COUNTRY PROFILE OF THE LAND ADMINISTRATION DOMAIN FOR GHANA: WITH THE INCLUSION TITLE, DEED, CUSTOMARY AND INFORMAL SYSTEMS OF LAND REGISTRATION

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June, 2021

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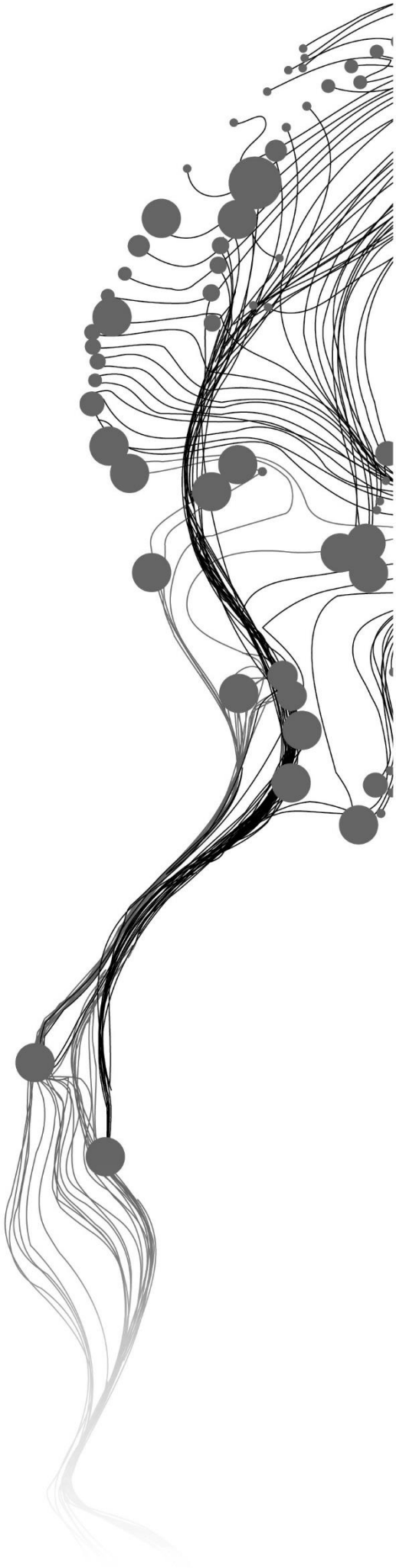

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DERICK BOATENG OKYERE
Enschede, The Netherlands, June, 2021

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation.
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ABSTRACT

Access to land sits at the crust of all contemporary political goals like climate action, disaster management, spatial planning, gender equity and poverty eradication. Land administration when well organized ensures the security of people's rights to access land. Since it can ensure security of tenure, land rights for all and regarding all kinds of people to land relationships are important.

This study looks at the land administration system of Ghana, which is not succeeding. Partly due to data redundancies, errors, inconsistencies, and discrepancies as well as the analogue nature of the system. The new Land Act 2020 (Act 1036) that supports eConveyancing together with recent projects to digitized land administration in Ghana has urged the need for a well-designed nationwide land administration infrastructure that can be implemented step by step. The foundation of a digital (distributed) database is a conceptual data model. The land administration domain model (LADM) is a conceptual data model certified by the international organization for standardization (ISO).

The land administration system in Ghana requires a conceptual data model that can integrate, standardize, and interoperate land tenure data from the title, deeds, customary and informal land registration systems while ensuring high data quality. Plus, with the functionalities to support swift jettison or conversion of any of these multiple systems. The LADM provides the core functionality and a reference framework to support the design of such a conceptual model.
This study sought to create and evaluate an initial draft proposal of a LADM based country profile for Ghana. With additional requirements derived from streamlining the deeds to title conversion in Ghana with lessons from Ontario conversion process. This qualitative and design study used semi-structured interviews and document analysis to draw data requirements from ten areas in Ghana with diverse customary land tenure reflected in their respective customary land registration systems. The interviews were conducted virtually with key informants from the Lands Commission, Customary Land Secretariats, Meridia and the Ontario Land Agency.

The results were data requirements from Ghana on parties, documents, registers, rights, restrictions, responsibilities, spatial unit, surveying, and representation (core LADM packages) elicited, analysed, and presented. The ongoing deeds to title conversion process in Ghana is included in the analyses. Solutions to expedite based on lessons from a similar process in Ontario, Canada were analysed, and data requirements were elicited. Again, the initial draft LADM country profile for Ghana was created and presented in unified modelling language (UML). Finally, the country profile was evaluated with a requirement authentication framework. In addition, the model was evaluated with the Abstract Test Suite of the ISO 19152. All the packages in the country profile passed and have level 3 compliance (highest level)

The study concludes that the initial LADM country profile for Ghana created is a conceptual level form of a digital database that co-opts all the multiple registration systems in Ghana as well as can swiftly phase out any of these multiple systems if necessary. This draft aims to initiate a national debate among all stakeholders. Hence this study recommends that subsequent research and steps should focus on deliberations, improvements, and agreement on this country profile. Again, to develop and convert this model into a technical model for implementation in an agile approach.

Keywords; *The Land Administration Domain Model (ISO 19152), System of Land Registration, Province of Ontario Land information system (POLARIS), Informal Land registration System, Meridia, Customary Land Registration System, Requirements Engineering.*

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Derick Boateng Okyere
June, 2021
Enschede, The Netherlands

To my Mother Comfort Asiamah

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1. INTRODUCTION

1.1. Background and Justification of the study

Land is a vital resource that mankind relies on to meet most of its vital needs. As such, access to land is crucial in our endeavour to tackle contemporary political goals including, poverty eradication, gender equality, indigenous land rights recognition, suitable housing, sustainable agriculture, food security, climate action, disaster management, spatial planning, and good governance (Lemmen et al., 2015). As without a good way to administer land, landholders stand the risk of losing land and its related investment. Access to land is construed to relate to tenure security (Lemmen & van Oosterom, 2001; Simbizi et al., 2014).

Land Administration (LA) is defined in the Land Administration Domain Model (LADM) (ISO, 2012, p.VI). as "*the process of determining, recording and disseminating information about the relationship between people and land*" This definition already identifies the three main entities, or core classes, in LA: parties, rights/restrictions/responsibilities (RRRs) and spatial units. LA or land recording is a term used to reveal that land registry and cadastre are pieces of one system (Henssen & Williamson, 1990). These terminologies have other aliases like land registration system, system of land registration (Zevenbergen, 2002) and cadastral system (Silva & Stubkjær, 2002). The system of land registration has a lot of usefulness to aid the provision of tenure security. Simply, system of land registration, if well organized and executed, supports certainty and clearness in identifying the three main entities in land transactions (Palmer, 1996). This certainty has a positive ripple effect to improving the economic, social, environmental and political wellbeing (Palmer, 1996).

In Ghana, the formal land administration system (LAS) consists of deeds, title and customary land registration systems (Abubakari et al., 2018; Ayitio, 2019). Also, there are informal land registration systems (Salifu et al., 2019). The current LAS is not yet succeeding to bring certainty to the object-right-subject data in support of the land market and property taxation. (Ministry of Lands, 2003: Rickard, 2020). For example, 59% of all court cases are land-related (Gyamera, et al., 2016). The underperforming LAS is partly attributed to costly public and private resource duplication, data redundancies, inaccuracies, errors and inconsistencies. All originating from the parallel, separated multiple nature of the LAS as well as, the analogue nature of the registered records (Abubakari et al., 2018; Biitir et al., 2017; Ehwi & Asante, 2016; Safo-Katanka, 2012; Rickard, 2020).

Resource-wise, the registration systems are managed by different institutions and departments. People have to interact with several systems separately in order to get complete information on the three entities, which most people forgo due to the time and money it takes. These separate multiple registration systems, bring isolation of land registration systems, data redundancies and inconsistencies. Only a small amount of data is shared between the customary land registration and other registrations (Biitir et al., 2017).

A measure that could resolve this situation is integration of data (Gardner, 2005; Koers et al., 2013). Phasing out the deeds system as planned will reduce the number of systems. For this measure, there is a gap in knowledge on how to improve the administrative capacity to quickly make the deeds system obsolete. It is imperative to realise that the conversion process from deeds to title system in Ghana started 35 years ago. Several countries have already been through this conversion challenge. Subsequently, it is common sense and prudent to draw knowledge from these countries. In the current study, lessons from the deeds to title conversion process of Canada (Ontario), will be used. This system has similarities with the land registration system of Ghana. In Ontario, it took less than 20 years to complete this conversion. (Brennan, 2015; Gainer, 2017; Murray, 2010).

The analogue nature of the land records implies that only manual business workflow processes can be used to interact with the land records in Ghana. Most paper records are kept in chaotic order. This has led to the complete occupation of working space in the registry's records room, many misplacements of documents, and a tedious file retrieval process resulting in delays (Safo-Katanka, 2012; Edwin et al., 2020;

Rickard, 2020). Thus, it mostly takes six months to get land registered and even more than a year for people who fail to follow up on documents or pay bribes (Williams-Miller, 2018). These delays are disincentives for most people to bring land into the formal registration system hence its failure to produce certainty (Edwin et al., 2020; Toulmin, 2009).

Moreover, section 110(3) of Act 1036 requires the title register to be in a digital form supporting electronic conveyancing in section 73 of that Act. This new legal support for digitization has ushered in a new era of reforms in the LAS. This thesis could influence the national debate among all stakeholders and policy makers.

Critics of having a digital LAS argue that landowners usually prefer titles that are tangible (Muir, 2003). Also, computerization makes indefeasibility unsound eventually due to fraud, if the system can easily be hacked or manipulated by unauthorized people (Thomas, 2003). However, this could happen to paper-based system too. Also, systems of land registration in many countries have been digitized already. Furthermore, digital records are more resilient to physical destruction, where there are proper offsite backups, making them more secure and durable. Again, digital records give wider access, standardization and simplification of the system which breeds efficiency and transparency in the system (Brennan, 2015). Besides, land registers in a digital form are always available, lessen administrative load on users, have quick data processing, reduced cost ultimately and enable new information dissemination and analysis trends (Gahan, 2008). Also, it counteracts multiple registrations on the same parcel, entering an incorrect record in the system and other errors. This saves time and reduces disputes (Brennan, 2015). In all, it solves most problems wrong with system of land registration in Ghana. The basic level of a land register in a digital form (digital database) is a conceptual data model; a collection of concepts for describing data (ITC, 2020). The LADM is an international standard known as ISO 19152:2012, that encapsulates the semantics of the land administration domain (ISO, 2012; Lemmen et al., 2015). The LADM can support the coverage of all tenure types. The standard was designed to create a shared ontology implied by the model, to support the designing of the application software based on model-driven architecture (MDA), to enable cadastral data exchange and to ensure efficient data quality management (Lemmen et al., 2015). The LADM allows cross-jurisdiction interoperability and effective standardisation of LAS. As such, it could be implemented by different maintenance organisations with mandates at various levels of land governance (ISO, 2012). The LADM contains functionalities that uphold women's land rights (Lemmen et al, 2019). The LADM is a generic standard as such, it is flexible to be extended and adapted to capture local situations (Lemmen et al., 2015).

The LAS of Ghana demands a conceptual data model that can integrate, standardize, and interoperate data that can eradicate data redundancies and disturbed data correctness. This model should allow the easy creation of a digital database in Ghana. This is possible with the LADM if all the requirements for data modelling from LAS in Ghana are added. This research will focus on developing an initial draft proposal of a LADM country profile for Ghana. It will also draw requirements on how to accelerate the speed in the deeds to title conversion process in Ghana with lessons from the Ontario conversion process. The outcome, the initial draft LADM country profile will help start a national debate on how the data from land registration systems should be organized in the digital environment.

1.2. Research Problem Statement

The research problem is to get an overview of the data included in the current analogue, bifurcated multiple land registration systems that resulted in data redundancies, inaccuracies, errors, inconsistencies and a long, expensive process of land registration. This is sabotaging the performance of the LAS in general. (Abubakari et al., 2018; Asaaga & Hirons, 2019; Edwin et al., 2020). Apart from the deeds, title and customary registration systems, there are registration systems used to record informal land rights whose data are not utilized. The deeds to title conversion process is in progress. There is a new legal reform supporting digitizing the LA of Ghana. All these calls for the imagination and creation of a data

model with functionalities that could resolve the bad performance by data integration. Despite all the incentives that the LADM offers, Ghana does not have an LADM based country profile.

1.3. Research Objective

The main objective of this study is to create and evaluate an initial draft proposal of an LADM based country profile for Ghana. This country profile should support the streamlining of the deeds to title conversion in Ghana with lessons from the Ontario conversion process.

1.4. Sub-Objectives

Given the research objective the following sub-objectives are derived:

a) to derive data requirements and structure for the conceptual data model from the title, deeds, customary, and informal registration systems in Ghana:
b) to extract data requirements from the existing deeds to title conversion process and to develop new ways to expedite the deeds to title conversion process in Ghana based on lessons from the Ontario conversion process:
c) to design an initial draft LADM country profile using the requirements derived from sub-objectives 1 and 2 on the LADM package basis; and:
d) to evaluate the initial draft LADM country profile from sub-objectives 3 against the (local) country requirements and the international standard.

1.5. Research Questions

Sub-objective 1; a) To derive data requirements and structure for the conceptual data model from the title, deeds, customary, and informal registration systems in Ghana.

a) What are the current data requirements from deeds registration, title registration, informal registration, and customary registration systems in Ghana?
b) What are the current data structures of deeds registration, title registration, informal registration, and customary registration systems?

Sub-objective 2; T*o extract data requirements from the existing deeds to title conversion process and to develop new ways to expedite the deeds to title conversion process in Ghana based on lessons from Ontario conversion process*.

a) How is the conversion process from deeds to title done currently in Ghana?
b) How was the deeds to title conversion done in Ontario, Canada, and what lessons can be adopted?
c) What data requirements can be extracted from the existing process and the suggested lessons, for fast conversion process, that can be adapted to Ghana?

Sub-objective 3; To design an initial draft LADM country profile using the requirements derived from objectives 1 and 2 on the LADM package basis.

a) How can the data requirement be incorporated into LADM packages of the proposed country profile?
b) How can the data structure requirements be incorporated into LADM?

Sub-objective 4; To evaluate the initial draft LADM country profile from sub-objectives 3 against the (local) country requirements and international standard

a) Does the proposed draft LADM country profile contain all the country requirements?
b) Is the proposed draft LADM country profile valid per Annex A of LADM?

1.6. Conceptual Framework

Broadly, a LA has four functions: Land-use, land tenure, land value and land development (Williamson et al., 2010). In Ghana, the Land-Use and Spatial Planning Authority is responsible for the land-use function.

The land institutions control the land tenure and land value functions. The various Metropolitans, Municipalities, and Districts Assemblies (MMDAs) are in control of land taxation. The land development function is done by the state and private institutions. These institutions interact with the land registration institutions in Ghana (Nara et al., 2014; Abubakari et al., 2018; Cobbinah et al., 2020). See figure 1.1.

The LC has 4 divisions: the land title registry divisions (LTRD) handles title registration; the public and vested land management division (PVLMD) handles deeds registration; the land valuation division (LVD) does land valuation, and the survey and mapping division (SMD) does the land plans (see Act 787). The deeds or title registers ideally should be connected to customary registers maintained by the customary land secretariats (CLSs) by law. There are 240 customary areas, each of which is mandated to create a CLS (COLANDEF, 2019); so far 38 are created (Nara et al., 2014; Abubakari et al., 2018). In Ghana, the registration of mineral rights is done by the Minerals Commission (MC). The registration of timber rights is vested in the forestry commission (FC). See figure 1.1.

There exist various informal systems of land registration with no legal effect. Their data are mostly brought to the formal system for formalisation. The database of Meridia Ghana will be used for this purpose. Formalization should ideally end at the title system but that is not always the case. Formalization can start at any of the systems. This information flow from one system to another brings duplication, data redundancies, data inaccuracies, data inconsistencies, disturbed data correctness, and sometimes is not executed due to inadequate interoperability between systems (Salifu et al., 2019). Figure 1.1 shows how data requirements from LASs in Ghana can be incorporated in an initial draft LADM country profile for Ghana. This draft will be examined with an authentication framework and abstract test suite of the LADM. This conceptual framework is illustrated in Figure 1.1.

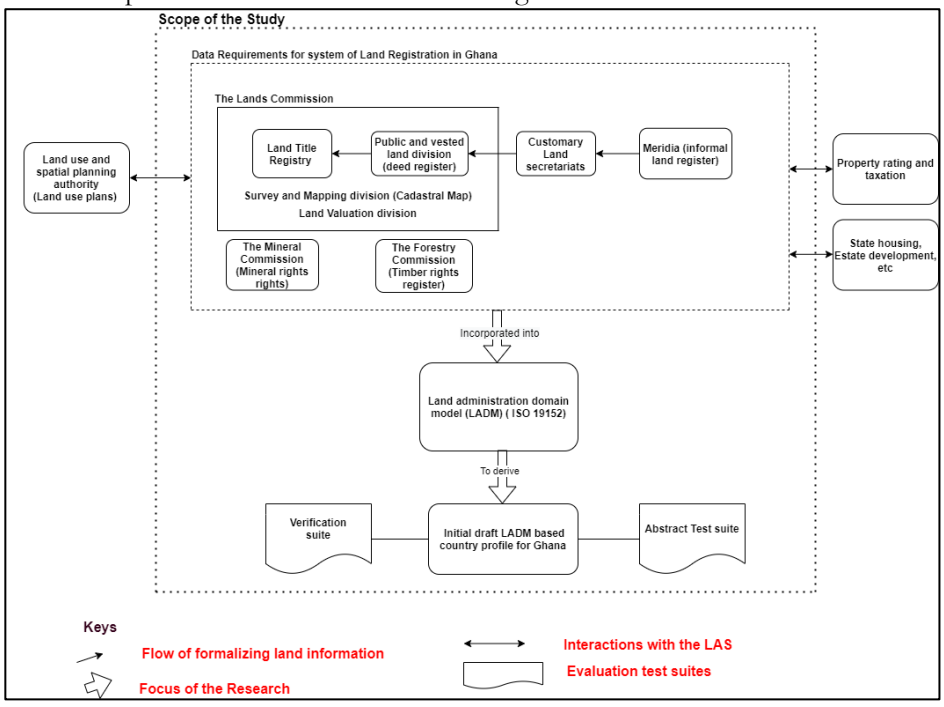

Figure 1.1: The conceptual framework of the study.

1.7. Research Design

This shows how the study was done. The research used qualitative and design approaches (Rossiter, 2019). It will involve the pre-data collection, data collection and post-analysis.

1.7.1. Pre-Data Collection

This involved investigating, through literature reviews, the research problem. Then, the research objectives, research questions and conceptual framework were formulated. The preparation of data collection instruments was included.

1.7.2. Data Collection

The research used primary and secondary data. This includes documentary analysis, literature review and semi-structured interviews. Virtual semi-structured interviews, using proxy interviewers were used to collect data from the LC, CLS, Meridia and the Ontario Land Agency. Secondary data were collected from various Laws in Ghana, published and unpublished literature.

1.7.3. Data analysis or Processing

Primary and secondary data were processed and analysed to derive the requirements for modelling. These requirements were used to design and evaluate the initial draft proposed LADM based country profile for Ghana (named initial profile in the table).

Table 1: The research design matrix for the study

OBJECTIVE	RESEARCH QUESTIONS	MODE OF DATA COLLECTION	SOURCE OF DATA	ANTICIPATED RESULTS
To derive data requirements and structure for the conceptual data model from the title, deeds, customary, and informal registration systems in Ghana.	What are the current data requirements of deeds registration, title registration, informal registration, and customary registration systems?	Semi-structured interviews and Literature review	LC, CLSs, Meridia, Land Act and Existing Literature	Derive new data requirements on attributes, codelists, multiplicities, and classes from Ghanaian context
	What are the current data structures of deeds registration, title registration, informal registration, and customary registration systems?	Semi-structured interviews and Literature review	LC, CLSs, Meridia, Land Act and existing Literature	Derive new data structures on associations and multiplicity from Ghanaian context
To extract data requirements from the existing deeds to title conversion process and to develop new ways to expedite the deeds to title conversion process in Ghana based on lessons from Ontario conversion process.	How is the conversion process from deeds to title done currently in Ghana?	Semi-structured interviews and Literature review	LC, Land Act	Show deeds to title conversion process in Ghanaian context
	How was the deeds to title conversion done in Ontario, Canada and what lessons can be adopted?	Semi-structured interviews and Literature review	Ontario land agency and existing Literature	Know how deeds to title conversion was done in Ontario and draw lessons for Ghana's context
	What data requirements can be extracted from the existing process and the suggested lessons, for fast conversion process, that can be adapted to Ghana?	Semi-structured interviews and Literature review	Existing Literature	Data requirements and structure to be extracted as to attributes, classes, code lists and associations in Ghana context

To design an initial draft LADM country profile using the requirements derived from objectives 1 and 2 on package basis.	How can the legal data requirement be incorporated into packages of the proposed LADM country profile?	Semi-structured interviews, Design and Literature review	LC, CLSs, Meridia, Land Act, LADM EAP files and standard and Existing Literature	A UML class diagram of the initial country profile showing all the land registration systems data requirements in Ghana
	How can the data structure requirements be incorporated into LADM?	Semi-structured interviews, Design and Literature review	LC, CLSs, Meridia, Land Act, LADM EAP files standard and Literature	A UML classes diagram of the initial country profile showing all the land registration systems data requirements and structure in Ghana
To evaluate the initial draft LADM country profile from sub-objectives 3 against the (local) country requirements and international standard	Does the proposed draft LADM country profile contain all the country requirements?	Semi-structured interviews, Literature review and Evaluation	LC, CLSs, Meridia, Land Act and Existing Literature	A UML classes diagram of the initial country profile with all requirements
	Is the proposed draft LADM country profile valid per Annex A of LADM?	Semi-structure interviews, Literature review and Evaluation	LADM standard and LADM EAP files	A UML classes diagram of the initial country profile.

1.8. Thesis Structure

This study is in 7 chapters: introduction, literature review, methodology and study areas, modelling requirements, designing the draft LADM country profile for Ghana, evaluation of the proposed country profile and conclusion and recommendation. Chapter 1 contains the background and justification of the study, research problem statement, objectives, and questions. Chapter 2 presents the literature review and conceptual framework behind the study. Chapter 3 introduces the research methodology and study area with a description and justification of why these methods and study areas were chosen. Chapter 4 gives the modelling requirements based on interviews and literature reviews and the data requirements for deeds to title conversion. The lessons learnt from the conversion process in Ontario, Canada are included. Chapter 5 deals with the design of the draft LADM country profile. Chapter 6 evaluates the LADM country profile with test suits in LADM. Chapter 7 concludes and makes recommendation for further research.

1.9. Summary of this Chapter

This chapter gives an overview of how the research problem was carved out of a wider global societal challenge. It introduces the research topic and justifies why the development of a LADM based country profile for Ghana is relevant. It shows the research objectives and related research questions. This chapter contains a conceptual framework that explains the concepts and scope of this study. It also has the study structure, research matrix and research workflow.

2. LITERATURE REVIEW

2.1. Introduction

This chapter will explain various concepts related to the research objectives and research questions based on a comprehensive literature review. These concepts are system of land registration, system of registration of deeds, system of registration of title, methods used to in the conversion of deeds to title, requirement engineering, the LADM and country profile modelling process.

2.2. System of Land Registration

A system of land registration includes the complex process of adjudication, storing, updating and supplying information over the legal relationship between man and land (Zevenbergen, 2003). Concertedly, land registration and cadastre enable a system of land registration to contain the three interrelated entities party (natural or legal person), right, and spatial unit (which can be a parcel) (Zevenbergen, 2002).

A system of land registration brings certainty in identifying these entities for land-related purposes like land transactions and land taxation. If properly arranged, it can enhance social stability and economic wellbeing for all especially the landless, poor, and disadvantaged (Manthrope, 2007). It can aid in the process of capital formation and development which is vital in chronic poverty-tagged countries (Brennan, 2015). Further, it may crack the issues that emerge if land rights are not formalized (De Soto, 1994). In addition, it may help in preserving evidence and in guaranteeing the truth in land ownership. (Lawson and Rubben, 1982). A system of land registration offers information to various levels of government and it helps in supplying security of tenure on land to all landholders (Zevenbergen, 2002).

The categorization of the types of system of land registration is performed in plentiful ways. (Zevenbergen, 2003). There are two systems of land registration practiced around the world (Zevenbergen, 1998). These are the system of registration of deeds and system of registration of title.

2.3. System of Registration of Title

The first system of registration of title was Torren's system of title registration, (Coffin & Pierre, 2005). In this Torrens system, title is created upon registration in the register (title by registration) (Bredbrook et al, 2002). This is contrary to the British title style; thus, it is merely the registration of title that exists already or created by landowners but here with a guarantee of that title (registration of title) (Brennan, 2015).

A system of registration of title means "*that not the deed, describing for example the transfer of rights is registered but the legal consequence of that transaction thus, the right itself*" (Henssen & Williamson, 1990, p.6). This system records three entities (party, right and spatial unit (parcel)) and not a document that shows a transaction. So, all aspects are scrutinized including mobile, mortal, mistakable person and precise location of the parcel of land being titled (Zevenbergen, 1998). These are the basis of a registered record.

The fundamental principles of system of registration of title are that it should remove the prerequisite to investigate the chain of registered title. Again, block any other claims to the land. The register should reflect accurately as possible the true state of title to land besides all associated encumbrances (Palmer et al, 2008). A registered title should either be secured, or else monetary compensation should be paid (Palmer et al., 2008). These signify the curtain, mirror, and guarantee principle respectively (Zevenbergen, 1994).

Therefore, registers created under this system offer all people involved in a land deal the required foreknowledge. Because it has comprehensive details of land rights, benefits or liability for each parcel. (Palmer et al., 2008). The register is proof of ownership and its accuracy is guaranteed by the state or insurance company (Zevenbergen, 1998). So, this system ensures security of ownership as it shields

landholders from being evicted from their lands. The system enables land deals because it lets land rights pass from one party easily, quickly, cheaply, and safely to another (Palmer et al., 2008).

From the above, security under the system can be dynamic or static security. Dynamic security means, conveyance made due to fraud, force or deceit will result in the loss of the land right of the innocent landholder (seller). This upholds the principle of certainty of the register (Brennan, 2015). But it might not encourage productivity as existing owners might fear being deprived of their land without their consent (O'Connor, 2005). As such would not invest in their lands. Static security allows the correction of the register whenever it is fair. Thus, it upholds the land rights of sellers, who are robbed of their lands, without their assent in times of fraudulent, force or deceitful transactions (Brennan, 2015).

A title registration system with dynamic security is indefeasible (Cooke & O'connor 2004). Indefeasibility means the registered title is immune to adverse claims to land (Palmer et al., 2008). This can be immediate or deferred indefeasibility (Palmer et al., 2008). Immediate indefeasibility is absolute. Thus, buyers are protected from any defects with the registered title or transaction and no alteration will be made to subsequent transactions. Deferred indefeasibility means that a flawed registered title can be dismissed until it is perfected by an onward sale to a bona fide purchaser with consideration (Brennan, 2015).

A system of registration of title is often censured as its principle of infeasibility contradicts the "*nemo dat non hat*" principle (you cannot give what one does not have). Thus, titles are mostly infeasible, hence conveyance made due to fraud, force or deceit will result in the loss of the land right of the innocent land holder (seller) (Brennan, 2015). Hence, in such extreme cases, it gives land rights to the wrong people. Also, it is inflexible as the register cannot be utterly inclusive and conclusive of all land rights (Brennan, 2015). The guarantee of the content of the register by the state or insurance companies means a stringent, lengthy, exorbitant, and bureaucratic process to render the register correct. These deter landholders who do not want to go through this intricate process (Zevenbergen, 1998).

2.4. System of Registration of Deeds

Registration of deeds means "*the deed itself, being a document, which describes an isolated transaction, is registered*" (Henssen et al., 1990, p. 6). The deed serves as evidence in the backing of the fact that conveyancing was made concerning a right. However, a deed is not evidence of the legality of the subject right (Henssen & Williamson, 1990). Subsequently, to ascertain land rights correctness of any parcel involved in a transaction, the deeds must be traced back in time to a good root of title (Palmer et al., 2008).

However, there is a contrary academic opinion to this description of system of a deeds system. They argue that the idea that a deed is only a proof of legal right is not entirely correct because a deed can be used to convey a right and not just to evidence it. They attribute this misconception to the translation of terminologies to the English language which distorts the meaning of concepts in different country contexts (Lemmen & van Oosterom, 2001). For example, the improved deed system of the Netherlands is a proof that supports this view (Zevenbergen, 2003).

The system of deeds registration affords security to landholders since the registered deeds always takes priority over the unregistered deeds. Also, registered deeds are made public hence precluding the creation of contradictory deeds on the same parcel (Palmer, 1996). Again, it permits very fast handling of an instrument (deed) being registered. This system does not obstruct most land transactions. This is because deeds registration system removes all protracted and in-depth due diligence in various aspects like personal information, immovable, durable, precisely and defined units of the land (Zevenbergen, 1998).

Usually, a system of deeds registration is characterized by no guarantee for completeness, correctness and validity that the transfer of subject land actually occurred. (Zevenbergen, 1994). Also, there is inactiveness of the registering authority, limited object speciality due to poor description of the spatial unit linked to the deed record (Zevenbergen, 1994). Finally, there is mostly lack of financial guarantee from the state in times of loss emanating from errors in the system (Zevenbergen, 2003). Furthermore, conveyancing under

a system of deeds registration is complicated, burdensome and expensive (Palmer et al., 2008). Thus, there is a need to always probe "*de novo*" the chain of title for each land transaction (Palmer et al., 2008).
In response, most countries switch to a system of title registration created to blend certainty, economy, simplicity, and facility in the system of land registration (Palmer et al., 2008). Nevertheless, other countries modify the deeds registration system to improve its operation to the level of a title registration system (Zevenbergen, 1994, 2002).

