information to the nodal centres that are entrusted with the job of capturing the data into the online HDDS. Based on these facts and figures, the department analyzes the need for building housing complexes across the province; the KZN-DHS then budgets and plans for the development of housing societies and providing citizens with their own homes.

The process of reaching out to the citizens, gathering data and storing it in physical files is a long and arduous process which takes years to complete. The business process involves the department and the municipalities and their constant

communication channel of gathering and processing of information to establish an authentic housing demand database.

Objective two: To develop an internet based HDDS that can leverage the improvement of the business activities of KZN-DHS.

The online system was developed with the objective of capturing data from all sectors of the province related to the housing requirements of the citizens. The system design took into account the basic requirements and objectives of KZN-DHS department and the e-governance model required to implement the system. To do this, a meeting with all the key functional business units involving the persons spearheading the unit was conducted. The system was then developed by getting the requirement specifications from these units.

The system analysts prepared a software requirement specifications document which was shared among all the departments and users concerned. The key decision makers, management and the users then scrutinised the document and gave feedback regarding whether or not they approved of the various modules. The users checked the process flow to ensure that it conformed to the functional areas of business. Based on this document's approval from all sectors, the database administrators designed the relational database.

From the systems perspective, scalability and flexibility, it was best to design the database in the third form of normalization (3NF) so that redundancies could be eliminated while maintaining ample flexibility within the database. The system design was supported with schematic diagrams, process flow charts and use case diagrams. The use of these diagrams defined the functional areas of the system in respect to how the system design would take place and the data flow across multiple

entities. The technology adopted by the system designers and architects was a client server architecture keeping the Entity Relationship Model in mind. The client server architecture thus contains a central database server which can be accessed from users' computers across the internet or intranet. The system also used the Entity Relationship Model to design the database efficiently. These entities were defined by the functional processes performed in a system design and the relationship it shared with the data elements.

The Entity Relationship Model was transformed into schematic diagrams which helped the technical team to build a relational database where the entities communicate with each other across hierarchical levels. This took into account Chong's (2002) emphasis on the importance of the various levels of abstractions, generalizations, and specializations between data components and units which determine the hierarchical pattern of information flow. The researcher developed the system based on identified user requirements and implemented the system after user acceptance.

After going live, it was revealed that the business activity of the KZN-DHS received a major boost with the design and implementation of the HDDS as the department was in a better position to get all relevant information at the click of a button. The data was processed and the information streamlined to enable the business managers and the key policy holders to get access to all relevant information. This study succeeded in assisting the KZN-DHS as e-governance is all about helping the government to function with an entire information channel being processed and which enables the decision makers to make informed business and policy decisions. They had all the necessary information on hand to enable them to take corrective action and plan for the future. This aspect of future planning was not possible in the

past due to the lack of readily available information through an online information system.

Objective three: To evaluate the proposed system in a real-life user study to test for business improvement and usability.

The new system was evaluated to test its role and application in real life business situations and to check how it can contribute to business improvement and usability. The testing mechanisms ensured that the system conformed to the specified goals and objectives agreed upon in the requirements analysis. The system was tested using different mechanisms such as integration testing, black box testing, white box testing, walk-throughs, reviews and inspection. The V model was used during the testing phase with the coding, detailed design, high level design and requirements in the development phase conforming to unit testing, integration testing, system testing and acceptance testing.

The black box testing was more of a functional testing with the testers taking specific test case examples and conforming them to the requirement analysis with the input and output perspectives. On the other hand, white box testing was a detailed testing measure which concentrated more on the internal functions of the system, and its behaviour and the standard coding rules applied provided a thorough insight into the system development mechanism. Reviews of testing done by the non-coders provided insight into the nature of output being received and whether it was conforming to the user's requirement. Inspections were the formal reviews of the system while walk-throughs assessed the product's usability and effectiveness in meeting the desired goals of the system.

The testing of the system revealed some operational issues and technical bugs that were documented for further evaluation and enhancement of the new system. All the identified bugs/suggestions were attended by the system developers. The system developers implemented various input, processing and output controls to ensure efficient and secure operation of the system, corrected coding errors, and implemented the suggestions identified by the users during acceptance testing.

5.3 LIMITATIONS OF THE STUDY

Every research study faces some limitations that may cast doubts on the validity and reliability of the findings. This study was limited in terms of the methods used for the research. The JAD session used for this research proved effective in terms of finding the basic flaws in the old system and pinpointing user specific needs to create an efficient information system. The session highlighted the need for a complete revamped system and identified user requirements at each level of operation.

A number of pertinent points discussed during the course of the JAD session helped in gaining a deeper understanding of the desired system functionalities and how the information system structure should be designed. While these were effective in guiding the design and development of the information system, there were possibilities of ensuring a scalable design through a deeper introspection of the system. The researcher had conducted only one JAD session for this due to the availability of the participants study and therefore had to support the findings with semi-structured interviews. The JAD session thus had distinctive limitations in enabling the researcher to delve deeper into each issue owing to time constraints.

The agenda planned by the researcher had to be completed within the span of eight hours allocated for the JAD session. This time was insufficient to delve deeper into

some of the pertinent system functionalities and work processes that define the operational requirements. While the researcher overcame this limitation through the use of semi-structured interviews, a few more JAD sessions could have enabled her and the development team to design a scalable system that could be used across multiple browser and operating systems. Consequently this study addressed the concern of browser portability by designing a system that can be used across different browser settings.

Arising from the time limit regarding the JAD session, the researcher did not ask the JAD group questions regarding government's policy for housing requirements of the region. The principal reason for this was that if the major policies change then there will be a change in the database structure which will affect the running of the live system. The system architects including the researcher and the database administrator therefore made provisions for flexibility within the database but if there are major structural changes, then a different version of the software will need to be developed taking into account all the functional changes. It would therefore have been to have multiple sessions with all the concerned departments and policy makers so that they could illustrate the entire functioning of their departments and their requirements. If more questions were asked the study would have benefited from a richer outcome. However policy matters cannot be changed suddenly, and if at all there is a change, then the system will need to assess the change and modify or adapt the system to address this. The use of a robust, flexible and scalable database is therefore a pre-requisite for any system development.

5.4 RECOMMENDATIONS

It is recommended that KZN-DHS provide a procedure manual to data capturers and end users that is user-friendly and which ensures that users are able to complete the applications without any difficulty.

The system should be configurable as the behaviour of the system is identified based on the configuration settings of the system. The KZN-DHS system administrator should therefore be made aware of configuration of the system parameters so that he/she can modify the system behaviour without depending on the development team.

Training of the staff and providing training material is critical for the system users to reap the complete benefits and utilise all the available features of the system. This will also help new employees that join the department. The training should be focused on the benefits that it provides to the users. Training must also be provided on an on-going basis and the system's usage must be monitored to ensure it continues to meet users' needs. It is further recommended that KZN-DHS train new employees and that they provide support to the citizens of the province regarding the online application process.

It is recommended that a complete document management system be implemented in the department to manage the versioning of the scanned/modified copies of the applications/communication documents efficiently. A document management system would also help to manage the security features of the uploaded documents.

Ensuring the system's sustainability is critical for the KZN-DHS; this should be maintained by generating user confidence in the system's quality and usability,

creating a flexible system able to adapt to changes within the public system, and providing evidence of system benefits. Four main factors to promote sustainability should include: providing and maintaining a functional internet access point at the KZN-DHS; ensuring the quality and promptness of data; provision of reliable internet connection to all local, district, and metro municipalities to access the system; and provision of readily available information for the management to take informed decisions.

5.5 SUGGESTIONS FOR FURTHER STUDY

Future research in creating empowered systems for e-governance structures should focus on streamlining operations across different departments and units for increased work efficiency as information systems have assumed new dimensions in re-defining work processes and enabling increased efficiency through improved flow of information across departments and units.

E-governance system designs and development processes face increased difficulties on account of the large number of users and inter linkages existing between various sectors and units. Functionalities and operational requirements are also prone to policy changes creating the need for a system that is flexible and scalable for long term benefits (Bohlen, Gamper, Polasek and Wimmer, 2005) and social, economic and cultural changes that take place in the immediate surroundings (Homburg, 2008). Based on the above, it is clear that information tools and applications require constant review in order to remain relevant and functional within the organization. Research into relevance, functionalities and operational requirements based on large number of users and inter linkages between sectors could provide valuable insight into systems design.

Further study is required on the capturing of data from people living in remote and/or rural areas where they may not even have access to a computer or any internet connectivity. Research should also focus on ways to incorporate facilities such as nodal centers/sector offices into the system so that citizens can go to such centres to capture their data on the system.

Studies into the analysis of the contexts in which e-governance systems and more specifically online housing demand database applications can contribute to effective management of operations and handle emerging user requirements are required. This can be done in light of the social, cultural, economic and political changes in the country.

5.6 FINAL WORD

Web based e-governance tools and applications will witness increased changes as the months and years go by with new requirements and trends being incorporated by the government for e-governance projects. Technology is constantly being upgraded and so would be the system. These new technologies can help public administrators and employees cope with the many challenges they face in managing information and business processes effectively and efficiently. The researcher has identified, developed and implemented a web based housing demand database for KZN-DHS with improved features and usability options to help to improve the administration and to give citizens' easy access to public information and services.

It is desired that all valuable information be archived for the department to function smoothly and yet transform the same from one system to another as the online software upgrades to a better model. The findings indicated that the implementation of internet based HDDS in KZN-DHS improved: communication between

stakeholders; administration of the data; and provision of valuable information in the form of reports to various levels of management. Given that change is constant and that political and business logic is dynamic, research needs to be ongoing to ensure sustainability of the HDDS.

