

Securing Community Land Rights using a Simplified Land Community Data Model: A Uganda Case Study

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1.0 Abstract

This paper discusses the design and implementation of Cadasta Foundation's Land Community Data Model to document and formalize customary land rights in Uganda in partnership with the Ministry of Lands, Housing, and Urban Development. The paper demonstrates how the data model facilitates the registration of customary land rights at the sub-country level, integrates land administration and social tenure domain principles, and focuses on subsequent transactions. Cadasta's approach and tools provide a cost-effective, flexible, and participatory solution for securing customary land rights and improving land information systems at the community level. The data model incorporates Uganda's National Land Information System attributes to support smoother data integration and more comprehensive national data coverage. The paper also highlights ongoing efforts to customize business processes and workflows to comply with land administration regulations in Uganda and ensure seamless integration with government systems.

2.0 Introduction

Cadasta's Land Community Data Model is a customized data model designed to document and formalize customary land rights in Uganda. The model supports the national implementation of land administration, management, and continuous data collection and is fit-for-purpose, affordable, flexible, participatory, and easily upgradeable.

Cadasta's Land Community Data Model has successfully facilitated the registration of customary land rights at the sub-country level and integration with the Uganda National Land Information System (UgNLIS) to support data integration at the national level. Cadasta's Platform uses Esri's ArcGIS Online to capture spatial and non-spatial data with details on the properties, linking legal documents to parcels and allowing future transactions to be made on any given parcel. The tool also allows for adjustments during the registration approval process; the approval process is the mandate and is guided by the features developed and configured within the tool.

In this paper, we discuss how Cadasta's data model was developed to facilitate the registration of customary land rights at the sub-country level while integrating land administration and social tenure domain principles. Our paper also details the features developed to support

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subsequent transactions at the sub-county and district levels. We also discuss future planned improvements aligning with the local legal and institutional frameworks to enable integration with government systems.

3.0 Cadasta’s Land Community Data Model

Cadasta’s Land Community Data Model adopts the Land Administration Domain Model (LADM) framework to establish an integrated concept of the spatial units, property, and social rights supported by the spatial, legal, and institutional frameworks. The fit-for-purpose principles are followed from the user requirements stages to the implementation stage of data capturing and processing to secure the land rights, such as physical boundaries, satellite imagery, accuracy, and the element of future transactions on the parcel and the procedure Customary Certificates of Occupancy (CCOs).

3.1 Previous Data Model

The previous data model design focused on capturing and supporting securing customary land rights without incorporating the concept of subsequent transactions. This called for model improvement, and below in figure 1 was the previous model by Cadasta.