2.5. Deeds To Title Conversions Processes

Countries can adopt a system or switch between different types of registration systems. According to (Comparison between Proposed Land Title Registration System for Hong Kong and other Jurisdictions, n.d.; Divithure & Tang, 2013) the style of this conversion can be classified into four processes.
First, *purely voluntary*. This is a sporadic approach where the owners bring their property already in the deeds system for registration in the title system willingly and at their own convenience. This is deemed as ineffective and time-consuming as few properties are brought up for title registration when used in England in the 1800s.
Secondly, *voluntary for existing properties, compulsory for new properties*. This means that properties already capture by the deeds system will be converted to the tile system at the request of the owner. Owners of new unregistered properties are mandated to register such properties under the title system. In such an approach existing properties under the deeds system could remain in it for a very long time thereby prolonging the process. This process is being used in Australia (Victoria), the process started on 2nd October 1862 and still in progress; at least it was in 2016 (Marco, 2016).
Thirdly, *compulsory on transactions*. This is where conversion to the title system is made compulsory upon transfer of the property to another party with a specific time frame. The penalty for failing to abide by this will rob the current purchaser of their legal interest in the property thereby will not be able to instigate any onward transaction on the subject property. This style of conversion is efficient to some extent however it takes a long time to complete as properties that are rarely sold are not included in the title system. This style has been in use in England since 1897 yet the conversion process is not yet complete.
Finally, *compulsory requirement by Government*. Thus, where properties registered in the deeds system are automatically converted to the title system via a legislative act usually combined with strategic administrative procedures. This style of conversion is fast but has inherent problems if there is no clear and proper administrative management. It was used in the conversion process in New South Wales in 2004 where 70,000 titles were converted in 2 years (Mooney, 2004). And Ontario which took 20 years for the whole province (Comparison between Proposed Land Title Registration System for Hong Kong And other Jurisdictions, n.d.).

2.6. Review of the Multiple Systems of Land Registration in Ghana

In Ghana, the formal LAS consists of deeds, title and customary land registration systems (Abubakari et al., 2018; Ayitio, 2019). This approach was adopted to administer the dual tenure systems in Ghana. Thus, there is always a customary tenure and a statutory tenure existing simultaneously on the same land at the same time (most cases held by the same party). This is a remnant of the legal pluralism that existed in the Ghanaian colonial society but is now limited to only land holding. The customary and the deeds system were used to register the customary and statutory tenure respectively (Arko-Adjei, 2011). When the deeds system; was failing to provide certainty and clearness of ownership, the state passed the land title registration law 1986 (PNDL 152) that supports a title system with aim the of phasing out the deeds system (Abubakari et al., 2018; Agbosu, 2018). Categorically, the system of registration of title is the endgame of the fourth republic of Ghana as it is required in article 258(1)d of Ghana's 1992 constitution. However, the inadequate administrative capacity of the LC to fully produce this endgame has resulted in

the keeping of two separate systems (deeds and title) for recording of statutory tenure (Abubakari et al., 2018).

Likewise, to ensure effective administration of customary tenure, and halt the constant wrangles between it and the statutory tenure causing general tenure insecurity in both tenurial regimes, the new Land Act 2020 (Act 1036) has formalized all customary tenure to statutory. The customary registration system is now a legal source (formalized) to administer customary tenure per Section 12 of Act 1036 Hence, the formal LAS of Ghana consists of these 3 systems. These formal systems are outlined in section 80 of the new Land Act 2020.

Informal land recording systems operate outside this formal system for the existing informal tenure (UN-HABITAT, 2011). However, those systems should be considered as they record informal "de facto" tenures (van Gelder, 2010). Per section 272 of Act 1036, the state may authorize the temporary occupation and use of any land in pursuance of public welfare. These kinds of land rights are not registrable under any of the formal systems. Hence, having a space in the formal digital infrastructure to record (not register) data on informal and temporary rights will support the easy governance of these lands (like spatial units in slum areas), mostly recorded in informal systems (UN-HABITAT, 2011).

2.7. Requirements Engineering

Modern (the 2000s) definition of requirements engineering like requirement specification is a concept for digital solution developments since the start of the computer age. Requirement engineering involves a standard edifice that is comprehensible and reconstructable by anyone. It follows standardised approaches for each phase within this edifice with standardised explanation of the requirement (Ahmed, 2014). The requirement framework is explained above. see figure 2.1.

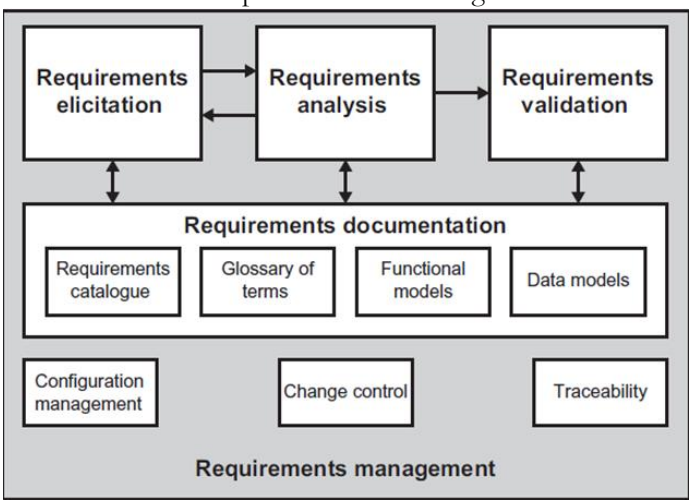

Figure 2.1: Requirement engineering framework Copied (Ahmed et al., 2014)

Firstly, *requirement elicitation*. This term is about 'requirement gathering', an arduous and proactive activity. It can be done through interviews, workshops, focus groups, observation, shadowing, scenarios or proto typing (Ahmed et al., 2014). Secondly, *requirement analysis*. In this phase, the elicited requirements are scrutinized to see if they pass as good requirements. They are grouped into functional, general, technical, business and stakeholder requirements. Requirements are examined to see if they are relevant, achievable, understandable and unambiguous, testable, consistent, prioritized, owned, unique, and atomic, traceable, concise, complete, correct and conformant (Ahmed et al., 2014). Thirdly, *requirement verifications and validations*. The verification means they conform with the standard templates and rules that are required by the subject topic. Validation implies that the requirements are concise brief reports of the user's needs (Ahmed et al., 2014). Finally, *clear documentation*. Documentation is what makes the framework comprehensible and reformable. This could be in the form of a requirement catalogue, glossary of terms functional models or data models. see figure 2.1.

2.8. The Land Administration Domain Model (LADM)

The LADM is both a conceptual and descriptive standard, that has been steadily designed from September 2002 to November 2012 (Lemmen, 2014; Lemmen et al., 2015). The LADM focuses on both legal and geometrical aspects of land administration (Lemmen et al., 2015). It provides standardization that expresses the semantics of land administration domain as to identifications of spatial units, party, rights, restrictions and responsibilities, person, control points, source documents and others. It supports manual and digital records. It enables land information from diverse origins to blend coherently (Lemmen et al., 2015) Per (ISO, 2012, p.VI) the goals of LADM are "*To provide an extensible basis for development and refinement of efficient and effective Land administration systems (LASs) based on MDA. Where you design once but can build on any software platform. Also, to enable involved parties both within one country and between different countries, to communicate based on a shared ontology implied by the model*".

The LADM meets requirements that are observed in LASs in the world. (Lemmen et al., 2015). There is a continuum of land rights, a continuum of use rights, claimants, spatial units, basic administrative units, and typology of authentic source documents that need representation in the model (Lemmen et al., 2015). The LADM is a generic standard that can be adapted to unique local situations hence people to land relationships for most if not all are depicted (Lemmen et al., 2015). It forms the basics from which national to regional profiles are created. Hence, there are country profiles for Croatia, Cyprus, Honduras and Guatemala, Kenya, South Korea, Poland, Portugal, Queensland, Japan, Russia, Morocco and the Netherlands (Adad et al., 2020; Lemmen et al., 2015; Radulovic et al, 2017; Kalogianni et al., 2021).

The LADM is defined in Unified Modelling Language (UML) (Bydlosz, 2015). It was developed in line with the ISO 19100 series and methodologies. The LADM is organized into three packages: The Party (people and organizations), Administrative (ownership rights) and Spatial Unit (parcels and legal space of building and utility networks) packages. There is one sub package, the Survey and Representation package (geometry and topology). The main classes in the party package are LA_Party, LA_GroupParty, and LA_PartyMember. The main classes of the Administrative package are LA_BAUnit and LA_RRR which has specialized classes: LA_Right, LA_Restriction and LA_Responsibility. The main class of the spatial unit package is LA_SpatialUnit. The main classes of surveying and representation package are LA_Point, LA_SpatialSource, LA_BoundaryFaceString and LA_BoundaryFace. The LADM has a special class VersionedObject that manages and maintains historical data in the database (Lemmen et al., 2015).

2.9. LADM country Profile Modelling

A profile "*is defined as a set of one or more base standards or subsets of based standards and where applicable, the identification of chosen clauses, classes, options and parameters of those base standards that are necessary for accomplishing a particular function*" (ISO, 2012, p.4). A country profile broadly should be a profile usable throughout a specific country (ISO, 2012). There are three existing ways of modelling a country profile (Adad et al., 2020; Kalogianni et al., 2021). i) to use LADM's exact classes, attributes, code lists and associations between classes. ii) to exhibit inherited structures between the LADM and the existing LA model. iii), to show mapping elements between the LADM and existing LA data model (Adad et al., 2020). In this study, the first approach will be used.

2.10. Summary of Literature Review

This chapter looked at the conceptual basis of this study, from the perspective of literature related to the research problem, objectives and research questions. The concepts were systems of land registration, its benefits and its practice in Ghana. Investigations were made into systems of title and deeds. This chapter also peered into the various views in literature on how deeds to title conversion can be done. Then requirement engineering was introduced. Finally, the LADM was dissected into i) justifications as to why it is a perfect solution for any LAS. ii) Into its packages with the main classes of each package. iii) how to model a LADM country profile. The next chapter explains the research methodology.

3. RESEARCH METHODOLOGY

3.1. Introduction

The research methodology is about the facts of all the interconnected approaches and thinking that underlines the probe that the researcher wants to make into the problem (Creswell, 2003). The research used qualitative and design approaches (Rossiter, 2019). The qualitative method was used to get the data requirements and structure of the system of land registration in Ghana. And design method for creating the LADM country profile. See appendix 1.

3.2. Customary Context and Study Areas

The Republic of Ghana is a democratic country located in West Africa. (Tiah Bugri, 2012). Customary governance in Ghana can be generalized into 4 major ethnic groups albeit there are over 70 ethnic groups in Ghana. They are the Akan, Mole-Dagbani, Ewe, and Ga-Dangme. The Akan mainly consists of Asante, Akyem, Fante and Bono ('Akan | people | Britannica', n.d.). The Mole-Dagbani mainly includes Mamprugu, Dagbon, Pusiga and Nanun (Jönsson, 2007). Ga-Dangme is made up of Ga and Dangmes. These 4 ethnic groups have crisp divergence in terms of their customs, traditions and practices. Nevertheless, these four represent a generalization of what is a complex and diverse customary institution in Ghana. So, the use of these four groups will help capture at least parts of all customary tenures that affect customary land recordation in Ghana to be reflected in the initial LADM country profile. Out of the 38 CLSs; the Asantehene, Okyehene, Wasa Amenfi, Techiman CLSs, were chosen to represent the Akans. Gbawe Kwatey CLS represents Ga-Dangme. Fieve CLS represents Ewes. Gulkpegu CLS for Mole-Dagbon and Bolgatanga CLS for the others. These are the study areas for the customary registration system. See appendix 2.

The deeds and title land registration systems are uniform throughout the country. Therefore, the Kumasi and Accra LCs were chosen to be the source of data about the system. See appendix 2

There are many informal land registration systems in Ghana for diverse purposes. Examples are the paralegal titling project, the community-based land survey tool and the Meridia project (Asiama et al., 2017). For this study, the Meridia project, operating in Suaman is the source of data for these types of registration systems ('Ghana Farmseal 2017 — Meridia', n.d.). See appendix 2.

3.3. Pre-Processing

To start, the research used primary and secondary data. This included documentary analysis, literature review and semi-structured interviews. The design research method was used to design and evaluate the draft LADM country profile. The methodology of design research consists of system specification, system design, system implementation, and system evaluation (Rossiter, 2019). Since we designed an initial proposed draft, the implementation is outside the scope of the study. There were officers, former colleagues and institutions in the land sector of Ghana that were willing to support this part of the research See Figure 3.1.

3.3.1. Primary Data

Primary data are data directly collected from the field (Currie, 2005). They brought new facts about registration systems in Ghana. The method for primary data collection was semi-structured interviews. The sampling technique for primary data collection was a purposive sampling method.

3.3.2. Semi-Structured Interviews

A semi-structured interview is a conversation around an exact topic where the interviewee retorts to questions asked comprehensively based on their perspective in a narrative form (Bryman, 2016). The flexibility and fluidity afforded by this method enable the creation of new themes (Mason & Jennifer, 2011). It allows easy follow-ups, interpretation, and communication due to the use of open-ended questions. Distinct interview guides were developed for each type of officer and organization in the formal and informal LAS of Ghana. Thus, interviews were conducted with the surveyors, land registrars and other land professionals from the LCs (Kumasi and Accra), CLSs, and Meridia. These interviews, due to COVID-19 restrictions, were conducted virtually with the support of field assistants. They aided in the physical scheduling of the meetings with the respondents and conducting the interview. Also, an online interview was conducted with two experts from the Ontario Land Registry who were part of the POLARIS project.

3.3.3. Purposive Sampling

Purposive sampling is where respondents are sampled based on the specific knowledge they possess (Latham 2007). This sampling method allowed data to be collected from people with the capacity to give the needed data (Archer, 2019). This method was used because only a few people know the subject matter of this study. In this research, officers of the LC, Ontario Land Registry, Meridia and CLSs were purposely chosen for their expert views on land registration's data requirements and structure.

3.3.4. Secondary Data

Secondary data are existing data extracted from secondary sources (Archer, 2019). Secondary data will include data from the laws on land registration in Ghana, published literature, data models from Meridia and LCs, LADM Enterprise Architect project (EAP) files and others. All to get data requirements and structure.

3.4. Data analysis or Processing

Next, data from the semi-structured interviews were transcribed and coded using Atlas TI (see appendix 1). These codes were reorganized under specific themes. Hence, coupled with the secondary data extracted, the existing data requirements and structure from LAS of Ghana were gathered using conventional content analysis (Hsieh & Shannon, 2005). The content analysis helped to condense the qualitative data in achieving sub-objectives 1 and 2. (see appendix 1) see figure 3.1.

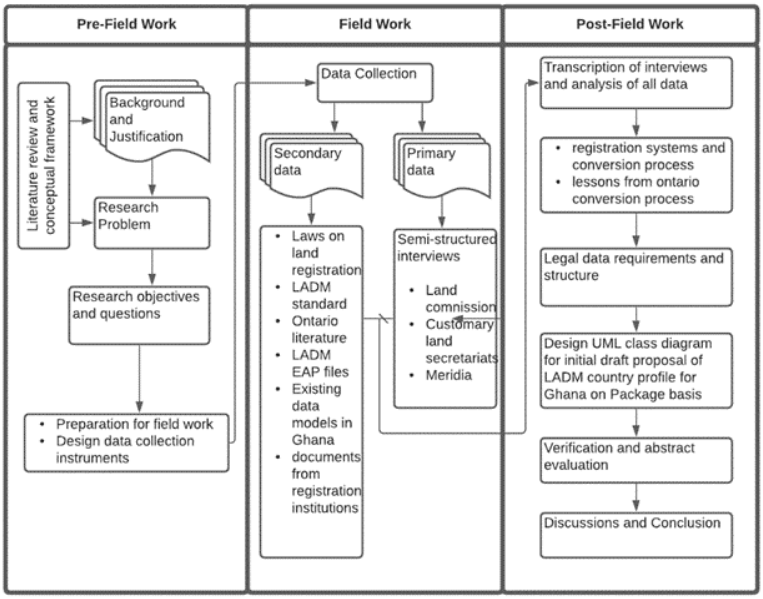

Figure 3.1: The research workflow

3.5. Designing Draft LADM Country Profile

The tool used to design the draft country profile was Enterprise Architecture. This software was used to incorporate the new data requirements and structure from the LAS of Ghana and lessons

into the LADM standard using UML class diagrams. This was arranged on basis of the different LADM packages. See figure 3.1.

3.6. Evaluation Of Draft LADM Country Profile

The proposed draft LADM country profile for Ghana was appraised to see if all the data requirements and structure have been integrated. Also, its conformance with the test suite in Annex A of ISO 19152 will be evaluated. See figure 3.1.

3.7. Data

The data, together with the source, used in this study are shown in Table 2.

Table 2: The description of data used

Data	Type of Data	Source/Fieldwork location	Type of survey	Respondents Sample method
LADM	EAPfiles	Github.com	N/A	N/A
People-to-land relationship data and structure requirements data	N/A	Fieldwork and Literature review	Semi-structured interviews	Purpose Sampling

Appendix 1 contains the data management plan used for this study. Also, appendix 1 contains screenshots of how data were analysed using the Atlas TI.

3.8. Ethical Considerations, Risks, And Contingencies

All scientific research rules of conduct were abided by. Introductory letters from the university were given to all interviewees. Interviewees got prior notice of all scheduled interviews. The consent of each interviewer was given before the start of each interview. COVID-19 rules were observed. Digital media of communication, aided proxy field assistants were used. All privacy rules relating to the LADM standard and respondent's privacy were observed. The research has acknowledged all data collected.

3.9. Limitation of The Data Collection Work

The interviews, due to COVID-19 restrictions, were conducted virtually with the support of field assistants. They aided in the physical scheduling of the meetings with the respondents and conducting the interviews. Hence, the physical interaction between the respondents and the researcher never happened.

3.10. Summary of Research Methodology

The research was conducted in several towns in Ghana. The study used qualitative methods thus semi-structured interviews. The data were analysed using conventional content analysis with the aid of Atlas TI software and Microsoft word. The Country profile was created using Enterprise Architecture.

4. MODELING REQUIREMENTS

4.1. System of Land Registration In Ghana

There is no clear definition of a spatial unit that is subject to registration in the laws of Ghana. This could be attributed to the fact that the system of land registration in Ghana is riveted on interest in land and not necessarily the land per se. Notwithstanding, per Article 4(1) of the 1992 Constitution of Ghana, defining the territories owned by Ghana, defined it as "*the sovereign of Ghana is a unitary republic consisting of those territories comprised in the regions which immediately before the coming into force of this constitution existed in Ghana, including the territorial sea and the air*". This position is validated by the definition of land by Ghana's interpretation Act, 1960 to include all land rights, natural (like a tree) and artificial (like buildings) fixtures attached to the land (Asante, 1965). Furthermore, in Dadzie v. Kokofu, the Supreme Court held that land ownership could be different from ownership of a cocoa farm situated on that land. Per these, one could construe that laws in Ghana do not see land (spatial unit) ownership as just related to the surface (2D) of land but recognise it as a 3D object. Hence, ownership extends beyond the ownership of just the surface to entail the volume of space above and below the surface of the land (or water) together with anything affixed to that volume of space. This should be captured in the land registration. In this study, each requirement (R) will be numbered.

R 1: Country profile applies to the territory of Ghana – including marine environment and space above and below the land.

R 2: The profile should include an option for 3D partition of space.

In Ghana, the real ownership of land (allodial and freehold interest) is in the hands of a few entities party Type (stools, skins, clans, families, individuals and the state). This is validated by Article 267 of the Constitution. Except, scanty individual land acquired mainly through adverse possession. All other recognised rights in land (leasehold, usufructuary etc.) are use rights, to use land for a fixed term, originating from the ownership rights of these entities.

R 3; Basic administrative unit (BAUnit) type that could be subject to registration are: public space (see section 145 of Act 925); In Act 1036, any unclaimed land (per section of 90(c) of the new Act 1036), Stool lands (Section(s) 9(1)), Skin lands (s9(1)), clan lands (s9(1)), family lands (s9(1)), group lands (s13(1)), common land (19(4)), public land (s50(12)), lands held by the State in trust (83(2)), and that by operation of law become the property of the State (83(2)), public roads (s90), unregistered land (s105) and vested lands (s269).

4.2. System of Registration of Title In Ghana

The system of registration of title envisioned in Ghana is a Torrens system of title registration. That is, a title is only established on land upon registration in the land register (title by registration). This is validated by sections 103, 123 and 124 of Act 1036, which needs further implementation. The system of title registration in Ghana means, per Section 104 of Act 1036, the land registrar entering the following in the land register: name and other information of the proprietor (party), name and other information of the person granting his or her interest, the interest (RRR) and the information on the parcel (spatial unit).

Title registration in Ghana embraces the curtain principle. As once an interest is entered in the register it cannot be revoked, it is indefeasible (s119 of the Act 1036). Unless an aggrieved party writes to the LC or makes a case in the Law court of falsifications. The decision to cancel an entry in the land register can only be done by the courts (see s118 and s195 of Act 1036). This prevents arbitrary tempering of the land register. Also, the land title registration in Ghana espouses the mirror principle in the law. Howbeit, in practise most of the interests that subsist on land like usufructuary, allodial interest, customary tenancies are not registered. As one respondent narrated:

"land ownership in the Ashanti region is quite interesting in the books right if you are a usufruct, you can register that's in the books but when it comes to practices it doesn't happen" respondent LTRD Kumasi January 2021

The system of title registration in Ghana, per the law, utilizes the guarantee principle. Thus, anyone who suffers an injury caused by the register will be indemnified by the state. Yet in practice, nobody is yet to receive such compensation from the government. A respondent said:
"*I just heard that someone has applied for that (compensation) but prior to that even though that provision was there I don't think anybody has tested it I just heard recently somebody has tested it so I'm yet to find out the outcome of the test"* LTRD Accra January 2021
One can argue that the LTRD is very good at what they do. That is why no one has received such compensation. Whilst another view would be that in reality this provision is not materialized yet. Title registration in Ghana offers static security to one's interest in land. As the court can cancel an entry in the land register acquired through fraud, force and other vitiation factors to uphold the land rights of the original proprietor.
The impediments in title registration lie in the plethoric opulence used to get an interest registered in this system. Because of the sporadic nature of the system, there are no sectional plans for most areas. Sectional plans reduce costs because bulk surveys are less expensive than individual surveys. For instance, applicant A pays surveyor C to pick 4 points of his boundary and his neighbour B at a different time pays Survey D to go and pick another 4 points 2 of which has been picked and plotted already in the system. But B still pays for them to be picked again. In addition, in some cases, the process must be done twice, as title registration in Ghana requires the applicant to produce a cadastral plan inserted in the instrument and another cadastral plan attached to the land certificate. Finally, the cost of publication of the interest through various media outlets increases the expense in Title registration.

4.2.1. Requirements for System of Title Registration in Ghana

The areas declared as land title registration areas (where it works) are the whole Greater Accra region, Kumasi Metropolis and some portions outside the Kumasi metropolis in the Ashanti region and some portions of the central region near Weijia like Kasoa and Awutu. The requirements of the title registration will be provided as this study discusses the data collection process in the LTRD and the SMD of the LC. All of the lengthy code lists or enumeration requirements are in the appendix.
Collection of land tenure information for land title registration in Ghana is done by a legal expert (lawyer) and by a licenced surveyor or a surveyor at the SMD separately. Before an applicant can start title registration at the LC, the applicant must fill an application form, submit a site plan, cadastral plan, and the source instrument (see section 103 of Act 1036). Then the applicant goes for stamping and they are given a 'yellow card', a form used to follow up the registration process at a later date. From here this study will split the process into the three packages of the LADM.
Requirements for Party Package from Land Title Registration in Ghana
The registration officer will need: (see requirements *R 4* till *R 8)*
R 4; The names (as it appears on the instrument) of the parties, their postal address, telephone and/or phone number, and age because infants cannot be registered under this title system (see section 280 of Act 1036).
R 5; The identification (ID) cards of the parties. It can be any national ID. A national ID can be a voter ID, National health insurance ID, Passport ID, Driver's licence and Ghana card.
R 6; The email address of parties, the tax identification numbers (TIN), the digital address, the residential address (In case of a company their registered office address (s 70 of the Act 1036)). It should be categorized as to whether the party is a natural or non-natural person. The citizenship status should be provided, a photo, the reference (the position of the party in their respective institution), the occupation (see mortgage application form), and the biometric details.
R 7; The marital status of the parties: as stated in the law (section 97 (4) and (5) of Act 1036): "*that where a property is acquired during marriage all spouses of the marriage should be indicated as applicant unless contrary intent is expressed on where only one spouse is stated it shall be presumed that the application is done on behalf of both parties spouse's unless contrary intention is stated"*. This is probably to protect women's land rights acquired during marriage.

R 8; The signatures of the parties for some parties the signatures in addition to their stamp, seal, embossment or endorsement. Whether the parties are joints proprietors or proprietors in common
R 9; A party can be a single person or a group of persons.
R 10: Where a party is a single person, these are all the forms a single party can be according to Act 1036 can be natural or non-natural person.
R 11; The party type can be a parcel. An example is the registration of easements (see section 157 of Act 1036).
R 12; Where a party is a group of parties the party group types could be per Act 1036. See appendix 3
R 13; Plus, a group party can be a church, mosque, union, religious institution, organization, community.
R 14; Moreover, the role or capacity of each party to the registration must be present. For example, per section 174(1) of the Act 1036 where a person makes an application on behalf of a deceased party, he must state his capacity whether as an executor or administrator of the estate of the deceased.
R 15; The roles a party can play in registration per the law are listed in appendix 4.
R 16; A single party can be part of the group which is also a party to the transactions. In the registration process, the registration officer extracts these required data as mentioned above from the source instrument (document) supplied by the applicant. This is mostly how the members in the group are identified by the registration officer. However, due to the difficulty in identifying or categorically stating that these are all the members of a specific group like a family. As a respondent said:
"you know in Accra most of these families I would say that the fathers have had children with multiple women, so everybody feels that it is our land" LTRD Accra January 2021.
R 17; The LC has created "family files" for the various stools and families that have clearly and properly been set up to assist them in identifying members of a group. The LC deal with this by relying on the heads of families, principal members and stool occupants who are easy to identify as most of these stool occupants are mostly published in the Gazette. Also, section 15(1) of Act 1036 requires the CLS to provide a list of all persons with the capacity to make grants in their area of jurisdiction of the CLS to the LC. Also, Section 182(8) of Act 1036 requires people to inform the LC in writing when there is a change in chief or occupant of a stool, skin or family or clan heads.
R 18; Share in RRR of a party member in a group is not recorded. Where the shares of the parties are not stated in the source instrument for the registration. The practice is that the LC officers assume that the group is holding the interest either as joint proprietors or proprietors in common in equal shares. For instance, where a group of a mother and daughter are proprietors in common (in a group) for a given interest, the officers assume that the quantum of the share of the mother is ½ and that of the daughter is ½. Howbeit, this practice may garble the true reality of quantum of shares of each party in reality. For example, sections 4,5,6,7 and 8 of the PNDCL 111 shows different quantum of shares the surviving family of a deceased can have as tenants-in-common. It states in section 5 "*(1) Where the intestate is survived by a spouse and child the residue of the estate shall devolve in the following manner:(a) three-sixteenth to the surviving spouse;(b) nine-sixteenth to the surviving child;(c) one-eighth to the surviving parent; (d) one-eighth in accordance with customary law:*….". Therefore, if the current practice is applied to this kind of property, it will misrepresent the reality. So, the share of each party must be recorded. Also, the sum of the share must be equal to 1 as the above example by the law.

Requirements on Administrative Package from Land Title Registration in Ghana

The LADM defines rights as "*action, activity or class of action that a system participant may perform on or using an associated resource*" (ISO, 2012 p.5). Per this, an interest in land can be termed as a right in land. The registrable rights are spelt out in sections 81 and 82 of Act 1036. Overriding interests are also registrable here but it is subject to some conditions (see section 121 (1) and (2)) of the same law. *R 19;* In Act 1036, all the right types that can exist in land are in appendix 5.

Albeit these multifold of rights that a party can have in land listed in appendix 5, it appears that the only one capable or effectively registered in the system of title registration is the leasehold right (including, sublease and assignment) especially in Kumasi LTRD. When asked why, this was the response:

"*Basically, what I have not seen since I started working here at the lands Commission is that the basic interest that is where you say in land in the Ashanti region here is the leasehold interest I think the constitution forbid the registration of a freehold interest I think previously they used to do it but I think the constitution I have forgotten the article so I have not seen anybody registered freehold interest in land in Ashanti region*" LTRD Kumasi January 2021.

Contrary to what the respondent said namely that article 267(5) of the 1992 Constitution the respondent referred to, it bars the creation of freehold interest, but it does not interdict the registration of existing freehold/allodial titles that existed before the coming into force of the Constitution and are still valid.

In Accra, the LTRD registers freehold interests but they do not have a Map of all allodial title holders in the title registration area. As a result, they are finding it difficult to determine the people with the capacity to grant leasehold in the title area. As one person said:

"so, it takes a lot of investigations a lot of hard work to be able to determine among these parties who have the rightful capacity and that has also affected the number of parcels that we have registered and the timelines for registration" LTRD Accra January 2021

Hence, if they had already registered all the people with freehold and allodial interest it would have been easy to identify the people with the right to make subsequent leasehold grants.

R 20; In Ghana, there is no clear obligation for the registration of responsibilities. this could be pinned on the fact that all the source documents for the registration of rights in the system of title registration are some form of contract documents. Hence, the responsibilities are tied to the rights in the form of covenants (express or implied), conditions, undertakings, stipulations, and agreements in the contract documents. Also, they are usually not considered separate from the right itself. As the respondent said;

"*We consider all the three RRRs rights, responsibility and restrictions but for us we have not specified them in a more explicit way, but we cramped everything together*" LTRD Accra January 2021.

R 21; However, it is possible to register just a new responsibility. The party has to prepare a new conveyance or source instrument to include the new responsibility and then submit it for registration. This responsibility can be anything agreed by the parties and the number of responsibilities can any number.

R 22; Therefore, they are indicated in title registers as:

"*subject to the reservations, exceptions, restrictions, restrictive covenants, and condition contained or referred to in a lease*".

R 23; Per the Act 1036 examples of responsibility types that can be registered are in appendix 6.

Restrictions to land in Ghana can be grouped into 8 parts; i) statutory restriction originating from other laws aside from the Act 1036 and the Act 925, ii) planning restrictions imposed by the land use and spatial planning 2016 (Act, 925), iii) restrictive covenants imposed on parties to the transaction in the form of covenants, terms, and agreements in the source instrument, iv) easements, v) mortgages, vi) profits, vii) customary taboos and viii) caveat. These restrictions may originate from different laws however they are covered under Act 1036 in some form.

R 24; Per Act 1036 the restriction types that can exist in land are in appendix 7.

In addition, Act 1036 states that registration must not be done contrary to a planning restriction (see section 117 of the law). The planning restrictions that can be imposed on a parcel are in appendix 8.