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APPENDICES

| APPENDIX | |
|----------|--|
| A | Permission letter from the KwaZulu-Natal Department of Human Settlements |
| B | Covering Letter and Letter of Informed Consent |
| C | JAD Session Questions |
| D | E-R diagram - Administration Module |
| E | E-R diagram - Maintenance and Transaction Screens |
| F | Housing Development Database System - Transaction Tables |
| G | Requirements Overview |
| H | Test Cases |

APPENDIX A

Permission letter from the KwaZulu-Natal Department of Human Settlements



human settlements

Department:
Human Settlements
PROVINCE OF KWAZULU-NATAL

2 Samora Machel Street DURBAN 4001, Private Bag X54367 DURBAN 4000
Tel: +27 31 336 5295, Fax: +27 31 336 5296 / +27 86 568 1885
E-mail: mxolisi.matebese@kzndhs.gov.za Web: www.kznhousing.gov.za

REF: IMST034/Project Research Permission - Mrs M Eedara

Date: 7 September 2010

Mrs M Eedara
204 Tiber Island
6 Mona Road, Victoria Embankment
Durban

Re: PERMISSION TO CONDUCT RESEARCH AND DEVELOP NEW SYSTEM

The above matter refers.

Permission is hereby granted to conduct the research, review documentation related to Housing Demand Database (HDD) System of the Province of KwaZulu-Natal subject to the following conditions:

1. You make all the arrangements concerning your research and no compensation is expected.
2. Department's daily schedules are not interrupted
3. Your research is only limited to HDD development and no financial gains can be made from the project. Clearly be aware that *all* research information is the sole property of KZN: Dept. of Human Settlements and any breach of the agreement stated in this document may result in legal action being taken against the transgressor.

The KZN Department of Human Settlements fully supports your commitment to research, based on issues concerning existing HDD system and identify the new requirements and develop a new Web based HDD system. The departments support for this project is in line with current experiential training initiatives by Government.

It is hoped that you will find the above in order.

Best Wishes



M. MATEBESE
DEPUTY MANAGER: IMST
INFORMATION MANAGEMENT SYSTEMS & TECHNOLOGY

Department of Human Settlements/uMnyango wezokuHlaliswa kwaBantu/
Departement van Menslike Nedersettings

APPENDIX B

COVERING LETTER AND LETTER OF INFORMED CONSENT

20 October 2010

Dear Participant

I am Studying towards an M. Tech Degree in Information Technology at the Durban University of Technology. The title of my research is: Development of an internet based housing demand database system for the KwaZulu-Natal Department of Human Settlements.

Please attend the JAD session to enable me to gather data for my research. The Information you provide will be kept strictly confidential. Only my research supervisor and I will have access to the identified requirements for online housing demand database. Please be assured that your participation will remain completely anonymous throughout the research process and in any reporting or write-ups related to my research.

Please read and sign the attached Consent Form during the JAD session.

Thank you very much.

Mrs M. Eedara

Student no: 21032801

Tel No. :(W) 031 3642538

(Cell) 0827113447

(Email): mamathae@nedbank.co.za

Prof. P Singh

Research Supervisor

LETTER OF CONSENT

Dear Participant

Thank You for agreeing to participate in this study entitled: Development of an internet based housing demand database system for the KwaZulu-Natal Department of Human Settlements

The intention of this study is to investigate the business processes of the KwaZulu-Natal Department of Human Settlements (KZN-DHS) to determine how the processes can be leveraged for improved housing service provisioning.

The JAD session Details:

Date: 6th November 2010.

Location: 10th Floor, KZN-DHS Premises, 2 Samora Machel Street, Durban – 4001.

Time: 9:00 AM.

This study will provide a new online system for KZN Department of Human Settlements to maintain the housing demand database. It is hoped that the findings of this research will make recommendations to the Department of Human Settlements with regards to managing the details of housing demand and eligible applicants per region.

The researcher undertakes to assure you the following:

- To maintain your confidentiality;
- To protect your rights and welfare, that is, to ensure that no harm comes to you as a result of your participation in this research;
- To present information and transcripts used in this research in such a way as to maintain your dignity and if in doubt to first consult with you;
- To make available to you the final copy of this research publication;
- No manipulation or withholding of information is involved in this study.

Thank you for volunteering to contribute to develop online housing demand database for KZN-DHS.

Yours Sincerely

M. Eedara

M. Tech: Information Technology

Student No: 21032801

I, ----- (participant's name), agree to participate in this study.

Participant's signature

Date

APPENDIX C

JAD SESSION QUESTIONS

- Q1. What are the loop holes of the current system in a broader perspective?
- Q2. Which specific areas of the current system do you think is redundant?
- Q3. What are the principal reasons for the failure of the current system and why it is not accepted by the users?
- Q4. What problems do you have while operating manually?
- Q5. Please explain the operational basics involving KZN-DHS and the municipalities.
What are the standard operational procedures of the department?
- Q6. What are the procedures of each and every section / department / user groups and what is the amount of data being shared amongst themselves?
- Q7. What is the current process of storing applicant data and how does the department manage it?
- Q8. What is the process of gathering data from the various provinces of KZN regarding the people's housing requirement and their needs?
- Q9. What is the data storage and data sharing requirements of the KZN-DHS and the municipalities? How often do they send / share data from each other?
- Q10. What current IT infrastructure does the KZN-DHS departments and the municipalities have?

Q11. How do the administrators of the KZN-DHS need to regulate data for the municipalities to view and work on?

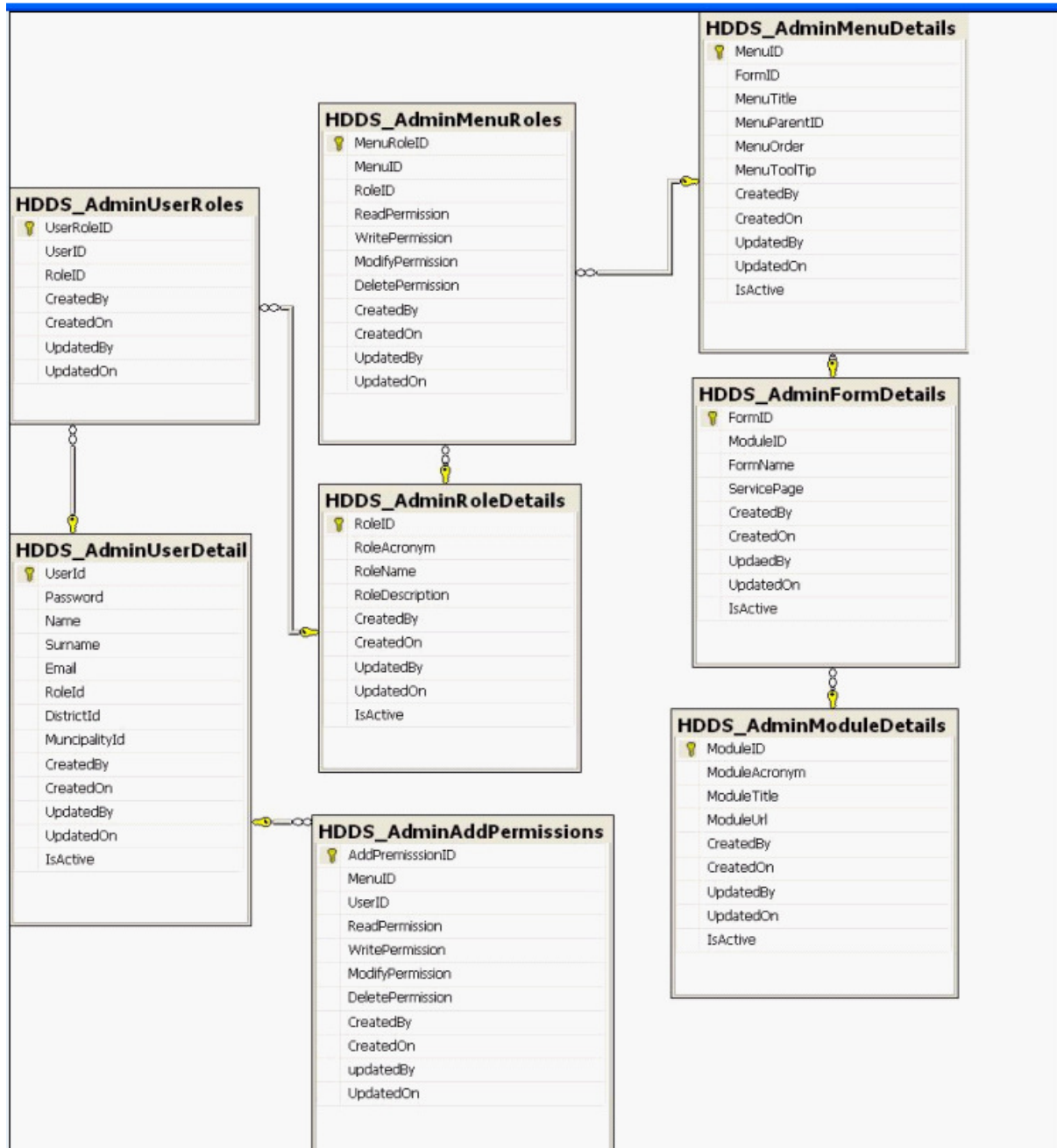
Q12. What is the level of data integrity which needs to be maintained?

Q13. What would be the organization's hierarchical structure in which data needs to be filtered and information stream needs to flow?

Q14. What are the shortcomings do the administrators and management of KZN-DHS foresees and what steps will be taken for these?