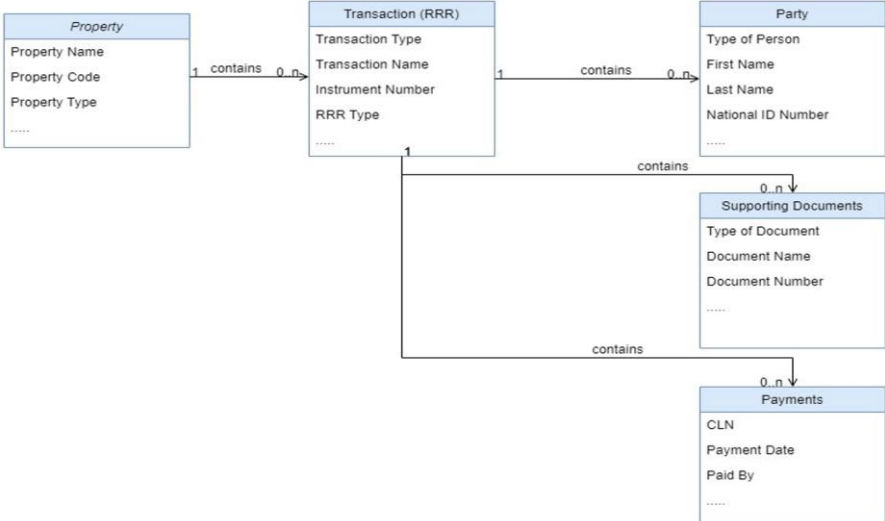


Figure 1: Previous Cadasta Data Model

3.2 Current Cadasta Data Model

Cadasta’s current data model was designed to support administrative lines as well as to secure customary land rights. The model provides customizable tools to operate on parcels and capture legal rights. A flexible emerging technology approach solution and standards have been developed and tested at the national and international levels, as shown in Figure 2, for the customary subsequent land transactions in Uganda.

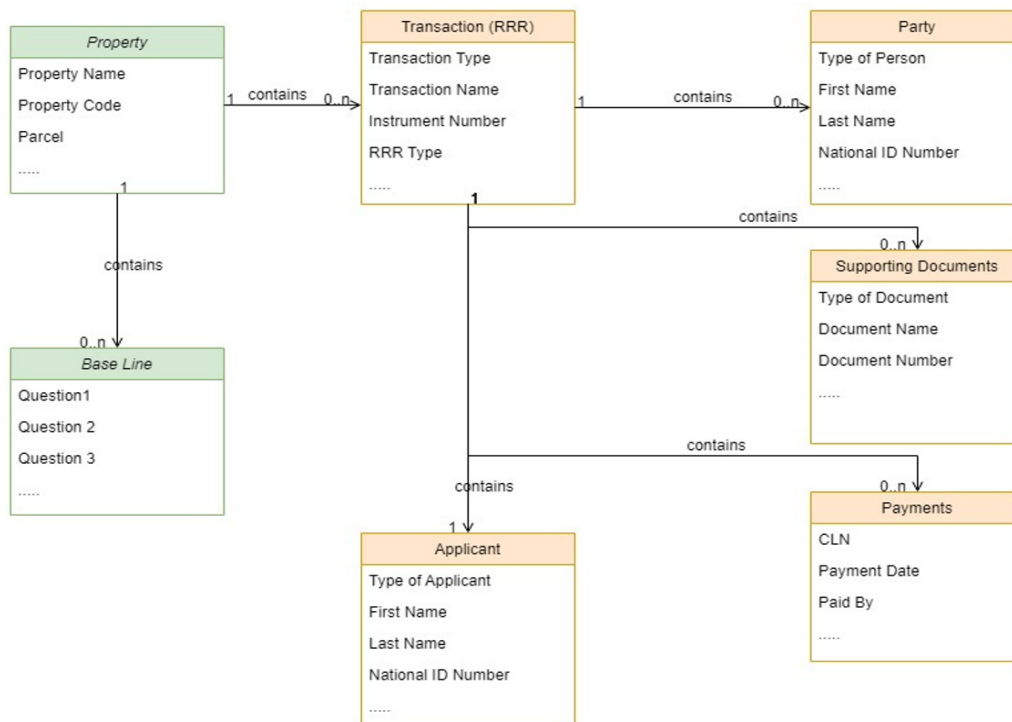


Figure 2: Current Cadasta Data Model

4.0 Business Process Modeling and Workflow

The business processes modeling and workflow are customized to adhere to Ugandan land administration regulations. The UgNLIS can be integrated with these business processes, including as transfers, mortgages, and subdivisions, ensuring that administrative and spatial parties are updated for subsequent transactions. Administrators can define parameters and other technical requirements to integrate these processes into the UgNLIS. The workflows and data flow follow LADM classes and include different land tenure types, including customary land rights (Paasch et al., 2015). The approach follows the principles of fit-for-purpose land administration, which supports the continuous updating of land rights at the community level.

Below are the three (3) main steps that can be implemented initially to secure the customary land rights and ensure subsequent land transactions.

