

SOFTWARE DEVELOPMENT FRAMEWORK FOR ELECTRONIC LAND TITLES RECORDS ADMINISTRATION SYSTEM

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ABSTRACT

Record keeping is a fundamental activity of public administration. Land Titles management in Nigeria, by virtue of the Land use act 1990, is one of the functions of government. Most of the records hitherto used in managing the records of lands are documented on paper. We carried out an investigation into the suitability of the present method of documenting these records, with a view to aligning it with the evolving E-Government policy. The problems with the existing system were analyzed, and were discovered to fall below the requirements of E-Government. We hereby introduce a software development framework for electronically administering the records of Land Titles. The model is computer dependent, and the graphical presentations in the designs will simplify the job of software developers in the process of systems conversion from the existing cumbersome, disorganized and centralized record keeping system to a more reliable and decentralized information system, meant to improve reporting to stakeholders in Land Titles records administration.

KEYWORDS: E-Government, Land-Titles, Record-keeping, Electronic- Framework

1.0 INTRODUCTION

The subject of land evokes strong feelings whenever it is mentioned. The reasons for this are not far fetched. Firstly, the supply of land is virtually fixed; yet it is required to provide security (either productive, investment or both) in such forms as food, shelter as well as a base for the rapid transformation of the economy. Secondly, land is the focus of much wealth, power and status. Indeed, the current concern in the use of land as a vehicle for investment gain as well as a hedge against inflation under conditions of economic turbulence, points to the centrality of land in present day Nigeria, and more importantly how it is managed (Mamman, 2006).

The Lands Use Act Cap 202 Vol. 11 Laws of the Federation, 1990, regulate Land ownership in Nigeria. The laws vest ownership of all land within a state (except those vested in the Federal Government or its agent) in the Governor of the state who holds land in trust for the people and allocates same as far as the urban area is concerned, to individuals and corporate entities for residential, commercial, agricultural and other purposes allowed by law. Land located in rural areas is under the control of local government authorities, and also includes community lands (Ezejiolor, 1998).

Governments can no longer justify taking action with little or no reference to past performance or future goals. Nor can they justify parallel or duplicate services when they can combine services and reduce costs. Client services, quality performance of tasks, and measurable outcomes are increasingly important responsibilities, and these aspirations all depend on accessible and usable records (Commonwealth, 2003).

For the purpose of this paper, we define a record as a piece of historical information, which supports the

management of land within the jurisdiction of federal, state or a local government. Without records there can be no rule of law and no accountability. We further define Record- keeping as a system used for creating, storing and otherwise managing records. It is a fundamental activity of public administration. Public servants must have information to carry out their work, and records represent a particular and crucial source of information. Records provides a reliable, legally verifiable source of evidence of decisions and actions. They document compliance or non-compliance with laws, rules and procedures. People take better care of land, and are more productive when they know they can prove their title or claim to the land and can buy, sell or lease land with assurance that their rights to do so will be respected (Kalantari et al., 2005). All such rights, claims, titles, etc are managed through records. Consequently, good record keeping is essential for good and transparent management that in turn leads to security, better land management, and better economic development.

The Department of lands in the various states of Nigeria, by virtue of the land use act, are saddled with the responsibility to keep records of land allocation they make. Each Department devises its own record system, which it understood. Most of the records hitherto used in managing the records of lands are documented on paper. Recently, however, it was noted with concern by higher authorities that, although there are records in the Departmental offices, they do not in any way help the government. This is because they cannot be easily referred to (Adoki, 2006).

The main problem is that records are always fragmented, so that when one traces the history of a single plot, one may have to go through more than ten (10) sets of records. The tendency is for officers to be reluctant to refer to such records, and as a result, some

cases, which have been dealt with are replicated over time. Most people have come to realize this handicap and take advantage of it. For example, if a person appealed and lost a case, he waits for three to five years and resubmits the appeal, well knowing that the Department of lands will not be in a position to know of its former decision. This happens frequently when there is change of office by members of staff of the Department. Sometimes the appeals are ruled otherwise and this is an embarrassment for government if later on they find that they have changed their first decision. (Kersey, 2005).

With the heavy workloads and the records that are kept, the Departments of lands find it difficult or impossible to check on allocations they have already made. As a result, people can themselves extend or change plots without the government finding out. Sometimes government rejects the suggestion that they ever allocated such plots until a certificate issued by them is produced. Again, this can cause people to doubt that government knows of their own allocations. In the case of appeals, if government hands down decisions, people may choose not to heed such decisions, and unless the rights of other people are infringed upon, the Department of land never gets to know whether their decisions have been implemented or not.

Furthermore, the information systems currently in place are structured to support centralized record keeping. As yet, little thought has been given to the complicated task of decentralizing centrally held but disorganized government records, while taking into account the information needs of the federal, states, and local governments. The advantages of decentralization cannot be over emphasized.