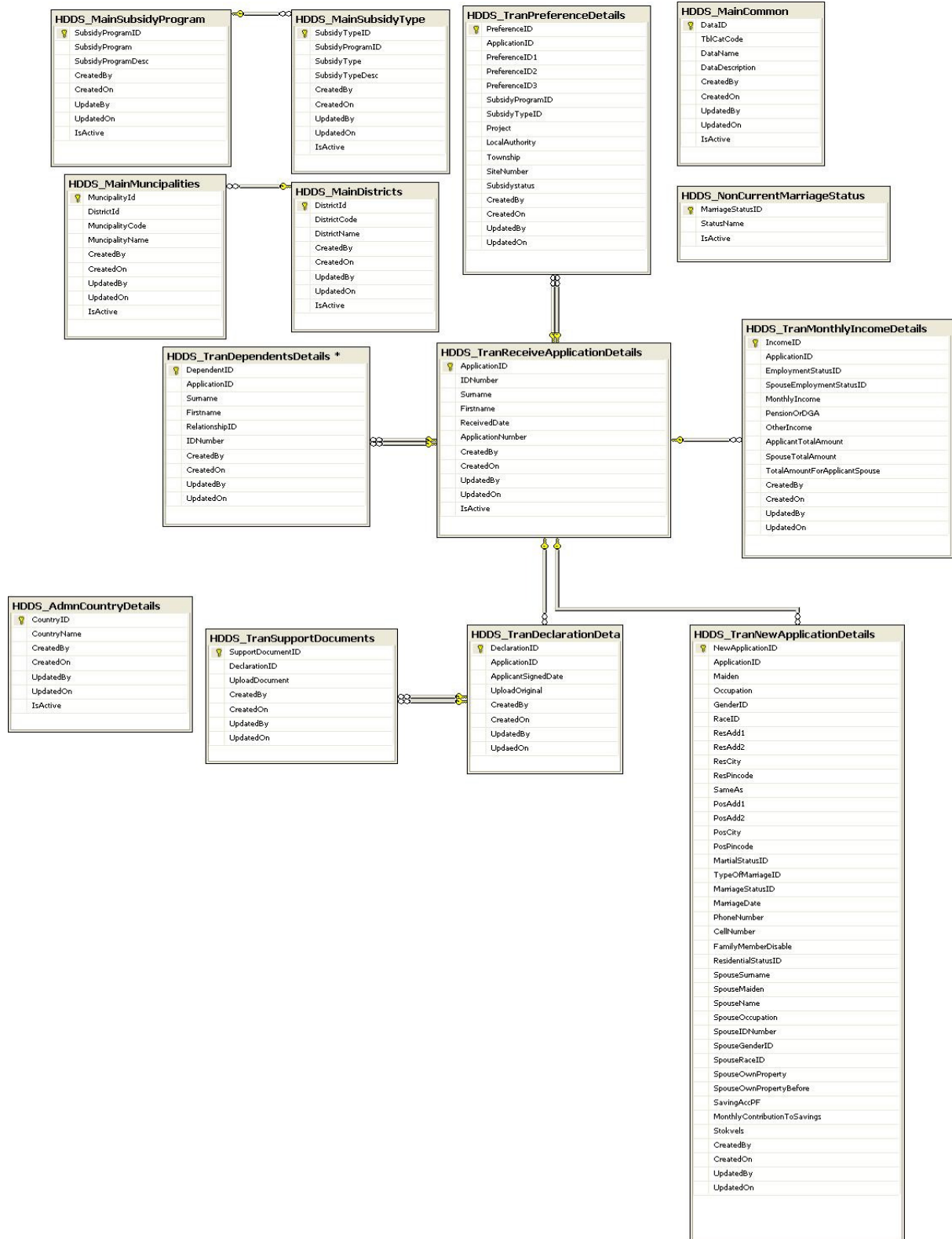
APPENDIX D

E-R diagram - Administration Module



APPENDIX E

E-R diagram - Maintenance and Transaction Screens



APPENDIX F

Housing Development Database System - Transaction Tables

Table 1 HDDS_TransDeclarationDetails

Description

| Field | Data Type | Null | Default | AI | Key |
|---------------------|--------------|---------|-----------|-----|-----|
| DeclarationID | bigint | NotNull | | Yes | |
| ApplicationID | bigint | NotNull | | | FK |
| ApplicantSignedDate | datetime | NotNull | getdate() | | |
| UploadOriginal | nvarchar(50) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdaedOn | datetime | NotNull | getdate() | | |
| | | | | | |
| | | | | | |

Table 2 HDDS_TransDeclarationDetailsHistory

Description

| Field | Data Type | Null | Default | AI | Key |
|---------------------|--------------|---------|-----------|-----|-----|
| DeclarationID | bigint | NotNull | | Yes | |
| ApplicationID | bigint | NotNull | | | |
| ApplicantSignedDate | datetime | NotNull | getdate() | | |
| UploadOriginal | nvarchar(50) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdaedOn | datetime | NotNull | getdate() | | |

Table 3 HDDS_TransDependentsDetails

Description

| Field | Data Type | Null | Default | AI | Key |
|----------------|---------------|---------|---------|-----|-----|
| DependentID | bigint | NotNull | | Yes | PK |
| ApplicationID | bigint | NotNull | | | FK |
| Surname | nvarchar(75) | NotNull | | | |
| Firstname | nvarchar(150) | NotNull | | | |
| RelationshipID | int | NotNull | | | |
| IDNumber | nvarchar(20) | NotNull | | | |
| CreatedBy | int | NotNull | | | |

| | | | | | |
|-----------|----------|---------|-----------|--|--|
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 4 HDDS_TranDependentsDetailsHistory
Description

| Field | Data Type | Null | Default | AI | Key |
|----------------|--------------|---------|-----------|-----|-----|
| DependentID | bigint | NotNull | | Yes | |
| ApplicationID | bigint | NotNull | | | |
| Surname | nvarchar(50) | NotNull | | | |
| Firstname | nvarchar(50) | NotNull | | | |
| RelationshipID | int | NotNull | | | |
| IDNumber | nvarchar(20) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 5 HDDS_TranMonthlyIncomeDetails
Description

| Field | Data Type | Null | Default | AI | Key |
|-------------------------------|--------------|---------|-----------|-----|-----|
| IncomeID | bigint | NotNull | | Yes | PK |
| ApplicationID | bigint | NotNull | | | FK |
| EmploymentStatusID | int | NotNull | | | |
| SpouseEmploymentStatusID | int | NotNull | | | |
| MonthlyIncome | nvarchar(15) | NotNull | | | |
| PensionOrDGA | nvarchar(15) | Null | | | |
| OtherIncome | nvarchar(15) | Null | | | |
| ApplicantTotalAmount | nvarchar(15) | NotNull | | | |
| SpouseTotalAmount | nvarchar(15) | Null | | | |
| TotalAmountForApplicantSpouse | nvarchar(15) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 6 HDDS_TranMonthlyIncomeDetailsHistory
Description

| Field | Data Type | Null | Default | AI | Key |
|-------|-----------|------|---------|----|-----|
|-------|-----------|------|---------|----|-----|

| | | | | | |
|-------------------------------|--------------|---------|-----------|-----|--|
| IncomeID | bigint | NotNull | | Yes | |
| ApplicationID | bigint | NotNull | | | |
| EmploymentStatusID | int | NotNull | | | |
| SpouseEmploymentStatusID | int | NotNull | | | |
| MonthlyIncome | nvarchar(15) | NotNull | | | |
| PensionOrDGA | nvarchar(15) | Null | | | |
| OtherIncome | nvarchar(15) | Null | | | |
| ApplicantTotalAmount | nvarchar(15) | NotNull | | | |
| SpouseTotalAmount | nvarchar(15) | Null | | | |
| TotalAmountForApplicantSpouse | nvarchar(15) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 7 **HDDS_TranNewApplicationDetails**
Description

| Field | Data Type | Null | Default | AI | Key |
|---------------------|---------------|---------|-----------|-----|-----|
| NewApplicationID | bigint | NotNull | | Yes | PK |
| ApplicationID | bigint | NotNull | | | FK |
| Maiden | nvarchar(50) | NotNull | | | |
| Occupation | nvarchar(50) | NotNull | | | |
| GenderID | int | NotNull | | | |
| RaceID | int | NotNull | | | |
| ResAdd1 | nvarchar(100) | NotNull | | | |
| ResAdd2 | nvarchar(100) | Null | | | |
| ResCity | nvarchar(50) | NotNull | | | |
| ResPincode | nvarchar(8) | NotNull | | | |
| SameAs | nchar(10) | Null | | | |
| PosAdd1 | nvarchar(100) | NotNull | | | |
| PosAdd2 | nvarchar(100) | Null | | | |
| PosCity | nvarchar(50) | NotNull | | | |
| PosPincode | nvarchar(8) | NotNull | | | |
| MartialStatusID | int | NotNull | | | |
| TypeOfMarriageID | int | NotNull | | | |
| MarriageStatusID | int | Null | | | |
| MarriageDate | datetime | Null | getdate() | | |
| PhoneNumber | nvarchar(20) | NotNull | | | |
| CellNumber | nvarchar(20) | NotNull | | | |
| FamilyMemberDisable | char(1) | NotNull | | | |
| ResidentialStatusID | int | NotNull | | | |
| SpouseSurname | nvarchar(50) | Null | | | |
| SpouseMaiden | nvarchar(50) | Null | | | |

| | | | | | |
|------------------------------|--------------|---------|-----------|--|--|
| SpouseName | nvarchar(50) | Null | | | |
| SpouseOccupation | nvarchar(50) | Null | | | |
| SpouseIDNumber | nvarchar(20) | Null | | | |
| SpouseGenderID | int | Null | | | |
| SpouseRaceID | int | Null | | | |
| SpouseOwnProperty | char(1) | Null | | | |
| SpouseOwnPropertyBefore | char(1) | Null | | | |
| SavingAccPF | char(1) | Null | | | |
| MonthlyContributionToSavings | nchar(10) | Null | | | |
| Stokvels | char(1) | Null | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 8 **HDDS_TransNewApplicationDetailsHistory**
Description