- **Data Collection & Mapping** | Surveyors can go to the field and gather information (draw parcels) and add data related to the property. Surveyors can add other not associated data to the property in the new entity baseline.
- **Intake Process** | When data can be lodged in the system, and an instrument number is generated.
- **Recorder** | Can review the information and can be modified and add more data.
- **Land Customary Identification Book** | The validation stage when information related to the Land Identification book can be filled in.

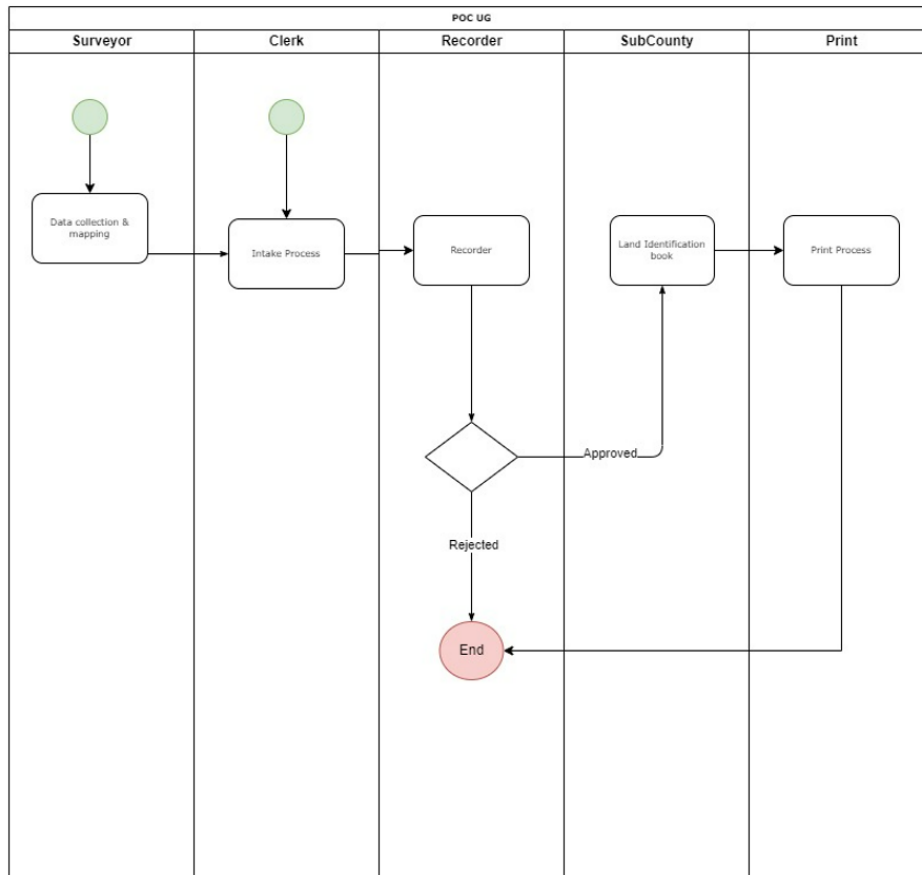


Figure 3: Mapping and Registration Workflow

In the Cadasta tool, the existing spatial layers that UgNLIS have generated are considered alongside stakeholder data such as forestry, roads, and land use cover following a Fit-for-purpose approach to surveying and mapping.

Uganda Land Information System currently recognizes GNSS-enabled tablets with a defined data format for further operations. Cadasta's tool can be a great approach to implementing the E-Land Registry at the sub-county level in Uganda in accordance with the regulations.