R 25; For all the RRR, each RRR is extracted from the source instrument submitted by the applicant. The source document or instrument can be the following according to Act 1036: See appendix 9.

R 26; On these source documents, what must be present in relation to each right, restriction or responsibility to be registered include the following: The consideration paid for the RRR. Consideration should not necessarily be money. For example it could be "*in consideration of love and affection*". The consideration could be paid annually monthly and a specific annuity. An acknowledgement of the receipt

of the consideration, the date of the instrument, the terms, covenants and conditions, whether the title is provisional or substantive, the term of the RRR, date on which the commencement, possession or occupation of the interest began, the description of spatial unit linked to the interest, the type of RRR, the amount of rent to be or paid for the interest, the rent review term, the unexpired terms of the interest of the grantor to see if he/She is capable to make the grant, the unique number given to the source instrument by the LVD after the document has been stamped by them, in terms of a grant on a stool or skin land the date when concurrence was given by the regional LC, and date and time of when the instrument was proved.

R 27; For the case of only contractual licence issued by the LC, in the addition to the above, it should state the use of the land and the length of notice required to terminate the licence.

R 28; In case of the registration of a certificate of allocation issued by the LC in addition to the general on it should state use of land.

R 29; In relation to caveat, where a person writes to the LC to obviate LC from registering on a specific parcel or group of parcels, it should provide the reasons for the caveat in addition to the above.

R 30; With regards to a restriction by a court as in section 191 in Act 1036; the term of restriction be for a given period of time, until the occurrence of a particular event or until the making of a further order in addition to the above.

R 31; For easement, the instrument should specify the type or nature of the easement, express easement, prescriptive easement, implied easement or easement by necessity in addition to the general requirements

R 32; For the registration of profits: the nature of the profit, whether the profit is in gross or appurtenance to other lands, whether the profit is enjoyed by the grantee only or by the grantee and grantor in common.

R 33; For mortgages, in addition to the general requirements above, the amount of the loan, the interest rate of the loan, the repayment schedule of the mortgage (for example every month and the like). And the amount of money paid on such times. For the mortgage types see appendix 10. Also, before a mortgage can be registered, the right which has been used as a security for the loan must be registered first.

R 34; When the registration officer is satisfied with the source instrument, a file is opened for the instrument. The file is given a unique lodgement number. This is used to track the instrument until a certificate is issued. The attributes of a lodgement file commonly called a jacket file are the lodgement number, the supplementary number, name of the applicant, receipt number and registration number when the rights from the source instrument are registered. After registration, the file is put in a box and stored in the records room. The box is called record centre box. The attributes of this box are the code number, consignment number, box number and location number. Together with the lodgement files attributes of an instrument, they are used to locate any instrument in the records room.

During registration, the details of the interest are entered into the land register where each registered parcel has its own folio. The collection of folios for all registered parcels is the land register. The land register is divided into different volumes. For instance, a volume could have 100 parcels. Within each volume, there are folios like a page. On each folio, there can be various entries of registered interests on that parcel and each entry has a registration number.

R 35; Each registered interest has a volume number, referring to a part of the register, for example, volume 2. Also, each registered interest has a folio number, thus what page example volume 2 folio 40. Each registered interest has an entry number for example volume 2 folio 40 entry 1 is a leasehold between Mr. Okyere and Chief Derick. If Mr. Okyere takes a mortgage from Boateng Bank plc. The mortgage interests will be registered in volume 2 folio 40 entry 2. Each of them will have a different registration number. Thus, each transaction has a unique registration number. Finally, all registered interests have a unique certificate number. The certificate number is a counter of the number of certificates issued by the LTRD in a given title registration district.

R 36: On each register or folio, there is has the date of the instrument, nature of the instrument, date of registration, price paid, remarks on the entry, land title registry district name, Reservations, issuance date of certificate, serial number of the certificate, official notes, date of valuation, valuation amount, remarks on the valuation. On the encumbrance (Restrictions): the land part where it affects, memorials, folio reference number back and frontside and remarks on the restriction (encumbrance).

Requirements on Spatial Unit, Surveying and Representation Package from Title Registration in Ghana

R 37; For the current system of title registration in Ghana, the fabric is parcel. Only 2D polygons are can be registered. Howbeit, there are protocols in place for the registration of 3D objects like multi-storey apartments. The spatial units that are registrable in the title are a parcel and a building. The building types capable of registration are the floors of apartments, condominiums and multi-storey buildings. To start with the collection of spatial information, it is important to note that at the beginning of this chapter it was stated that, the applicant must have a source instrument, a site plan and a cadastral plan.

R 38; The site plan is an extract of the approved layout prepared by planners of the area. The subject parcel must be edged red on this plan. This is required by law before a party can alienate an interest in land to another party unless the conveyor can prove to the intended buyer that the area has been zoned or the parcel falls within the zoning scheme of that area (see 96(1) of Act 925). The way to observe this is to attach a site plan to the source instrument and the cadastral plan. On the site plan, only the parcel appears even if it is a registration of a building. On the site plan each parcel has a street address (alias locally as plot number) derived from the computerised street addressing system produced by the district assemble where the parcel is located. For example plot 7 Agyeiwaa crescent. It also shows, the locality of the parcel, for example '*old Boase'*, the district (MMDAs) where the parcel is located like '*Atwima Nwabiagye'*, and then the region, for example, '*Ashanti*'. The areas of the parcel are in acres and sometimes in hectares. The area type here could be surveyed area but is mostly estimated. For example, it is common practice in most areas that if a person gives you one plot it is assumed that the area is 0.25 acres, but the area might be different if a rigid survey is done on that parcel. Also, some land professionals (mostly valuers) use scale rule to measure the dimensions of a parcel on this plan as they are mostly drawn to scale (usually at 1:2500), geo-referenced (grid lines mostly indicated) and oriented (show the north arrow). With these, they could calculate the area of the parcel on the plan Note that the subsequent mention of a site plan in this study refers to a parcel with all the attributes to avoid repletion.

R 39; Furthermore, the cadastral plan must be attached to the instrument before it is submitted. This plan must be prepared by licenced surveyors, the private wing of the SMD. It is the only accepted legal survey document that can be attached to a source instrument for registration per the legislative instrument (LI 1444) to show the boundaries of the land relating to a specific instrument. The applicant gets the site plan from his grantor and, takes this plan to a licenced surveyor and engage his or her services. The licenced surveyor will go to the SMD to collect a regional number (name in Kumasi) or cadastral number (mostly used in Accra). This number is unique for any survey work done in Ghana. Every spatial unit has a cadastral or regional number. For example, a cadastral number in Accra could be SGGAD0001/2021. The format is such that 'SG' means survey of Ghana followed by the region where the survey work was done, here 'GA' means greater Accra. There is an alphanumerical character attached to the number that starts from A. When the number reaches 'C9999' it moves to the next character; 'D0001'. Then the final part is the year: '2021' here.

R 40; With the cadastral number the licenced surveyor goes to the field with the client. The cadastral survey method used is a direct method thus GPS receivers are used for the cadastral data acquisition. The use of Total station for cadastral surveys is banned. The use of plane table and compass surveying methods are not accepted. In the field, the client shows the boundaries of their parcel in the presence or absence of the owners of the adjoining parcels. This depends on the area. For instance, in developed areas,

it is likely to meet the neighbours. In contrast, for a developing area (dubbed as new sites) is unlikely to meet any neighbours. With the information of the client, the licenced surveyor knowing his/her reference or base or station (reference point). It is based on national paramic control and trig stations normally around the offices of the SMD. The licenced surveyor uses the differential mode to conduct a GNSS survey. The surveyor takes 3 GNSS receivers, makes one a base station and the other two rover stations. Then they observe points: the time needed per point depends on the quality of the GNSS receiver and distance from the base station. The surveyor(s) collects the points at the parcel corners in a clockwise manner (standard practice). The licenced surveyor collects a check point after the survey to check the survey. The surveyor can use post-processing system. Real Time Kinematics (RTK) is not accepted because it is difficult to verify the accuracy of the survey by a third party at the SMD office. The required tolerance of error for each point should be 2 decimal places as the respondent said:

"Interviewer; yeah, even with that one (accepted error) in our interview you said its 0.22 something right
Interviewee: yeah I said 0.2 I said 0.02, 0.02" SMD Accra January 2021

R 41; Each point observed is given a unique identifier. For examples "SGGAD0001/2021/1" the format here is the regional or cadastral number plus the order of survey. The '1' means it was the first point surveyed. The licenced surveyor plant monument on each point surveyed. The monument type is a Type C pillar (see LI 1444 for dimensions) with point identifier inscribed on top of the pillar. Subsequent mention of surveying process in this study will mean the process described above.

R 42; The licenced surveyor will convert raw data into Receiver Independent Exchange Format (RINEX) the standard format use by the SMD. Once the licenced surveyor submits his or her result to the SMD, a lodgement file with a unique file number is created at the SMD, the officers at the SMD do the computations and write reports. They produce the diagram of survey and the history of survey. All these documents are kept on the lodgement file of the parcel at the SMD. The quality control officer checks and does quality control on the data in the file. The chief examiner examines the data in the file and approves it. The head of cartography prepares the cadastral plan. Then the file is sent to the director of surveys or his or her representative to sign the cadastral plan. It is taken to the LRTD for publication and collection by the licenced surveyor on behalf of the applicant. This lodgement file is stored differently in Kumasi and Accra. In the Kumasi SMD, the licenced surveyor brings the softcopy of the raw data to CD RINEX. The officers just copy and paste it into original coordinates on the AutoCAD software and hyperlink the documents produced during the file processing described above to drawing on the AutoCAD. The regional number is what they use to retrieve files. In Accra, the lodgement or compilation files are stored in their cubicles.

R 43; The cadastral plan produced by this process shows the attributes of a parcel, such as the locality, district (MMDAs), region of the parcel, the coordinates of each point of at the parcel corners and their corresponding unique identification numbers, the coordinates of the control point and its unique ID. It is signed by the licenced surveyor and director of survey or his representative. The area of the parcel in acre and hectors. This cadastral plan has a barcode in Accra but not in Kumasi. The coordinates should be in the national datum of Ghana called the Ghana War office, bearing and distances of each point in the parcel, street address either by the blocking or the street if it is street name based. Also, the date of the approved layout on which it was based. For this study, any mention of a cadastral plan prepared by a licenced surveyor means a spatial unit with these requirements and attributes.

On provision of the instrument, site plan and cadastral plan to the client access and service unit (CASU). The applicant will be given a letter attached to cadastral plan prepared by the licenced surveyor to be submitted to the director of survey or his/her representative for a parcel plan to be prepared. In Accra, this plan is called a parcel plan where the parcel fall in a parcel area (developed area like Cantonments) or cadastral for parcel in an undeveloped area like Dodowa (for easy understanding and to differentiate this

cadastral plan from the cadastral plan prepared by a licenced surveyor, this cadastral plan will be referred in this study as cadastral plan prepared by the SMD). These plans are prepared by the parcel unit and cadastral unit respectively of the SMD. If the parcel plan is related to the registration of a building it is called a strata plan. On this plan, the surveying process is the same for the cadastral plan prepared by a licenced surveyor. Sometimes the SMD surveyor uses the same data from the cadastral plan prepared by the licenced surveyor to produce the parcel plan.

"sometimes what you will see is that what the client used [cadastral plan prepared by the licenced surveyor] for his deeds registration will be a little different sometimes it shifts from its position" SMD Kumasi January 2021.

"*Like I said the first cadastral plan is just for the instrument but then the cadastral plan is for the certificate you know all these are just checks and balances whereby we wouldn't have forge how do you call it plans in the system*" SMD Accra January 2021.

These were some of the reasons given when asked why 2 different cadastral plans are prepared with respect to same parcel

R 44; On the cadastral plan produced by the SMD the attributes on each parcel are the date of the cadastral plan (date on which it was approved by the director of Survey), the regional number, reference number, CC number, Z number, the coordinates of the points in the parcel, the unique identification number of each point of the parcel, land title registration district number, the surveyed area of the parcel in Acre and hectare.

R 45; Moreover, on a parcel plan for each parcel the following attributes are presented: the section number, block number, parcel number, locality, district number, region, area in acres and hectors, coordinates of each point, the bearings and distance to each point, parcel corner number (like 1,2 etc) with the prefix, Grid name, unit of measure, plan number, CC number, land title registration plan number, date of the plan(date on which it was signed by the director of survey or his/her representative) and registry map number.

R 46; Also, for a strata plan, the existing protocol for registering a building is that the unit is registered as a subdivision on a particular parcel. Hence, it has all the attributes of a parcel plan except the coordinates of parcel corners in this case the building floor plan. Instead, the building footprint is outlined on the parcel. The additional attributes for the building are the strata plan number, the parcel number of the parcel on which the subdivision is done, measurements dimension (in feet) of the building footprint, lot number, unit entitlement number, building block number, remarks, TS. Ref number, sheet number.

R 47; All coordinates referred to a point in the above are in 2D (X and Y). The boundary of the spatial unit can be a general boundary or a fixed boundary by law. But in practice, it looks like only fixed boundaries are used. Where general boundaries are used there should be an indication of the approximate situation of the spatial unit on the plan or map.

R 48; Finally, the cadastral plan by the SMD, parcel plan, or strata plan; and the cadastral plan prepared by the licenced surveyor are attached to the source document. They are stored together in the lodgement file. Before that, the spatial unit is plotted on the land title registry map. This process is done differently in Accra and Kumasi. In Kumasi, the parcel is plotted on the grided sheet (paper-based map). On the grided sheet the certificate number would be indicated for each plotted parcel. The officers have developed an excel database containing the certificate numbers linked to the registered parties. The grided sheet is a 2D map consisting of polygons that have topological measures. They cannot overlap on the map. In Accra, the parcels are plotted on the digital registry map from the enterprise land information system. On this digital portal, the parcel is given the Ghana Land Parcel Identification number (GLPIN). The aim of this unique number is that in the future it will be the one identifier with which all data held by the LC in its 4 division can be retrieved. The format of the GLPIN consists of the coordinates of the centroid of the

parcel and a prefix of the region where the parcel is located. All these registry maps are divided into districts and sections.

4.2.2. Requirements from the enterprise land information system of the LC

The enterprise land information system is a digital system being developed by the LC, the system now is based on the processes of the LC like title registration, stamping, searches and parcel plan approval

R 49; In the system, a case number creates a kind of container linked to an applicant and all the jobs link to that person is given a job number then store in that container. Currently, they are at the initial stage of implementing the electronic lodgement system where a person can lodge PDF copies of the four documents online. Then, the storage procedure described in this study is done manually at the back office. Each transaction has a unique job number linked to a case number.

4.2.3. Requirements for Future Changes in Land Title Registration in Ghana

R 50; The LC plans to conduct an aerial survey of the whole country to produce orthophotos to assist in Title registration. The photogrammetry section is confident that in future aerial and orthophotos will be used to digitize parcel boundaries that are visible on such images, to be used for the preparation of the cadastral plan. as one respondent said:

"is something we have done a research and we have seen that looking at the error we are talking about photogrammetry deriving orthophoto from technology of photogrammetry can be used for land registration" SMD Accra January 2021

R 51 There are plans to establish a 3D cadastre. There are ongoing research works conducted on this topic. Therefore, future spatial source data in Ghana could be from LiDAR, Radar, CAD designs, Stereo Camera, CityGML, Videogrammetry, and BIM designs (Brilakis et al. 2011; Che., 2019; Che & Olsen, 2018; Gröger & Plümer, 2012; Henry et al., 2012; Xiao et al., 2017; Yan et al., 2019). There are efforts to develop the enterprise land information system in order to move completely away from the paper-based system into a digital system. As a part of that, there is the goal to harmonised land tenure data from all the systems of land registration in Ghana in the immediate future.

"*As land commission deeds, title, customary secretariat or whatever they all have a link with us so gradually we also moving forward to gather the data till such a time that we will get it in a central database, and they will access it for their process*" IT lands commission Accra January 2021.

Currently, mobile mapping apps are being used for the valuation data gathering by the LVD. Also, most mobile apps and phones can produce survey data in the RINDERs format required by the SMD. There are expectations that mobile mapping with phones for land registration could be a reality soon

R 52; In the future, there are plans to incorporate these innovative biometric data to improve the identification of parties in the process. Some companies could assist this process like Simprints Technology ('Simprints Technology - Our Solution', 2021.). The biometric data of all-natural persons in Ghana have been collected by the National Identification Authority (NIA) in the Ghana Card project.

"*You see systems go with verification right yes every system goes with verification so in going forward we are looking forward to have fingerprints and anything that we think we can use to do this verification in a more efficient way*" IT LC Accra January 2021.

R 53; Also, there are plans to link the data on land title registration with the digital addressing system.

4.3. System of Registration Deeds

In Ghana, an instrument registered under the system of registration of deeds is sufficient evidence in court. This proves that an interest has actually passed from one party to the other without any additions. Unless the registered deed is proved to be a forgery per section 230 of Act 1036. Also, the transfer of a land right in Ghana has no legal effect unless it is registered under the system of registration of deeds per

the law. The system of deeds operates to provide evidence of a conveyance between parties and it also legally transfers land rights subsumed in that deed document from one party to the other.

The value of the deeds system lies in the fact that it provides security of tenure as registered instruments have priority over any other instruments related to that spatial unit except the judge's certificate. This aids in dispute resolution. The registration of a deed is actual notice of the rights of the registered person to all persons. Deeds registration is cheaper, easy and the first point of documenting most unwritten people-to-land relationships in land in Ghana. Registered deeds aid people to acquire loans. The system of registration of deeds requires the use of clear and fixed boundaries. Because it is a requirement that an instrument can only be registered under this system if a cadastral plan prepared by a licenced surveyor is attached to it. These plans are all approved by the director of survey or (her or his representative), the same person that approves parcel plans used for title registration. The LC has the power to rectify any plan plotted in their record which per the SMD is inaccurate.

If the deeds system really offers security to registered land rights the question one would ask is why do people do title registration after deeds registration? The answer is simple: when an area is declared a title area the registration of deeds ceases. People with registered deeds, must move their deeds to the title system. However, for the first-time applicant, the practice in the deeds registry is that they have what they term plotted cases and registration cases. The registration cases are registrations outside the title declared area. The plotted cases are for areas within the title declared area. Those cases are not registered. They only plot the transaction in their records so that they can have a record of that transaction; not registered so has no legal effect. The reasons for this a respondent said:

"*If you don't have records of that at the deeds registry the records will be scanty at the title registration*" PVLMD Kumasi January 2021.

But it should be noted that the title registration keeps records of all source instruments as discussed earlier. So, the answer to the question is, for first-time applicants in title-declared areas, the LC does not register their deeds at the deed registry. The applicants pay huge monies and use their time for their documents to be kept at the deeds registry which does not give them any legal security. Because the deeds registry is obsolete by law in that area. The overall blemish in deeds registration is that it does not have any guarantee on the registered land rights. The deeds system operates nationwide except title declared areas.

4.3.1. Requirements from System of Deed Registration

In Ghana, the deeds system needs the source documents, site plan and a cadastral plan prepared by a licenced surveyor. First, the study will consider the requirements for the party package, then the Administrative package, and Spatial Unit, Surveying and Representation packages.

Requirements for Party Package from Deeds Registration in Ghana

R 54; The deed registry would require the allotee to provide three basic things. The source document, the name of parties, address and sometimes they take any nation ID (which could be a voter ID card, national health insurance ID, Driver's licence, or Ghana card). If the registration officer identifies inconsistencies in the individual's signature. They also take passport pictures of the parties. A deed is a contract and under contract law, only adults (18 years in Ghana) can enter contracts. They take the age (date of birth). They also need the citizenship status of the person, signature, seal, initials, marking and/or thumbprint of the parties (see 217 of Act 1036). They need to know whether the party is literate or not, see section 209 (2) of Act 1036. A party can be all the party types listed in the previous part of the study. A party can be a single party or a group of parties. If they are a group, the types of groups that can be registered are the same group types already mentioned in this study. But for groups like churches and companies, the officers will require their certificate of registration to verify their authenticity. They also collect their constitution to identify the principal members in the group. For the share in a right of a party member, they only take what has been written on the instrument.

Requirements for Administrative Package from Deeds Registration in Ghana

R 55; The instrument types that are registrable under the deeds registration system are a conveyance (alias a lease or indenture), a vesting assent a certificate of purchase issued by a court, a certificate of purchase, under the borrowers and Lender Acts, 2008 (Act 777), a power of attorney, a caveat or a restriction, a

statutory declaration and a court judgement. These instruments are used to register any RRR. Most of these instruments are contract documents. The officers check for the basic features of a contract: valid offer, acceptance, consideration, capacity and intention to create legal relations. So, the registration officers do not check for any specific features in these documents. However, they check for the date on which the instrument was made, the term of the RRR (example 99 years) and, start date of the instrument.

R 56; After the officer certify that the submitted instrument meets all requirement, the date and time when the instrument is received will be noted, the instrument shall be proved by the parties before an appropriate person. The date and time when it was proved or the registration date will be noted. A file called a correspondence file will be created for the parcel that the instrument relates to. The file moves through the process. When the process is completed, 3 additional copies of the instrument are created: one is given to the applicant: one is sent to the LC head office in Accra: and one is kept on a title file place in a safe place. All subsequent transactions affecting that same parcel will use that correspondence file during it registration. And when it is registered it will be kept on the same title file created for that parcel during that earlier transaction. Therefore, if you pick a correspondence file or a title file of a particular parcel, you see all the transactions that have occurred on the parcel.

R 57; The correspondence file contains all the minutes, letters and other documents generated by the staff of the LC who worked on the file. It has the street address or plot number of the parcel. It has information on the movement of the file within the registry, the file number, and PROP. Number

R 58; The title file only contains registered instruments related to a parcel or plot number. For instance, a leasehold registered on that plot number will be on the title file. A subsequent easement registered will be kept on that same title file. The title file has a title file number (title number) and the plot number of the parcel. These two files are kept on separate shelves in the records room.

R 59; The deeds registry has only one register. The details of a deed will be entered on the deeds register (book). The document number is entered, the registration number is entered, the title file number (title number), and the type of document. The document number is related to a transaction where concurrence or consent has been given by the LC. The format of the document is such that an officer can know the year regions and others from it. "ASH-561-06-2020". The registration number is given when the instrument is plotted, date and time of registration and a description of the parcel is also entered.

Requirements for Spatial Unit, Surveying and Representation Package from Deeds Registration in Ghana

R 60; Three main documents are used in deeds registration. The source document, site plan and the cadastral plan prepared by the licenced surveyor. The spatial units capable of being registered under the deeds system are Parel and buildings. The cadastral plan must be attached to the instrument to show the boundaries of the parcel. However, if it is a subsequent transaction the back must be endorsed by the parties. This spatial unit should have the same attributes as the cadastral plan prepared by the licenced surveyor as already discussed in this study. These documents go through the administrative process on registration they are stored in the tile file and correspondence file. Then the entries are made on the deeds register. The cadastral plan is plotted on the Air sheet. The title number is indicated on the parcel after it has been plotted on the air sheet.

R 61; The air sheet is the deeds registry map. It is a big plan like the planning layout. Usually, it has the site plan of a specific area traced onto it. So, if the parcel on the cadastral plan is matched to that same parcel on the air sheet, the title number is indicated on it. This is called plotting. The air sheet is a map containing polygons of each plotted parcel with topology. There cannot be overlaps on this map. In an area where the site plan has not yet been traced on the air sheet, you cannot register a parcel.

In the registration of buildings, the architectural plans or block plans must be attached to the site plan and cadastral plans. The registration is done by registering the parcel (it gets correspondence file, title file and it is plotted on the air Sheet. Then the building area (like each apartment) is registered as a subsequent transaction between the head lease and the owners of the apartment.

4.4. Deeds to Title Conversion In Ghana

The process of deeds to title conversion in Ghana started in 1986. Per the PNDL 152, upon declaration of an area a land title registration district, deeds registration in that area ceases (see Section 13 (3) of PNDCL 152). Therefore, all existing deeds must be converted into title. Interestingly, the law is silent about the legal effects of registered deeds in an area where the deeds system is supposed to cease. The old process to convert deeds into title is outlined in Sections 11 and 13 of the repealed PNDCL 152. This includes;

1. The declaration of an area as a land title registration district.
2. The land registrar requests all existing parties (both those with registered and those without a registered deed) holding rights, restrictions and responsibilities in respect of any spatial unit within the title registration district to apply, given a clear indication of the boundaries of that spatial unit and make a claim of proprietorship over the subject spatial unit. See Sections 11 (b) and 11 (c) of PNDL 152.
3. The land registrar shall prepare a list (within a specified time) of all the applicants whose claims are backed by unconflicted instruments (deeds). See Section 13 (1a).
4. The land registrar shall furnish all the parties in the list above a notice explaining the intention to register that party as the proprietor of that spatial unit. Then, after the lapse of certain conditions that party will be registered as the proprietor. See Section 13 (1b) and 13 (3).

As stressed in this study, the PNDCL 152 has been replaced by Act 1036. In the new Land Act 2020, this process now include:

1. Before the declaration of an area as land title registration district, a registry map will be created. See Section 85.
2. One year before the declaration of an area as land title district, the registrar shall prepare a list of all parties with an interest in land in the title district supported by instruments that are unconflicted by any other instruments (existing registered deeds holders with no contradictory claims or instruments to that registered deed). See Section 99 (1a).
3. One year before the declaration of an area as a title district or land registration district, the land registrar prepares a list of all parties with RRRs related to spatial units authenticated by deeds which appear to have other conflicting deeds to that deed (existing registered deeds holder with conflicting claim(s) to that registered deeds). See Section 99 (1b).
4. On declaration of an area as a title district, all parties (including those with or without registered deeds) with an interest in a spatial unit located inside the title district are expected to claim their respective spatial units through an application in a prescribed form and within a given time to the land registrar. See Section 97(1).
5. On declaration of an area as a title area, all parties in the list of existing registered deeds without any contrary claims or deeds to that registered deed would be given a notice indicating the intent of the land registrar to register that party as the registered proprietor in the land title register upon the submission of an approved plan by the SMD. See Section 99(2).
6. The land registrar shall examine all claims to spatial units made through application to him/her in step 4 above. This scrutiny is done by comparing the claim made for a specific spatial unit to the existing registered deeds to that same spatial unit. See Section 97(2).
7. Where the land registrar is satisfied with the validity of a claim made in step 4 after the examination of that claim in step 6, the land registrar shall register that RRR of the party with respect to that spatial unit specified in the claim. See Section 97(3).
8. The list of parties in step 2 with existing registered deed without any conflicting claim to that registered deed will be published in the Gazette and a daily newspaper purveyed nationwide. See Section 99 (3).
9. Any objection to the list published in step 8 should be made to the LC within the prescribed time. See Section 99 (4).

10. The LC will register the RRR of all the parties, to their corresponding spatial units, on the list published in step 8 if there was no objection in step 9. If that party submits an approved plan by the director of the SMD to the LC. See Section 99 (5).
11. The land titles issued after this process are subject to 'qualifiers' or overriding interest listed in Section 121 of the Law.

Undoubtedly, the steps that relate to the conversion of exiting deed to title are steps 1, 2, 3, 5, 8, 9, 10. Therefore in an ideal situation, which per this study entails that the LC prepares the registry map within the time stated, where there are no objections after publication, and where the party submits the approved plan immediately after receiving the notice sent in step 5. The minimum time taken to convert an existing deed to title is one year and 21 days. Thus, the 1 year taken to complete the list and 21 days waiting period for objection (See Section 91). However, the time that would be spent on new title claim in step 4 depends on a lot of variables.

Notwithstanding, these clear (client-centred) procedures spelt out in Ghanaian laws, it is surprising to know when Greater Accra was declared a land title registration district, such mass conversion of existing registered deeds to title never happened. As one respondent explained:

"*well from what I heard you the deeds were supposed to be converted into title. But the challenge was the quality of the plans within deeds at a [that] time were not up to standard. So, it was almost impossible to just convert all those deeds straight into title. There should have been confirmation of those plans before the conversion from deeds to the title. That wasn't done and the beneficiaries of the deed registered documents also did not take it up themselves to come forward for that conversion to be done. So as far as I am concerned really that conversion never really took place [happened]…… if you want to confirm this [that a mass deeds to title conversion process did not happen]. You can go to the Accra deeds registry, you can request for a deed there. Then you ask that okay, this is a sample deed. And come to the registry [land title registry] and confirm whether that deed has been registered. And if it has been registered, you look at the time and date of the registration and see whether it was done just at the time when the conversion was supposed to have been done. Then you can have enough information to confirm that whether or not that was the case*." Land Title Registration Division Accra January 2021.

There was a similar story at the Kumasi title registry as one respondent said:

"*Then around 2010 through this small LAP [land administration project], they did something called systematic land title registration system. They picked some bits in the region like Ridge, Patase and some areas that are within the title zone and prepared parcel plans for them. And then they went there, they went to various houses with the surveyors and then invite the applicants to bring their documents [deeds]. The parcel plan, it was prepared at the expense of the LAP. But some people came forward others also did not come. Others did not bring their documents. So, it will be based on the deed that you bring that they will be able to convert it to title for you. Some did not come. So, we still have some parcel plans that were prepared during that systematic title registration still lying in our offices that the applicants have not come*" LTRD Kumasi January 2021.

In practice, the old, registered deeds are converted sporadically, at different times and it is dependent on the party's voluntary decision to convert their registered deeds. Thus, the same process as registering title on a spatial unit with unregistered deeds. At this pace, the deeds to title conversion process could take forever like in the case of England and Australia (Victoria) (Divithure & Tang, 2013).

4.5. Introduction Deeds to Title Conversion in Ontario

The province of Ontario, Canada also operated two land registration systems. There is the deeds system or registry system introduced in the 1700s. It was created by the Registry Act of 1795. The other land registration system is the Torrens title system introduced in 1885. Under this system, the government confers ownership and guarantees that ownership subject to qualifiers or exceptions stated in section 44 (1) of the Land Titles Act 1885 (LTA) (Gainer, 2017; Murray, 2010).

In the late 1980s, the booming economy that existed in Ontario led to an explosive number of property transactions in the province. There were clear indications that the then paper-based land records and workflows used could not cope with the existing demand. Hence, in 1987, the stakeholders got together to

brainstorm on how to automate the system: a broad solution that would streamline, impose consistency and simplify source documents used in the registration processes of the two systems. (Gainer, 2017). As one respondent remarked:-,

"*You know it was being automated so the, …correct me if I am wrong, the first idea was to get things automated. So, we could search thing[s] on the computer. So, you look toward electronic registration as we are at now. The goal was just to get the records automated. In other words, get a database created.*" Registration Services Officer, ServiceOntario-CPVSB-CSD, Ministry of Government and Consumer Services (to be referred to as respondent 1 in this study) January 2021.