| Field | Data Type | Null | Default | AI | Key |
|---------------------|---------------|---------|-----------|-----|-----|
| NewApplicationID | bigint | NotNull | | Yes | |
| ApplicationID | bigint | NotNull | | | |
| Maiden | nvarchar(50) | NotNull | | | |
| Occupation | nvarchar(50) | NotNull | | | |
| GenderID | int | NotNull | | | |
| RaceID | int | NotNull | | | |
| ResAdd1 | nvarchar(100) | NotNull | | | |
| ResAdd2 | nvarchar(100) | Null | | | |
| ResCity | nvarchar(50) | NotNull | | | |
| ResPincode | nvarchar(8) | NotNull | | | |
| SameAs | nchar(10) | Null | | | |
| PosAdd1 | nvarchar(100) | NotNull | | | |
| PosAdd2 | nvarchar(100) | Null | | | |
| PosCity | nvarchar(50) | NotNull | | | |
| PosPincode | nvarchar(8) | NotNull | | | |
| MartialStatusID | int | NotNull | | | |
| TypeOfMarriageID | int | NotNull | | | |
| MarriageStatusID | int | Null | | | |
| MarriageDate | datetime | Null | getdate() | | |
| PhoneNumber | nvarchar(20) | NotNull | | | |
| CellNumber | nvarchar(20) | NotNull | | | |
| FamilyMemberDisable | char(1) | NotNull | | | |
| ResidentialStatusID | int | NotNull | | | |
| SpouseSurname | nvarchar(50) | Null | | | |
| SpouseMaiden | nvarchar(50) | Null | | | |

| | | | | | |
|------------------------------|--------------|---------|-----------|--|--|
| SpouseName | nvarchar(50) | Null | | | |
| SpouseOccupation | nvarchar(50) | Null | | | |
| SpouseIDNumber | nvarchar(20) | Null | | | |
| SpouseGenderID | int | Null | | | |
| SpouseRaceID | int | Null | | | |
| SpouseOwnProperty | char(1) | Null | | | |
| SpouseOwnPropertyBefore | char(1) | Null | | | |
| SavingAccPF | char(1) | Null | | | |
| MonthlyContributionToSavings | nchar(10) | Null | | | |
| Stokvels | char(1) | Null | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 9 **HDDS_TransPreferenceDetails**
Description

| Field | Data Type | Null | Default | AI | Key |
|------------------|---------------|---------|-----------|-----|-----|
| PreferenceID | bigint | NotNull | | Yes | PK |
| ApplicationID | bigint | NotNull | | | FK |
| PreferenceID1 | int | NotNull | | | |
| PreferenceID2 | int | NotNull | | | |
| PreferenceID3 | int | NotNull | | | |
| SubsidyProgramID | int | NotNull | | | |
| SubsidyTypeID | int | NotNull | | | |
| Project | nvarchar(100) | NotNull | | | |
| LocalAuthority | varchar(50) | NotNull | | | |
| Township | varchar(50) | NotNull | | | |
| SiteNumber | varchar(50) | NotNull | | | |
| Subsidystatus | varchar(50) | Null | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 10 **HDDS_TransPreferenceDetailsHistory**
Description

| Field | Data Type | Null | Default | AI | Key |
|---------------|-----------|---------|---------|-----|-----|
| PreferenceID | bigint | NotNull | | Yes | |
| ApplicationID | bigint | NotNull | | | |
| PreferenceID1 | int | NotNull | | | |

| | | | | | |
|------------------|---------------|---------|-----------|--|--|
| PreferenceID2 | int | NotNull | | | |
| PreferenceID3 | int | NotNull | | | |
| SubsidyProgramID | int | NotNull | | | |
| SubsidyTypeID | int | NotNull | | | |
| Project | nvarchar(100) | NotNull | | | |
| LocalAuthority | varchar(50) | NotNull | | | |
| Township | varchar(50) | NotNull | | | |
| SiteNumber | varchar(50) | NotNull | | | |
| Subsidystatus | varchar(50) | Null | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 11 HDDS_TransReceiveApplicationDetails
Description

| Field | Data Type | Null | Default | AI | Key |
|-------------------|--------------|---------|-----------|-----|-----|
| ApplicationID | bigint | NotNull | | Yes | PK |
| IDNumber | nvarchar(50) | NotNull | | | |
| Surname | nvarchar(50) | NotNull | | | |
| Firstname | nvarchar(50) | NotNull | | | |
| ReceivedDate | datetime | NotNull | getdate() | | |
| ApplicationNumber | bigint | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |
| IsActive | char(1) | NotNull | Y | | |

Table 12 HDDS_TransReceiveApplicationDetailsHistory
Description

| Field | Data Type | Null | Default | AI | Key |
|-------------------|--------------|---------|-----------|-----|-----|
| ApplicationID | bigint | NotNull | | Yes | |
| IDNumber | nvarchar(50) | NotNull | | | |
| Surname | nvarchar(50) | NotNull | | | |
| Firstname | nvarchar(50) | NotNull | | | |
| ReceivedDate | datetime | NotNull | getdate() | | |
| ApplicationNumber | bigint | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |

| | | | | | |
|-----------|----------|---------|-----------|--|--|
| UpdatedOn | datetime | NotNull | getdate() | | |
| IsActive | char(1) | NotNull | Y | | |

Table 13 **HDDS_TransupportDocuments**
Description

| Field | Data Type | Null | Default | AI | Key |
|-------------------|--------------|---------|-----------|-----|-----|
| SupportDocumentID | bigint | NotNull | | Yes | PK |
| DeclarationID | bigint | NotNull | | | FK |
| UploadDocument | nvarchar(50) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

Table 14 **HDDS_TransupportDocumentsHistory**
Description

| Field | Data Type | Null | Default | AI | Key |
|-------------------|--------------|---------|-----------|-----|-----|
| SupportDocumentID | bigint | NotNull | | Yes | |
| DeclarationID | bigint | NotNull | | | |
| UploadDocument | nvarchar(50) | NotNull | | | |
| CreatedBy | int | NotNull | | | |
| CreatedOn | datetime | NotNull | getdate() | | |
| UpdatedBy | int | NotNull | | | |
| UpdatedOn | datetime | NotNull | getdate() | | |

APPENDIX G

Requirements Overview

The application requirements are based on the use of the form as a primary input document and all functionality is based on thereon. Access to the application is to be via a browser based interface on the client side, to a web server and database combination on the Department of Human Settlements.

The local authorities and municipalities will have access to application through internet on the client side.

- a) Capture and update applicant's personal details;
- b) Capture and update applicant's spouse's details;
- c) Capture and update applicant's dependents details;
- d) Capture and update applicant's income details;
- e) Capture and update applicant's citizenship details;
- f) Capture and Update applicant's housing preference details;
- g) Capture, Update and Administration of local authority and district information;
- h) Allow for queries of applicant details and application status by using application number and ID number as input;
- i) Track & Trace of application status through any internet connection to the Department of Human Settlements website;
- j) Audit Trail of critical data modifications;
- k) Support e-mail notifications for applications, and missing details;
- l) Provide Automatic reminders sent to key stakeholders;
- m) Scan original signed applications, attach files and other documents;
- n) Provide Tracking of subsidy authorisations;
- o) Provide alerts to all relevant parties on actions due or pending;
- p) Provide secure online access to the Housing Demand Database System;
- q) Provide management with centralised real-time provincial reporting;

- r) Provide central maintenance and administration of information;
- s) Provide Full text searching;

The following have been identified as key functional requirements:

- a) Maintain Applications Information
 - i.) Add Application Information
 - ii.) Update Application Information
 - iii.) Associate Application and Project details
 - iv.) Disassociate application with a project
- b) Maintain Project correspondence details
- c) Maintain Project details
- d) Monitor Subsidy process details
- e) Maintain Audit Trail Details
- f) Maintain User Details
 - i.) Add users
 - ii.) Update user details
- g) Maintain informational data (*Lookup tables*)
 - i.) Add/Update Municipalities/local authorities Details
 - ii.) Add/Update Marital Status Details
 - iii.) Add/Update Race Details
 - iv.) Add/Update Gender Details
 - v.) Add/Update Residential Status Details
 - vi.) Add/Update Employment status Levels
 - vii.) Add/Update Preferred Subsidy Program Details
 - viii.) Add/Update Subsidy Type Details
 - ix.) Add/Update Type of Marriage details
 - x.) Add/Update Ward Details
 - xi.) Maintain Subsidy Status Details
 - xii.) Maintain Relationship Type Details
- h) Generate Reports
 - i.) Applications Received per Municipality or per Residential status or per Subsidy type

- ii.) Incomplete Applications Received per Municipality or per Residential status or per Subsidy type
- iii.) Complete Applications Received per Municipality or per Residential status or per Subsidy type
- iv.) Approved Applications per Municipality or per Race or per Gender or disability status
- v.) Total number of Applications per quarter, per Application Status
- vi.) Turnaround time of the applications per Subsidy Type, per Municipality
- vii.) Audit Trail Report

Each user will only have access to their own data and any reports drawn should display information relevant to that user's section. Housing Demand Database System Administrator will be able to view and draw reports for the entire System.