4.1 Compliance with Uganda National Land Information System

Cadasta's Land Community Data Model complies with requirements for data exchange from the UgNLIS. Data can be exported and used to guide the issuance of titles. The tool aims to support geospatial information interoperability, not only in the land sector and other sectors such as forestry, human settlements, and physical and urban planning. The Ministry of Lands, Housing and Urban is developing the Guidelines for Fit-for-Purpose Surveying and Mapping for Certificates of Customary Ownership (CCOs) and Certificate of Occupancy (COOs),

which Cadasta is considering for further customization and can be rolled out to other regions across the globe.¹

4.2 The Simplified Land Community Data Model Prototype

The Simplified Land Community Data Model (SLCDM) prototype uses the Cadasta Platform. It is a preliminary model of a simplified land registration solution that can be used to test and simplify various aspects of land administration domain model. The prototype will include key features in the final version, such as recording land records, user interfaces for entering and querying data, and security measures to protect against unauthorized access. These features are planned for releases three and four. The prototype captures the following types of data:

- Transaction type
- Property data
- Owner's data
- Property rights data
- Geometry of the property

Through the Cadasta Platform, users can access Esri tools aligned to manage light registration. To accomplish this, we use ArcGIS Online as a backend. A survey can be deployed on a mobile device or desktop using Esri's Survey 123 and/or Field maps. Esri Dashboards are designed to display multiple data visualizations so you can monitor events, make decisions, inform others, and see trends. Dashboards provide a comprehensive overview of your data and critical insights for analysis, monitoring, and decision-making.

In this infrastructure, you can configure quickly, test on the fly, and adjust as needed without going through long development processes. However, this also has some limitations, which is why the STDM model is key in the implementation. The prototype also allows for quick deployments for configurations, and, most importantly, it uses cloud-based solutions for scalability. If there is no reliable internet service, then the "offline" option is a huge advantage of the tool as it allows one to work in remote regions, complete all the processes, and "commit" all the data once the connection is available.

In summary, using the STDM concept, the SLCDM prototype represents an evolving model that allows for a light registration process for subsequent transactions of small villages or communities. The prototype can be scaled up or down according to the project's needs and allows for "offline" work.

¹(The Republic of Uganda Land Sector Strategy Plan 2013-2023 Ministry of Lands, Housing and Urban Development Republic of Uganda, 2013)

4.3 Cadasta Data Model: Use Cases

4.3.1 Use Case 1

The Applicant is registering his property for the first time as a polygon of 100 square meters. Applicants must pay registration fees and attach two documents to the registry office, minutes of the property with number 2019 and the approved plan with number 4123. That will generate instrument 001.