They initially estimated that Ontario had 4 million properties that needed to be automated. They estimated that the process would take 10 years for everything to be automated. Also, they were aware that major issues like corruption and informal tenure that always derails such projects, were minimal in the province. They estimated 200 million paper records were to be digitized. Apart from these, they agreed that some skilled personnel would be required to sort out issues on conflicting claims to a spatial unit. They were aware that most existing staff needed to upgrade their skills in order to cope with the new process. They were also aware that most of the staff would lose their jobs due to redundancies. Outside the registry, professionals and stakeholders were aware of the exact impact this new process would have on their business and processes (Gainer, 2017; Murray, 2010).

It was as part of this automated process that the province saw the need to bring all the properties registered in the deeds system to the title system. As one respondent said:

"*it was actually shortly after the first part of automation that we decided to switch from the last registered owner [deeds system] to a certified owner [title system]. So, I believe the first automation was 1988 at the end of that year and soon after. I believe early 1990s, we decided to switch over to a conversion process from registry. [deeds system]*" Operations Manager, CPVSB ServiceOntario, Ministry of Government and Consumer Services (to be called respondent 2) January 2021.

Henceforth, the deeds to title conversion process was added to the broader automation process. The project was called POLARIS (Province of Ontario Land Registration and Information System). Currently, three types of land titles exist in Ontario due to the deeds title conversion processes in the province: the Land Title Absolute, Land Titles Converted Qualified (LTCQ) and Land Title Plus (also called Land Titles Absolute Plus (LT+)) (Murray, 2010).

However, constraints imposed by funding, time, scaling up the entire process to cover the whole province and staff, meant that only 250,000 properties were automated out of the estimated 4 million properties after 7 years (Gainer, 2017). A strategic Public-Private Partnership (PPP) was made with some private companies which are now called TERANET. Strategic, because what is now TERANET at the time of the partnership could develop software, convert records, remodel business process and indeed handle government relations. Eventually, the entire process was completed in late 2010 (Gainer, 2017).

4.5.1. Deeds to Title conversion processes in Ontario

The focus of this study is on deeds to title conversion process, not on the broader automation process in Ontario. As aforementioned, there are three types of titles in Ontario, a product of three different title creation processes. Before the mass conversion process of existing registered deeds to title as part of the automation process, there was only one type of title (now called Land Title Absolute) with one title creation process. (Murray, 2010). Yet, during the automation process, a new process for converting existing deeds to title was tested. This test started with the following preparations:

All the stakeholders like surveyors, conveyers and lawyers came together and produced huge new sets of rules, procedures and business processes. These influenced the enactment of key legislation: the Land Registration Reform Act 1990 (LRRA) and amendments to the Land Title Act 1990 (LTA). These laws provided the legal basis for the entire conversion process. Particularly, Section 32 of the amended Land Title Act gave the parcel register the authority to administratively convert deeds to title without any

involvement or whatsoever from the clients with RRRs to the spatial unit (referred to as Administrative deeds to title conversion process in this study) (Gainer, 2017; Murray, 2010).

This study will look at the 'First application' deeds to title conversion process (Land Title Absolute), Administrative deeds to title conversion process (LTCQ) used during the automation process and finally the process of converting a LTCQ to a Land Titles Plus (LTplus) (or Land Titles Absolute Plus (LT+)).

Firstly, in the '*First Application*' deeds to title conversion process:

1. The subject spatial unit is surveyed.
2. All parties concerned or Owners of the adjoining spatial units to the subject unit are furnished with the application made and survey plan.
3. All parties are given reasonable time to object to the application. Where there is objection provisions are made for a hearing to redress any grievances.
4. A land title parcel is issued outlining the party with RRR to that spatial. Any claims of adverse possession are addressed and upon recordation in the title system, it blocks any ability to bring adverse possession claims with regards to that registered spatial units. See section 51 LTA. (Murray, 2010).

Guarantee of all Land Titles Absolute is subject to qualifiers or exceptions listed in Section 44(1) of LTA.

Secondly, The '*mass administrative conversion of existing deed to title process to produce LTCQ'*. This was created as part of POLARIS and was done internally. There were no land surveys, no publications (no notice to any concerned party), no involvement of parties with the assumed ownership based on existing deeds and adverse possession issues were overlooked (Murray, 2010). As one respondent confirmed:

"*well for us just to be clear Derick, we were actually doing that administratively, internally, so it wasn't through request of a client*." Respondent 1, January 2021

However, the innovative concept here was that anything that was not properly checked, done or verified with regards to party, RRR and spatial unit, was attached to the title as an additional qualifier to the already existing qualifiers listed in section 44(1) of the LTA. Yet, they had clear qualifiers that related to the bulk of the title deeds and limits to types of qualifier allowed. The steps were:

1. Scanning of the paper record to a picture format.
2. Entering data from the image into the POLARIS.
3. A title analyst reviews for errors. Thus, what the title analyst does is that instead of the long process of doing a 40-year search of deeds with unbroken root of title, she/he simply looks for deeds produced from 3 arm's length conveyancing within 10 years subject to conditions. This analysis was best explained by a respondent:

   "*I would take 3 title deeds going back at least 10 years. Making sure that they are 3 independent parties. Probably dealing with each other, we call that a chain of title. And we have to make sure that the chain of title flows properly. Was it dealt with correctly by the lawyers for 3 deeds and at least 10 years back, 3 deeds? If the 3 deeds are within 5 years, you have to keep going back until you clear 10 years. Well, if it's one deed in 10 years, then you have to keep going back until you find 3 deeds or you hit 40 years because sometimes people can own property for 40 years. So, if you hit that point then you say the title is fine. If you have three titles deeds and there is a break in chain, in other words, if you go back from the 2nd to the 3rd and the owners do not match you have to investigate: was there a mistake in dealings or was there a will involved? If we do not know what it is, then like [respondent 1] said we don't convert it*" respondent 2, January 2021.
4. If there is a problem with a deed to be converted to title, per the title analyst, it was given a property identification number, left in the registry (deeds system) and digitized in a spatial database. Again, it would be passed up from the title analyst to the on-site supervisor to TERANET's legal department to the province's Director of Titles for a decision.
5. If there are no problems, thus everything checks out at the title analysis (step 3), it would be given PIN (used to track the subsequent transaction on that property) and the data would be entered into a database (Gainer, 2017; Murray, 2010).

The guarantee that applies to the LTCQ starts from the date and time of conversion. The guarantee of ownership supported by LTCQ is qualified or does not apply to mature claims for adverse possession, boundaries (survey) issues, misdescription, unregistered registry Act leases (leases statutory exempted from registration but protected under the law), Planning Act contravention at the time of conversion and guarantee against dower. These qualifiers are in addition to the qualifiers listed in section 44(1) of the LTA. These 'Qualified land titles' are inferior to Absolute titles produced from the 'First Application' (Murray, 2010).

Moreover, as the project progressed several operational improvements were made. It should be noted that this administration process was done in a digital environment. Initially, the conversion team used to use a separate office close to the registry office at the county level. The paper-based records were moved to this temporal office and conversion was done on-site. Contrarily, this improved with the creation of 'virtual central registry office'. All records at county level were scanned and sent to the virtual registry office for conversion. Only skilled people were involved in this conversion, reducing costs and time (Gainer, 2017).

The conversion team moved from writing on paper to integrated electronic worksheets and DOS. This worksheet reminded the members of the conversion team to enter the required data which on completion were uploaded onto the mainframe. This helped to reduce human errors and omissions.

Another improved operation procedure was that, before the conversion process in a county, the conversion team visited the county in advance. They had dialogs with stakeholders in the county (including the registry office) on their conversion workflow and the stakeholder's views on the unique challenges that might arise in that county. The team applied the conversion process on random land records. The goal was to be able to predict the unique possible issues that could be posed in that county in advance. This assisted the problems to be resolved and a decision to be made that would affect a majority of properties in the county. Before the start of the process, these solutions and decisions from counties had been integrated into a common guide. This guide assisted the conversion team (Gainer, 2017).

Furthermore, they devised the capacity to evaluate the performance of staff. For this purpose, the deeds were categorized based on their level of difficulty to convert to a title (and automate). The difficulty level of the deeds was related to the officer's work quality and productivity. Team managers know their performances correctly and acted on them (Gainer, 2017).

The team developed and improved their quality control mechanisms in place in order to ensure the integrity of the process and the products produced. If they failed and caused injury, the titles assurance fund was there to reimburse the injured party. As one respondent said:

"*you have to understand that when you are dealing with human transactions there is always going to be human errors…. So in the workflow, we had to build a lot of quality checks, quality control and quality assurance……. every once in a while, somebody might put a claim because they have suffered some kind of loss because of an error in the process*" respondent 2, January 2021.

However, given all the above, not all deeds could be converted into titles. They remained in the registry. The fact that they are in the registry serves as a red flag to any party that intends to deal with such land. It is common knowledge that if this administrative process did not result in a conversion of a deed, something seriously is wrong with it. About 35,000 out of 5 million deeds (7%) were not converted.

Thirdly, the *subsequent conversion from LTCQ to LTplus or LT+'*. This process is more of a title-to-title conversion than a deed to title conversion process. This process centers on amending or removing the qualifiers or exceptions attached to LTCQ. It is not always necessary to do this process. This process is done mainly in case of dispute resolution, land development in condos, parcel subdivisions and a party may require an absolute title prior to the advancement of funds to the holder of a LTCQ. The process is divided into parts: the upgrading title and making and perfecting a possessory claim ('Land Titles Conversion Qualified (LTCQ) to Land Titles Plus (LTplus) - Client guide | Ontario.ca', n.d.). The steps of upgrading the title are in appendix 11.

The steps in making and perfecting a possessory claim per system are in appendix 12.

4.6. Lessons Learnt from the Deeds to Title Conversion in Ontario for the Ghanaian Context

Unlike Ontario which had an older deeds registry (since 1795) and almost complete coverage, Ghana has a little catbird seat over Ontario. Ghana's deeds registry is much younger and has less coverage than Ontario. However, Ghana loses this edge the longer this process is allowed to drag on. This means new deeds into the deeds registry which equal more deeds to be converted to title increasing the timelines for the conversion. Hence, given all the losses accruing from this delay stated in various parts of this study, it is about time that Ghana follows in the footsteps of Ontario and administratively converts existing registered deeds to titles. Ghana has legislation enabling the environment to support this process. The caveat here is that if Ghana decides to do that, lessons could be learnt from Ontario.

The registry in Ontario was not full of fraudulent deeds same as in Ghana. This was the *source of confidence* on which they believed that whatever title produced based on deeds administratively converted was going to reflect the land tenure situation on the ground. On *corruption*, the professionalism of the conversion team and *the quality control checks* that were put in place to ensure the integrity of the conversion process. On the part of informal land tenure, there is a lot of it in Ghana. But the edge in Ghana is most of them are unregistered (not in the system). However, the Ontario process dealt with this issue by qualifying or subjecting all titles produced to any adverse possession that could be obtained from informal tenure.

Collaboration and participation led to the formulation of ground rules and workflows that worked. The team picked the brains of all the stakeholders involved. Clearly, the rules could not cover all instances, but it worked for majority of instances (93%) and was accepted and understood by all stakeholders. Also, *collaboration and participation* was a *continuous and decentralized activity* throughout the process.

The *formulation of rules and legislations* :- the administrative conversion process must be without doubt based on the laws of Ghana. As explained, Ontario passed a new law and amended an old law before starting the administrative conversion process. Clearly, the current laws empower the land registrar to issue provisional (qualified) title like the LTCQ in Ontario and state the qualifiers which affect that title issued per Section 112 of the new Act 1036. Hence unlike Ontario, Ghana may not need to enact or amend any laws before it can implement this administrative conversion process. Rules like the *standardization of all records*, rules on *categorizing the complexity of a deed* to be converted, rules on *quality control*, rules *on the establishment and management of land title assurance fund* and *operating guidelines* must be designed.

Furthermore, undertaking the conversion process in a *digital environment* versus in a paper-based environment is a key lesson. Ontario (like Ghana) at the start of the conversion process had a paper-based system. Ontario did the administrative conversion process in a digital environment. This does not mean that the administrative conversion process cannot be implemented in a paper-based system. Unquestionably, the administrative conversion increased the timeline of the whole POLARIS. But, made it more rewarding in the end. Definitely, converting the systems (deed and title) from paper-based to a digital-based system and converting administratively the deeds to title is comparatively simple. Again, conducting the process in a digital environment allowed Ontario to have the so-called '*central virtual registry offices'*. This reduced the skilled labour, travel times and other resources that would have been spent if the team had to visit each of 53 registry offices.

The *time and cost of the process* could not be explained any better as one respondent said:

"*The lesson learnt would be the cost estimation I think we underestimated what the cost would be to the government right. So trying to get that and we collect fees for this. So it is like okay there is a benefit to have it automated [including deeds to title] and we are collecting fees as we go. How do we fit that into the Ontario government budget kind of thing right, we could be through a lot of money at, once TERANET was formed, we could have been given them whatever millions of dollars or a billon dollars. Maybe we would be done 5 years or 10 years sooner. So there is that cost element that I would say have to be cognisant of how long you want this process to take. The more money you throw at it the less time you could take*" respondent 1, January 2021.

Finally, the *administrative deeds to title conversion* workflow itself. This means a workflow to convert a registered deed into a title in Ghana without the involvement of the party, no need for a plan, no initial to

be money paid by the client, no objections and lengthy litigation. This already solves most of the issues in the current conversion workflow in Ghana. This is exactly what the administrative workflow used in Ontario offers. Again, deed registration in Ghana started in 1883 and per the new Act 1036, the land registrar has to find deeds with unbreakable chain of title for each party before they could be added to the list of parties with deeds unconflicted by any other deeds. This is a laborious task, prone to errors and slows specifically in the paper-based system of Ghana if such chains start from the 1880s. The Ontario title analysis part could come in handy for such cases. This workflow may need some tweaks to fit the Ghanaian context of course but it has been tried and it worked in Ontario. It has a part to amend the qualifications on a title.

Requirements from Lessons Learnt from Ontario and Deeds to Title Conversion Process In Ghana

R 62; A party role could be a title analyst.

R 63; A title for RRR can be 'Qualified land title.'

R 64; A 'Qualified land title' has a list of qualifies. These qualifiers can be removed.

R 65; the date of administrative conversion from deeds to title must be stated.

4.7. Introduction to Customary Land Registration System in Ghana

Customarily, Ghana can be said to be a collection of completely different autonomous states like Asante, Dagbon, Wassa Amenfi, Akyem Abuakwah and others. These states had distinct governance structures, languages, laws, religions (gods), moralities, leaderships, customs, traditions and land tenure. This assertion is validated by countless counts by European merchants in the pre-colonial era (Affrifah, 1976). Customary laws used to be the laws of these former states. Knowing what the customary laws are, gives an insight into the bases for the customary land governance and land tenure of that area. Hence, the requirements for developing a LADM solution.

80% of all lands in Ghana are held under customary land tenure secured under customary laws of specific customary areas. These customary laws per the 1992 Constitution of Ghana are part of the binding laws in Ghana. Unlike the statutory laws which are uniform and written, customary laws are unwritten, vary from place to place, and have evolved with no clear indication of which parts of the laws are outmoded. Hence, it is strenuous to know what the customary laws are. This herculean task of knowing the customary law is imperative. One way to know and cognize these customary laws is to look at it now and how it was done in the past using historical accounts in literature.

R 66; the country is divided into various customary (traditional) areas. A customary area could consist of other customary areas. A customary area could be a continuous area or isolated areas that form one customary area. There are 240 diverse customary areas in Ghana (COLANDAF, 2019).

R 67; Currently 38 customary area have their own CLS. However, it is expected that in the future each customary area in appendix 35 (240) will have its own CLS for only that area.

4.8. Customary Land Registration System in Asanteman

The Asanteman is not a tribe, but a single alliance made up of a confederation of different customary areas (of distinct tribes and languages). To know the Asante customary laws (adopted by most other customary areas that used to be vassal states of the Asantes) on land governance and tenure, which dictates how customary land registration is done by the CLSs in Asanteman. This study will digress from land registration, to focus on their social structure. As it is established that *"within the social system lies the legal system which in Asante is not the King, chief, clan, tribe or the individual but the family*" (Rattray, 1929, p. 2).

Historically, the base of what later became Asanteman is a family. A family ('*fiefo*' or house-folk) in Asante is different from a clan ('*abusua*' or Kindred group). The old Asante family consisted of the head of the household, a male called father '*agya'* or housemaster *'fie-wura'* (will be referred to in this study as house father) and others. For the Asantes, everybody automatically belongs to the clan of their mother upon

birth. It is important to note this family, clan and the authority the house father exerted over his family members. The heirloom of the house father, a stool, is a god of the family (Rattray, 1929).

The old Asante society comprised an aggregation of families with their own house fathers whose utterance was law on his family. Similar laws in discrete families on property, inheritance and land ownership became customary law governing that group. The family units came under the house father of a family who presided over issues that impact the families as a collective. This conflation led to unique localities (collection of families) and later a unique autonomous territory (collection of localities) or a state (*'Oman')* or tribes. (Rattray, 1929). The house fathers of the territories became chiefs with their mother or sister as the queen (termed queen mother). The house fathers who were head of localities in his territory became his elders (*'Mpaninfo'* singular *'opaynin*'). Families from the same clan migrated to new areas to form new towns that later became new self-governed territories using this same system. Example, Kumasi was a territory formed by families from the Oyoko clan. The Asanteman was formed when some territories (not all) or tribes like Assumegya, Juaben, Kumawu, Kumasi, Mampong, Offinso, Nsuta and Kokofu allied to fight their enemy the Denkyira. Each locality head and paramount chief was given a military role. This is the origin of the term a divisional chief (*'safohene*'). Before the Feyiase war, Osei Tutu I, head of Kumasi territory was made head of the alliance. After the war, he became "*primus inter pares*": head of the Asante confederation 'Asantehene' (Rattray, 1929).

In summary, the *'Mpaninfo*' also called *'Abirempon'* or *'Birempon' (*singular) now termed caretaker chiefs in each customary area in Asanteman are the Queen mother, Abusuahene, Gyasehene, Okyeamehene and all the Nsafohene (Rattray, 1929).

In Asante, land governance used to be the same as governance. At the confederation level, by making Kumasihene, the Asantehene. Each of the independent paramount chiefs swore an oath of allegiance to serve him. As such, he became the owner of these paramount chiefs, their lands and stools. The customary maxim explaining the above is; all Asantes are all *'Nkoa'* to the Asantehene. '*akoa*' (singular) translates to English as a slave but in Asante is a mere voluntary servitude to a '*wura'* (Master/Owner). The *'akoa'* (slave) is different from *'somfo'*(servant), or '*odonko*'(slave)-This one is derogatory (Rattray, 1929).

Therefore, with social structure and the term '*akoa'* in mind, the customary legal maxim that explains land rights is that whatever belongs to the slave belongs to his master eventually. A more modernized version of this maxim somehow found its way to section 5 of Act 123. Example, the Asantehene is the akoa of god or ancestors, hence he serves god in return god protects his interest. This maxim is capture in an Asante saying that "*Akoa didi men a, na no wura, okom de no a, ne die no afuhye"* meaning *"a slave may eat to repletion while his master remains hungry, but what the slave has is, after all only wind in his[master] stomach"*. This customary law will further be referred to as Slave-Master principle (Rattray, 1929).

This slave-master principle explains why the Asantehene who is not a native of Mampong traditional area is now the allodial title holder of Mampong lands (Mampong paramount chief serves him). This maxim in the old days applied to the slave himself/herself and his/her properties (like land) belonged to the master. However, this customary law has evolved and now it only applies to land (perhaps most people believe so). This customary law is what provided tenure security, through deterrence. Thus, if a person is holding land that belongs to the Asantehene, any force attempt to take the land from that person is an indirect attempt on the Asantehene. This most people did not want hence people have held on to land for generations without any documentation yet had tenure security. This maxim is the basis of current customary holding (Rattray, 1929). However, these families have held these lands for generations, hence most of the current generation are under the illusion that they are owners of the land. In addition, "*In Ashanti law, there are only two kinds of property that having passed to another outright by a sale 'tramma' could again be recovered by the vendor. These were land and persons*" (Rattray, 1929, p. 53). Thus, a sold land could be regained by paying back the '*tramma*' and performing the prescribed customs. This is slightly contrary to the modern view that land cannot be sold in Asante under any circumstances.

4.8.1. Requirements Customary registration system in Asanteman

There are many CLSs in the Asanteman traditional area. In this study, the CLS in Kumasi traditional area was used as a source of data. In brief, customary land registration in Asante is the registration of a contract between three parties. The grantee (the party acquiring the interest in land), the grantor (thus the caretaker chief) and the Asantehene as a confirming party to the transaction. The Asantehene (allodial owner) has delegated this party role to the paramount chiefs '*Amanhene*' of the respective traditional(customary) areas within Asanteman tradition area except for Kumasi where he doubles as the paramount chief.

Furthermore, there are only stool lands in Asante. However, there are vested lands through the Administration of Land Act 1962 (Act 123). The Asantehene is the eventual beneficiary of these lands. Any party holding these inferior land rights, under the slave-master principle, who wants to register in the Manhyia CLS must convert it into a leasehold before that rights would be recognized and registered. It should be noted that the new Act 1036 permits the registration of these inferior land rights.

Requirements for Party Package

The CLS need the following from all party.

R 68; The names of the party as it appears on a national identification card (ID).

R 69; The age of the party (date of birth). Thus, they do not register minors. Because it is a contract and only adults (18 years or older) have the legal capacity to enter into contracts.

R 70; A national ID from the party. A national ID can be Voter ID, NHIS ID, Ghana Card ID, Driver's licence, SSNIT ID, Passport ID.

R 71; The citizenship of the party. *R 72*. A passport picture of the party.

R 73; The party's residential address, postal address and endorsement. This endorsement can be (Signature, marking, thumbprint or/and seal).

R 74; The capacity or party role of that party. A party role type can all the roles listed in appendix 4 in this study. The unique addition here is the role of confirming party and liaison officer.

R 75; The unique additional party role from Asante and afflict customary areas to Asante to be discussed later in this study is the Ohemaa, Konti(re)hene, Omanhene (paramount chief), Birempon, Abusuahene, Twafohene, Adontenhene, Ankobeahene, Kyidomhene, Akwamuhene, Nifahene, Benkumhene, Okyeamehene, Gyasehene, Odikro, Abusuapanin and Asantehene. A party can have more than one of these party roles.

R 76; A party can be a group of parties. A party group type can be all the group types listed in appendix 3. Party member can be identified using all the methods explained earlier in this study. The unique method in Asante is using the 'akoa' and 'wura' relationship. Example:- a nephew (slave '*akoa*') is an automatic party member of the family (now extended family), clan (example Asona), and in the hometown (example Kumasi) of his uncle (master or owner '*wura*').

R 77; the CLS uses the same method used by the LC to indicate the quantum of the share of each party member.

Requirements for Administrative Package

Land tenure in Asante is very simple and straightforward and perhaps unfair. The Asantehene is the only landowner per the slave-master principle and supported by the 1992 Constitution of Ghana. His land right co-exists with the inferior ownership land rights of his subjects on the same piece of land (spatial unit). His subjects down the chain in the social structure recognise his stake in their land which in return protects their stake in that same spatial unit. This relationship has been categorized in modern times as allodial interests, customary or common law freehold interest, usufructuary rights and customary tenancies. All these interests have an unlimited number of years upon being granted. However, this categorisation breakdown or fails to represent the interests of all parties on a typical current Asante family land from the old times under the slave-master customary maxim. See figure 4.1. However contrary to this impression given by modern categorization of land rights, these parties who appear to have no interest in the spatial unit per figure 4.1, in reality, they have interest in the land as explained by one respondent:

"*These families are mostly usufructs, cultivate on the land and then work on the land before the land is actually demarcated into building plots. So they have a format which is always agreed by themselves as to how to dispose of the land which part belongs to the families and which part belongs to the stool and which part belongs to Otumfo[Asantehene]"* Manhyia CLS January 2021

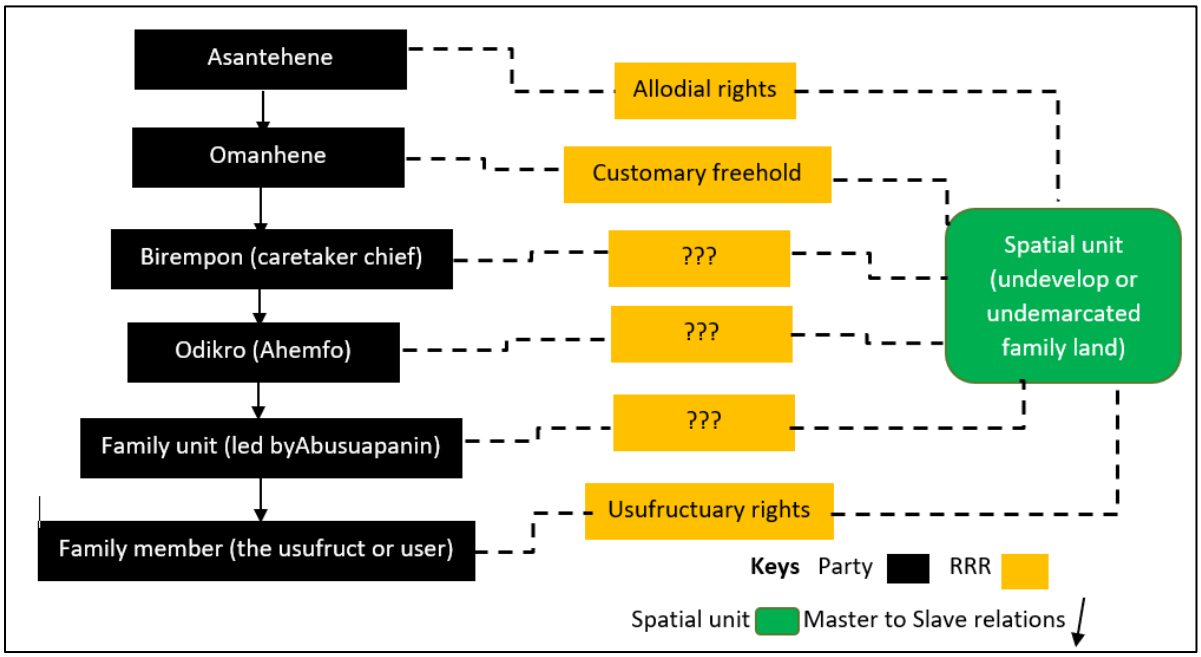

Figure 4.1: An illustration of the master slave relation in Asante linked to the same land.

The above statement is a more simplified version. In Kumasi, the Asantehene is also the paramount chief and there was no Odikro here. But the point is that the Asantehene and other chiefs have a stake in every land under their control. There are transactions in Asante like customary gift, and 'Awowasie' (customary pledges). These were land transactions of the land rights listed in R. 78 (Da Rocha and Lodoh, 1995). Of course, each of these rights consists of a bundle of rights.

R 78; The land rights are allodial interest, customary freehold, common law freehold, leasehold, assignment, Sublease, short term lease, Awowasie (customary pledges), and customary tenancies (*yc ma y3n ky3, Abunu and Abusa)*. However only leases (leasehold, assignment, sublease, short term lease) can be registered at the CLS but this is bound to change after the passing of Act 1036.

R 79; In the Manhyia CLS, there is one document format for preparing a lease document depending on the use of the spatial unit, with sight tweaks on few occasions. Example, all residential leases (lease on land used for residential purposes) have one format in terms of RRR just changes in the parties, time limit and the spatial units. Except for the few tweaks stated earlier which are rarely made. In the lease document, the land use type can be any of the approved land uses in Ghana from the zoning guidelines and planning standards (LUPSA, 2011).

R 80; The responsibility types are in appendix 13.

R 81; The customary restriction types in Asante are in appendix 14.

R 82; The lease document has the same features of a deed explained in R. 26 and R. 56.

R 83; Copies of the lease document, allocation note, site plan and the cadastral plan are stored at the CLS. Each lease registration is given a unique reference number and a volume number upon storage.

Requirements for Spatial Unit, Surveying and Representation Package

R 84; Land parcels are the only registrable spatial units at the CLS. However, for 3D objects like buildings (condominiums), the established practice is that the applicant will add the block plans of the subject building during the registration of the land. He /She will just seek a onetime consent from the chiefs to be able to sublease the various parts of the building.

R 85; The documents accepted showing the boundaries of the parcel are: the cadastral plan, site plan and block plans. Therefore, a land parcel here has the same attributes as a parcel on a site plan and cadastral plan prepared by a licence.
R 86; There is no registry map that provides an overview of all spatial units with registered leaseholds at the CLS. The CLS relies on the government (LC) to know who owns what and where in their own traditional area. Thus, the CLS conducts a search from the deeds or title system before they can know the holder of a spatial unit. As one respondent said:
"*That is why we may prepare a lease today, tomorrow if someone comes to do a transaction on it [that same parcel] we have to go back to the LC because they are always plotting their agreements and transaction on the layout or scheme.*" Manhyia CLS January 2021.
R 87; The CLS currently has its own simple less expensive way to identity customary boundaries without cadastral maps. As already explained, the traditional areas (territory) like Kumasi started as towns, lesser towns and villages. Therefore, the collection of the planning layout/schemes in the town visualise the boundaries of all parcels in that town and the boundaries of that town. The same process applies to a traditional area, thus a collection of planning layouts of towns in that traditional area gives that traditional area. This approach will hereafter be alias, the planning layout cadastre in this study.
R 88; There are blind spots in the planning layout cadastre approach, A town (eg. Mampong) may not have a collection of planning schemes that cover the whole town. Some smaller towns do not have planning schemes at all. Therefore, data on the spatial units are unknown on paper. In fact, a lease document cannot be prepared for such areas. And there many areas like those. A respondent explained:
"*The major problem we encountered in the 2012 mass registration was that because most of the areas were planned but not approved and when an area is not approved you can't prepare leases. A lease is a legal document as the law is saying would have to be registered on the planned and approved scheme.*"
The approach, used to solve these blind spots, is the slave-master relationship. Everybody knows who they serve. The chiefs also know their '*nkoa*'. Hence for these blind spots which exist on paper (but not on the ground), when an official planning scheme is prepared (Akaateba, 2019) the usufruct declares the chief they serve. Then, that land becomes an extension of the boundaries of land under that chief on paper. Also, an extension of the boundaries on paper of the land of a paramount chief which that caretaker chief serves and same up the chain. In events of conflict between parties due to the human element (not always truthful) the Asantehene simply steps in, (remember as house father of the tradition area his utterances are customary law), and he is the allodial owner. This takes most of his time as one respondent said:
"*when you come to Otumfo (Asantehene) and he is adjudicating on issues if its 100%, you take it in the range of 100%, 90% of them are boundaries disputes.*" Manhyia CLS January 2021.