APPENDIX H

Test Cases

| Project Name: HDDS --> Transaction Module | | | | Environment Requirements: |
|---|-----------------------|--|--|---|
| Reference Document: | | | | Execution Requirements: |
| Author: Mamatha Eedara | | | | Reviewed By: |
| Date Executed: | | | | Reviewed On: |
| | | | | |
| Form Name | Test Case Id # | Test case Description | Execution Steps | Expected Results |
| Search Receive Application | TC001 | Verify Search receive application menu | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item | Search receive application page should open with Search and Cancel buttons with Add link |
| Receive an Application | TC002 | Verify Add link in search receive application | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Click on Add link | Receive an application page should open |
| | TC003 | verify Asterisk mark (*) for the following fields 1. ID Number 2. Surname 3. First Name 4. Received Date | Click on the Add link in Search receive Application | The following fields should be marked with asterisk (*) to indicate the user that they are mandatory fields. 1. ID Number 2. Surname 3. First Name |
| | TC004 | Verify Save&Continue button without enter any values | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Click on Add link 6. Click on Save & Continue button | Should display alert messages for all the mandatory fields |

| | | | | |
|--|-------|--|---|---|
| | TC005 | Verify Cancel button in receive an application | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Click on Add link 6. Enter all the required fields 6. Click on Cancel button | Should Clear all the selected field values and cursor should be focus on the ID Number text box |
| | TC006 | Verify Tab order | Click on the Add link in Search receive Application | Tab order should move as per field order |
| | TC007 | Validate ID number text box with Numeric's | Enter numeric's in ID number text box | ID number should accept numeric's in specific format as 8001015006574 |
| | TC008 | Validate ID number text box with Special characters | Enter special characters in ID number text box | Relevant Error message should be displayed |
| | TC009 | Validate ID number text box with Alphabets | Enter alphabets in ID number text box | Relevant Error message should be displayed |
| | TC010 | Validate Surname text box with Numeric's | Enter numeric's in Surname Text box | Relevant Error message should be displayed |
| | TC011 | Validate Surname text box with Special characters | Enter special characters in Surname text box | Relevant Error message should be displayed |
| | TC012 | Validate Surname text box with Alphabets | Enter alphabets in Surname text box | Surname text box should accept Alphabets |
| | TC013 | Validate Surname text box with 101 characters | Enter Surname with 101 Characters | Relevant Error message should be displayed |
| | TC014 | Validate Surname text box with 5 characters | Enter Surname with 5 Characters | Surname text box should accept 5 character Length |
| | TC015 | Validate Surname text box with 100 characters | Enter Surname with 100 Characters | Surname text box should accept 100 character Length |
| | TC016 | Validate First Name text box with Numeric's | Enter Numeric's in First name text box | Relevant Error message should be displayed |
| | TC017 | Validate First Name text box with Special characters | Enter special characters in First name text box | Relevant Error message should be displayed |
| | TC018 | Validate First Name text box with Alphabets | Enter Alphabets in First name text box | First name text box should accept Alphabets |

| | | | | |
|-----------------------------------|-------|---|--|--|
| | TC019 | Validate First Name text box with 101 characters | Enter First name with 101 characters | Relevant Error message should be displayed |
| | TC020 | Validate First Name text box with 5 characters | Enter First name with 5 characters | First name text box should accept 5 character length |
| | TC021 | Validate First Name text box with 100 characters | Enter First name with 100 characters | First name text box should accept 100 character length |
| | TC022 | Validate received date | select the date from date picker | Received date should be less than or equal to the current date |
| | TC023 | Validate Save & Continue button in Receive an application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Click on Add link 6. Enter /select all the required fields 7. Click on Save & Continue button | All the captured details should be saved to the database |
| Search Receive Application | TC024 | Verify the Search link in Receive an application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Click on Add link 6. Click on Search link | Search receive application page should open with Search and Cancel buttons |
| | TC025 | Verify search functionality with Date | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Select the From date and To date 6. Click on Search button | System should display a data grid with search results data |

| | | | | |
|--|-------|---|--|--|
| | TC026 | Verify search functionality with ID Number | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter the ID Number 6. Click on Search button | System should display a data grid with search results data |
| | TC027 | Verify search functionality with Surname | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter the Surname 6. Click on Search button | System should display a data grid with search results data |
| | TC028 | Verify search functionality with First Name | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter the First Name 6. Click on Search button | System should display a data grid with search results data |
| | TC029 | Verify search functionality with Application Number | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter the Application Number 6. Click on Search button | System should display a data grid with search results data |

| | | | | |
|--|-------|---|--|--|
| | TC030 | Verify search functionality with Status | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Select the Status 6. Click on Search button | System should display a data grid with search results data |
| | TC031 | Verify the Cancel button in search receive application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter/Select all the required fields 6. Click on Cancel button | Should clear all the entered/selected fields |
| | TC032 | Verify search functionality with ID Number and Date | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Select the Date and enter the Id number 6. Click on Search button | System should display a data grid with search results data |
| | TC033 | Verify search functionality with Application Number and Surname | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter the application number and surname 6. Click on Search button | System should display a data grid with search results data |

| | | | | |
|--|-------|---|--|---|
| | TC034 | Verify search functionality with Application Number and first name and status | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter the application number, first name and select the status 6. Click on Search button | System should display a data grid with search results data |
| | TC035 | Validate Search functionality with Invalid Credentials | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Enter invalid search parameters 6. Click on Search button | Should display an alert message as " No Search Results Found " |
| | TC036 | Verify Top row of the List grid | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data | Last updated record should be Placed on top of the grid |
| | TC037 | Verify sorting on ID Number by Ascending | Click on the ID Number column | ID Number should be sort by ascending order |
| | TC038 | Verify sorting on ID Number by Descending | Click on the ID Number column | ID Number should be sort by descending order |
| | TC039 | Verify sorting on surname by Ascending | Click on the surname column | Surname should be sort by ascending order |
| | TC040 | Verify sorting on surname by Descending | Click on the surname column | Surname should be sort by descending order |
| | TC041 | Verify sorting on first name by Ascending | Click on the first name column | First name should be sort by ascending order |

| | | | | |
|--|-------|--|--|---|
| | TC042 | Verify sorting on first name by Descending | Click on the first name column | First name should be sort by descending order |
| | TC043 | Verify sorting on Received date by Ascending | Click on the received date column | Received date should be sort by ascending order |
| | TC044 | Verify sorting on Received date by Descending | Click on the received date column | Received date should be sort by descending order |
| | TC045 | Verify sorting on Application Number by Ascending | Click on the Application Number column | Application Number should be sort by ascending order |
| | TC046 | Verify sorting on Application Number by Descending | Click on the Application Number column | Application Number should be sort by descending order |
| | TC047 | Verify sorting on Last updated by Ascending | Click on the Last updated column | Last updated by should be sort by ascending order |
| | TC048 | Verify sorting on Last updated by Descending | Click on the Last updated column | Last updated by should be sort by descending order |
| | TC049 | Validate No of Records control | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data | Records per page in the grid should be controlled by value selected in no of records dropdown |
| | TC050 | Validate pagination for the List grid | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data | <ol style="list-style-type: none"> 1. Should move to corresponding page in the grid by clicking the page navigation links 2. Sort order should not be disturbed while page navigation |

| | | | | |
|--|-------|--|--|--|
| | TC051 | Verify Status icon in Search receive application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on status icon | Should display a confirmation message as "You are trying to change the status, Do you want to continue?" with Ok and Cancel buttons |
| | TC052 | Verify Ok button in confirmation message box | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on status icon 9. Click on ok button in the confirmation message box | Should be able to change the Access permissions from Activate to Inactivate (or) Inactivate to Activate |
| | TC053 | Verify Cancel button in confirmation message box | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on status icon 9. Click on Cancel button in the confirmation message box | Should not be able to change status |

| | | | | |
|--|-------|--|--|---|
| Edit Receive an Application | TC054 | Validate Edit Link | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit icon | Edit Receive application page should open |
| | TC055 | Validate Cancel button in Edit Receive application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit icon 9. Click on Cancel button | it should be redirected Search receive application page |
| | TC056 | Validate Update button in Edit Receive application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit icon 9. Modify the required fields 10. Click on Update button | Modified details should be updated to database |

| | | | | |
|--------------------------------|-------|---|--|--|
| Capture New Application | TC057 | Verify New Application link in Search Receive Application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link | Add application page should open |
| | TC058 | verify Asterisk mark (*) for the mandatory fields | Click on the New Application link in Search receive Application | All the mandatory fields should be marked with asterisk (*) to indicate the user that they are mandatory fields. |
| | TC059 | Verify Save&Continue button without enter any values | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Click on Save & Continue button | Should display alert messages for all the mandatory fields |
| | TC060 | Verify Cancel button in Add application details | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 9. Click on Cancel button | Curser should be redirected to the search receive application |

| | | | | |
|--|-------|--|---|--|
| | TC061 | Verify Tab order | Click on the Application link in Search receive Application | Tab order should move as per field order |
| | TC062 | Validate Maiden Surname text box with Numeric's | Enter numeric's in Maiden Surname Text box | Relevant Error message should be displayed |
| | TC063 | Validate Maiden Surname text box with Special characters | Enter special characters in Maiden Surname text box | Relevant Error message should be displayed |
| | TC064 | Validate Maiden Surname text box with Alphabets | Enter alphabets in Maiden Surname text box | Maiden Surname text box should accept Alphabets |
| | TC065 | Validate Maiden Surname text box with 101 characters | Enter Maiden Surname with 101 Characters | Relevant Error message should be displayed |
| | TC066 | Validate Maiden Surname text box with 5 characters | Enter Maiden Surname with 5 Characters | Maiden Surname text box should accept 5 character Length |
| | TC067 | Validate Maiden Surname text box with 100 characters | Enter Maiden Surname with 100 Characters | Maiden Surname text box should accept 100 character Length |
| | TC068 | Validate Occupation text box with Numeric's | Enter numeric's in Occupation Text box | Relevant Error message should be displayed |
| | TC069 | Validate Occupation text box with Special characters | Enter special characters in Occupation text box | Relevant Error message should be displayed |
| | TC070 | Validate Occupation text box with Alphabets | Enter alphabets in Occupation text box | Occupation text box should accept Alphabets |
| | TC071 | Validate Occupation text box with 101 characters | Enter Occupation with 101 Characters | Relevant Error message should be displayed |
| | TC072 | Validate Occupation text box with 5 characters | Enter Occupation with 5 Characters | Occupation text box should accept 5 character Length |
| | TC073 | Validate Occupation text box with 100 characters | Enter Occupation with 100 Characters | Occupation text box should accept 100 character Length |
| | TC074 | Verify Gender combo box in Add application details | Click on Gender combo box | Gender details should display the items in dropdown field |
| | TC075 | Verify Race combo box in Add application details | Click on Race combo box | Race details should display the items in dropdown field |