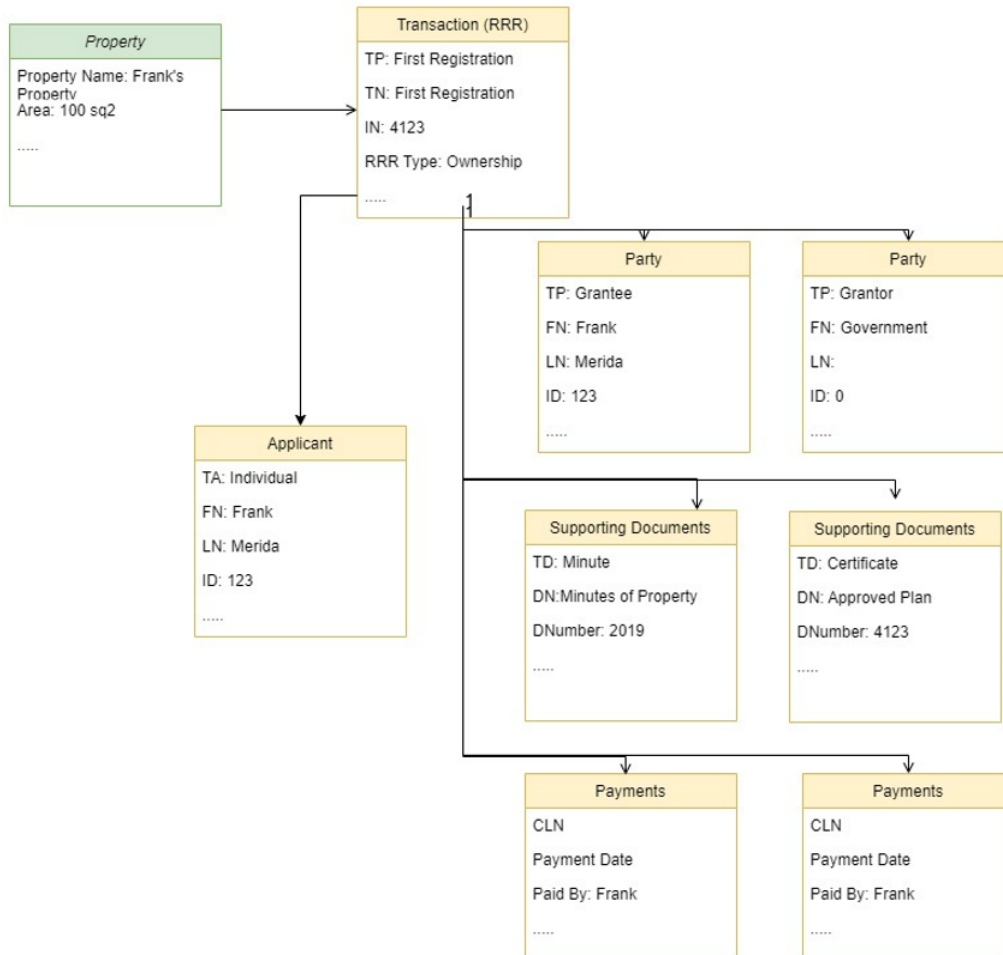


Figure 4: Property Registration

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4.3.2 Use Case 2

The Applicant decides to sell the property to JP. The Applicant gives the power to a representative to carry out the process, pays a fee, and attaches the property title.

² Republic of Uganda. (2004). Statutory Instruments 2004 No.100 THE LAND REGULATIONS, 2004 (Under Section 93 of the Land Act, cap 227.