4.8.2. Future Requirements

R 89; In the future, the CLS plans to know the gender balance and age distribution in land ownership in the traditional area. A party can be male or female.

4.9. Customary Land Registration of Dagbon

The Kingdom of Dagbon was established by Yaa Naa Nyagse. Thus, this Yaa Naa and his Army (cavalry) vanquished the native people and installed themselves as the rulers '*dagbandaba*' of the area. It should be noted that the local Tindaanas (landowners) were killed but the institution of Tindaanas was allowed to carry on (Staniland, 1975). The customary structure as explained by a respondent:
"*Our chieftaincy setup is different from how other chieftaincies are been set up and the name sometimes 'Daaris' sometimes doesn't go along with how it is named in English. In our chieftaincy setup, we have the Yaa Naa who is the overall of the entire Kingdom of Dagbon so he is the king of Dagbon. So, he has those that he also appoints like ministers, chief of staff and others. So those that he appoints, they are the paramount chiefs among them there are some who has been appointed by the King who has no other village to appoint subchiefs like divisional chiefs and sub-chiefs there are some among them who has*

large area of control they have villages that they will appoint as divisional chiefs. they also have under them the Sub chiefs to appoint. ……..the Yaa Naa is the King of Dagbon, Those that he appoints are his children we call Yaa Naa Nazugri (Head Chiefs). You see those that the paramount chiefs to appoint we name them as grandchildren of the Yaa Naa called Yaa Naa Bihi and the Sub chiefs would also be named as the great-grandchildren of the Yaa Naa called Yaa Naa Yaasi." Gelkpeogu CLS Tamale January 2021.

This account is consistent with existing literature on the structure of Dagbon (Staniland, 1975). For example, the occupant of the 3 gate skins (future Yaa Naa candidates); Karanga-Naa (mostly spelt Na), Yo-Naa and Mion-Lana will have more power and important roles than other skins like Gushiegu, Tolon, Gulkpeogu, Gundogo and others.

In terms of customary law on land tenure, the Yaa Naa is the allodial owner. As such all the lands are called Skin lands after the heirloom of the Yaa Naa, who sits on the lion Skin. He has delegated the rights to dispose land to the Yaa Naa Nazugri. The customary right to apportions or allocate land, for use by the local people outside Yendi (the capital town), is done by the Tindaana. The allocation is only to use the land, not ownership. Because customarily, selling land outright they believe is not the way of the black Dagomba (first Dagomba people) (Staniland, 1975).

4.9.1. Requirement on Collection Land Tenure Information at the CLS

There are many customary areas in Dagbon, for the purpose of this study the Gulkpeogu CLS was used. The registration at the CLS has been classified into two levels. The chieftaincy level and the government level. The chieftaincy level concerns registration of RRRs involving the sub-chief, the paramount and the applicant. The government level is an extension to the chieftaincy level with registrations involving the paramount chief, the Yaa Naa and the applicant.

The registration process starts when the applicant submits a land allocation document (consisting of a form 'A' and a form 'B') issued by a Yaa Naa Yaansi or a Tindaana (in case of a large-scale allocation a group of sub-chiefs) at the village level. Here, the form 'A' part of the land document will be filled and executed by the applicant and the sub-chief. Upon submission to the CLS, the same details on the 'form 'A" will be copied onto the form 'B' now executed between the Gulkepe Naa (a Yaa Naa Nazugri) and the applicant.

Requirements for Party Package

The CLS want these details from each party:

R 90; Party name, residential address, contact/mobile number and postal address.

R 91; Whether the party is a natural or non-natural person.

R 92; The CLS does not take the ID card of the party.

R 93; The capacity or party role of each party.

R 94; The party role type can be any of the types stated in appendix 4. However, unique additions here are that a party role can be the Yaa Naa, Yaa Naa Nazugri, Yaa Naa Bihi, Yaa Naa Yaansi or a Tindaana. These party role types are present in each transaction.

R 95; A Party can be a group of parties. The party members are identified by the names that appear on the land allocation document form 'A'. Again, the CLS knows all the chiefs that control land in their area.

R 96. The CLS does not indicate the share of each party member yet.

Requirements for The Administrative Package

R 97; The land rights that can be registered at the chieftaincy level is only use rights. One respondent said: "*we only give you the land to go and settle and you cannot use that land to transact any business because they will not. The bank doesn't recognise it unless you lease it before they can use it for any transaction but at the customary level, we only give you to go and build and settle with your family*" Gelpkpegu CLS, January 2021.

At the government level, the CLS only registers leasehold (reasons stated above). A right type here can be a use right (usufructuary right), leasehold (assignment sublease and other leases), freehold (customary or common law) and allodial interest.

R 98; The responsibility types at the chieftaincy level are in appendix 15, at the government level, in appendix 16.
R 99; The restrictions on land at the customary level are listed in appendix 17, at the government level the restriction types are in appendix 18.
R 100; The indenture/lease document is the same as a deed therefore has the said attributes of a deed already explained in section 4.3.1 in this study.
R 101; In terms of the land allocation document three copies are produced. Here, two copies are given to the applicant and a copy is kept by the CLS. This copy is stored in a file designated for the allocation land documents related to a particular town. So, the town has its file earmarked to contain land documents from that area. There is no reference number attached to a land document for now.
R 102; Entries are made into the land ledgers. Thus, there are three land ledgers:- two for the entry of land allocation documents and one for the lease document. The CLS enters in the allocation ledger: the date the document was lodged, the plot number, the name of the community where the land is located, applicants phone number, applicant name, date of allocation, endorsements of the two land secretaries of the CLS and the date of entry. The same information is entered in an excel spreadsheet. This concludes the registration at the chieftaincy level. The government-level prepares an indenture with a cadastral plan prepared by a licenced surveyor and a site plan. The indenture is sent to Yendi to be executed by the Yaa Naa. Upon return, the entries are made in the Lease ledger in the same way as the allocation ledger above.
Requirements for Spatial unit, Surveying and Representation Package
R 103; The registrable spatial unit at the CLS is a parcel.
R 104; The only way of knowing boundaries is a cadastral plan prepared by a licenced surveyor and a site plan.
R 105; The CLS has no cadastral map to show the boundaries of all spatial units (parcels) in the area.
R 106; The CLS has a simple and less expensive method to know customary boundaries without maps. The customary boundaries were determined by their ancestors. They are passed orally from generation to generation. So, every chief knows his boundaries by heart. Again, they have marks (monuments) like old trees, hills, etc. However due to the absence of a map, as one respondent complained:
"*There are still problems to determine the boundaries. There are still arguments because lands are now commercialized so people [are] trying to forcibly show where they're not supposed to claim and there are problems in few parts of the area*" Gelkpeogu CLS January 2021.

4.10. Customary Land Registration System Fieve Customary Area (Ewe)

Fieve customary area is located in South Tongu in the Volta Region. The social structure, customary law, land tenure and customary land registration of Fieve people are straightforward and easy to understand. The Fieve customary area represents one clan of the Ewe people (a larger ethnic group). The Fieve clan has 4 gates '*Kpcnu*'. These gates are called Amegafeme, Afegame, Avagafeme and Afevieme. These four gates are siblings from one great grandfather. Together they represent the clan. Each of these four gates has four representatives '*Kpcnunclawo'* (16 in total). There is a gate head out of these four representatives for each gate. The rest are called principal elders. They represent the interest of their respective gate. Below the ruling class are the families that are part of the Fieve clan and non-indigenous people. Each family has a family head '*fometatc*'.
Moreover, for land tenure, each gate has a group of towns where its people are from that gate. For example, towns like Sogakope, Amegakopfe and Adgoku are from Amegafeme. Therefore, lands are under the control of Amegafeme. The unique feature here is that all the towns under the control of a given gate are not concentrated in one region. In addition, the customary law on land tenure is that the allodial interest '*etcnyenye'* is vested in the Clan. As such, Fieve lands are clan lands. The right to dispose of land (power of attorney) is in the hands of the 16 representatives of the 4 gates. Each land transfer must have the endorsement of one representative from each of the 4 gates. According to Fieve customs land is not a

commodity that can be sold. The types of customary land rights a person can have in Fieve are the Possessory title '*Agbledefe*', customary licence '*Amedzro*', Crop sharing or customary tenancy '*Nujcjc*' and animal rearing business '*Deme*".

The native members of the clan have the possessory title to the land. The non-Fieve people have a customary licence to the land. As one respondent said:

"*so we have people at Abgoquen [spelling might be incorrect] for instance who are not natives but are living on Fieve land as licensees*" Fieve CLS January 2021

4.10.1. Requirements from Customary Registration in Fieve

The registration process starts when the applicant negotiates with the *fometatc* (family head) with the possessory title or licence. This individual would inform the gate head of the Town or area. These parties move to the CLS. The clan through the 4 representatives from the gates grants a lease to the applicant. The clan has an agreement in place to compensate the previous processionary title or licence holder. The CLS issues a receipt and an indenture to the applicant

Requirement for Party Package

From Each party the CLS wants:

R 107; The name, the location of the party, residential address, postal address, whether or not the party is an indigene, if not an indigene, the hometown of the party and the endorsement of the parties.

R 108; The party role type is the same as the ones listed in appendix 4. The unique party role type here are family head '*Fometatc*', and gate representative '*kpcnumetietiewo*'.

R 109; The party type.

R 110; The party group types are the same all the ones already indicated in appendix 3. The unique addition here is that a party group can be a gate '*kpcnu*'. As will be explained below, the CLS knows all the groups that have possessory title and customary license in memory that is how they determine party member of such group. For leaseholds, the CLS only recognise party members whose names appear on the indenture.

R 111; The share of each party member is not stated yet.

Requirements for Administrative Package

R 112; the land right types in Fieve are allodial interest, leasehold, possessory title, customary license, crop sharing or customary tenancy and animal rearing business.

R 113; only leasehold interest can be registered. As one respondent said:

"*Interviewer: so yes if I'm a customary licensee like you talked and I want you to document it how would it be done?*

Interviewee; eei! Who will even document for you? In Fieve you cannot document it [License] you cannot document….. even the possessory title holders cannot document they are not allowed to document. If my family has a land, we can go and carve that out as our farmland. We call it farmland. You are only allowed to farm and build a house if you want to" Fieve CLS January 2021

Part of the reasons why these interests are not registered is because the CLS has a simple and less expensive way of keeping track of all these land rights. Thus, they know all the families and parties that have these land rights. The CLS has close ties with these landholders hence they have all of them in memory. As explained by one respondent:

"*We know all of them, so you don't need any document. By the mention of your name or your family name, we will know where you belong. You don't need any document to support for now that is what we are doing maybe in future it will change*" Fieve CLS January 2021

R 114; The responsibility types in Fieve are in appendix 19.

R 115; The customary restriction types are in appendix 20.

R 116; The RRRs are written in an indenture, a deed. It has the same attributes as a lease See R. 26 and R. 56. Copies of receipts issued are stored however a copy of the indenture produced is not stored at the CLS. The receipt has a unique reference number, the amount paid and the date the receipt was issued. All receipts are stored in a single file.

Requirements for Spatial Unit, Surveying and Representation Package

After the receipt is issued, the applicant is expected to furnish the CLS with a cadastral plan prepared by a licenced surveyor and a site plan.

R 117; The registrable spatial unit in the CLS is a land parcel.

R 118; A parcel in this system has the same attributes as a parcel on a cadastral plan prepared by a licenced surveyor and a site plan previously listed in requirements 38,39,40,41,42, and 43.

R 119; There are no cadastral maps that show all the registered parcels in the CLS.

R 120; The CLS has a less expensive way of keeping track of boundaries without maps. They have boundaries in memory. They use natural features (Monuments) like creeks, trees to mark such boundaries. As one respondent said:

"*Their boundaries they know it by himself and is by heart. The families then the chiefs and the family heads they know it and its by heart. You also know your boundaries where you farm up to and those things. So, they know it by heart*" Fieve CLS January 2021.

4.11. Customary Land Registration System of Gbawe

The origin of the Gbawe Kwatey family was described by a respondent:

"*In Gbawe here, it is that we have because it's family land, it is one person who gave birth to everybody that constitute the family. So, we don't have apart from…. we don't have a different family again*" Gbawe CLS January 2021.

The hierarchy of the Gbawe Kwatey family as per Arko-Adjei (2011) has the family head (high priests) '*Gyaastse*' at top. Followed by, the stool father (principal head or kingmaker), then down to the chiefs, below the chiefs is the '*oshibi*' (chief of defence staff). Then, the '*Asafoatse*', the commander in chief. Next below is the chief linguist. Then finally the Asafo group. The family assists the land board, land allocation committee and the CLS with land management. This confirmed in our interview with Gbawe CLS.

The allodial interest of Gbawe Kwatey land is vested in the family. Therefore, land here is called family lands. The Gyaasetse is the appointed trustee. Accordingly, he is the only person with the authority to give out family land. Aside from this, the only interest a person can have in Gbawe area is leasehold interest. The justification for this is that the constitution of Ghana has barred the creation of freehold interest on family land. Yet, this point is arguable.

4.11.1. Requirements of Customary Land Registration

To start, a party who wants to lease a Gbawe land must submit an application form. This form will be vetted by the land allocation committee. When satisfied, the committee will inform the family head. The grant will be made to the applicant. A surveyor will accompany the applicant to the land to show him/her the land allocated. The applicant will be issued a site plan which upon submission to the CLS a receipt confirming the payment for the land.

Requirement for Party Package

The CLS needs from the party the following:

R 121; The name, Postal address, House number or residential address, digital address number, street name (street address), hometown, email address, business registration number if the party is a business entity, church; registration number if the party is a church and ghana post GPS address.

R 122; The passport picture of the party, if it is a person.

R 123; National ID cards. ID card types are already listed above in requirement 54

R 124; Whether the party is a natural or non-natural person.

R 125 The party role type can be any of the roles already listed in appendix 4. The unique thing here is that a party may be a land allocation committee member, *Gyaastse*, Stool father, chief, Oshibi, Asafoatse, chief linguist, or Asafo member.

R 126; The party type.

R 127; A party can be a group of parties. A group party type can be any of the ones in appendix 3.

R 128; The CLS use the certificate of incorporation collected from a non-natural person to identify the principal stakeholders of that entity.
R 129; The CLS does not state the share of each party member but they want to know if the members hold the property as joint tenant or tenants-in-common.
Requirements for Administrative Package
The CLS like all the other CLSs in this study has a standard lease or indenture format.
R 130; Only leaseholds can be registered at the CLS.
R 131; The responsibility types on Gbawe lands are in appendix 21.
R 132; The types of restriction on Gbawa land are in appendix 22.
R 133; All the RRR are coded in an indenture document and have the same attributes listed earlier in requirements 26 and 56.
R 134; After preparing the indenture, a copy is stored at the CLS. Each indenture is given a unique reference number (file number).
R 135; The information is entered in the land register of the CLS. The attributes that relate to only administrative package of the LADM (other than party and spatial unit) entered in the register are: the Lands commission registration number, land title certificate number, land valuation board registration number, document type (lease, Assignment and sublease), commencement date, date of payable (rent), year of revision (rent), annual rent, file number, lease period, rent payment schedule.
Requirements for Spatial unit, Surveying and Representation
R 136; The spatial units registrable in Gbawe are land parcel and building.
R 137; The CLS accept cadastral plan, site plan and architectural plans. Hence, a spatial unit here has the same attributes as spatial unit in these plans previously explained in requirements: 38,39,40,41,42, and 43.
R 138; There are no unique customary methods for boundary determination in Gbawe.
R 139; The CLS does not have a cadastral map that gives an overview of all registered lands.
R 140; The CLS uses the planning scheme cadastre explained in requirement 87. In Gbawe, they have a planning scheme for the whole area, so there are no blind spots here.

4.11.2. Future Requirements from Gbawe CLS

R 141; The CLS plans to create a property ID in future. The CLS wants to transfer all data on party, RRR and spatial unit onto this ID card. The purpose is to allow easy and quick identification of people with RRR in a spatial unit in Gbawe. Each property card is expected to have a unique property ID number.

4.12. Customary Land Registration in Bolgatanga (Bolga)

The societal structure in Bolga, consists of the Tidanna and members that form the community under that Tidanna. The office of the Tindaana (earth priest) is purely a spiritual office. Thus, he is in charge of human relations with the land god. He has nothing to do with ruling or leading other people
Also, customary law on land tenure in Bolga is such that the Tindaana is the allodial title holder of the area. Because these Tindaana (family line of that Tindaana) were the first settlers of that area they control. The Tindaana acts as the general overseer of his lands and apportions these lands. Moreover, there are the family heads '*Zudaana*'. They hold customary freehold (but this can only be registered as leasehold) on the land. Mostly this freehold was apportioned to that family by a Tindaana in the distant past time hence such families have held the land for generations. The Zudaana are mostly referred to as landlord. Thus, the unique feature on land tenure here is that these landlords can lease out, transfer their lands to a third party, take the consideration (like money) without sharing land or monies with the Tindaana. Thus, they are landowners themselves. However, they need the consent of the Tindaana. Per one interviewee:
"*you know for here, the allodial title owner being the tindaana can have his own piece of land and that is different [from what is owned by the landlords]. Here, you can have somebody selling [leasing] his piece of land [unregistered land] without giving*

that money to the Tindaana. The Tindaana is only caretaker of the land but is not entitled to that piece of the land" Bolga January 2021

The Zudaana could also allocate these lands to his family members only to start their separate farms as farm owners '*Kuadaana*'. They have usufructuary rights on their farmlands as one respondent explained:

"*The Tindaana doesn't live in that house so it is the landlord who is the person to know that 'A' farms on this land and 'A' is from my house and that is my son, that is my niece, it's the landlord who will know that.*" Bolga CLS January 2021.

4.12.1. Requirements from Customary land registration process

The registration process starts with the applicant filling a land acquisition form at the CLS. The CLS officer will follow the applicant to the subject land and investigate the root of title of the grantor with the assistance of the land management committee in that area. When the CLS is satisfied with the outcome they prepare an indenture with the site plan and cadastral plans provided by the applicant.

Requirements for Party Package

R 142; The nationality. *R 143;* Occupation, residential address, email address, gender, name, telephone number and endorsement of the party.

R 144; The role of the party. A party can perform all the party roles listed in appendix 4. The unique thing here is that a party can be a land management committee member, family head (Zudaana), farm owner (Kuadaana), Tindaana and caretaker (Gu'urah).

R 145; The party type. A party type can be any of the listed party types in requirements 10, 11, and 12.

Requirements for Administrative Package

R 146; Right types registrable at the CLS is a leasehold '*Boali*'. Yet, land rights in the area can be allodial interest, customary freehold, customary tenancy and usufructuary rights. The CLS still interviews people to know who owns or uses what and where. A respondent said:

"When *we go to the site, we will have to look for the landowner of the land. The land owner who have to testify whether he is [the] rightful owner of the place…..when we go we don't deal with the farm owner, we have to look for the landlord first. He is the owner of the house*" Bolga CLS 2021.

This shows land rights of the landlords and usufructs (farm owners) are not yet recorded by the CLS.

R 147; The responsibility types are similar to the general responsibility type in appendix 6.

R 148; The restriction types are listed in appendix 23.

R 149; These RRRs are documented in an indenture same as a deed and has the same attributes (see R. 26 and R. 56). This lease is executed by the landlord, Tindaana and the applicant.

R 150; on completion the CLS keeps a copy document in a file created for that community.

R 151; The CLS enters the information on RRR into the land register:- term of the lease, type of grant (use), date of commencement of the lease and expiring date of the lease, date of the lease rent.

Requirements for Spatial unit, Surveying and Representation Package

R 152; The registrable spatial unit at the CLS is a land parcel.

R 153; The CLS accepts cadastral plans prepared by a licenced surveyor and site plans. Hence a parcel here has the same attributes of a parcel as in such plans (see requirements: 38,39,40,41,42, and 43).

R 154; The CLS does not have a cadastral map that shows all the registered land parcels in the area.

R 155; The CLS relies on the land management committee members to keep track of land boundaries in each community without maps. These members know the land boundaries of other community members since they live in that community. For community boundaries, the CLS uses marks mostly natural features as monuments to identify them. Per a respondent:-

"*now they leave landmarks, you know our forefathers they were using landmarks. They were using rivers, they were using rocks, they were using trees as for the tree they can die off. They were using rocks, rivers and so on to demarcate the areas…This is what they use apart from survey coming in.*". Bolga CLS January 2021.

4.12.2. Future Requirements from Bolga CLS

R 156; the CLS desires to have at least a point cadastral map in the near future. They believe this could help them in their operations. They believe, due to the economic status of the majority of the landholders, they may not be able to afford the costs of getting site plans and cadastral plans. However, a low-cost point cadastral map may be within the price range of these landholders. Those point maps could be improved to the current required standard when economics situation gets better.
R 157; The CLS wants to register the interests of the landlord, the Tindaana (already started) and the farm owners in future.

4.13. Customary Land Registration System of Techiman

From the Asante part of this study, not all the territorial states or tribes joined the Asante confederation. Takyiman (Techiman) is one of those states. The royal family unit ('*fiefo*') of Techiman are from the Oyoko clan, the same clan as the Asantehene's family. A long series of clashes has occurred throughout history. In 1723, the Techiman state was defeated and forced to join the Asante confederation as a vassal state (Rattray, 1932). The Techiman state had its independence when the Asanteman was colonized by the British.
Given their historical ties with the Asantes, it is not a surprise that the customary laws on land tenure is the same slave (akoa)-master principle. Further validation of this customary law is in the old Techiman mining agreement (extracted from this statement by Arhin, 1979, p.3): "*The tradition assert that the Asante were permitted to dig for gold on Takyiman land. They sent the gold they obtained to the Takyiman chief who gave them the one-sixth portion given to all Bono-miners.*" Hence, the master owns what belongs to the subject. Currently, it still applies to land in Techiman per (Akaateba, 2019, p.6): "*Within the traditional hierarchy, the Techiman traditional council has come out with a policy that out of every four sub-divided plots, you give the person who is farming [usufruct] on that land one plot. He will either build on it or sell it and enhance his living. Out of the remaining three plots, the divisional chief [caretaker chief] takes one for his own upkeep. Then one goes to the paramount chief for his upkeep and personal expenses. The other one goes to the royal clan family. This is how we divide the land after we have paid the planners and surveying and sub-division of the land (in-depth interview, Divisional chief, 26.10.2015, Techiman)".*
In the above, a divisional chief was describing how an undeveloped land that has been used by a particular family unit for generations is or will be shared between the chiefs and those land users. The Techimanhene is the allodial owner of all lands in Techiman, lands are stool lands. His land ownership right coexists with the inferior land rights of his subjects. Per the policy above he and his family unit have a 2/4 stake in every undeveloped land in Techiman. It is crucial to understand that the other half held by his subjects is only a leasehold with which he has the reversionary interest upon expiration. These relationships have been categorized into allodial interest, customary freehold, common law freehold, usufruct, lease, gift, and tenancy. Akaateba (2019) further classifies these rights as primary and secondary rights. The primary rights are obtained in the past by the people of Techiman without a time limit. They are allodial, customary or common law freehold, usufructuary and customary tenancies. Secondary rights are obtained in more recent times mostly by non-indigenous people with a fixed term. These are leases and tenancies. Current only leaseholds are registrable in CLS. But this should change since the new Act 1036 supports the registration of all these rights.

4.13.1. Requirements from Customary Land Registration in Techiman Traditional Area.

The registration of customary grants is quite simple. The applicant negotiates with the caretaker chief irrespective of whose plot, out of the 4 plots. Because only a caretaker chief allocation chit is accepted by the CLS. The applicant will submit the caretaker chief's allocation to the CLS. They would go to inspect the land and conduct a search at the LC. After all this due diligence, the CLS will issue the paramount chief's allocation chit to the applicant with a site plan. If the party submits a cadastral plan to the CLS a lease will be prepared for the applicant.

Requirements for Party Package

The CLS take these from the party:

R 158; The name, postal address, residential address. *R 159*; a nation ID card.

R 160; a passport picture.

R 161; The party role types are listed in appendix 4 and requirement 75.

R 162; The party group types are the same as the ones listed in appendix 3.

R 163; All party types are the same as the ones in requirements 10, 11, and 12.

R 164; Shares of each party member are not stated but they can be joint tenants or tenants in common.

Requirements for Administrative Package

The CLS has one standard file format for all transactions depending on the use of the land.

R 165; The right types in Techiman are allodial interest, customary freehold, common law freehold, usufruct, leasehold, gift, and tenancy.

R 166; The responsibility types in Techiman are in appendix 24.

R 167; The restriction types in Techiman are in appendix 25.

R 166; These RRRs are documented in the caretaker chief's allocation chit, paramount chief allocation chit and the lease document. The lease document has the same attributes as a deed (see requirements 26 and 56). The unique information on RRR here is the date of allocation.

R 167; These records are entered in 3 books or registers. One book each for the chits and one book for the lease document. The books are used to keep track of the leases issued.

Requirements for Spatial unit, Surveying and Representation Packages

R 168; The spatial unit that can be registered in Techiman CLS is a land parcel for now.

R 169; If the applicant does not proceed to prepare the lease document, a cadastral plan prepared by a licensed surveyor and a site plan is not obligatory. The exception here is land located in an area where there is no planning scheme. The parcel here has the same attributes as a parcel in these two plans (see requirements: 38,39,40,41,42, and 43).

R 170; There is no cadastral map that shows the boundaries of registered lands in the area, of the lands under the control of each caretaker chief and the lands held by usufructs.

R 171; The CLS uses the planning scheme cadastre in place of a cadastral map. This has the blind spot problem and is resolved with the same approach explained in Requirements 87 and 88. A respondent said: "*it is now the current officer from the town and country planning office who was posted to the place has joined hands with a surveyor and they are using drones to map up and get the town layout.*" Techiman CLS January 2021.

4.14. Customary Registration System of the Wassa Amenfi

Historically the Wassa people live in completely different states or territorial areas. Examples of such states were Wassa Amenfi and Wassa Fiase. These states are now traditional areas. the Wassa states had a series of wars where the outcome was the Wassa paramount chief swearing allegiance to the Asante until their independence when the British crushed the Asantes (Affrifah, 1976). Therefore, the Wassa people have a similar social and governance structure like the Asantes. Wassa Amenfi was the focus of this study.

Wassa Amenfi has a paramount chief and caretaker chiefs '*safohene*' below him. Then, the family units. The customary law on land tenure here is the slave-master principle. Thus, all persons in Wassa Amenfi serve or swore allegiance to the paramount chief. Therefore, the paramount chief is the allodial owner of all land in Wassa Amenfi. His land right exists on any land in Wassa Amenfi. As one respondent said:

"*Omanhene [paramount chief] is allodial owner……from the Omanhene we have divisional chiefs [caretaker chief] which they call in Wassa Safohene okay. In Asante we call it Birempon……they are chiefs of their own they have a stool yeah……. then we get to the family head, individual who have interest in the land but not ownership.*"

Moreover, each caretaker chief has a town or an area under them. A caretaker chief assisted by his allocation committee can take, demarcate and allocate lands that have been held by a specific usufruct family for generations.

4.14.1. Requirements from Customary Land Registration Process in Wassa Amenfi

There are two types of customary land registration in Wassa Amenfi. The so-called registration of farmlands and the registration of parcels. The first deals with the registration of the usufruct and customary freehold interest held by Wassa people for generations, before the constitution barred the creation of new freeholds. The registration of transactions or transfers of these rights from one party to another through gifts, inheritance, customary mortgage and tenancies. The second type is the registration of leases, these are eventually registered at the LC.

The registration starts with filling an application form. If the applicant would like to proceed with the second type of registration, the CLS would need a national ID card, site plan, and cadastral plan. Then, the CLS will inform the allocation committee of the safohene in charge of that area to issue an allocation paper to that applicant. Even if that applicant and his predecessors have been occupying that land for generations.

Requirements for Party Package

The CLS needs from a party

R 172, The name, contact number, place of birth, date of birth, gender, passport picture, fingerprint, region of origin, residential address, house number, cell phone number, email address, and age group

R 173; Hometown. Thus, the place of birth of a party may be a town in Wassa Amenfi. Yet that person may not be a Wassa (an indigene). A party's hometown, a place where they are a native, is needed.

R 174; A national ID card. A national ID card type can be any of the ones listed earlier in Rs.5, 54 and 70.

R 175; Nationality, a person can be from any country in the world.

R 178; The party role or capacity. The same as the party role types in appendix 4. The unique addition here is a land allocation committee member.

R 179; The type of party. The party can be any of the party types listed in requirements 10, 11, and 12.

R 180; A party can be a group of parties. The group type can be any of the ones in appendix 3. Party members are identified based on the documents they provide. This can be a business registration document or church members document. The slave-master relation is used to identify people in groups of unidentified members like a community.

R 181; The share of a party member is not stated but it is recorded whether they hold it as joint tenants or tenants in common.

Requirements for Administrative Package

R 182; All the land rights that exist in Wassa are registrable at the CLS. The right types are usufructuary rights, common law freehold, customary tenancies, leaseholds, the allodial title, customary freehold. However, not all these rights can be registered at the LC yet. The new Act 1036 will remedy this case.

R 183; The responsibility types of the landholder are in appendix 26.

R 184; The restriction types in Wassa are in appendix 27.

R 185; The RRRs are coded in lease documents, share cropping documents, receipts, customary law freehold (indigenes) for farmlands documents, plot allocation notes, plot registration forms, land application forms.

R 186; The CLS has one standard document format for each of the document types listed above. In terms of the indenture, the format varies depending on the use.

R 187; The indenture is the same as a deed and has the same attributes as already listed (see Rs 26 and 56).

R 188; The information needed with regards to RRRs by the CLS are:- date acquired, the lodgment date (at the CLS), date registered at the CLS, type of acquisition (customary mortgage, purchase, gift, inheritance or customary tenancy) use of the land, the term or time of the RRR (customary freehold and usufructuary rights have no time limit), cost of the land (purchase price), types of crop (a crop can be any crop), this relates only to customary tenancy, tenancy type (Abunu or Abusa), commencement date, expiry date, drink money, renewal date, nature of interest, annual rent, the valid date for development, file number, date of entry, registration number and allocation note reference number.