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| | TC076 | Verify Address 1 text box in Postal address with alphabets | Enter Alphabets in Address 1 text box | Address 1 text box should accept alphabets |
| | TC077 | Verify Address 1 text box in Postal address with Numeric's | Enter Numeric's in Address 1 text box | Address 1 text box should accept Numeric's |
| | TC078 | Verify Address 1 text box in Postal address with Special characters | Enter Special characters in Address 1 text box | Address 1 text box should accept Special characters |
| | TC079 | Validate Address 1 text box with 251 characters | Enter Address 1 with 251 Characters | Relevant Error message should be displayed |
| | TC080 | Validate Address 1 text box with 5 characters | Enter Address 1 with 5 Characters | Address 1 text should accept 5 characters |
| | TC081 | Validate Address 1 text box with 250 characters | Enter Address 1 with 100 Characters | Address 1 text should accept 100 characters |
| | TC082 | Verify Address 2 text box in Postal address with alphabets | Enter Alphabets in Address 2 text box | Address 2 text box should accept alphabets |
| | TC083 | Verify Address 2 text box in Postal address with Numeric's | Enter Numeric's in Address 2 text box | Address 2 text box should accept Numeric's |
| | TC084 | Verify Address 2 text box in Postal address with Special characters | Enter Special characters in Address 2 text box | Address 2 text box should accept Special characters |
| | TC085 | Validate Address 2 text box with 251 characters | Enter Address 2 with 251 Characters | Relevant Error message should be displayed |
| | TC086 | Validate Address 2 text box with 5 characters | Enter Address 2 with 5 Characters | Address 2 text should accept 5 characters |
| | TC087 | Validate Address 2 text box with 250 characters | Enter Address 2 with 100 Characters | Address 2 text should accept 100 characters |
| | TC088 | Validate City text box with Numeric's | Enter numeric's in City Text box | Relevant Error message should be displayed |
| | TC089 | Validate City text box with Special characters | Enter special characters in City text box | Relevant Error message should be displayed |

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| | TC090 | Validate City text box with Alphabets | Enter alphabets in City text box | City text box should accept Alphabets |
| | TC091 | Validate City text box with 101 characters | Enter City with 101 Characters | Relevant Error message should be displayed |
| | TC092 | Validate City text box with 5 characters | Enter City with 5 Characters | City text box should accept 5 character Length |
| | TC093 | Validate City text box with 100 characters | Enter City with 100 Characters | City text box should accept 100 character Length |
| | TC094 | Validate Pin code text box with Alphabets | Enter alphabets in Pin code Text box | Relevant Error message should be displayed |
| | TC095 | Validate Pin code text box with Special characters | Enter special characters in Pin code text box | Relevant Error message should be displayed |
| | TC096 | Validate Pin code text box with Numeric's | Enter numeric's in Pin code text box | Pin code text box should accept numeric's |
| | TC097 | Validate Pin code text box with 10 characters | Enter Pin code with 10 Characters | Relevant Error message should be displayed |
| | TC098 | Validate Pin code text box with 5 characters | Enter Pin code with 5 Characters | Pin code text box should accept 5 character Length |
| | TC099 | Validate Pin code text box with 4 characters | Enter Pin code with 4 Characters | Pin code text box should accept 4 character Length |
| | TC100 | Verify the mailing address check box in Mailing Address | Check the Mailing address | Mailing address should be copied same as postal address |
| | TC101 | Verify Address 1 text box in mailing address with alphabets | Enter Alphabets in Address 1 text box | Address 1 text box should accept alphabets |
| | TC102 | Verify Address 1 text box in mailing address with Numeric's | Enter Numeric's in Address 1 text box | Address 1 text box should accept Numeric's |
| | TC103 | Verify Address 1 text box in mailing address with Special characters | Enter Special characters in Address 1 text box | Address 1 text box should accept Special characters |

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| | TC104 | Validate Address 1 text box with 251 characters | Enter Address 1 with 251 Characters | Relevant Error message should be displayed |
| | TC105 | Validate Address 1 text box with 5 characters | Enter Address 1 with 5 Characters | Address 1 text should accept 5 characters |
| | TC106 | Validate Address 1 text box with 250 characters | Enter Address 1 with 100 Characters | Address 1 text should accept 100 characters |
| | TC107 | Verify Address 2 text box in Postal address with alphabets | Enter Alphabets in Address 2 text box | Address 2 text box should accept alphabets |
| | TC108 | Verify Address 2 text box in Postal address with Numeric's | Enter Numeric's in Address 2 text box | Address 2 text box should accept Numeric's |
| | TC109 | Verify Address 2 text box in Postal address with Special characters | Enter Special characters in Address 2 text box | Address 2 text box should accept Special characters |
| | TC110 | Validate Address 2 text box with 251 characters | Enter Address 2 with 251 Characters | Relevant Error message should be displayed |
| | TC111 | Validate Address 2 text box with 5 characters | Enter Address 2 with 5 Characters | Address 2 text should accept 5 characters |
| | TC112 | Validate Address 2 text box with 250 characters | Enter Address 2 with 100 Characters | Address 2 text should accept 100 characters |
| | TC113 | Validate City text box with Numeric's | Enter numeric's in City Text box | Relevant Error message should be displayed |
| | TC114 | Validate City text box with Special characters | Enter special characters in City text box | Relevant Error message should be displayed |
| | TC115 | Validate City text box with Alphabets | Enter alphabets in City text box | City text box should accept Alphabets |
| | TC116 | Validate City text box with 101 characters | Enter City with 101 Characters | Relevant Error message should be displayed |
| | TC117 | Validate City text box with 5 characters | Enter City with 5 Characters | City text box should accept 5 character Length |

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| | TC118 | Validate City text box with 100 characters | Enter City with 100 Characters | City text box should accept 100 character Length |
| | TC119 | Validate Pin code text box with Alphabets | Enter alphabets in Pin code Text box | Relevant Error message should be displayed |
| | TC120 | Validate Pin code text box with Special characters | Enter special characters in Pin code text box | Relevant Error message should be displayed |
| | TC121 | Validate Pin code text box with Numeric's | Enter numeric's in Pin code text box | Pin code text box should accept numeric's |
| | TC122 | Validate Pin code text box with 10 characters | Enter Pin code with 10 Characters | Relevant Error message should be displayed |
| | TC123 | Validate Pin code text box with 5 characters | Enter Pin code with 5 Characters | Pin code text box should accept 5 character Length |
| | TC124 | Validate Pin code text box with 4 characters | Enter Pin code with 4 Characters | Pin code text box should accept 4 character Length |
| | TC125 | Verify the current residential status in New application tab | Click on Current residential status combo box | Current residential details should display the items in dropdown field |
| | TC126 | Validate Cell Number text box with Alphabets | Enter alphabets in Cell number Text box | Relevant Error message should be displayed |
| | TC127 | Validate Cell Number text box with Special characters | Enter special characters in Cell Number text box | Relevant Error message should be displayed |
| | TC128 | Validate Cell Number text box with Numeric's | Enter numeric's in Cell Number text box | Cell Number text box should accept numeric's with specific format as |
| | TC129 | Validate Cell Number text box with 25 characters | Enter Cell Number with 25 Characters | Relevant Error message should be displayed |
| | TC130 | Validate Cell Number text box with 4 characters | Enter Cell Number with 4 Characters | Relevant Error message should be displayed |
| | TC131 | Validate Telephone number text box with Alphabets | Enter alphabets in Telephone number Text box | Relevant Error message should be displayed |
| | TC132 | Validate Telephone number text box with Special characters | Enter special characters in Telephone number text box | Relevant Error message should be displayed |

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| | TC133 | Validate Telephone number text box with Numeric's | Enter numeric's in Telephone number text box | Telephone number text box should accept numeric's with specific format as |
| | TC134 | Validate Telephone number text box with 25 characters | Enter Telephone number with 25 Characters | Relevant Error message should be displayed |
| | TC135 | Validate Telephone number text box with 4 characters | Enter Telephone number with 4 Characters | Relevant Error message should be displayed |
| | TC136 | Verify the Marital status in New application tab | Click on Marital status combo box | Marital status details should display the items in dropdown field |
| | TC137 | Verify Is any family member disable radio button | select the radio button | Is any family member disable is selected either Yes or No |
| | TC138 | Verify You have a savings account/provident fund? radio button | select the radio button | You have a savings account/provident fund? is selected either Yes or No |
| | TC139 | Verify You invest in stokvels/other? radio button | select the radio button | You invest in stokvels/other? is selected either Yes or No |
| | TC140 | Validate the Save & Continue button in New application tab | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button | All the details should be saved to the database and cursor should be move to dependent details tab |

