

# **FINAL REPORT ON THE DESIGN OF AN ELECTRONIC DISPUTE DATABASE FOR RWANDA NATURAL RESOURCES AUTHORITY (RNRA)**

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## Table of Contents

EXECUTIVE SUMMARY.....	3
INTRODUCTION.....	4
DESCRIPTION OF THE PROBLEM.....	4
THE SOLUTION.....	4
DATABASE DESIGN.....	4
STORAGE OF PERSON RECORDS.....	5
DISPUTE TYPE LOOKUP.....	5
USER INTERFACE DESIGN.....	6
DATA ENTRY.....	6
DISPUTE DISTRIBUTION BY PROVINCE.....	7
.....	7
DISPUTE DISTRIBUTION BY DISTRICT.....	7
DISTRIBUTION BY DISPUTE TYPE.....	9
DATA CHECKING.....	10
DATA MIGRATION.....	10
CHALLENGES.....	10
FACING THE CHALLENGES.....	11
NOTES.....	11
MIGRATION APPROVAL.....	12
MAINTENANCE.....	12
LAIS 1.....	12
LAIS 2.....	12
REPORT GENERATION.....	13
KNOWLEDGE TRANSFER.....	13
RECOMMENDATIONS.....	14

## **EXECUTIVE SUMMARY**

The Government of Rwanda maintains most land related information in an information system – referred to as the Land Administration Information System (LAIS). Most of this information was collected during the Land Tenure Regularization (LTR) period. Information on disputes was left in the dispute registers and not transferred to the electronic system. The current implementation of LAIS does not provide much detail on a dispute – just a simple note attached to a Caveat to indicate that the parcel is under dispute. Details of the dispute are usually included in the supporting documents for the caveat transactions. These are scanned and attached to the parcel record in the system. Keeping the details of a dispute in scanned attachments is a good idea but it creates a problem: one cannot do a general search for a given kind of disputes on the database because this information is stored as a scanned image. Also the system does not allow for a classification of disputes which would later be used in specific searches or analysis of dispute records.

The main objective of this work is to get an electronic version of all these dispute records and integrate them into LAIS, thus making it easy for all stakeholders to see this information whenever they need to.

The database has been developed, all data available in the dispute registers has been entered into this database. During this process, all disputes were carefully classified. The complete database has been migrated to LAIS and will co—exist together with the main LAIS, thereby offering more detailed reference information on a dispute on a given parcel. The new LAIS which, in a few months, will replace the existing system, has been modified to include more detailed and useful dispute handling functionality that will make it possible to do better reporting.

## **INTRODUCTION**

All disputes that existed before the Land Tenure Regularization exercise started in Rwanda, were recorded in Dispute Registers. The information in each of these registers typically included the name of the disputant, relationship (if any) to the current holder of the parcel, id card no, sex and text describing the nature of the dispute. During the time of recording this data into the LTRSS (Land Tenure Regularization Support System), only a checkbox was provided to indicate whether a parcel was under dispute or not. The rest of the information was left in the registers.

## **DESCRIPTION OF THE PROBLEM**

The Registrars, and all LAIS users occasionally need more information about a parcel. This happens for parcels that do not have any history of transactions. These are referred to as First Registration. For such parcels, the registrars must confirm that the parcel does not have a dispute. This means that the dispute registers have to be fetched from the archives and manually checked to find the dispute records. Another problem is that when a dispute was resolved, no effort was made to indicate this change on the dispute registers – thereby rendering these books less accurate over time in addition to wasting a lot of time finding the registers in the archives. The problem was compounded by the fact that the archives are only available at the zonal office, yet the Land Information system is gradually becoming available at the district offices. This means that a trip has to be made to the zonal office from the district office to search for the registers in the archives. This increases the time it takes to process a transaction – which RNRA is keep to keep to a minimum.

## **THE SOLUTION**

The obvious solution was to move the dispute records out of the registers and put them on a database that can be queried in all sorts of interesting ways. The direct benefit of this would be to provide a much quicker response to land holders since information would be available at the click of a button.