R 189; The CLS has two books in use to track the documents that are incoming to and outgoing from the CLS. The CLS has a standard document in a digital format in a digital system. The system keeps a copy of the documents it generates.

Requirements for Spatial unit, Surveying and Representation Package

R 190; The registrable spatial unit is a land parcel. The CLS is yet to face the registration of objects like a condominium. Hence there are no procedures yet for these objects.

R 191; The documents accepted to show boundaries of a parcel is the cadastral plan prepared by a licensed surveyor and site plan. So, a parcel here has the same attributes of a parcel on these plans listed in requirements: 38,39,40,41,42, and 43.

R 192; For the registration of farmlands no cadastral plan and site plan is needed.

R 193; The CLS has no cadastral map to provide an overview of all the parcels registered in the CLS.

R 194; The CLS uses the planning scheme cadaster. Per one respondent:

"*yeah, some of the divisional chiefs have a plan [planning scheme] which combine their total land others don't have but those who don't have, they are use a landmark to represent their boundaries*" Wassa Amenfi CLS January 2021

R 195; So, chiefs use natural features like river as monuments of the boundaries of their lands.

4.15. Customary Land Registration of Akyem Abuakwah Traditional Area.

The Akyem people historically lived in three different states:- Akyem Abuakwah, Akyem Kotoku and Bosome (western Akyem). This study will focus on the Akyem Abuakwah traditional area (Affrifah, 1976). Given Akyem Abuakwah's origins the from Asona clan and were later forced to join the Asante. They have a similar social structure, governance structure and customary laws as the Asante. In terms of social structure:- the Okyenhene (King of Akyem Abuakwah) at the top. Next down the chain are the caretaker chiefs. Below the caretaker chiefs are the regents and finally the family units.

The customary land law is the same slave-master principle where everybody in the then Akyem Abuakwah state serves or swore allegiance willingly *'Akoa'* to the Okyenhene. The Okyenhene is the allodial owner of all lands in the Akyem Abuakwah traditional area. All lands are stool lands. However only leaseholds can be registered. But this is expected to change given the enactment of Act 1036.

4.15.1. Requirements from Customary Registration Process Kyebi CLS

Registration of a leasehold starts with the client being allocated land by the caretaker chief. They submit a cadastral plan and site plan which will be attached to "the deed of stool lease" prepared for the client. A file is then created for that spatial unit. Each CLS officer that works on the file, minutes whatever they did on that file and adds that minute document to the file. The file is stored in the CLS administrative section.

Requirements for Party Package

The CLS needs from the party:

R 196; the name, date of birth, occupation, a national ID card, residential address, Postal address passport picture and endorsement.

R 197; The party type.

R 198; The party role. The unique addition to the party role type listed in appendix 4 is the Okyenhene

R 199; A party can be a group of parties. The group types are the same as the ones listed in appendix 3. The CLS identifies a member of a group based on the members listed in the deed of stool lease. Again, using the slave-master relations. Also, taking the names of the principal member of the group

R 200; The shares of party members are not stated however they indicate with the group hold the land as joint tenants or tenants in common.

Requirements for administrative package

R 201; The right types are allodial, customary freehold, common law freehold, leaseholds, tenancies and usufructuary rights. Each of these consists of a bundle of rights.

R 202; The responsibility types in Akyem Abuakwah are the same as the general responsibility type listed in appendixes 13 and 15.
R 203; The restriction types are similar to the types listed in appendixes 14 and 18. The unique restriction here is that a party is prohibited from building on a land unless that party has a lease on that land. A party that breaks this restriction will pay a penalty to the CLS when they register the land with the CLS.
R 204; RRRs are coded in the deed of stool lease and has the same attributes in requirements 26 and 56.
R 205; Upon registration, the CLS keeps a copy of the deed of stool lease in a file.
R 206; The land tenure information is entered in the register;- the names of parties, size of land, location of land and date of the indenture.
Requirements for Spatial Units, Surveying and Representation Package.
R 207; The registrable spatial unit is a parcel of land *R 208;* The document used to show boundaries is a cadastral plan prepared by licensed surveyor. So, a parcel here has same attributes in R.39,40,41,42, and 43
R 209; The CLS does not have a cadastral map to show the boundaries of the registered spatial unit.
R 210; The CLS uses the planning scheme cadaster. A respondent said
"*if I am in Kumasi and I have bought a land at Tafo, we have their layout, the toposheet to make sure that it does not fall in anybody's land*" Kyebi CLS January 2021

4.16. Introduction To Informal Land Registration System In Ghana

In Ghana, there are various informal land registrations for registering both formal and informal land rights for various purposes. This information is not been fully utilized by the LC. For example, Meridia together with its partners assists farmers to document their rights to their farms. This information may or may not be registered at the LC. Also, the housing the Masses and People Dialogue on Human Settlement collects land rights in various informal settlements. An informal registry where such information could be recorded in the national registry could improve tenure security for all and make maximum use of these data. As one respondent said
"*our biggest challenge in Ghana is that the Lands Commission has their own records and for titles and deeds you have to go through a very expensive process and cocoa farmers cannot afford this. So what is happenings is that there is a whole informal setting [documented land rights but not registered at the LC]…… of course the Lands Commission is afraid that if it starts accepting this kind of documentation it will open the door to all kinds of people mapping land without adhering to the right standard etc. But they also should recognise that the standard they have, makes sense for urban work [but] it doesn't make sense for the farmer in rural villages and so in some sense, they should start to build some kind of database for this kind of more informal and secondary interest*" CEO Meridia January 2021
On the other hand, an informal settlement is any illegal land occupation or non-adherence to building regulations or both (Mesgar & Ramirez-Lovering, 2021). Currently, the land rights of people who live in such settlements are invisible to Ghanaians as if such informal rights do not exist on land. Since they cannot be ascertained from the land registration system. However, such rights exist even the executive secretary of the LC as he said;
"*if we take the Weija road for example, the area between where the old Wejia barrier to where keycell is for example. The whole area was meant to be green. Green because the Weijia works, works is there, so when it overflows that is where it is supposed to pass. That is the pathway. Unfortunately, people just encroached on it and now it is a city and every year when it rains, the water goes there [flooding]. Nobody there has any document covering the land [registered land document]*" The Executive Secretary of the LC Citi Face to Face interview January 2021
Informal land rights exist in Ghana. There are 78 slum settlements in only Accra (UN-HABITAT, 2011). Not recognizing this fact does not make it disappear but it only magnifies the danger and harms all parties involved. Like in the above statement, the LC not registering these informal rights has not forced these informal settlers to vacate from what is unquestionably a hazard-prone area. However, information on who owns what and where could be useful in managing or mitigating their voluntary frequent flooding

problem for now. Till a more permanent solution like a slum clearance (UN-HABITAT, 2011). For this purpose, there should be an informal recordation. Benefits that would be enjoyed by these informal settlers, among which are slum upgrading, planned infrastructure, public buildings etc (Stacey & Lund, 2016; UN-HABITAT, 2011), if their informal land rights are recorded. This recordation of informal rights would benefit the LC and its clients. The LC as the manager of state lands is a victim of informal settlements and this information would assist them in times of relocation and its land management decisions. To their clients, this move would ensure that they could access all land tenure information.
Again, Act 1036 has authorized the President to declare recognition of any area as temporary occupation and use of land if it is in the public interest. These newly created middle point land rights could be an avenue through which informal land rights could be formalized and managed. This stresses the need for informal recordation of rights in informal settlements in advance. In the event that the President declares an informal area a temporary occupation, it will be easy to know the party, RRR, and spatial unit.
Therefore, requirements from Meridia Ghana, the leading player in documenting all land right types in Ghana, would be used in developing the informal land recordation part of the country profile of Ghana.

4.17. Requirements from informal land registration system of Meridia

Meridia's process of documenting land rights is very straightforward. It starts with consultative sessions and consumer awareness training with all stakeholders. The goal is to try to understand the unique land tenure situation of that area. Next, is the integrated land tenure data collection. Thus, a trained paralegal will map the spatial unit with the Meridia App on a tablet and a 3rd party GPS receiver in the presence of the neighbours. From the field, each spatial unit is linked to details on the party and rights collected in the center of the village or town. Those data are collected with custom-made questionnaires.
Requirements for Party Package
For each party Meridia collects:
R 211; Name (first name, middle name, last name, alias's name), National ID card, picture of the party holding a card with a full name written on it, gender, phone number, birthday, hometown, marital status and education.
R 212; Residential address. This can be directions the house of the party, residential address, reference location of the home or take a geo-coded picture of the house of that party
R 213; Number of children, siblings, spouse, co-applicants, digital signatures, farm yield, income level
R 214; The party capacity, party types. The party is can be a single applicant, two applicants, the applicant is a family, the applicants are siblings and applicant children.
Requirements for the Administrative package
Meridia records any land right the client presents. Informal right types per Payne (2001) could be pavement dweller, a squatter tenant, squatter owner unregularized, tenant in unauthorised subdivision, squatter owner regularised, owner-unauthorised subdivision, legal owner unauthorised construction
R 215; Meridia records the root of title through oral history of the land rights of the applicant
R 216; Meridia records testimonials. An attestation of the land rights of the applicant by other people
R 217; Meridia records any restrictions and responsibilities in that area. Thus, through consultation sessions, they become aware of these RRR and assist the people in documenting these RRR
R 218; Meridia prepares the clients for further registration of their rights at the LC. So, the document they issue is indenture. Hence, it has the same attributes listed in requirements 26 and 56.
R 219; Meridia keeps two softcopies of any land document they produce, each with a unique number.
Requirement for Spatial Unit, Surveying and Representation.
R 220; Meridia can register any spatial unit and even trees. These spatial units (if it is land) have all the attributes of land in a cadastral plan prepared by licensed surveyor and a site plan. The addition here is the parcel boundaries accuracy, parcel centroid, parcel altitude, locality, project name, area type (see appendix 35).

5. THE LADM COUNTRY PROFILE FOR GHANA

5.1. Introduction

In this chapter, the proposed country profile for Ghana is presented. It is created using the requirements provided in chapter 4 is provided. Explanations of each package, class, data type, associations, multiplicities, generalizations, aggregations are given and why it has been included in the country profile. Some parts of these explanations are in the appendixes. This thesis will present an overview first and then the party, the administrative, spatial unit packages, the survey and representation sub package and associations between classes in the profile.

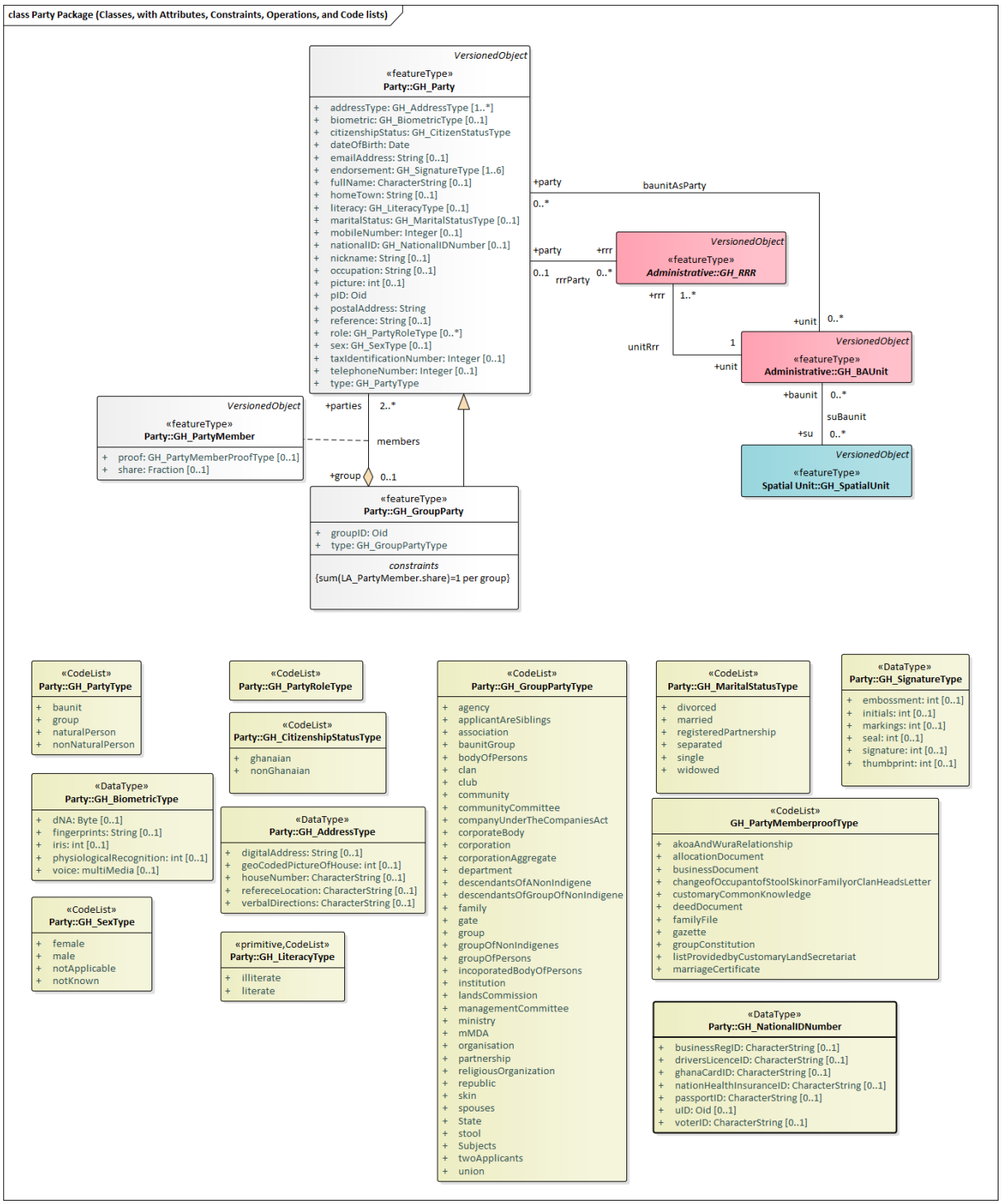

Figure 5.1 The Party package of the country profile

5.2. Overview of The LADM country profile for Ghana

The LADM country profile is organized into 3 packages and one sub package as said in Section 5.1. The country profile supports the registration and recordation of all land right types that exist in, above or below land (both on land and sea) in Ghana. A land right(interest) on a BAUnit in this country profile could be registered under the informal, customary, deeds, title registration systems, all the above simultaneously (current practice) or if it is concerted to a higher level in the tenure security ladder it will be eliminated at the lower lever with timestamps. The country profile further includes the right to minerals and forest resources affixed to the land. These rights in Ghana are separated from the LA setup and organizations (LC and CLSs). They are vested in, the FC and MC for timber rights and mineral (all forms of it, see Act 703) rights respectively.

In summary, this country profile has registers for informal RRRs and all formal RRRs. The formal RRRs registers are the customary registers (kept by CLSs), all the deeds registers (kept by the regional LCs), the title registers (kept by the LC), timber rights register (FC), and the mineral rights register (both MC District register for small scale miners and mineral right register).

This study introduces an innovative feature into the country profile called a qualified title. This was introduced following lessons learnt from Ontario on how to quickly convert Ghana's current paper-based deeds system to a title system. The qualified title feature is not an entirely alien concept in the legal regime in Ghana. The current legal system in Ghana permits the registration of provisional title something similar, if not the same as a qualified title used in Ontario during POLARIS. The emphasis here is on (paper-based) conversion. Because, in the ideal situation where all the land rights are recorded into this country profile, a BA unit in the deeds system can simply be converted to title by changing the attribute (*titleType*) in the GH_BAunit class as will be explained later in Section 5.4.

5.3. The Party Package of the Country Profile For Ghana

The party package consists of GH_Party, GH_PartyMember and GH_GroupParty as main Classes. It also includes GH_CitizenStatusType, GH_SexType, GH_MaritalStatusType, GH_PartyRole, GH_PartyType, GH_PartyMemberProofType, GH_LiteracyType, GH_BiometricType, GH_SignatureType, GH_AddressType, GH_NationalIDNumber and GH_GroupType see figure 5.1.

GH_Party is an adaptation of LA_Party into the Ghanaian context per requirements collected in Ghana. An instance of GH_Party is a party. The GH_Party has the same associations as LA_Party (ISO, 2012) see figure 5.1. The GH_Party has attributes like email address, telephone, and mobile numbers which in other countries would be in the population register. Withal, in Ghana the population register is under development hence they are included directly in the country profile. The hometown attribute is an essential attribute specifically for the CLSs. Thus, in each customary area, the indigenes have more elevated land rights compared to non-indigenes (both Ghanaians and non-Ghanaians) from other customary areas. The term 'hometown' is used in Ghana to refer to the cottage, village, town and city where a party is an indigene.

Again, the attributes 'PID' is a unique ID to be generated for each party automatically. The existing national ID numbers do not meet the criteria of uniquely identifying each party for LA purposes. For instance, the voter ID; only Ghanaians above 18 years have voter ID cards hence cannot be used to identify infants who could be a beneficiary to a land right held in trust on their behalf. Also, Driver's license ID is only for all citizens and non-citizens in Ghana who have the legal right to drive a vehicle in Ghana, not for people that cannot legally drive. But they can hold land hence this ID cannot be used. Again, the national health Insurance ID is only applicable to Ghanaians enrolled in the national health scheme. This excludes foreigners and Ghanaians not enrolled in the scheme hence not suitable. The passport is close to applying to all. But the passport excludes non-natural persons and Ghanaians (most in rural areas) who do not have a travel passport yet can hold interest in land. subsequently, a travel passport ID cannot be used.

Lastly, Ghana Card ID is the citizenship ID card for all Ghanaian and non-Ghanaians residing in Ghana introduced in 2020 by the National Identification Authority (NIA) of Ghana. The Personal Identification Number (PIN) of a Ghana card holder links that person to the NIA database where the full name, date of birth, sex, photograph, height and biometric details (fingerprints, signature, and iris) of that person can be ascertained ('National Identification Authority', n.d.). Hence, this PIN could be used to identify a person and the most required attributes (see Section 110 of Act 1036) of the GH_party would automatically be filled. If at the implementation stage of this model, the GH_Party class is proposed to be linked to the NIA database using the PIN. The small problem with this ID, in terms of using it as the '*pID*' is that non-natural persons and BAUnits (who can be a party to land rights) do not have these IDs. However, each non-natural person and BAUnits have a business registration ID number and uID respectively hence external IDs. Nonetheless, the Ghana Tax Identification Number (TIN) is a unique ID that all persons natural, non-natural, citizen, or non-citizen all other things being equal must-have. Howbeit, most people do not have it yet (due to tax avoidance and evasion reasons). But, in future the TIN could be used as the unique ID number for GH_Party. Thus, a lesson could be learnt from the Netherlands converting Social-Fiscal Number issued formerly by the Dutch tax office '*Belastingdienst*' (Dutch equivalent of Ghana's TIN) to a citizen service number, a unique registration number for all residents in the Netherlands called BSN (burgerServicenummer) ('Generating Test NID Data: Netherlands BSN - IRI', n.d.).
All these national ID numbers notwithstanding their issues for land registration per the requirements above are needed in this model. Hence, the introduction of "*nationalID*". The instance of this attribute can be the ID number of at least one of the above. This study proposes that for natural persons the PIN should be first considered. If that not available, then any of the other IDs see figure 5.1. The tables in appendix 28 explain the contents of the party package of the country profile.

5.4. The Administrative Package of The Country Profile for Ghana

The administrative package of the LADM country profile for Ghana has the abstract class GH_RRR, which has a subclass of GH_Right, GH_Responsibility, GH_Restriction, GH_Mortgage, GH_ContractualLicence, GH_Easement, GH_Caveat, GH_OtherResponsibility, GH_RestrictiveConvenant, GH_UseRestriction, GH_PurposeForWhichTheLandWasGiven, GH_JurisdictionalAndCulturalRestriction and GH_RentPayment. See Figures 5.2 and 5.3. This abstract class is associated with GH_BAunit, GH_AdminstrativeSource and all the other associations including functionalities of LA_RRR (ISO 19152). Since GH_RRR is the Ghanaian version of LA_RRR each RRR has an entry number and registration number used in the title system. Also, each deed document for each RRR is given a registration number when registered in the deeds system. These are added as attributes of the GH_RRR class but none of them can be used as unique ID (Oid) for each RRR in the country profile. Although, they are RRR identifiers in their respective registration systems. The country profile covers deeds, title, customary and informal hence they cannot serve that function. However, they are extremely essential to be used to link each RRR to the paper-based deeds and title system. The tables in appendix 29 give further clarity on the contents of these classes.
Furthermore, the GH_BAUnit is a class in this package adapted from LA_BAUnit in ISO 19152. It has the same associations, association multiplicities and constraints of LA_BAunit. In Ghana, folio number plus volume number are used to identify each BAUnit under the title system. This is different from the title number used for the same purpose under the deeds system. Hence, neither could be used as the ID for BAUnits in the country profile. Yet again, they are included so that the link between the same BAUnit in the country profile and the paper system will not be broken. Also, it makes the profile more legible to people used to the paper system. See figures 5.2 and 5.3.
Besides, the same BAUnit, example a family land, could be a BAUnit recorded in title, deeds, customary informal system or all of these registration systems. In the title registration system, the BA unit may have a provisional title, substantive or good title. Also, the proposed qualified title is introduced by this study for

quick conversion of BAUnit in deeds registry to the title system explained earlier. All these were modelled into the country profile by introducing an attribute in GH_BAUnit called titleType. The presence of this attribute is an innovative way that would allow the easy conversion of a BAUnit from one system to the other. By simply changing the value type of this attribute in a BAUnit instance. For example, a recorded BAUnit as an informal BAUnit in this country profile, for whatever reason, if the responsible authority wants to convert such BAUnit to be a BAUnit under the title system. All that such authority has to do is to change the value of the '*titleType*' attribute to '*SustentiveTitle*' if it is satisfied with the quality of the data on that BAUnit. Just like that, that BAUnit will be registered in the title system.

Finally, the administrative package has the LA_RequiredRelationshipBAunit class and GH_Administrative source class, see Figures 5.2 and 5.3. Detailed explanations of all the classes, data types, code lists and attributes are explained in appendix 29.

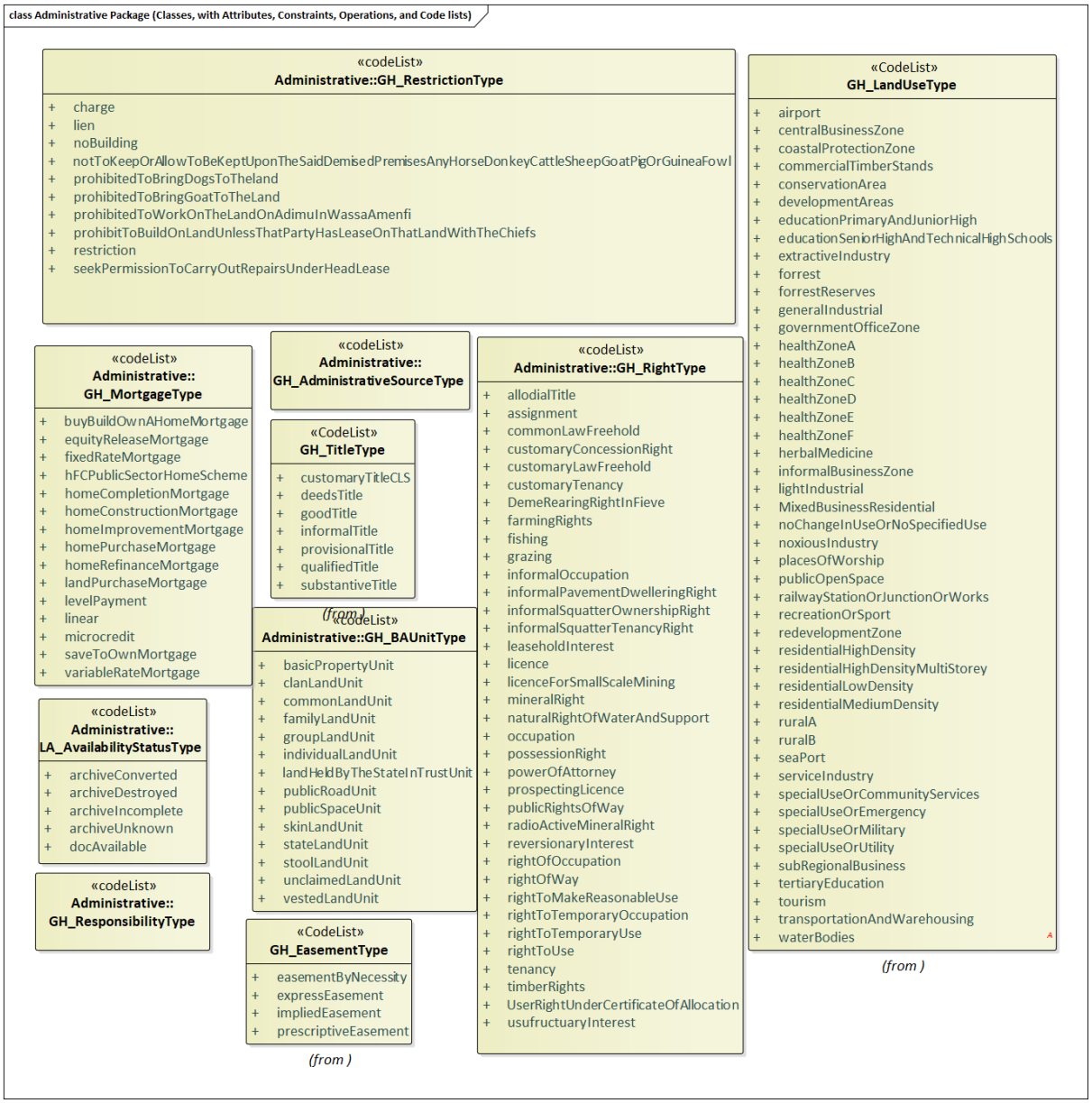

Figure 5.2: The administrative package of the country profile

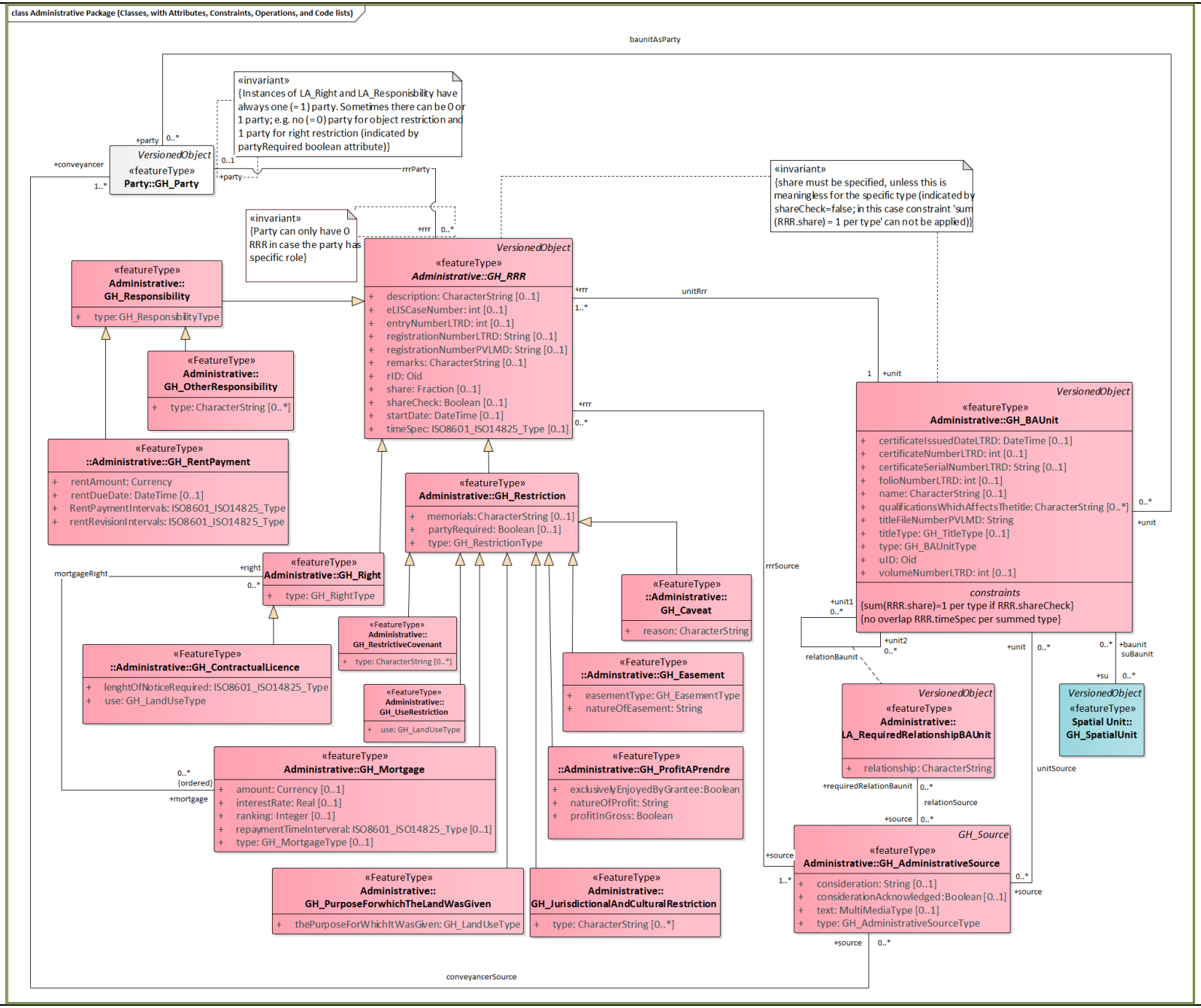

Figure 5.3: The administrative package of the country profile

5.5. Spatial Unit Package

The main class of the spatial unit Package of the country profile is the GH_SpatialUnit. An instance of this is a spatial unit. This could be a parcel of land, building or a utility network see figure 5.4. The GH_SpatialUnit is a root class (not an abstract class) with leaf classes of LA_LegalSpaceUtilityNetwork and GH_LegalSpaceBuildingUnit. See figure 5.4. In Ghana, the combination of block number, district name, land title registration district number, name of the locality, region name, land title registration section number, street address and parcel number (or strata number if the spatial unit is a building) are used to identify each spatial unit under the title system. While, in the deeds registry only a combination of the region name, district name (MMDAs), locality and street address are used to identify a parcel or spatial unit. The same combination from the deeds system is used to identify spatial units in the customary system. Yet, the newly proposed Ghana Land Parcel Identification Number (GLPIN) by the LC could best be the unique ID (Oid) for any spatial unit in the country profile. Albeit all the above are added to the class GH_SpatialUnit so that any spatial unit can always be linked to the paper-based system.