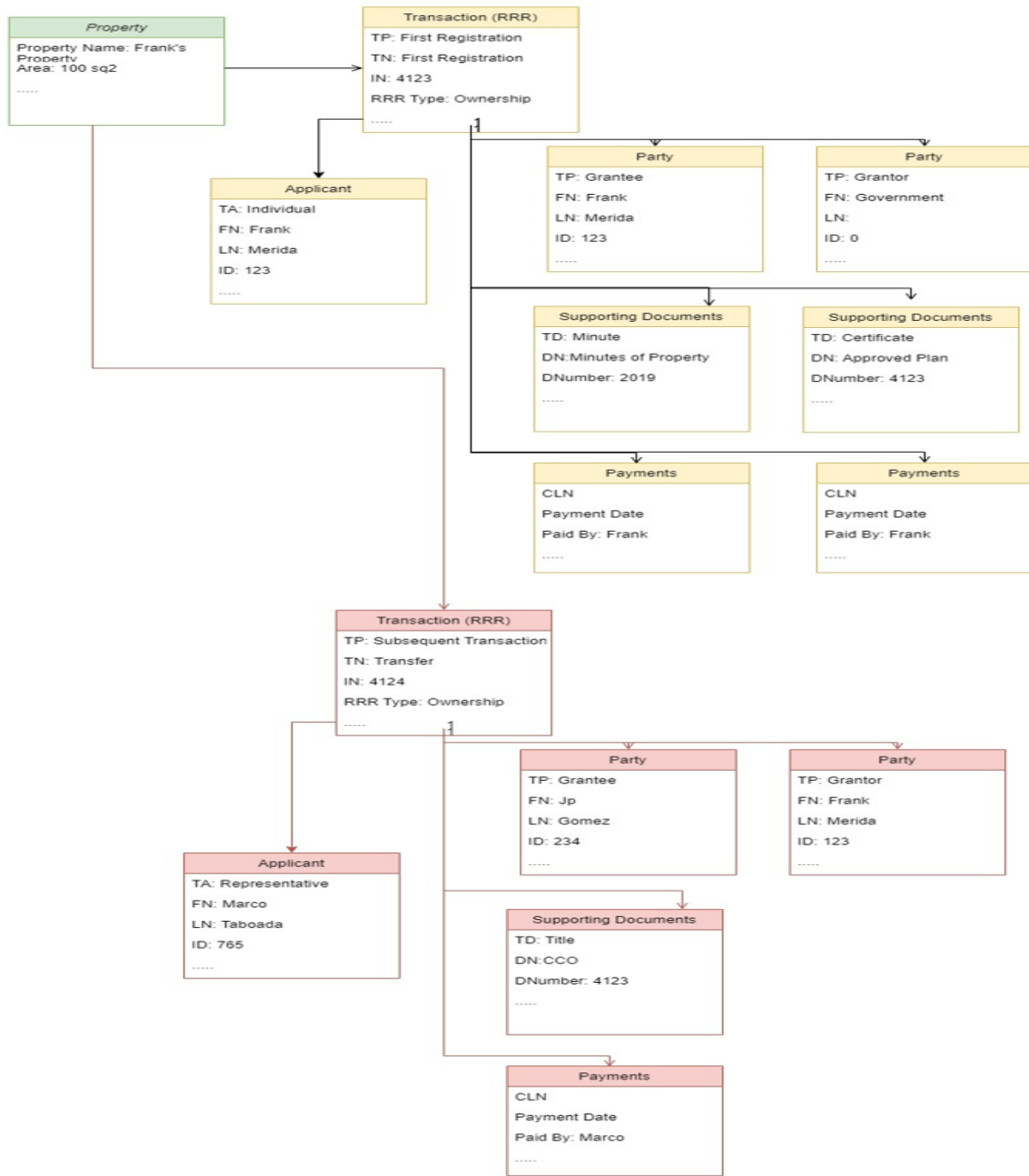


Figure 5: Transfer of Property

4.3.3 Cadasta Survey123 Connect

Cadasta's Suvery123 tool summarizes the forms used to capture the data in the field and performs the quality assurance of the parcel and parties' rights entered by users of the tool before committing the parcel in the database.