The lapses enumerated in the preceding paragraphs justify the initiatives in this paper for an alternative method of administering Land Titles records. Our framework is the outcome of practical observations and experiences of events encountered through the different stages of acquiring and retaining lands in Nigeria. The model is computer dependent, and the graphical presentations in the designs will simplify the job of software developers in the process of systems conversion from the existing cumbersome, disorganized, and centralized record keeping system to a computerized form. Successful implementation of the strategies in the overall framework will ensure timely, secure, and effective operations on Land Titles information.

As part of the E-Government initiative, computers and electronics systems are being applied to all aspects of public services, including health, education, pensions, land, and judicial rights to bring about well-kept and well-managed records (Stuedler, 2004). The effectiveness and efficiency of the public service across the range of the government functions depend upon the availability of, and access to information held in records. This paper presents a contribution towards achieving this goal.

2.0 Analysis of the Existing System

The Department of lands is usually a part of the Ministry of Lands and Housing, and is saddled with the

responsibility to keep records of land ownerships in its areas of jurisdiction. A purchaser of land is expected to take steps to obtain the Governor's consent to a land's transaction. This is done after the exchange of the payment for the purchase price with the executed Deed of Assignment and other relevant documents. To initiate this, an application is made on the prescribed form to the Governor's office. It is pertinent to note that the procedures vary slightly in different states of Nigeria. However, our presentation is an abridgement of the components, which occurred mostly in the course of our research process. Through personal contacts with staff, we conducted interviews and reviewed existing documents. We hereby present our findings under two broad headings:

- (i) The basic operations of the existing system, and
- (ii) The major problems to be resolved by computerization

2.1 The Basic Operations of the Existing System include:

- (a) Registration and processing of applications:
This involves the following activities:

- 1 Receive applications from prospective owners,
- 2 Check the application for the necessary documents to be attached, which may include:
 - i. A covering letter forwarding the documents,
 - ii. Copies of the Deed of Assignment
 - iii. Survey Plan,
 - iv. Tax clearance certificate of applicant,
 - v. Passport Photograph of the Applicant,
 - vi. Approved Building plan (if property is developed),
 - vii. Receipt for the payment of tenement rate (where land is developed) or affidavit in lieu,
 - viii. Initial deposit on consent fee (final payment determinable upon independent valuation of property by the Governor's office).
- 3 Query the application (if a necessary component is missing) or forward it to the Governor for consent
- 4 Register the application with a registration number

After the endorsement of the Governor's consent, stamp duty is paid on the document and the same registered at the lands registry. Let us reiterate that the requirements differ from state to state and are subject to review from time to time.

- (b) Registration and arbitration of petitions and complains

This involves the following activities:

1. Receive petitions from aggrieved persons on any of:
 - i. Land in dispute,
 - ii. Trespass,
 - iii. Illegal development
 2. Determine Governments involvement, and advice accordingly as follows;
 - i. Advise petitioner to go court, if it is a community land,
 - ii. Intercede in cases involving Government lands.
 3. Document the subject of the case and action(s) taken there-from as in:
 - i. Referred to court,
 - ii. Resolved amicably,
 - iii. Not resolved
- records in central stores. There is also the problem of inadequate controls leading to:
- a. Lack of data integrity
 - b. Data inconsistency
 - c. Data insecurity,
 - d. Data redundancy'
 - e. Duplications, and
 - f. Obsolescence

2.3 Problems identified with the existing system are summarized below:

Poorly stored, poorly categorized and poorly filed records, which make them difficult to access. Lack of metadata (i.e. lack of summary information indicating what the record contains), and this hampers navigation and effective use of records. Revisions are poorly tracked. Further problems relate to centralization of the

3.0 Development of the Electronic Framework

This section presents the graphical systems depicting the structures required in the computerization of the processes listed in section 2. The systems are based on the surveys on the current system and projections of the system in view. The framework transcends the traditional (centralized) filing systems into showing how data can be transmitted between various offices. The Database Architectures presents the details of the requirements in the development of the electronic system.

3.1 Database Architecture

We adopt a three-schema architecture design approach because of the advantage of data independence associated with it. Figure 1 shows the three levels of the schema: External, Conceptual, and Internal levels. These shall form the background for the designs.

Figure 1: The levels of Three-schema Database Architecture

The external level is the user level. Each group of users can have a separate view of the database tailored to the group's specific needs. It describes the structure of the interfaces, which enables the users to perceive correctly, the aspect of the database they require.

The conceptual and the internal levels represent the entire database. The conceptual level describes the structure of data. It also describes the relationship among the various components of the database, thereby representing the logical meaning of the database. The internal level defines files and collections of data on a storage device. It represents the storage view of the database. The following subsections represent the

design of the structures corresponding to the descriptions herein.