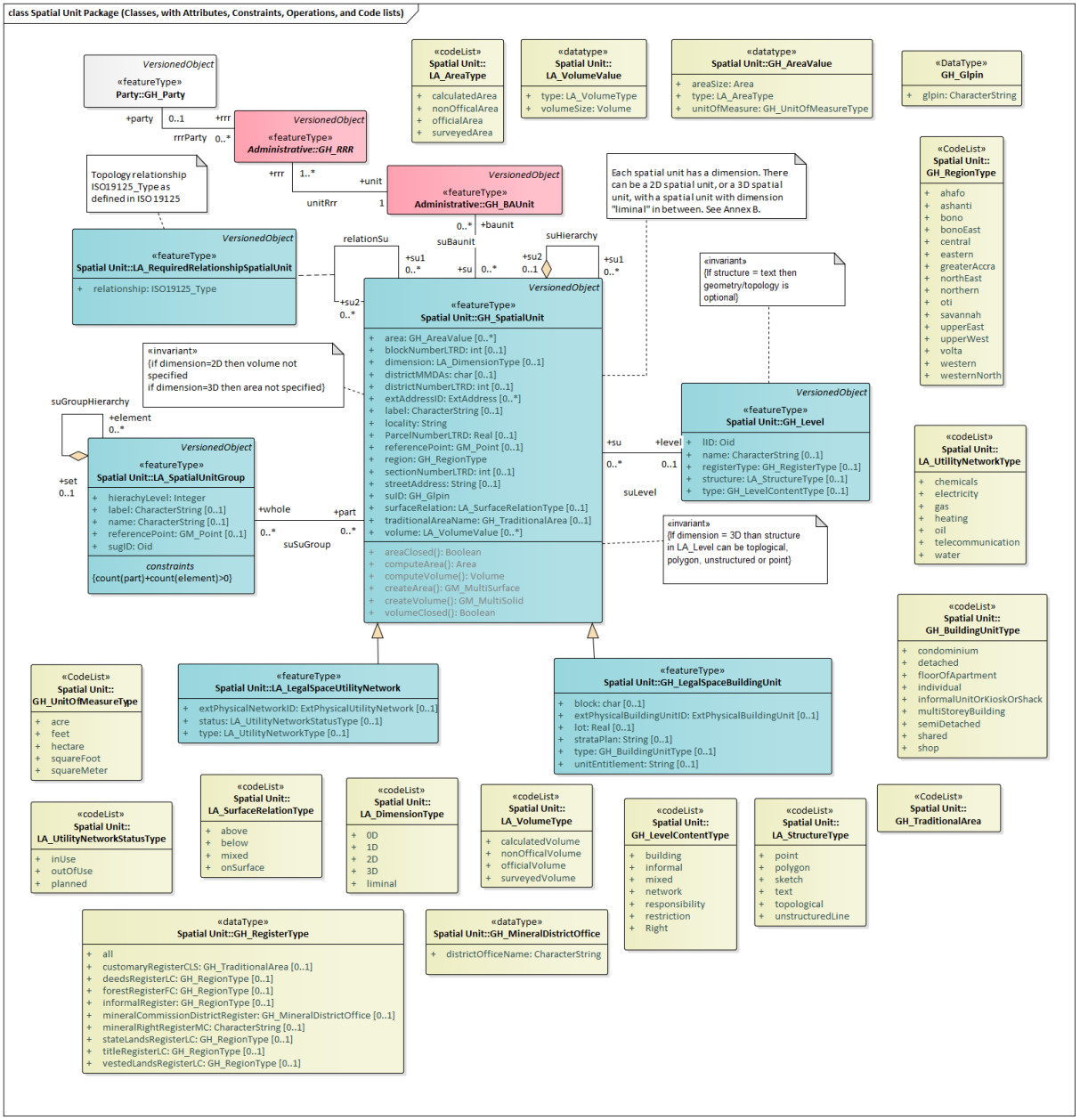

Figure 5.4: The spatial unit package

Moreover, GH_SpatialUnit is linked to class GH_Level, an instance of which is a level. This will enable the customization and segregation of spatial units into various levels as practiced in Ghana. LA_SpatialUnitGroup allows the spatial unit to be grouped into any required group. For example, spatial units can be grouped into towns, blocks, sections, traditional areas and others. See figure 5.4.
Lastly, LA_LegalSpaceUtility is directly copied from ISO 19152 and pasted to the country profile. The rationale; although currently the registration of utility networks is not done in Ghana, the increased installation of underground utility infrastructure for digital communications, the current underground water pipelines and sewages systems suggest that the registration of utility networks would be relevant and needed in future. The detailed explanation of all classes, attributes, code list and data type are in appendix 30

5.6. Surveying and Representation Sub-package

The core classes in the surveying and representation subpackage in the Ghana country profile are GH_Point, GH_BoundaryFaceString, and GH_SpatialSource, See figure 5.6. LA_Point, LA_BoundaryFaceString and LA_SpatialSource respectively are customised to suit the Ghanaian context. LA_BoundaryFace was added but the class was not customized as the digital 3D representation of spatial units is not done in Ghana yet. All the associations between these classes were kept. See figure 5.6.
In Ghana, each boundary vertex point represented in the deeds, customary and title system has a unique identification number. Their format is different depending on the registration system. The deeds and customary system use the same identifier format called beacon identifier. However, in parcel areas under the title system, the parcel corners identifier format used is different from this beacon identifier for each point (see parcel plans). Subsequently, none of these IDs for points can be used in the country profile as point ID. They are added as an attribute to class GH_Point to maintain the link between the paper-based system and the country profile. A separate automatically generated point ID is proposed to be used as point ID in the country profile. The accuracy of each point is collected here.

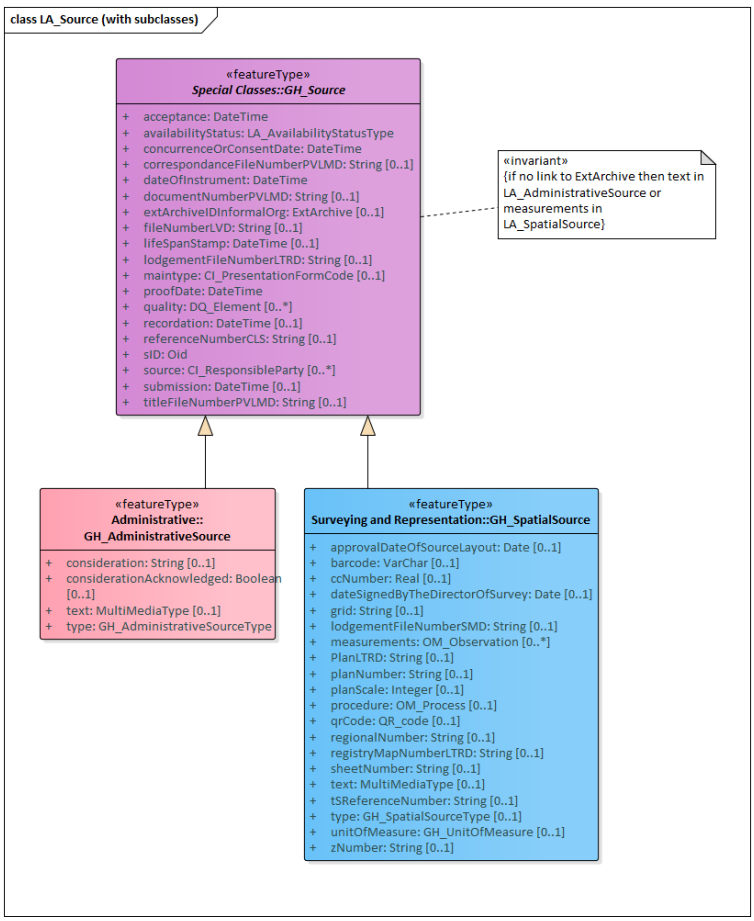

Figure 5.5: The special class, GH_Source (with specialized classes)

For the GH_BoundaryFaceString class, an instance of which is a boundary face string. The approximate situation of that boundary, if it's a general boundary must be known hence modelled into GH_BoundaryFaceString using attribute '*approximateSituation*'.
The boundary face string type is required. A boundary in Ghana could be based on a river, a fixed surveyed boundary etc. (see chapter 4). These are modelled by introducing the *'boundaryType'* attribute which could have an instance as a dynamic boundary, fixed or others (see code list GH_BoundaryType). Appendix 31 explains all the contents of this package in the country profile. See figure 5.5

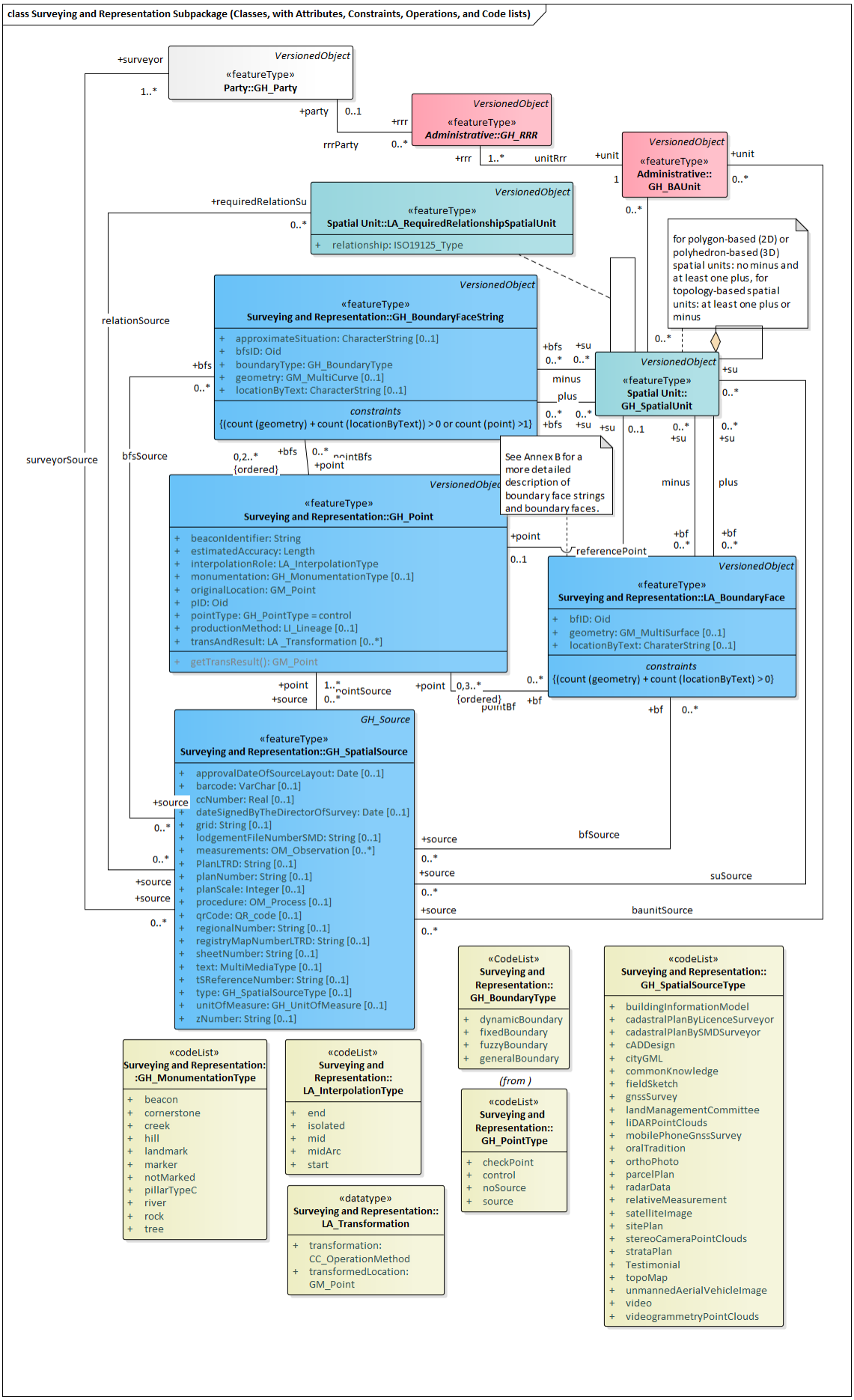

Figure 5.6: The surveying and representation package of the country profile

5.7. Special Classes of the Ghana Country Profile

The special classes in the country profile are VersionedObject, GH_Source, Oid and Fraction see Figures 5.5 and 5.7. *Oid* is used repeatedly in various classes. However, the format of this *Oid* for each class is different. It is proposed to be a meaningless automatically generated alphanumeric value similar to PIN, GLPIN etc formats. This will not harm outside users. Thus, the *Oid* in each class is used in addition to a well-known and understood external ID number of that class. For example, the *Oid* of a GH_Party is used with the PIN of that party. Hence, persons outside the system can always fall on the PIN to get the *Oid*. Detained explanation of the contents of each special class can be found in appendix 32

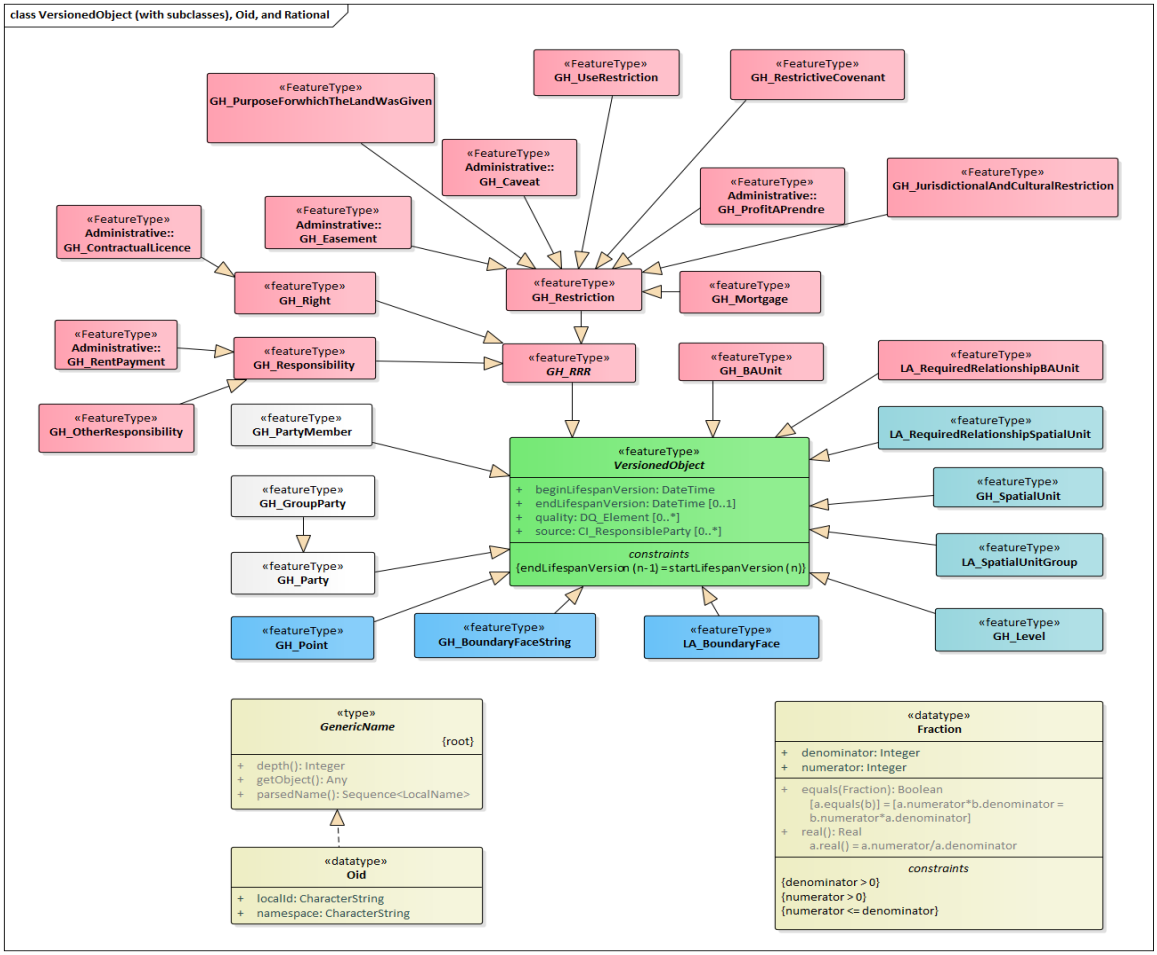

Figure 5.7: The special classes

5.8. Association, Generalization and Aggregation Between the Classes for the LADM Country Profile

All the associations between parties, RRRs and spatial units could be represented in the LADM country profile of Ghana. Generally, the associations and association multiplicities between the classes as in ISO 19152 did not change in the country profile of Ghana. This is because the LADM (ISO 19152) associations per requirements collected were deemed fit enough to represent the existing registration of links between party, RRR and spatial unit in Ghana. Essentially, the associations in ISO 19152 are capable of representing the captured people to land relations that exist in reality in Ghana but are not captured under the existing system. For example, under the current system is not possible to register a basic administrative unit with multiple spatial units. Contrarily, the reality says otherwise, thus a stool can own an area (one BAUnit) with several spatial units. Hence the associations and association multiplicities as from ISO 19152 are maintained in the country profile. Howbeit, new generalizations are introduced in the country profile. Appendix 33 presents a table that gives a microscopic explanation of all the associations, generalizations and aggregations in the country profile.

6. EVALUATION AND DISCUSSION OF THE LADM COUNTRY PROFILE FOR GHANA

6.1. Introduction to the Requirements Authentication Framework

To start, numerous requirements were described in chapter 4 of this thesis. One of the study objectives is to evaluate the proposed LADM country profile for Ghana. The first approach of this evaluation is to check whether all the requirements collected have been successfully incorporated into the model. To do this check, an authentication framework was created. This framework simply matches the unique number given each requirement (see chapter 4) to the class, code list, data type or attributes in the country profile that proofs that that requirement was modelled hence incorporated in the model. The authentication framework is shown in Appendix 34. Appendix 34 illustrates where in the model each requirement from chapter 4 could be found. See appendix 34.

6.2. Abstract Test Suite (Appendix A of ISO 19152)

The LADM is a generic model hence it must be customized to capture local requirements for effective use. This implies the development of an application schema or simply a country profile. Therefore, in foresight, the creators of the ISO 19152 standard developed an abstract test suite (ATS) in Annex A of the standard. The ATS is solely to check whether any of these supposed application schemas or country profiles created based on LADM do indeed conform with the LADM in terms of package or level. Hence, the LADM country profile for Ghana was also be evaluated using the ATS (ISO, 2012).

To summarize this ATS (see ISO 19152 for detailed explanation), the ATS spells out a set of requirements (tests) that a country profile must meet to be deemed conformant to ISO 19152. The conformity elements for each requirement or after each test can be the following: i) conformant, meaning the country profile fully conformant with the specific requirement of the ATS or has passed the test,- ii) nonconformant, thus, the country profile does not conform with the specific requirement of the ATS or has failed the test;- or iii) not evaluated, that is the country profile has not been evaluated yet.

The details of these tests are in Annex A of the ISO 19152. This will not be re-explained in this thesis since the focus of the thesis is to apply the tests to the country profile developed in this thesis. In ISO 19152, each of these tests is given a unique ID. Each of the tests has conditions(dependencies) that determine the conformity element of that test. These tests or requirements are divided into conformance levels (ISO, 2012). Hence, the ATS is separated based on the conformance level of that test. The ATS consist of ATS for conformance level 1, ATS for conformance level 2 and ATS for conformance level 3. (ISO, 2012)

Abstract test suit for conformance level 1

This ATS means, the conformance level of a country profile that passes the tests in this ATS is at a low level. It consists of several tests. Regardless, the general requirement of this ATS is that; the packages of the country profile shall contain the basic classes of the LADM. The implementation of these basic classes in the country profile shall conform to that same basic class in the LADM:

- Party package is compliant if, LA_Party is implemented. The dependencies here are that at least one class in the party package of the country profile should meet the vignette of LA_Party and has all the compulsory attributes and association roles. See table 3
- Administrative package is compliant if, LA_BAunit and LA_Right are implemented. Thus, at least two classes in this package of the country profile must have the same definition of LA_BAunit and LA_Right as well as all the mandatory attributes and associations of the LA_BAunit and LA_Right respectively. (ISO, 2012). See table 3 below.

- Spatial unit Package is compliant if, LA_Spatial unit is implemented. This dependency means there should be at least one class in the country profile which is conformant with the definition of LA_SpatialUnit and has all of its mandatory attributes and association roles. In the country profile, GH_SpatialUnit is that class (ISO, 2012). See table 3. In addition to this general test, there are other specific tests in this ATS (ISO, 2012). The country profile was evaluated against all the tests (both general and specific) in ATS conformance level 1, and it was conformant as illustrated in table 3

Abstract test suit for conformance level 2

Conformance here means the country profile conformance to the LADM is at a medium level. Among all the test in this ATS, the general requirements are that a country profile shall contain the core classes (see in ATS conformance level 1) plus the common classes of the LADM;- those are LA_AdministrativeSource, LA_BoundaryFaceString, LA_GroupParty, LA_PartyMember, LA_Point, LA_Restriction, LA_SpatialSource and LA_SpatialUnitGroup. The country profile classes that implement these core and common classes shall conform to the definition and have all the mandatory attributes and association roles of these basic and common classes. The ATS for conformance level 2 in addition to the above has other special tests (ISO, 2012). The Ghana country profile has been evaluated against all the tests in this ATS and it passed. See table 3 below

Abstract test suit for conformance level 3

Passing tests under this ATS proofs that the country profile's conformance to the LADM is at the highest level per ISO 19152. The general requirement under this ATS level implies that:- the packages of the country profile under test shall have all the core classes (level 1), all the common classes (level 2) and all other class(es) of the LADM. These other classes are LA_BoundaryFace, LA_LegalSpaceBuildingUnit, LA_LegalSpaceUtilityNetwork, LA_Mortgage, LA_RequiredRelationSpatialUnit and LA_Responsibility. The corresponding country profile classes that implement these basic, common and other classes of LADM shall conform to their definition and shall have all their mandatory attributes and associations. Aside from this general test of this ATS level, it has other special tests (See ISO 19152). The country profile for Ghana has been evaluated with this ATS and it passed. See table 3 below

Table 3: ATS for the country profile for Ghana

Abstract Test Suit for the LADM country profile for Ghana (See Annex A of ISO 19152)				
The GH_Country profile package	The GH_country profile classes that implement LADM classes that must be implemented per ATS of ISO 19152	Cl	Dependencies	Conformity element
	VersionedObject	1		Conformant
	GH_Source	1	oid, as minimum one of the specializations must be implemented in relations t GH_AdministrativeS or GH_SpatialSource, LA_AvailabiltityStatusType	Conformant
Party Package			(Exist if Administrative Package is implemented). Classes in this package with level 1, 2, or 3 dependencies are passing the conformance test	(Conformant) Level 3 compliant
	GH_Party	1	*versionedObject,* Oid, GH_Party	Conformant
	LA_GroupParty	2	Oid, GH_Party, GH_GroupPartyType	Conformant

	GH_PartyMember	2	*versionedObject,* GH_Party, LA_GroupParty	Conformant
Administrative Package			(Exist if party Package is implemented). Classes in this package with level 1, 2, or 3 dependencies are passing the conformance test	(Conformant) Level 3 compliant
	GH_RRR	1	*versionedObject,* Oid, GH_Party, LA_BAUnit, GH_Right, as a minimum, the specialization GH_AdministrativeSource shall be implemented	Conformant
	GH_Right	1	GH_RRR and GH_RightType	Conformant
	GH_Restriction	2	GH_RRR and GH_RestrictionType	Conformant
	GH_Responsibility	3	GH_RRR and GH_ResponsibilityType	Conformant
	GH_BAUnit	1	*versionedObject*, Oid, GH_RRR and GH_BAUnitType	Conformant
	GH_Mortgage	3	GH_Restriction	Conformant
	GH_AdministrativeSource	2	GH_Source, GH_Party, GH_AdminstrativeSourceType, LA_AvailabilityStatusType	Conformant
	LA_RequiredRelationshipsBAUnit	3	*versionedObject,* GH_BAUnit	Conformant
Spatial Unit Package			Classes in this package with level 1, 2, or 3 dependencies are passing the conformance test	Level 3 compliant
	GH_SpatialUnit	1	*versionedObject,* Oid(GH_Glpin)	Conformant
	LA_SpatialUnitGroup	2	*versionedObject,* Oid, GH_SpatialUnit	Conformant
	GH_LegalSpaceBuildingUnit	3	GH_SpatialUnit	Conformant
	LA_LegalSpaceUtilityNetwork	3	GH_SpatialUnit	Conformant
	GH_Level	2	*versionedObject,* Oid	Conformant
	LA_RequiredRelationshipSpatialUnit	3	*versionedObject,* GH_SpatialUnit	Conformant
Surveying and Representation Subpackage			Classes in this package with level 1, 2, or 3 dependencies are passing the conformance test	Level 3 compliant
	GH_Point	2	*versionedObject,* Oid, GH_SpatialUnit, GH_PointType,	Conformant

			LA_Interpolation	
	GH_SpatialSource	2	GH_Source, GH_Point, GH_Party, and GH_SpatialSourceType	Conformant
	GH_BoundaryFaceString	2	*versionedObject,* Oid, GH_Point (if using geometry)	Conformant
	LA_BoundaryFace	3	*versionedObject,* Oid, GH_Point (if using geometry)	Conformant
For each of the tests above, the conformity element could be conformant, not conformant or Not evaluated.				
ATS conformance level = CL				
All the test type in this abstract test suit is Basic. See ISO 19152				

6.3. Summary on the Evaluation of The Country Profile

In this chapter, the country profile was evaluated. First, an evaluation framework was developed and used to check if all the requirements elicited have been incorporated in the profile (see appendix 34). This also serves as a way of mapping requirements to components of the country profile. The result of this evaluation is that the profile has all the requirements (see appendix 34). Secondly, the country profile was evaluated with the ATS in Annex A of ISO 19152. The result is that the country profile has passed all the tests in ATS. All packages in the country profile are level 3 compliant (highest level).

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Introduction

This section addresses the conclusions made from the outcomes of this study in brief. Thus, it will revisit the result for each sub-objective of this study and conclusions will be drawn from them. The conclusions are made based on the relationships between the results and existing literature or knowledge

7.2. Conclusion

This study aimed to develop an initial draft LADM country profile for Ghana to kick off the national debate on how to organise a digital infrastructure that meets the requirements of the LAS of Ghana. Also, this initial LADM solution should have functionalities that support quick ways to phase out the deeds system in Ghana as planned. Based on the outcome per sub-objective, the conclusions are:

7.3. Objective 1: To derive data requirements and structure for the conceptual data model from the title, deeds, customary, and informal registration systems in Ghana.

It is a fact that Ghana has multiple registration systems operating parallel and separated from one another as evident in the new Act 1036. To develop a digital solution (database) for these systems based on the LADM, this current study is the first attempt to engineer requirements from all these systems of registration in Ghana. The study elicited all the existing and future requirements through semi-structured interviews and document analysis (see chapters 3 and 4), The study analysed these requirements and identified the common denominators in the requirements elicited. These were classified under the three packages of the LADM. The analysis revealed the existing and missing links in the data structures in these systems. For instance, a parcel can be linked from the customary, deeds and title system using the street address number which is present and the same in all these three systems for a given parcel. Howbeit, there are no links from party and RRR to utility network (spatial unit) yet. These eye-opening feedbacks meant that a couple of additional requirements were proposed by this study. All in all, the LAS requirements from Ghana were elicited, analysed, validated and cataloged (each getting a unique identifier) in conformance with the requirement engineering framework by Ahmed et al., (2014) for the first time.

7.4. Objective 2: To extract data requirements from the existing deeds to title conversion process and to develop new ways to expedite the deeds to title conversion process in Ghana based on lessons from the Ontario conversion process.

The conversion process of existing deeds to title in Ghana was outlined in this thesis. This was based on how the process should be per law and its actual implementation in practice. It was uncovered that the need for the participation of the right holder (client-driven) in the form of voluntary submission of approved plans and application on them before the conversion can be done, is a major reason why the process has stalled for 34 years now. This finding affirms (Comparison between Proposed Land Title Registration System for Hong Kong and other Jurisdictions, n.d.; Divithure & Tang, 2013) that a purely voluntary approach to deeds to title conversion is ineffective and time-consuming.

On the other hand, the study found that the administrative conversion process (not client-driven) used in Ontario during POLARIS is comparatively faster and effective than the Ghana approach to this conversion. To implement this administrative approach, it requires that there should be political commitment, collaboration and participation among stakeholders in land administration, clear business rules and legislations, conversion is better done in a digital environment and finally management of estimated life span of the process with the amount of money to be invested. From these lessons' requirements were drawn and used in the country profile. The attribute "*titleType*" was introduced to the

GH_BAunit class. An instance of this attribute is a qualified title like LTCQ in Ontario. The attribute "*qualificationWhichAffectsTheTitle*" was introduced so that all the qualifications affecting that qualified title can all be indicated in the system (example boundaries not measured). Subsequently, if Ghana decides to implement this type of approach used in Ontario to accelerate its deeds to title conversion process. The country profile could support this approach.

Moreover, an innovative idea on this conversion topic more outside the box of an existing scope, enable by how ISO 19152 has been designed, was discovered and has been proposed. In the future when data from all these numerous systems are integrated and all BAUints are recorded or registered in the LADM system. The "*titleType*" attribute could enable easy and quick conversion of BAUnit from one system to another. Example BAUnit in a customary system can be converted to the title registration system (without even going through the deeds system as done now). Although, this proposal can be executed under the existing legal framework of Ghana. Yet, more legal research and discussions are required to scrutinize this proposal to establish an absolute legal foundation for the execution of this simple administrative process in the future. In conclusion, the administrative conversion process of Ontario and the BAUnit approach, all proposed in this study represent some of the quickest ways to make the deeds system obsolete in Ghana. These functionalities are part of the above-drafted country profile.

7.5. Objective 3: To design an initial draft LADM country profile

A conceptual data model is the first step in creating digital infrastructure. The requirements engineered from existing and future needs of the LAS of Ghana were used to adapt ISO 19152 to the Ghanaian context. The country profile consists of all the common denominators observed in all the registration systems in Ghana. Plus, the unique needs of a specific registration system (like the title system, varied CLSs requirements etc), making it more adaptable to that system. Hence, it is one central model that could brooks the data needs from all the systems in the LAS of Ghana. Yet, it could be decentralized to each node(office) at different organizational, departmental, regional, district and customary levels. This differentia guarantees that each node in the LAS would have sole maintenance and supply right over their data. But these data would be readily accessible anywhere in the country in line with the LADM (ISO, 2012).