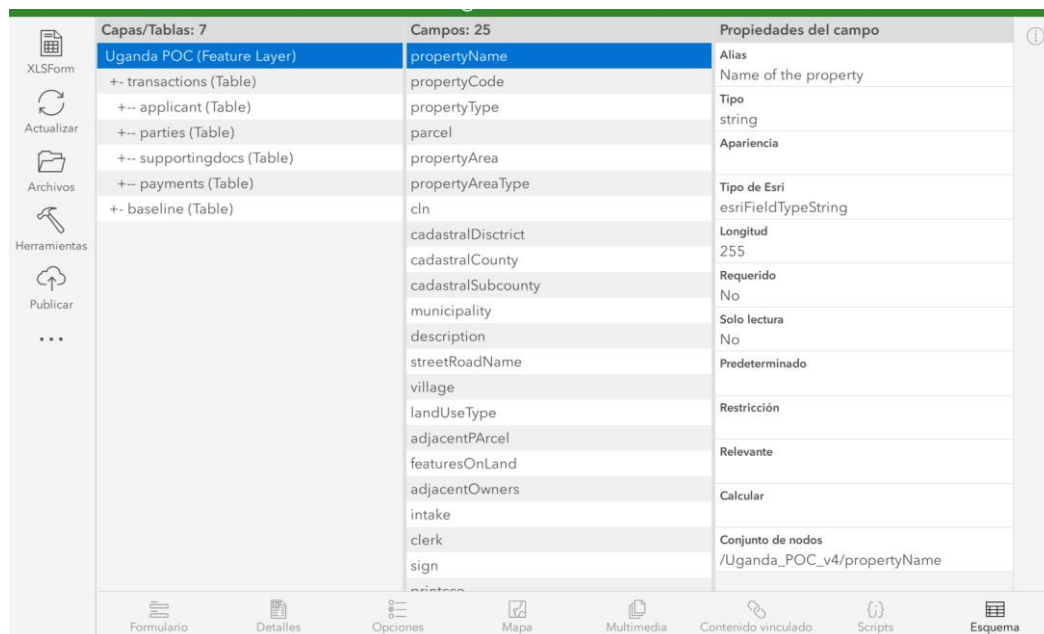


Figure 6: Survey123 Connect

4.3.4 Parcels Captured using the Cadasta Model

The Cadasta Tool has supported the registration of land rights, as discussed in the previous sections of this paper. The table below demonstrates the number of parcels and area coverage the tool has registered globally. This data is now available for subsequent transactions or updating as guided by laws, regulations, and policies of the respective communities³.

³ <https://www.esri.com/en-us/arcgis/products/arcgis-survey123/overview>

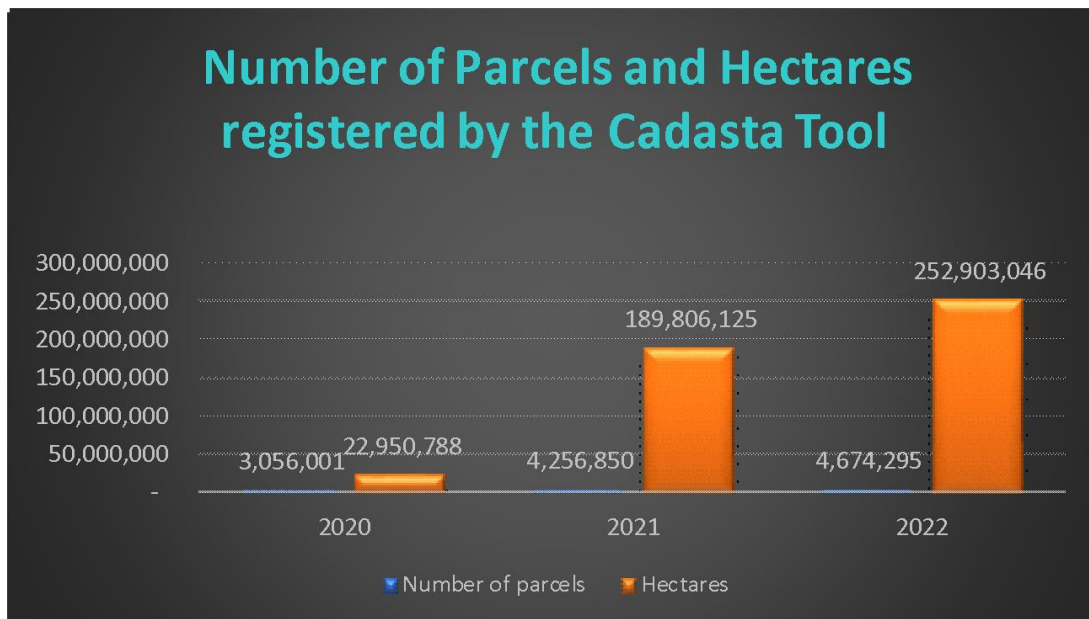


Figure 7: Graph showing the number of parcels registered and Area.

4.3.5 Subdivision of the Existing Parcel using the Cadasta Tool

Figure 8 below shows the subdivision transaction with the concept of topological integrity constraint to support the reduction of inconsistencies during the updating or modification by the mapping requirements.