## **DATABASE DESIGN**

The database has been adjusted to accommodate more details related to disputes. The

adjustments are such that the existing system can continue to function without disruption, but where more information on disputes exists, the information can be displayed and updated where appropriate.

## **STORAGE OF PERSON RECORDS**

In order not to introduce errors in recording person names and ids, all person names and ids are stored directly in the dispute tables. The database tables, as a result remain a true reflection of what's on the register – whether it is correct or wrong. Of course in the process of recording the resolution of the dispute, a correction can be made on the main LAIS database person database in a proper transaction – which, in this case, is the lifting of a caveat.

## **DISPUTE TYPE LOOKUP**

A list of dispute types is provided on the database as a lookup table. It simply holds the type of dispute in English, and the associated translation in Kinyarwanda. Below is the complete list of all the dispute types that were provided by RNRA. Please note that only the English description is being shown here. This coding will continue to be used in the registration of new disputes during maintenance of the records in LAIS2.

There were a number of disputes that could not be correctly classified and those were assigned the type “Others”.

### **DISPUTE TYPE**

Physical boundary conflict

Succession conflict

Wrongful claimant; caretakers/squatters registering false claims

Wrongful claimant; recording government claims on individual land

Wrongful claimant; recording individual claims on state land

Wrongful claimant; recording government claims on wrong government claimants (inter-ministerial)

Wrongful claimant; recording government claims against land belonging to public institutions.

Wrongful claimant; recording public institutions claims against state land.

Wrongful claimant; guardians wrongfully claiming land belonging to minors under their responsibility

Dispute registered by one of a married couple against the other

Dispute accruing from land sharing policy implementation

Dispute on expropriation in the public interest

Wrongful claimant; Recording individual claim on group ownership (cooperative, condominium)

Dispute recorded on behalf of children born out of wedlock

Others

It will be possible for this lookup table to grow when new types of disputes are discovered and agreed to by RNRA.

## **USER INTERFACE DESIGN**

The user Interface was designed using the same technology components that were used in designing the main LAIS.

A simple data entry screen was created using the Google Web Toolkit (GWT) backed by GXT, which is a UI library on top of GWT.

An effort was made to make the look and feel similar to what data entry clerks were already used to – which reduced the learning curve since we had limited time to train users.

The same principles were employed in modifying the Caveat functionality in LAIS2 to integrate the Dispute functionality. The outcome was a more or less natural change to the system that is intuitive to the user.

Business rules were added to prevent users from recording a new caveat without entering the dispute details that are relevant to the transaction.