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| | TC141 | Verify the dependent details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Dependent details tab | Dependent details form should open with Save & Continue and Cancel buttons |
| | TC142 | verify Asterisk mark (*) for the mandatory fields | Click on the Dependent details tan in New Application | All the mandatory fields should be marked with asterisk (*) to indicate the user that they are mandatory fields. |
| | TC143 | Verify Save&Continue button without enter any values | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Dependent details tab 12. Click on Save & Continue button | Should display alert messages for all the mandatory fields |

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| | TC144 | Verify Cancel button in Add application details | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Dependent details tab 12. Enter/Select all the required fields 13. Click on Cancel button | Should clear all the values and cursor should be highlighted on the Surname text box |
| | TC145 | Verify Tab order | Click on the Dependent details tab in New Application | Tab order should move as per field order |
| | TC146 | Validate Surname text box with Numeric's | Enter numeric's in Surname Text box | Relevant Error message should be displayed |
| | TC147 | Validate Surname text box with Special characters | Enter special characters in Surname text box | Relevant Error message should be displayed |
| | TC148 | Validate Surname text box with Alphabets | Enter alphabets in Surname text box | Surname text box should accept Alphabets |
| | TC149 | Validate Surname text box with 101 characters | Enter Surname with 101 Characters | Relevant Error message should be displayed |
| | TC150 | Validate Surname text box with 5 characters | Enter Surname with 5 Characters | Surname text box should accept 5 character Length |
| | TC151 | Validate Surname text box with 100 characters | Enter Surname with 100 Characters | Surname text box should accept 100 character Length |
| | TC152 | Validate First Name text box with Numeric's | Enter numeric's in First Name Text box | Relevant Error message should be displayed |

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| | TC153 | Validate First Name text box with Special characters | Enter special characters in First Name text box | Relevant Error message should be displayed |
| | TC154 | Validate First Name text box with Alphabets | Enter alphabets in First Name text box | First Name text box should accept Alphabets |
| | TC155 | Validate First Name text box with 101 characters | Enter First Name with 101 Characters | Relevant Error message should be displayed |
| | TC156 | Validate First Name text box with 5 characters | Enter First Name with 5 Characters | First Name text box should accept 5 character Length |
| | TC157 | Validate First Name text box with 100 characters | Enter First Name with 100 Characters | First Name text box should accept 100 character Length |
| | TC158 | Verify the Relationship to Applicant in Dependent details tab | Click on Relationship to Applicant combo box | Relationship to Applicant details should display the items in dropdown field |
| | TC159 | Validate ID number text box with Numeric's | Enter numeric's in ID number text box | ID number should accept numeric's in specific format as 8001015006574 |
| | TC160 | Validate ID number text box with Special characters | Enter special characters in ID number text box | Relevant Error message should be displayed |
| | TC161 | Validate ID number text box with Alphabets | Enter alphabets in ID number text box | Relevant Error message should be displayed |
| | TC162 | Validate the Save & Continue button in Dependent Details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Dependent details tab 12. Enter/select all the required fields 13. Click on Save & Continue button | All the details should be saved to the database and cursor should be move to Income details tab |

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| | TC163 | Verify the Edit link in Dependent Details tab | <ol style="list-style-type: none">1. Invoke any one of the following browsers IE 6.0/7.0/8.02. Logon to HDDS application3. Click on Transaction menu4. Click on Search receive application menu item5. Capture/select the required search criteria6. Click on Search button7. System displays a data grid with search results data8. Click on New Application link9. Enter/select all the required fields10. Click on Save & Continue button in New Application11. Click on Dependent details tab12. Enter/select all the required fields13. Click on Save & Continue button14. Click on Edit link | Edit dependent details page should open with Update & Continue and Add Dependent buttons |
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| | TC164 | Validate Update & Continue button in Dependent Details tab | <ol style="list-style-type: none">1. Invoke any one of the following browsers IE 6.0/7.0/8.02. Logon to HDDS application3. Click on Transaction menu4. Click on Search receive application menu item5. Capture/select the required search criteria6. Click on Search button7. System displays a data grid with search results data8. Click on New Application link9. Enter/select all the required fields10. Click on Save & Continue button in New Application11. Click on Dependent details tab12. Enter/select all the required fields13. Click on Save & Continue button14. Click on Edit link15. Modify the required fields16. Click on Update & Continue button | Modified details should be updated to database |
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| | TC165 | Validate Add Dependent button in Edit Dependent details | <ol style="list-style-type: none">1. Invoke any one of the following browsers IE 6.0/7.0/8.02. Logon to HDDS application3. Click on Transaction menu4. Click on Search receive application menu item5. Capture/select the required search criteria6. Click on Search button7. System displays a data grid with search results data8. Click on New Application link9. Enter/select all the required fields10. Click on Save & Continue button in New Application11. Click on Dependent details tab12. Enter/select all the required fields13. Click on Save & Continue button14. Click on Edit link15. Click on Add Dependent button | Dependent details form should open with Save & Continue and Cancel buttons |
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| | TC166 | Verify Income Details tab in New Application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Income Details Tab | Monthly Income details page should open with Save & Continue button |
| | TC167 | Verify Save&Continue button without enter any values | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Income Details Tab 12. Click on Save & Continue button | Should display alert messages for all the mandatory fields |
| | TC168 | verify Asterisk mark (*) for the mandatory fields | Click on the Income Details tab in New Application | All the mandatory fields should be marked with asterisk (*) to indicate the user that |
| | TC169 | Verify Tab order | Click on the Income Details tab in New Application | Tab order should move as per field order |

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| | TC170 | Verify the Employment status in Income Details tab | Click on Employment status combo box | Employment status details should display the items in dropdown field |
| | TC171 | Verify the Spouse Employment Status in Income details tab | Click on Spouse Employment Status combo box | Spouse Employment Status details should display the items in dropdown field |
| | TC172 | Validate Monthly Income of Applicant text box with Numeric's | Enter numeric's in Monthly Income of Applicant text box | Monthly Income of Applicant text should accept numeric's |
| | TC173 | Validate Monthly Income of Applicant text box with Special characters | Enter special characters in Monthly Income of Applicant text box | Relevant Error message should be displayed |
| | TC174 | Validate Monthly Income of Applicant text box with Alphabets | Enter alphabets in Monthly Income of Applicant text box | Relevant Error message should be displayed |
| | TC175 | Validate Pension or Disability Grant Amount of Applicant text box with Numeric's | Enter numeric's in Pension or Disability Grant Amount of Applicant text box | Pension or Disability Grant Amount of Applicant text should accept numeric's |
| | TC176 | Validate Pension or Disability Grant Amount of Applicant text box with Special characters | Enter special characters in Pension or Disability Grant Amount of Applicant text box | Relevant Error message should be displayed |
| | TC177 | Validate Pension or Disability Grant Amount of Applicant text box with Alphabets | Enter alphabets in Pension or Disability Grant Amount of Applicant text box | Relevant Error message should be displayed |
| | TC178 | Validate Other Income text box with Numeric's | Enter numeric's in Other Income text box | Other Income text should accept numeric's |
| | TC179 | Validate Other Income text box with Special characters | Enter special characters in Other Income text box | Relevant Error message should be displayed |
| | TC180 | Validate Other Income text box with Alphabets | Enter alphabets in Other Income text box | Relevant Error message should be displayed |

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| | TC181 | Validate Total Amount for Spouse text box with Numeric's | Enter numeric's in Total Amount for Spouse text box | Total Amount for Spouse text should accept numeric's |
| | TC182 | Validate Total Amount for Spouse text box with Special characters | Enter special characters in Total Amount for Spouse text box | Relevant Error message should be displayed |
| | TC183 | Validate Total Amount for Spouse text box with Alphabets | Enter alphabets in Total Amount for Spouse text box | Relevant Error message should be displayed |
| | TC184 | Verify Total Amount for Applicant in Income Details | Check the total amount of applicant | Total Amount for applicant should be equal to (Monthly Income of Applicant + |
| | TC185 | Verify Total Amount for Applicant & Spouse in Income Details | Check the total amount of applicant & Spouse | Total Amount for applicant & Spouse should be equal to (Total Amount for Spouse + Total Amount for Applicant) |
| | TC186 | Validate Save & Continue button in Income Details | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Income Details Tab 12. Enter all the required fields 13. Click on Save & Continue button | All the income details should be saved to the database and cursor should be moved to the preference details tab |

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| | TC187 | Verify Preference details tab in New Application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Preference Details Tab | Preference details page should open with Save & Continue button |
| | TC188 | verify Asterisk mark (*) for the mandatory fields | Click on the Preference details tan in New Application | All the mandatory fields should be marked with asterisk (*) to indicate the user that they are mandatory fields. |
| | TC189 | Verify Save&Continue button without enter any values | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Preference details tab 12. Click on Save & Continue button | Should display alert messages for all the mandatory fields |

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| | TC190 | Verify Tab order | Click on the Preference details tan in New Application | Tab order should move as per field order |
| | TC191 | Verify the Preference 1 in Preference Details tab | Click on Preference 1 combo box | Preference 1 details should display the items in dropdown field and should not contain preference 2 and preference 3 |
| | TC192 | Verify the Preference 2 in Preference Details tab | Click on Preference 2 combo box | Preference 2 details should display the items in dropdown field and should not contain preference 1 and preference 3 |
| | TC193 | Verify the Preference 3 in Preference Details tab | Click on Preference 3 combo box | Preference 2 details should display the items in dropdown field and should not contain preference 1 and preference 2 |
| | TC194 | Verify the Subsidy Program in Preference Details tab | Click on Subsidy Program combo box | Subsidy Program details should display the items in dropdown field |
| | TC195 | Verify the Subsidy Type in Preference Details tab | Click on Subsidy Type combo box | Subsidy Type details should display the items in dropdown field |
| | TC196 | Verify the Authority in Preference Details tab | Click on Authority combo box | Authority details should display the items in dropdown field |
| | TC197 | Verify the Township in Preference Details tab | Click on Township combo box | Township details should display the items in dropdown field |
| | TC198 | Verify the Site Number Details in Preference Details tab | Click on Site Number Details combo box | Site Number Details should display the items in dropdown field |