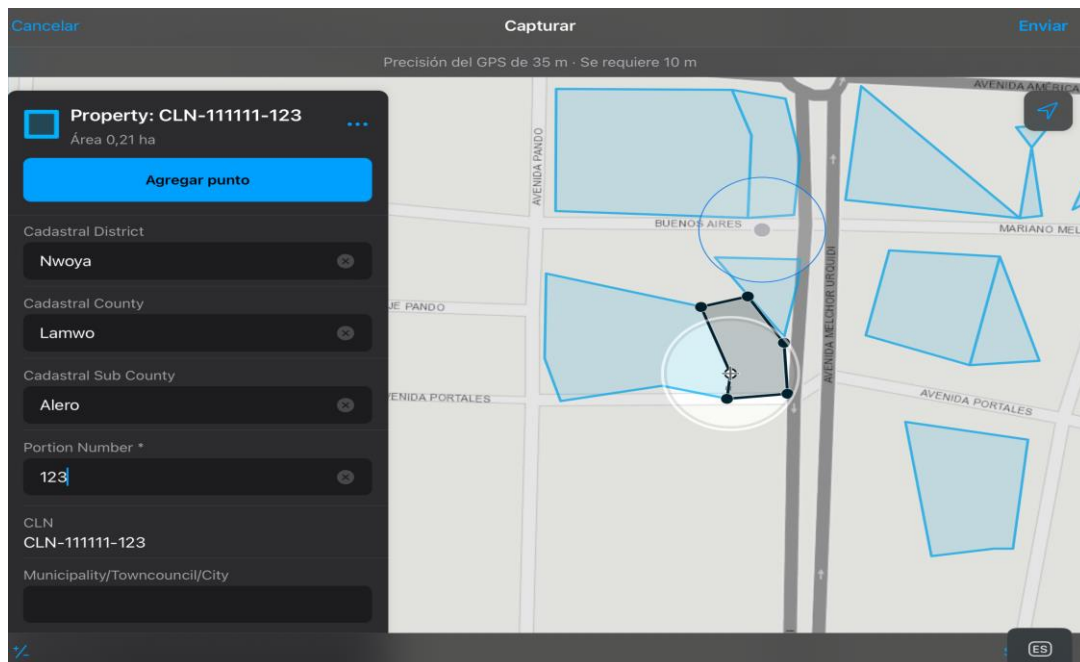


Figure 8: Mapping and Surveying Prototype

5.0 Future Work

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With the SLCDM prototype, you can utilize RAD (Rapid Application Development) solutions for land registration. The main objective is to present different alternatives to land administration using known standards (such as LADM).

The first version of SLCDM is currently being used and will generate new requirements for future versions. Currently, small communities are the target market for the registration process. To date, the model has only been used in African contexts but can be applied elsewhere.

In the future, we would like to expand the prototype's coverage, receive feedback about the processes, and scale it for new or different regions. We are not trying to replace a Land Information Solution (LIS), but this will be the first step toward a more formal LIS to move data to an enterprise solution.

Cadasta will update the prototype in 2023 based on the feedback we receive to make it more usable in different contexts. Standardizing the way land offices or communities capture land data is the challenge. Knowing which data is essential and what data is available is important. In summary, feedback is critical to how the tool is implemented, how it is used, and how the data is accurately maintained.

6.0 Conclusions

In doing so, Cadasta Foundation's Land Community Data Model has successfully supported Uganda's Ministry of Lands, Housing, and Urban Development to document and secure customary land rights. The Data Model has enabled the registration of customary land rights at the sub-county level, integrating land administration and social tenure domain principles. This process has significantly accelerated the rate of government-issued titles for unregistered customary land, thereby increasing the availability of land information and registration of land rights. Cadasta's approach and tools allow data integration into the Uganda Land Information System, enabling communities to access the data. The Cadasta tool complies with the requirements for data exchange from the UgnLIS and aims to support geospatial information interoperability, not only in the land sector but also in other sectors, such as forestry, human settlements, and physical and urban planning. Cadasta will continue to improve its data model and approach to ensure the security of collected customary data while aligning with local legal and institutional frameworks to enable integration with government systems. The Cadasta tool can be a great approach to support the establishment of the E-Land Registry in Uganda at the sub-county level as per the regulation.

7.0 References

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