3.1.1 Design of the Systems Interface

The interface will consist of the functions that will be constructed and the implementation process of system's data diagram. It can be used to determine the appearance frequency of smaller processes in the data flow chart. These features are well represented using a Functional Diagram (FD), as shown in figure 2, which provides important details about the hierarchies of data components. It is a typical representation of the interface for the projected system, and provides a good background for the main menu of the program.

Figure 2: Function Hierarchy Diagram of the system in view

In the diagram, each function is divided into many smaller functions and each smaller function contains many even smaller ones until the lowest level is reached. From the diagram it could be seen that the system is made up of five functions, namely: Applications Management, Petitions Management, Documents Looking up, Governor's Consent, and Systems Reports.

3.1.2 Structure of Data Flow

At the conceptual level, we devise a method of establishing relationships among the functions or

processes of the system with the information they use. Data Flow Diagram (DFD) is one of the most important tools in a structured system design project as this. It considers the information necessary for the implementation of functions discussed in figure 2, and the one necessary for the improvement of those functions. Here, we develop a DFD corresponding to the high level functions in the function hierarchy diagram shown earlier. This is presented in figure 3, which seeks to answer the following questions about the system:

Figure 3: Data Flow Diagram depicting data movement through the component of the system

- What functions should the system perform?
- Are there sufficient interactions between functions
- What inputs are transferred to what outputs?
- What type of work does the system do?
- Where does the system get information from to work?
- And where does it give work results to?

In the diagram, *processes* are represented with circles. A process shows a part of the system that transforms inputs into outputs; that is, it shows how one or more inputs are changed into outputs. The name of a process describes what the process does.

Flows are presented in the diagram by arrows into or out of a process. They describe the movement of information from one part of the system to another. Thus, they represent data in motion, whereas the *stores* represent data at rest. Two parallel lines represent stores graphically in the diagram. They are used to model a collection of data packets at rest.

External factors are important components crucial to the survival of the system. This is because they are sources of information for the system and are where the system products are transferred to. They are represented by rectangles, one shorter edge of which is omitted while the other is drawn by a duplicated line. External factors can be a person, a group of persons or an organization that are not under the studying field of the system (they

can stay in or out of the organization), but have certain contact with the system.

Here, the applicants and the petitioners are the external factors. The presence of these factors on the diagram shows the limit of the system and identifies the system relationship to the outside world.

The Data flow diagram provides the following facilities:

1. Analysis: it provides facility to determine the requirement of users,
2. Design: it maps out a plan and illustrates solutions for analysis and designing of the system'
3. Communication: it is simplified for the understanding of systems developers,
4. Documents: it provides an overview of key functional components of the system.

3.1.3 Database Entities

At this point, we develop the tables constituting the database, and describe their relationships with one another. The tables are formulated based on deductions from figures 2 and 3 as follows:

1. The system manages two main kinds of documents: Application and Petitions
2. Each Application has a distinct number (for example CR/2007/9550). All information about Applications will be stored in Applications table, which includes a list of attributes as shown in Table 1.

Table 1: Application Entity

APPLICATIONS		
List of attributes	Type of attributes	Comment
APPL_NO	Character	Number of the Application (must have)
APPL_NAME	Character	Name of the Applicant (must have)
DATE_OF_APPL	Character	Date of Application (must have)
AMOUNT_PAID	Number	Amount paid for the Consent (must have)
RECIEPT_NUMB	Number	Receipt Number for payment (must have)
SURV_PLAN_NO	Character	Number on the Survey Plan (must have)
TITLE_TO_LAND	Character	Is it Sold or Leased (must have)
LESSOR	Character	Seller (must have)
LESSOR_PIC	Picture	Passport Photograph of Seller (must have)
LESSEE	Character	Buyer (must have)
LESSEE_PIC	Picture	Passport Photograph of Buyer (must have)
WITNESS 1	Character	Witness to the transaction (must have)
WITNESS 2	Character	Witness to the transaction (must have)
WITNESS 3	Character	Witness to the transaction (must have)
WITNESS 4	Character	Witness to the transaction (must have)
WITNESS 5	Character	Witness to the transaction (must have)
WITNESS 6	Character	Witness to the transaction (must have)
GOV_CONSENT	Character	Status of Governor's Approval (must have)

3. Each Application must have attached a survey plan, which has a distinct number.

Because a survey plan contains further details, the information on it is stored in a separate table from Applications. However, the Survey Plan Number and the

Applications Number provide the corss link between the tables as they are present in both of them. All information about the Survey Plan is stored in Survey Plan table, which includes a list of attributes as shown in Table 2.