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| | TC199 | Validate Save & Continue button in Preference details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Preference details tab 12. Enter/select all the required fields 13. Click on Save & Continue button | Preference details should be saved to the database and cursor should be moved to the declaration details tab |
| | TC200 | Verify Declaration Details tab in New Application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Declaration details tab | Declaration details page should open with Save & Continue button |
| | TC201 | verify Asterisk mark (*) for the mandatory fields | Click on the Declaration details tab in New Application | All the mandatory fields should be marked with asterisk (*) to indicate the user that they are mandatory fields. |

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| | TC202 | Verify Upload | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Declaration details tab 12. Click on Upload button | Should display alert messages for all the mandatory fields |
| | TC203 | Verify Tab order | Click on the Declaration details tab in New Application | Tab order should move as per field order |
| | TC204 | Verify Application signed date in Declaration details | Select the date | Application signed date should be less than or equal to current date |
| | TC205 | Verify Upload the original application signed by applicant in Declaration details | Browse the file to upload the original application | Application should be upload |
| | TC206 | Verify Upload all supporting documents in Declaration Details | Browse the file to upload the supporting documents | Supporting documents should be upload |

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| | TC207 | Validate the upload button in Declaration details | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search receive application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on New Application link 9. Enter/select all the required fields 10. Click on Save & Continue button in New Application 11. Click on Declaration details tab 12. select all the required fields 13. Click on Upload button | Application should be saved to the database |
| Search Captured Application | TC208 | Verify Search Captured application menu item | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item | Search captured application page should open with Search and Cancel buttons |
| | TC209 | Validate Cancel button in Search Captured application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Enter/Select all the required fields 6. Click on Cancel button | Should clear all the values |
| | TC210 | Verify Search functionality with captured date | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Select the captured from date and Captured to date 6. Click on Search button | System should display a data grid with search results data |

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| | TC211 | Verify Search functionality with received date | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Select the received from date and received to date 6. Click on Search button | System should display a data grid with search results data |
| | TC212 | Verify the search functionality with Application ID number | Enter the Application ID number and click on Search button | System should display a data grid with search results data |
| | TC213 | Verify the search functionality with Surname | Enter the Surname and click on Search button | System should display a data grid with search results data |
| | TC214 | Verify the search functionality with Application Number | Enter the Application Number and click on Search button | System should display a data grid with search results data |
| | TC215 | Verify the search functionality with Project Name | Enter the Project name and click on Search button | System should display a data grid with search results data |
| | TC216 | Verify the search functionality with Subsidy Program | Enter the Subsidy Program and click on Search button | System should display a data grid with search results data |
| | TC217 | Verify the search functionality with Subsidy type application | Enter the Subsidy type application and click on Search button | System should display a data grid with search results data |
| | TC218 | Verify the search functionality with Application ID number and captured date | Enter the Application ID number, select captured from date and captured to date and click on Search button | System should display a data grid with search results data |
| | TC219 | Verify the search functionality with surname and received date | Enter the surname, select received from date and received to date and click on Search button | System should display a data grid with search results data |
| | TC220 | Verify the search functionality with Application number and project name | Enter the Application number, project name and click on Search button | System should display a data grid with search results data |

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| | TC221 | Validate Search functionality with Invalid Credentials | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Enter invalid search parameters 6. Click on Search button | Should display an alert message as " No Search Results Found " |
| | TC222 | Verify Top row of the List grid | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data | Last updated record should be Placed on top of the grid |
| | TC223 | Verify sorting on ID Number by Ascending | Click on the ID Number column | ID Number should be sort by ascending order |
| | TC224 | Verify sorting on ID Number by Descending | Click on the ID Number column | ID Number should be sort by descending order |
| | TC225 | Verify sorting on Application Name by Ascending | Click on the Application Name column | Application Name should be sort by ascending order |
| | TC226 | Verify sorting on Application Name by Descending | Click on the Application Name column | Application Name should be sort by descending order |
| | TC227 | Verify sorting on Received date by Ascending | Click on the Received date column | Received date should be sort by ascending order |
| | TC228 | Verify sorting on Received date by Descending | Click on the Received date column | Received date should be sort by descending order |
| | TC229 | Verify sorting on Captured date by Ascending | Click on the Captured date column | Captured date should be sort by ascending order |
| | TC230 | Verify sorting on Captured date by Descending | Click on the Captured date column | Captured date should be sort by descending order |

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| | TC231 | Verify sorting on Application Number by Ascending | Click on the Application Number column | Application Number should be sort by ascending order |
| | TC232 | Verify sorting on Application Number by Descending | Click on the Application Number column | Application Number should be sort by descending order |
| | TC233 | Verify sorting on preferred subsidy program by Ascending | Click on the preferred subsidy program column | preferred subsidy program should be sort by ascending order |
| | TC234 | Verify sorting on preferred subsidy program by Descending | Click on the preferred subsidy program column | preferred subsidy program should be sort by descending order |
| | TC235 | Verify sorting on Subsidy Type by Ascending | Click on the Subsidy Type column | Subsidy Type should be sort by ascending order |
| | TC236 | Verify sorting on Subsidy Type by Descending | Click on the Subsidy Type column | Subsidy Type should be sort by descending order |
| | TC237 | Verify sorting on Project name by Ascending | Click on the Project name column | Project name should be sort by ascending order |
| | TC238 | Verify sorting on Project name by Descending | Click on the Project name column | Project name should be sort by descending order |
| | TC239 | Verify sorting on Last updated by Ascending | Click on the Last updated by column | Last updated by should be sort by ascending order |
| | TC240 | Verify sorting on Last updated by Descending | Click on the Last updated by column | Last updated by should be sort by descending order |
| | TC241 | Validate No of Records control | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data | Records per page in the grid should be controlled by value selected in no of records dropdown |

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| | TC242 | Validate pagination for the List grid | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data | <ol style="list-style-type: none"> 1. Should move to corresponding page in the grid by clicking the page navigation links 2. Sort order should not be disturbed while page navigation |
| | TC243 | verify the History link in Search Captured application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on History link | <p>Application history page should open with the following tabs</p> <ol style="list-style-type: none"> I. New Application II. Dependent Details III. Income details IV. Preference V. Declaration VI. Receive Application |
| Edit Captured Application | TC244 | Verify the Edit link in Search captured application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit link | Edit Application page should open |

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| | TC245 | Validate the Update & Continue button in New Application tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit link 9. Modify the details in New application tab 10. Click on Update & Continue | Modified details should be updated to database |
| | TC246 | Validate the Update & Continue button in Dependent details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit link 9. Click on Dependent details tab 10. Modify the details 11. Click on Update & Continue | Modified details should be updated to database |

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| | TC247 | Validate the Update & Continue button in Income details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit link 9. Click on Income details tab 10. Modify the details 11. Click on Update & Continue | Modified details should be updated to database |
| | TC248 | Validate the Update & Continue button in Preference details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit link 9. Click on preference details tab 10. Modify the details 11. Click on Update & Continue | Modified details should be updated to database |

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| | TC249 | Validate the Upload button in Preference details tab | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Edit link 9. Click on Declaration tab 10. Modify the details 11. Click on Upload button | Modified details should be updated to database |
| | TC250 | Validate the Export to Excel button in Search Captured application | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Search captured application menu item 5. Capture/select the required search criteria 6. Click on Search button 7. System displays a data grid with search results data 8. Click on Export to Excel button | All the search results data should be export to Excel |
| Subsidy Status Change | TC251 | Verify Subsidy status change menu item | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Subsidy status change menu item | Search subsidy status change details page should open with search and cancel buttons |

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| | TC252 | Verify subsidy status change link in Search subsidy change details | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Subsidy status change menu item 5. Enter/select the required fields to search 7. Click on Search button 8. System displays a data grid with search results data 9. Click on Subsidy status change link | Edit Preference details page should open with Update and cancel buttons |
| | TC253 | Validate Cancel button in Edit Preference details | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Subsidy status change menu item 5. Enter/select the required fields to search 7. Click on Search button 8. System displays a data grid with search results data 9. Click on Subsidy status change link 10. Modify subsidy status change 11. Click on Cancel button | Should be redirected to Search subsidy status change details page |
| | TC254 | Validate Update button in Edit Preference details | <ol style="list-style-type: none"> 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Subsidy status change menu item 5. Enter/select the required fields to search 7. Click on Search button 8. System displays a data grid with search results data 9. Click on Subsidy status change link 10. Modify subsidy status change 11. Click on Update button | Modified subsidy status change details should be updated to the database |

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| Add Project Details | TC255 | Verify Add project details menu | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Add Project details menu item | Edit Preference details page should open with Update and cancel buttons |
| | TC256 | Verify Project text in Edit Preference details | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Add Project details menu item 5. Enter the Project Name | Project name should accept alphabets, Numeric's and Special Characters |
| | TC257 | Verify Update button in Edit preference details | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Transaction menu 4. Click on Add Project details menu item 5. Enter the Project Name 6. Click on Update button | Project details should be updated to the database |
| Logout | TC258 | Validate Logout button | 1. Invoke any one of the following browsers IE 6.0/7.0/8.0 2. Logon to HDDS application 3. Click on Logout menu item | Application should be logged out from current session and redirects to the Login page |