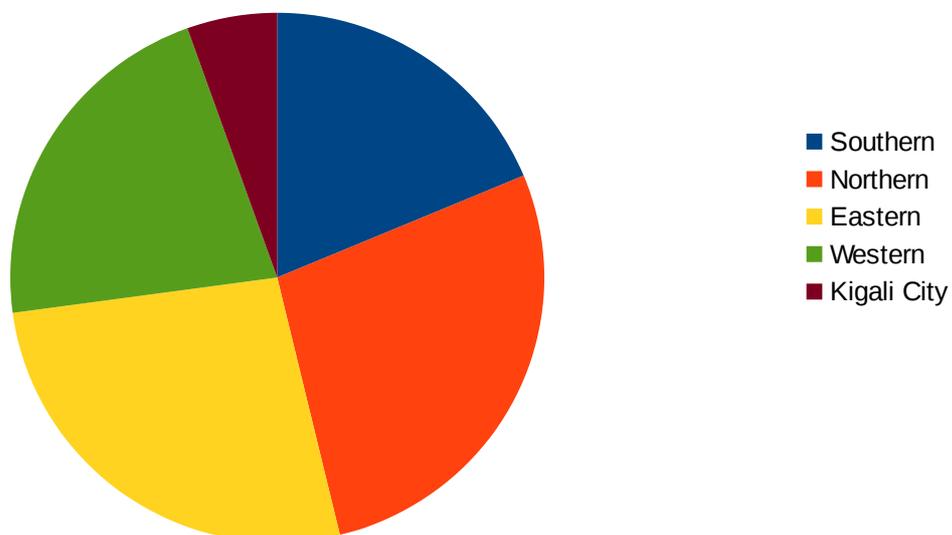
## **DATA ENTRY**

Records from the dispute register were entered into the database in a 3 week period. The registers were collected from all the regions and brought to Kigali for this process. The process of entering these records was a bit slow because for each record, a data entry clerk had to read and understand the text describing the dispute and then decide on the dispute type to attribute to the description. This was required in order to reduce the number of mistakes in mis categorizing disputes.

Some records were unclear and in some cases, id card numbers of the disputants were not in the register. The system permitted disputants to be recorded without any form of identification in order to have a more or less complete record from the register.

## DISPUTE DISTRIBUTION BY PROVINCE

### TOTAL



PROVINCE	TOTAL
Southern	3034
Northern	4461
Eastern	4317
Western	3512
Kigali City	886
<b>GRAND TOTAL</b>	<b>16,210</b>

## DISPUTE DISTRIBUTION BY DISTRICT

PROVINCE	DISTRICT	TOTAL
Eastern	RWAMAGANA	1185
Northern	MUSANZE	2724
Eastern	BUGESERA	728

Western	NGORORERO	586
Eastern	NGOMA	684
Southern	GISAGARA	119
Southern	NYARUGURU	410
Northern	RULINDO	355
Southern	MUHANGA	108
Northern	GICUMBI	447
Western	RUSIZI	435
Western	RUTSIRO	267
Eastern	KIREHE	515
Southern	HUYE	510
Southern	KAMONYI	371
Northern	GAKENKE	540
Southern	NYAMAGABE	1056
Kigali City	KICUKIRO	138
Western	NYABIHU	819
Kigali City	NYARUGENGE	275
Southern	NYANZA	340
Eastern	NYAGATARE	331
Western	KARONGI	649
Western	NYAMASHEKE	474
Eastern	GATSIBO	611
Kigali City	GASABO	473
Southern	RUHANGO	120
Western	RUBAVU	282
Northern	BURERA	395
Eastern	KAYONZA	263
	<b>GRAND TOTAL</b>	<b>16,210</b>

## DISTRIBUTION BY DISPUTE TYPE

DISPUTE TYPE	Eastern	Kigali City	Northern	Southern	Western	Total Result
Dispute accruing from land sharing policy implementation	241	53	1,099	59	124	<b>1,576</b>
Dispute on expropriation in the public interest	108	6	2	16	17	<b>149</b>
Dispute recorded on behalf of children born out of wedlock	53	9	24	5	46	<b>137</b>
Dispute registered by one of a married couple against the other	158	50	109	58	103	<b>478</b>
Others	474	191	224	262	329	<b>1,480</b>
Physical boundary conflict	108	16	31	39	21	<b>215</b>
Succession conflict	592	90	663	504	833	<b>2,682</b>
Wrongful claimant; caretakers/squatters registering false claims	2,308	447	2,208	1,927	1,922	<b>8,812</b>
Wrongful claimant; guardians wrongfully claiming land belonging to minors under their responsibility	48	7	26	12	29	<b>122</b>
Wrongful claimant; recording government claims on individual land	43	5	11	2	18	<b>79</b>
Wrongful claimant; Recording individual claim on group ownership (cooperative, condominium)	108	12	39	102	36	<b>297</b>
Wrongful claimant; recording individual claims on state land	78	1	37	51	41	<b>208</b>
Wrongful claimant; recording public institutions claims against state land.	5					<b>5</b>
<b>Total Result</b>	<b>4,324</b>	<b>887</b>	<b>4,473</b>	<b>3,037</b>	<b>3,519</b>	<b>16,240</b>

## **DATA CHECKING**

Data was checked by data entry clerks for errors and random spot checks were done by the supervisors by picking a register and checking the database for the entry.