Table 2: Survey Plan Entity

SURVEY PLAN		
List of attributes	Type of attributes	Comment
SURV_PLAN_NO	Character	Number on the Survey Plan (must have)
APPL_NO	Character	Number of the Application (must have)
AREA	Number	Total space bounded by the Land (must have)
ORIENTATION	Character	Orientation of the measurement (must have)
LOCATION	Character	Address of the Land (must have)
APPR_OFFICER	Character	Name of the Approving Officer (must have)
BEACON_STONE #1	Character	Beacon Stone Number 1 (must have)
BEACON_STONE #2	Character	Beacon Stone Number 2 (must have)
BEACON_STONE #3	Character	Beacon Stone Number 3 (must have)
BEACON_STONE #4	Character	Beacon Stone Number 4 (must have)
BEACON_STONE #5	Character	Beacon Stone Number 5 (must have)
BEACON_STONE #6	Character	Beacon Stone Number 6 (must have)
BEACON_STONE #7	Character	Beacon Stone Number 7 (must have)
BEACON_STONE #8	Character	Beacon Stone Number 8 (must have)

4. Petition are investigated for their relationship with Applications. Consequently, they are allocated distinct numbers, which uniquely identify them for consideration. However, it is also possible that a petition

may not have a relationship with an existing Application. In that case, the APPL_NO column is left blank. All information about Petitions is stored in Petitions table, which includes a list of attributes as shown in Table 3.

Table 3: Petitions Entity

PETITIONS		
List of attributes	Types of attributes	Comment
PET_NO	Character	Number of the Petition (must have)
PET_NAME	Character	Name of the Petitioner (must have)
DATE_OF_PET	Character	Date of Submission of Petition (must have)
APPL_NO	Character	Application Number referred to (may have)
SURV_PLAN_NO	Character	Survey Plan Number referred to (may have)
SUBJECT	Character	Subject matter of the Petition (must have)
ACTIONS_TAKEN	Character	Status of Resolution (must have)

5. In each of the tables, there are three column: List of attributes, Types of attributes, and Comment. List of attributes specifies the names of the attributes that make up the entity. Types of attributes column specifies the various types of fields that the attributes listed in the (list of attributes) column will assume. Lastly, the Comment column describes the characteristics of an attribute. *Must-have* indicates non optional, while *may-have* indicates otherwise.

4.0 Decentralizing the Information Points

Figure 4 is a conceptualization of the physical

structure of the interconnection of the computer equipment in the offices that have stakes in Land Titles management, as visualized from figure 3. the Data Processing centre is designated at the office of the Head of Department, Lands. He supervises the Database Administrator, who oversees the Server with the Database as well as the operation staff. The operational staff ensures the electronic recording, storage, and reproduction of the information on the Database for the clients. The Commissioner for Lands and that of Justice print reports for performing their official functions as it concern Land Titles administration.

Figure 4: Conceptualization of the interconnection of computer equipment in the offices of the stakeholders

5.0 DISCUSSION

Application and Petitioners can look up the status of their documents through the process called “Look Up Document”. The document number provides a good avenue, as a finding field for doing this. Facilities for editing records are not available for this level of operation.

The Database Administrator maintains the database. He uses backup facilities to ensure that the database is regularly backed up as a preventive maintenance strategy. He monitors the activities of operators on the database, by maintaining a log file, which keeps a record of consultations to it. He issues passwords to prospective users and authorizes different levels of permissions to different categories of users. He can then use this log file facility to determine who used the system, time to consulting the database, and major operation on the database.

Management, which includes such offices as the governor’s office, the commissioner for Lands, Commissioner for Justice, and the Head (Department of Lands) requires information from the database. To facilitate this, and to support decentralization, these offices are connected to the database maintained by the administrator, as seen in figure 4. The computers are linked in a network, which makes information available without physically moving to a central store.

At the end of each month, or each year, or whenever the need arises, the database administrator has to report the document situation into the database, such as the Applications, the Approvals, the Petitions, and the resolutions of the Petitions to the heads of departments concerned, the Commissioner, and to the Governor.

6.0 CONCLUSION

E-Government is concerned with making information available promptly to those who need it. Every stakeholder in government activities needs to trust that the records being used by site owners, contractors and agents and regulators are accurate and up-to-date, and that record-keeping systems are robust. They require ready access to accurate records on the status of land to inform strategies for land management. But for the coding stage, this paper has completed the analysis and design of the structures necessary for developing a computerized system for administering the records of Land Titles. We have therefore, provided a framework that will motivate programmes with the necessary impetus to develop robust systems that will alleviate the problems discussed herein.

Decentralization of information retrieval is one of the major features being promoted by this paper, as this reduces the incidence of physical movements aimed at obtaining operational data.

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