## **DATA MIGRATION**

On completing the data entry process, a backup of the entire database was done and a copy of the database was used to migrate the data onto the LAIS1. The data is available only for viewing and can only be used to respond to queries on a parcel. In LAIS2, the compute dispute function is available to be used to view old disputes, register new disputes and track the resolution of any disputes.

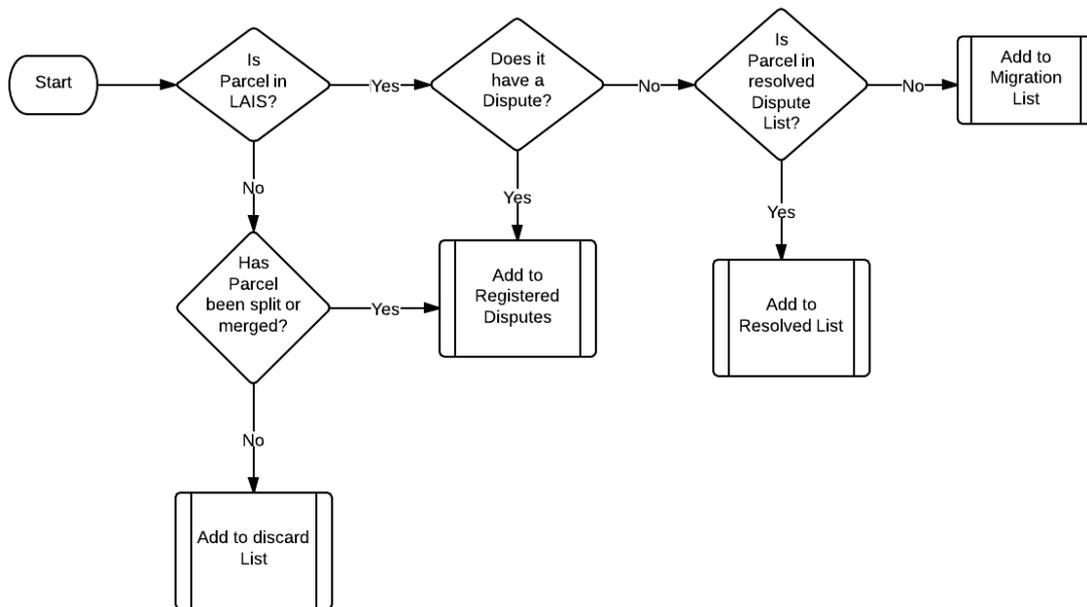
## **CHALLENGES**

In any data migration process, care must be taken to not compromise existing data – and this exercise is no exception.

1. After the LTR program, data was migrated from the LTRSS (Systematic Registration System) to LAIS (Maintenance/ Sporadic Registration System). As part of this process, textual information on parcels had to be compared to the spatial information in order to figure out which data should finally be made available for the final register. After this evaluation, quite a lot of parcels did not make it to the maintenance system since they did not have an equivalent record in the spatial database. In light of this, there is quite a number of parcels on the register that were invalidated by this process, the dispute registers were no exception. This, therefore, means that, there are some parcels on the dispute register that are not valid parcels because they do not exist on the spatial database in the GIS department.
2. The maintenance system (LAIS) has been in use for over two years now. In this time, a number of disputes have been resolved and transactions allowed on these parcels. Unfortunately there is no clear digital framework to track the resolution process in order to know which disputes have been resolved. It therefore means that a number of disputes in the dispute registers have been resolved and can no longer be called disputes.
3. Related to challenge 2 above, if a dispute was resolved and a mutation was performed on a parcel, the link between the parcel number in the dispute register and the current parcel number on the current system would have been severed. Even though, in some cases it would be possible to trace the record through the old UPIs of split or merged parcels, it is difficult and time consuming in many cases

because sometimes the old UPI's are not kept in the history.

## FACING THE CHALLENGES



The diagram below illustrates the process used to migrate dispute data into the main database.

## NOTES

1. The discard list contains those disputes connected to parcels that no longer exist on LAIS. Note that this search is exhaustive since it also searches through the history for parcels that may have been split or merged.
2. Registered Dispute list has all those parcels that are currently registered as disputes. Note that when a parcel is not currently registered as a dispute but still shows in mutation history (splits or merges), it is added to this list. The assumption is that due diligence was done to resolve the dispute first before allowing the mutation transaction.
3. Resolved List contains those parcels that had a dispute but through the sporadic process at RNRA, those disputes were resolved.

4. The migration list contains those parcels from the register that must still be registered as disputes on LAIS because no history of resolution of those disputes exists.

## **MIGRATION APPROVAL**

These operations were done on a separate database, mirroring the production database and along side it. It is currently being used internally for all transaction checks in LAIS1. RNRA is still compiling an exhaustive resolved dispute list. Once this is done, the balance of the records will immediately be used to create new caveats based on records from the dispute register.

## **MAINTENANCE**

### **LAIS 1**

LAIS 1 is the production system currently in use. The dispute records are available in separate tables on the same database for reference.

Processing a transaction that requires checking the dispute register is now quicker. This is because a LAIS user can now quickly check the dispute database to confirm that a parcel does or does not have a dispute. This is the only function that is currently available in this system.

### **LAIS 2**

This is the system under final testing before going to production. The user interface changes have been done in this system that allows more information to be recorded against a dispute.

A dispute is a kind of Caveat. This means that a parcel that has a dispute will have a caveat registered on that parcel. The registration process of this caveat has been modified to record the disputant details – including the id card no, name, sex, relationship to the current right holder(s), and dispute type. Please note that sex and relationship only apply to disputants that are natural persons. It is possible to register a caveat when a disputant is a non-natural person (organization, company, gov't body). In such a case, only the id card no, name and dispute type are recorded. In either case, a caveat cannot be saved until the required detail is provided to the system. The supporting documents must still be attached to the transaction like before.

## **REPORT GENERATION**

RNRA has some reporting infrastructure based on Jasper Reports – which is a reporting framework that can be used to design, test and generate reports based on a wide range of data sources. The reports are hosted on a report server within the RNRA internal local area network. This server is not accessible from outside the RNRA building.

The following reports have been designed and put on the report server and can be run on request.

1. Total number of disputes in a district aggregated by dispute type
2. Total number of disputes in a chosen province aggregated by dispute type
3. Total number of disputes of a chosen dispute type aggregated by district
4. Total number of disputes of a chosen dispute type aggregated by province
5. Total area covered by disputed parcels aggregated by dispute type
6. Total area covered by disputed parcels in a chosen province aggregated by dispute type
7. Total area covered by disputed parcels of a chosen dispute type aggregated by province
8. Total area covered by disputed parcels of a chosen dispute type aggregated by district.

## **KNOWLEDGE TRANSFER**

RNRA has 2 developers and 2 DB Administrators. The developers have received very little training in managing the code base of the Dispute Registration/Management component of LAIS2. Both developers were not available in the period when this training was to be conducted. It was agreed that RNRA would make arrangements for this training to be done in the next few months.

The DB Administrators have been shown the extra tables and attributes related to the dispute registration and maintenance function and since all this is within the database they are familiar with, they are able to manage the database routines – like backup and future modifications, which may be required in future to support further developments. They have also been show how to create new reports based on the new dispute tables and configure them correctly on the report server.

## RECOMMENDATIONS

- More detailed analysis of dispute should be carried out to compile a correct list of resolved disputes. This may involve having to go through approved transactions and reading the attachments for caveats. In this process, records detailing the time span between registering a dispute and resolving it can be compiled by using the acceptance date and approval date for caveats.
- The Dispute Registers should be updated to reflect the correct status of a dispute. In cases where disputes are invalid because the parcel has never really existed in the spatial database, the record should be crossed out in the register and an explanatory note to the effect attached. This would help make the dispute registers a correct historical record of disputes that were recorded during systematic registration.
- In collaboration with GIS, a mapping function should be added to the general reporting mechanism in order to show a geographical distribution of disputes. A process should be designed and automated for updating this map whenever a dispute is resolved.