This integration functionality supports a ground-breaking move away from the current situation, where a person must visit three registration offices independently in order to get comprehensive tenure information on a given spatial unit (less duplication). Also, standardization, interoperability, data quality controls and continuum of object representation (example 2D, 3D, text, etc) introduced by this country profile means the higher registration systems can source their information directly from the lower registration systems with no or little involvement of the client or need to collect new data already collected at the lower levels (less duplication). This will inject speed, data consistency, remove data redundancies, and resolves duplications in the LAS (Adad et al., 2020; Koers et al., 2013; Radulovic et al., 2017). Again, it will allow data representations that could depict complex modern reality or constructions (3D) but also could show objects in a fit-for-purpose way that is cheap and faster (text, 1D, etc) (Aien et al, 2015; Hackman-Antwi et al., 2013; Rönsdorff, et al., 2014; Surmeneli et al., 2020).

7.6. Objective 4: To evaluate an initial draft LADM country profile

The requirement authentication framework in appendix 34 proved that all the legal, customary, administrative, and informal needs of Ghana's LAS, alchemized into requirements form part of this country profile for Ghana. So, this country profile is the conceptual level form of a digital database that co-opts all the registration systems in Ghana as well as can swiftly phase out any of these multiple systems. A silver bullet to the problems upshot from the current analogue, bifurcated multiple land registration systems.

Besides, the ATS validation of the country profile illustrates classes of the country profile with conformance level 1, 2, and 3 passed the ATS tests. Also, all the packages of this country profile have level 3 compliant level. All of which certify that this country profile is indeed based on ISO 19152 (ISO, 2012)

7.7. Recommendations

This model is just a first attempt to create an LADM country profile for the LAS of Ghana. LADM country profiles have been designed and are in use in numerous countries (Adad et al, 2020; Lemmen et al., 2015; Radulovic et al., 2017; Kalogianni et al., 2021). This is a first step in what is to be a long development. Refinements, collaboration, participation, implementation, workflows for digitizing existing paper records and workflows for cadastral data acquisitions for populating this model are recommended (Kalogianni et al., 2021). Each of these steps is recommended to be the focus of future research. Specifically,

- The next step in Ghana's case is recommended to be the introduction of this model in the educational, public and professional stakeholders in LA for deliberations, improvements, and agreement on this model in future studies.
- A further step is recommended to be: to develop and convert this model into a technical model for implementation; database schema (SQL DDL), exchange format (XML/GML) and user interface for data entry, edits and circulation in Ghana. This implementation is recommended be done step by step (an iterative process). It is essential to realize that notwithstanding the point that this model is usable in the Ghanaian context now, there is much more room to refine and improve this model. This study has provided enough evidence to show that the requirements from LAS in Ghana keep mutating over time hence the development of this LADM solution for it must evolve equally to keep up with it. The use of agile or scrum development methodologies could help to achieve this continuous evolving process (Morandini et al, 2021).
- Also, it is recommended that there must be steps to teach train and build capacity of present and future generation of land professionals in Ghana on this model to make them LADM literate.
- Again, it is recommended that, steps to create workflows to effectively digitize existing records and populate the data infrastructure created from this model warrant looking into by future research works
- The implemented version of the country profile is recommended to be adapted to the new LADM edition II and subsequent editions or refinements of the LADM itself (Kalogianni et al., 2021)

7.8. Summary of Conclusions

To conclude, this thesis has presented an initial draft LADM country profile for Ghana created based on present and future:- administrative needs, spatial needs, legal mandates, customary laws, informal practices and lessons from other countries. This qualitative and design research used semi-structured interviews, literature reviews and conventional contents analysis to engineer requirements from the above needs.

The general conclusions are:-

a) The first initial draft LADM country profile for Ghana can integrate the current analogue, bifurcated multiple land registration systems, and can swiftly phase out any of these multiple systems.
b) The first initial draft country profile is valid per ATS in Annex A of ISO 19152. It indeed contains requirements from Ghana's LA.
c) The country profile supports the continuum of land rights, continuum of representation of spatial units, can be distributed to the various nodes in the LAS of Ghana and can be easily converted into a digital database
d) Refinements, collaboration, participation, implementation, workflows for digitizing existing paper records and workflows for cadastral data acquisitions for populating this model are recommended.

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APPENDICES

APPENDIX 1: DATA MANAGEMENT PLAN

OVERVIEW

Origin of Data:	July 3, 2020
1. What kind of data will be used during this project	Enterprise Architect Projects with The Harmonized Model
2. What is the source of the data?	https://github.com/ISO-TC211/HMMG/blob/master/README.md CLS, LC, Ontario land agency and literature review.
3. Are various data sources integrated in the datasets you are going to use?	Yes
4. If yes could you identify the individual datasets that are combined	I can identify the individual datasets combined
Data owner(s)	Github. 1. Dr. John R. Herring, USA (John.Herring@oracle.com) 2. Mr. Knut Jetlund, Norway. (knut.jetlund@vegvesen.no)
1. Which organization owns the data you are going to use?	Github
2. Can you easily find out what you are allowed to do with the data you are going to use?	Yes

ORGANIZING AND DOCUMENTING YOUR DATA

Data organization:	
1. How will you organize your data during the project? E.g. folder structure and names	1.MSc Thesis Data a. EAP files b. Interview Data ▪ Data from CLSs ▪ Data from LCs ▪ Data from Meridia ▪ Data from Ontario c. Data from Literature ▪ Data on Ontario registration system ▪ Data on Ghana registration system
2 What can you tell about the quality of the data?	1.The EAP files contain all the need class

	diagrams and it is up to date.
Metadata	
1 What metadata comes with the data?	The EAP files have a webpage that describes the datasets
2 Is there any metadata missing?	No

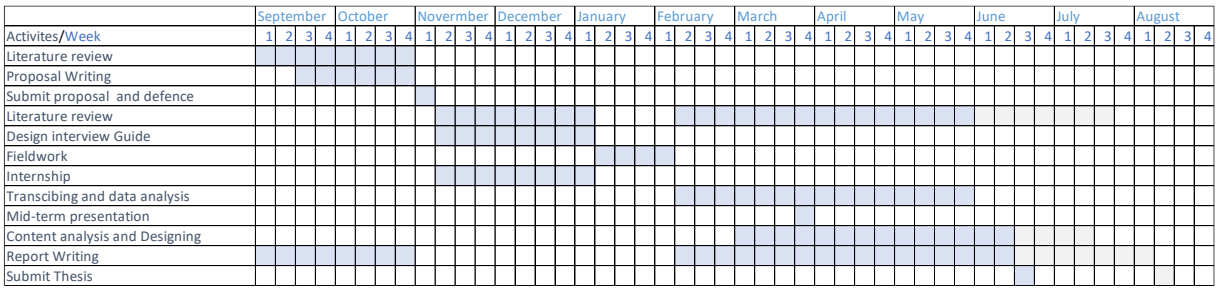
PROCESSING YOUR DATA

Versioning:	
1 What would be your strategy concerning versioning your data files during the project	Any upgrade to a previous model developed in the course of the study will be a new version
2 How can different versions of a datafile be distinguished	Depends on the number of upgrades made

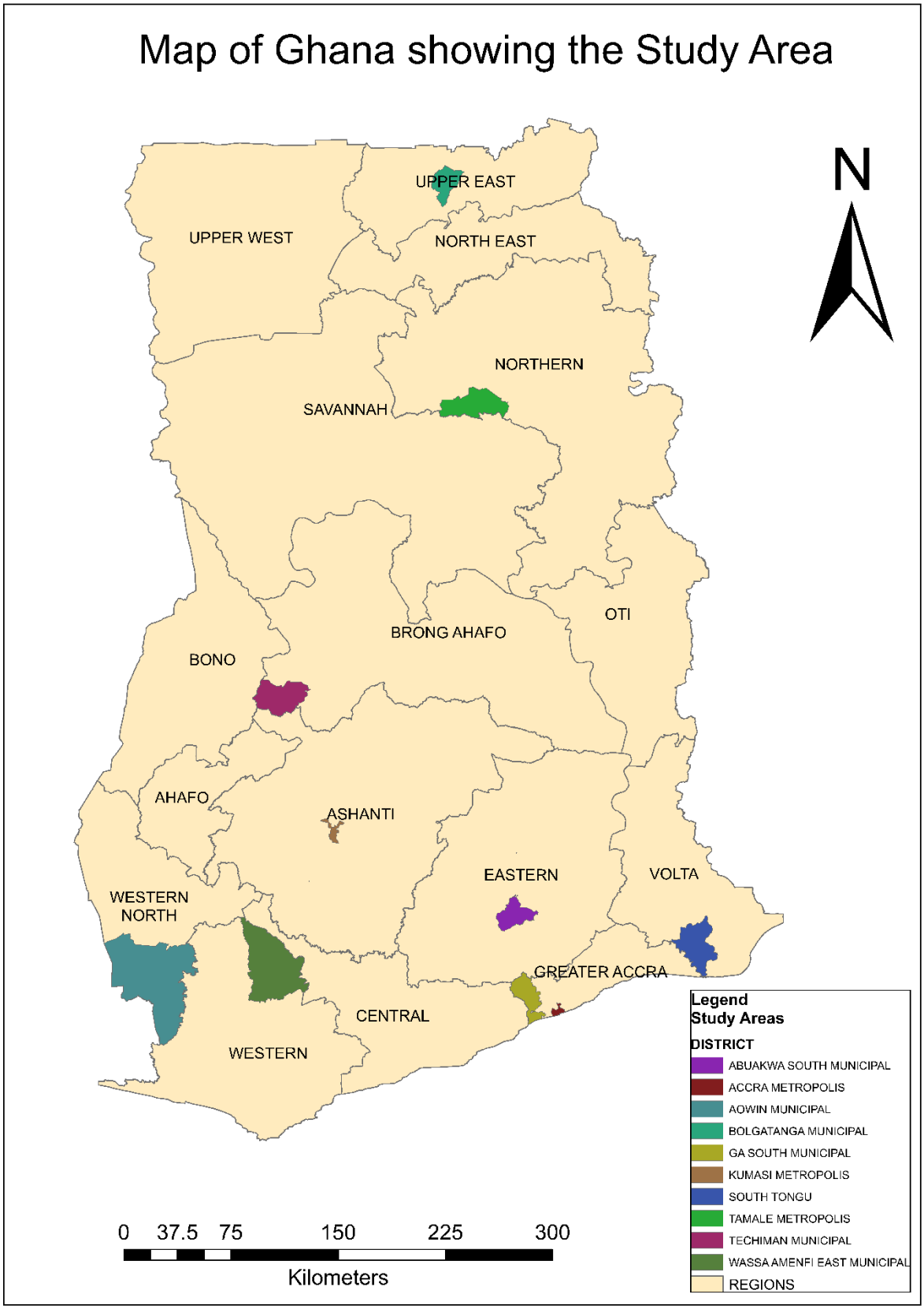
PROTECTING YOUR DATA

Ethical review:	
Do you think your project requires ethical approval by ITC Ethics Committee?	NO
Why?	

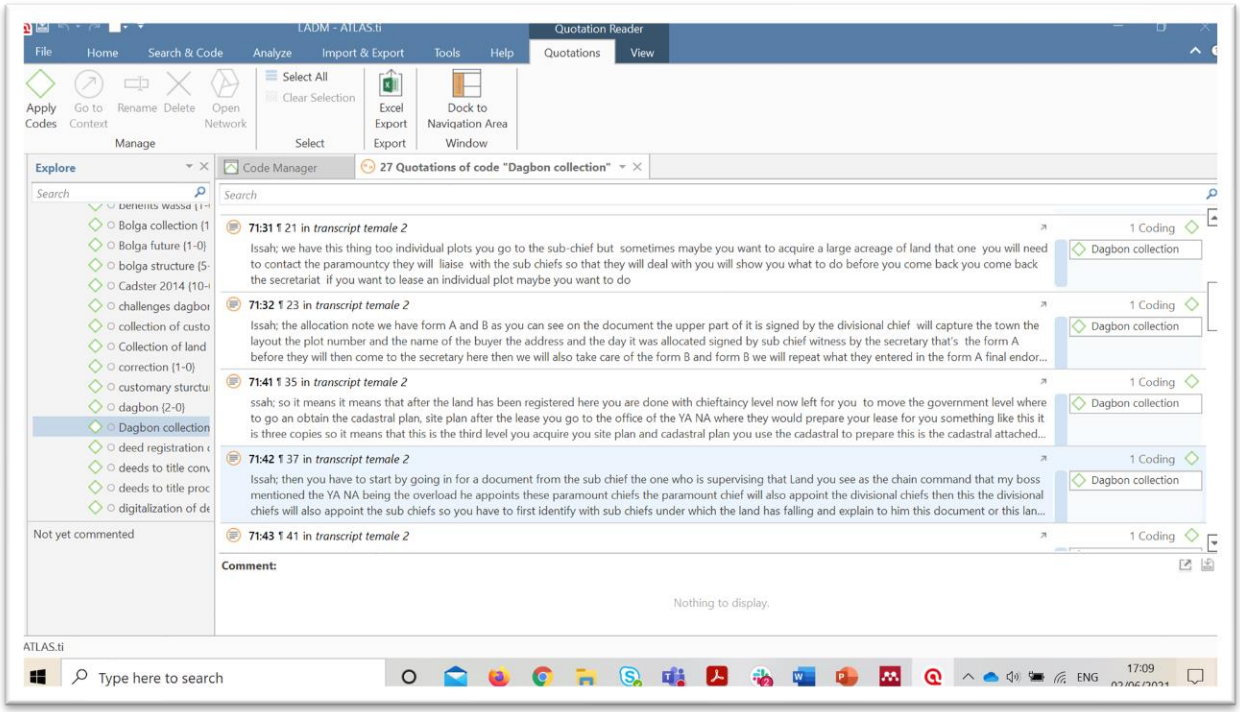
Research workplan

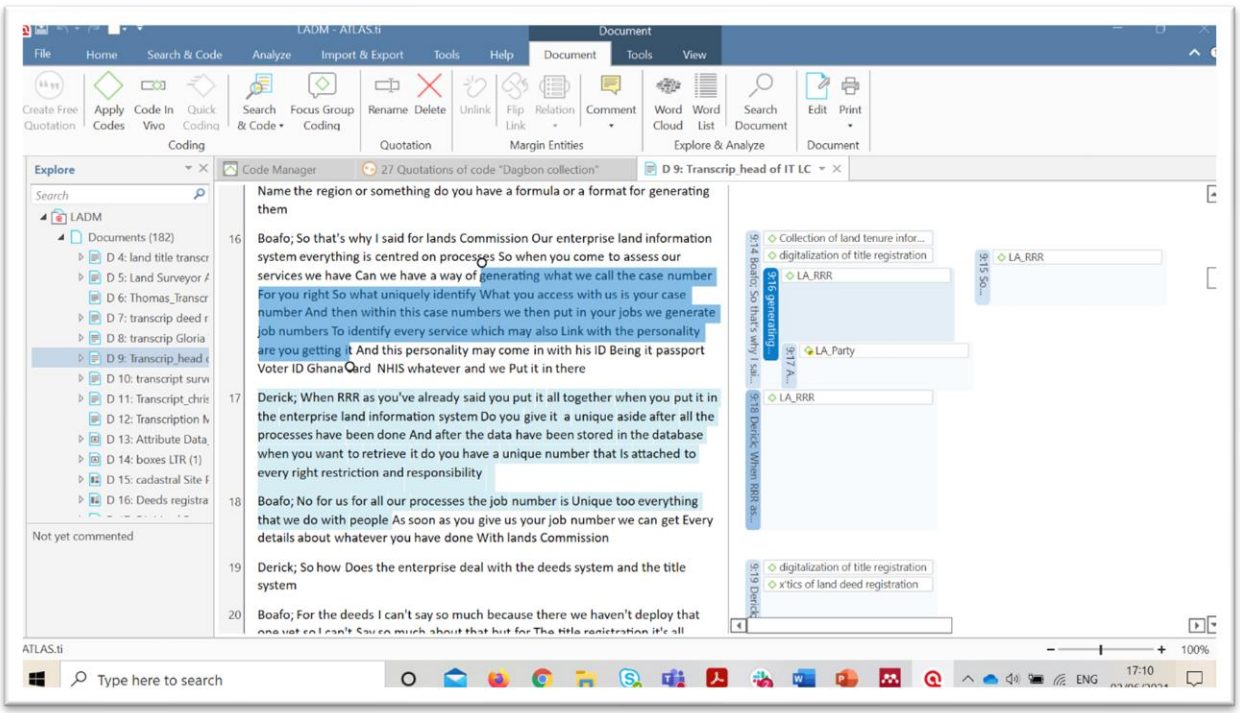


APPENDIX 2: MAP OF GHANA SHOWING THE STUDY AREAS



Data Analysis with Atlas TI





APPENDIX 3: LIST OF ALL THE GROUP TYPES IN GHANA

Group Type	**Portion of the law (Act 1036) to find it. (section= (s))**
group of persons	s2b
State	s2b
stool	s2b
skin,	s2b
Clans	2b
family	s2b
group of non-indigenes	s5(1)b, s5(2)b
descendants of the non-indigene	s5(1)b,
descendants of group of non-indigene,	s5(1)b,
A community	s19(1)
community committee	s19(5)
Alternative Dispute Resolution Act, 2010 (Act 798).	S26
spouses	s38(3) s47
corporation aggregate	s68
a body of persons	s68(8)
The Lands Commission	
Ministry	s172(3)
Department	s172(3)
Agency	s172(3)
Management Committee	s269
group	s280

APPENDIX 4: LIST OF ALL THE PARTY ROLE TYPES IN GHANA

Party Role Type	**LAW section (s)**	**Party Role Type**	**LAW section (s)**	**Party Role Type**	**LAW section (s)**	**Party Role Type**	**LAW section (s)**
an individual	s2b	holder	(S 6c),	A purchaser	s64 (5)	Holder of the land to which the profit is appurtenant	159(2)
person	s2b	grantor	s6d	assignee	s64(3)	translator	s164(1)
non-indigenes	s5(1b)	lessor.	S 10 (8)	vendor	s65(6)	an officer of the Commission	s164(3)
usufruct	s5(2)	Lands Officer	(s15(3)),	witness	s68	deceased proprietor	s167(1)
subjects	s9(1)	Stool Lands Officer	(s15(3)),	a principal officer of the corporation	s68	personal representative	s167(1)
not a citizen of Ghana	s10(1)	an administrator of Customary Land secretariat	(s 16 (2)),	a member of the board of directors or other governing body of the corporation	s68	deceased testator	s167(5)
chief	s13(2)	surveyor	S24	a person authorised to sign a conveyance on behalf of another individual	s68(7)b	deceased intestate	s167(5)
tendana	s13(2)	licensed surveyor	s24	donee	s68(10)	Beneficiary	s172(3)
clan head	s13(2)	workmen	S24	donor	s68(10)	Agents	s168
family head	s13(2)	a valuer	s25	holds a usufructuary interest	83 (1)	the executor	174(1)
authority in charge of the management	s13(2)	High Court.	s 25(4)	holds a common law freehold	83 (1)	the deceased	174(1)
The Lands Commission		legal practitioner	s33	holds a customary law freehold	83 (1)	the administrator of the estate	174(1)
a	s20(	the agent	s 35	holds a	83 (1)	a bankrupt	s176(1

corporate body	1)			leasehold interest		proprietor	)
an individual	s2b	Registrar of a Court	s37(2)	holds a customary tenancy	83 (1)	an insolvent proprietor	s176(1)
person	s2b	a Land Registrar	s37(2)	The Land Registrar		a liquidator	s177(1)
non-indigenes	s5(1b)	allodial owners	37(5)	proprietor	s83(2)	a representative of the Director of Survey and Mapping Division	s179(3)
usufruct	s5(2)	stool lands	37(5)	joint proprietors	s125(4)	the judge	
subjects	s9(1)	heirs	s38	proprietors in common	s125(4)	Chief Registrar	s182
not a citizen of Ghana	s10(1)	successors	s38	joint tenants	s125(5)	occupant of the stool	
an incorporated body of persons	S22(2)	personal representatives	s38	tenants in common.	s125(5)	occupant of the skin	
corporation	s40	assigns	s38	a mortgagor	s138	person authorised by the stool to administer the land or interest in the land	s182(7)
spouse	s38 (3)	joint tenants	s40(3)	mortgagee;	s138	person authorised by the skin to administer the land or interest in the land	s182(7)
an indigene	s50	lessee	s41	the Registrar of the Court	s156(4)	person authorised by the clan to administer the land or interest in the land	s182(7)
a citizen of Ghana		transferee	s43	Director of Survey and Mapping Division		person authorised by the family to administer the land or interest in the land	s182(7)
a company under the Companies Act, 2019	s68	The court	s44	Director of the Land Registration Division		caveator	s184
Republic		transferor	s50	a predecessor-in-	106(1	witness of the	s209

				title	)	grantor	
infant	167(1)	head lease		joint proprietor	s141	witness of the grantee.	
occupant of the stool	s182 (7)	trustee	s50(4)	proprietor in common	s141	caveatee	
occupant of the skin	s182 (7)	allodial owner	50(21)	joint tenant	s141	a District Magistrate	s210
person authorised by the stool to administer the land or interest in the land	s182 (7)	successors in title	s53	tenant in common.	S141	Person before whom proof was made	s210
person authorised by the skin to administer the land or interest in the land	s182 (7)	covenantor	s54	the person effecting the severance	s141(7)	a diplomatic agent	s210
person authorised by the clan to administer the land or interest in the land	s182 (7)	a person deriving title	s54	proprietor of the land which enjoys the benefit of the easement	s157(2)	consular officer	s210
person authorised by the family to administer the land or interest in the land	s182 (7)	The Minister	s62	proprietor of the land which enjoys the benefit of the profit	s159(2)	magistrate	s210
tendana	s280	Commission of Inquiry	s63	licensee	162(2)	a notary public	s210
a sub-chief		regent		paramount chief		Chief	
overlord		the bank		a financial institution		a local	
a public officer outside	s211	a successor-in-title	s222(4)	party in litigation	s222(4)	Management Committee	s269

Ghana							
deponent	210(3)	purchaser	s280	land owning group	s280	Joint trustee	s181
predecessor-in-title	s223	registered land owner	s232(1)			joint trustees	s181
dominant tenement		, servient tenement		confirming party		customary successor	
legal officer		lawyer		regional lands officer		the title adjudication committee member	
solicitor, representative of director of survey		head cartographer		planner		chief cartographer	
allotee		the applicant		depositor		grantee's grantor	
, principal member		servient parcel		dominant parcel		third party	
a certificated officer		a person to whom a certificate is issued, and acknowledged by (see title application form)					

APPENDIX 5: LIST OF ALL RIGHT TYPES IN GHANA

Right Type, Portion of the law (Act 1036) to find it. (section= (s)), Responsible organization currently		
allodial title, s1a, ILS	perpetual duration, s3(1)c, s4(1)a, ILS	reversionary interest, s41, ILC
customary law freehold, s(1)a, LC, CLS, ILS	is inheritable, s3(1)c, 4(1)d, ILS	right to sell, s47, ILS
common law freehold, s(1)a, ILS, CLS	alienable without the consent of or payment to the stool, skin, clan or family.s3(1)c, 4(1)d, ILS, LC, CLS	right to exchange, s47, ILS
usufructuary interest; s(1)a, CLS, ILS	duration which is certain, s6a, ILS, CLS	right to transfer, s47, ILS, CLS
leasehold interest, s(1)a, LC, CLS, Informal	sublease s6c, LC, CLS, Informal	right to mortgage, s47, LC, CLS, Informal
customary tenancy, s(1)a, LC,	an assignment s6c LC, CLS, ILS	right to lease the land, s47,

CLS, ILS		LC, ILS, CLS
Mining rights, s22, MC	the right to make reasonable use of common land, s19 (7) LC, CLS, ILS	right to enter into a contract for the sale, exchange, transfer, mortgageor lease of the land, right or interest in the land, s 47, , ILS
timber rights s22, FC	perpetual duration s3(1)c, s4(1), ILS,	right to give away the land, right or interest in the land inter vivos s47 LC, CLS, Informal
farming rights, s22, ILS	is inheritable s3(1)c, 4(1)d, ILS	right to quiet enjoyment s50(1). LC, CLS, ILS
farming rights s22, ILS	alienable without the consent of or payment to the stool, skin, clan or family.s3(1)c, 4(1)d, ILS, CLS	right to automatic renewal of lease s 50, ILS
Right to convey s39(3), ILS, LC, CLS	duration which is certain, s6a, ILS, LC, CLS	right to a renewal of the lease. S50(11)
right of possession, s40, CLS	Sublease, s6c, LC, CLS, ILS	take over bare land or farm land which is the subject of a usufructuary interest within the area covered by the allodial title s50(22), ILS
right of entry, s40, ILS	an assignment, s6c, LC, CLS, ILS	right to alterations and additions, s51, LC, CLS, ILS
the right to use the resources of the common land s19 (7) b, CLS, ILS	the right to make reasonable use of common land, s19 (7) a, CLS, ILS	right of re-entry, s55(1), LC, ILS, CLS
the right to exclude non-members of the community from the common land s19 (7) c, ILS, CLS	Right to transfer reversionary interest s41, CLS, ILS	right of forfeiture s55(3), LC,ILS, CLS
right to prescribe sanctions for breach of the duties s19(8) LC, CLS, ILS	Right to surrender reversionary interest, s41 ILS, LC, ILS	right to rent, s55(3), ILS, CLS
right to the establishment of common land s19(10)a, CLS, ILS	Right to merge reversionary interest s41, LC, ILS, CLS	right to a covenant s55(3), LC, ILS, CLS
right to damages or compensation for a breach of covenant, s59, LC, ILS, CLS	a right of compulsory acquisition, resumption, entry, search and user conferred by any other enactment s121, ILS, LC	Right to temporary use of a land s272(1), ILS
Licence, s61, LC, ILS, CLS	a lease for a term of less than three years and not capable of extension to terms of three years or more by the exercise of an enforceable option for renewal, s121, CLS, ILS	Right to exclusive occupation s272(3), ILS, CLS

right to change of use, s62, ILS, LC, CLS	a right, whether acquired by customary law or otherwise,of a person in actual occupation of the land s121 CLS, ILA	Right to temporary use of land for access s275, ILS, CLS
public rights of way, s90, ILS	right to use s162(2), CLS, ILS	Right to temporary use of a land s272(1), ILS, CLS
a right of possession, s112(1), CLS, ILS	right to enjoy, s162(2), LC, ILS, CLS	Right to exclusive occupation, s272(3) CLS, ILS
right of occupation, s112(1), CLS, ILS	right to enter a caveat s182(9), LC, CLS, ILS	Right to temporary use of land for access, s275 ILS
overriding interests, s116, s121, ILS, CLS	right to apply for an order prohibiting or restricting a transaction in respect land s182(9), LC, ILS	Right to temporary use of a land s272(1), ILS
a right customarily exercised and enjoyed in relation to the parcel of land which is not a recognised interest in land under customary law s121, CLS, ILS	Right to indemnity s196, LC, ILS	Right to exclusive occupation, s272(3), CLS, ILS
a right of way, s121, LC, CLS, ILS	a user right, s235(4), ILS	Right to temporary use of land for access s275, ILS
a right of water, s121, LC, CLS, ILS	Right to temporary occupation s272(1), ILS	Contractual licence s162, LC, ILS
a natural right of water and support ,s121, LC, ILS, CLS	a right of compulsory acquisition, resumption, entry, search and user conferred by any other enactment s121, ILS	a lease for a term of less than three years and not capable of extension to terms of three years or more by the exercise of an enforceable option for renewal s121, CLS, ILS
a customary right in respect of a concession granted under the Concessions Act, 1962 (Act 124) and the Forest Ordinance, 1937 (CAP 157) which was subsisting at the time of first registration s121, FC, LC, ILS, CLS		

LC-Lands Commission, FC-Forestry Commission, CLS-Customary land Secretariat, MC-Minerals Commission, ILS-informal land registration system like Meridia. Appendix 5 *shows the right type, the section in law (Act 1036) where it could be found, and the type of organization responsible for registering that right type*

APPENDIX 6: LIST OF ALL RESPONSIBILITY TYPES IN GHANA

Responsibility Types: Portion of the law (Act 1036) to find it. (section= (s))
payment of rent; s(7)c
the sharing of the produce of a farm; s(7)c

the physical partition or severance of the farm or land; s(7)c
the duty to comply with and assist in the enforcement of the rules set out in the plan and laws relating to environmental protection; s19 (7) d
the duty to bear a reasonable and proportionate share of any expenses or losses arising from the management of the common land or from any natural disaster affecting the common land; s19(7)e
the duty not to transfer any rights of occupation or use of the resources of the common land to any person whether for a fee or otherwise, except in accordance with customary law and usage and the terms of the management plan; s19 (7) f
the duty to comply with decisions of the community or any dispute settlement body established by the community or other applicable laws to settle disputes arising from the management of the common land; s19 (7) g
repair to adjoining premises; s51
Not to cause injury to walls; s51
Duty not to assignment and subletting to illegal or immoral user s51
not to cause nuisance or annoyance; s51
yielding up the premises; s51
seek permission to carry out repairs under head lease; s51(2)
to future observance of the head lease; s51(2)
to put premises in a good state of repair during the currency of a lease; s59
to leave or put premises in a good state of repair at the termination of a lease; s59
responsible for the maintenance, repair, restoration or re-erection of the beacon or mark that is not in good condition or is removed or obliterated; s 93(4)
a charge for unpaid rates and any other money which without reference to registration under this Act, are expressly declared by any enactment to be a charge upon land; s121
a duty, customary or otherwise to consult with or secure the consent or concurrence of other members of the stool, skin, clan or family; s182(10)
Freedom from Encumbrances; s50
Further Assurance; s50
Validity of Head Lease; s50
Past Observance of Head Lease; s50
Future Observance of Head Lease; s50
Production of title deeds and delivery of copies; s50
Permitting Repair under Headlease; s50

APPENDIX 7: LIST OF RESTRICTION TYPES IN GHANA PER ACT 1036

Restriction Type; Portion of the law (Act 1036) to find it. (section= (s))
is subject to the jurisdictional and cultural rights of the stool, skin, clan or family which holds the allodial title; s 3(1)a, 4(1)b
Alienable with the consent of or payment to the stool, skin, clan or family.s5(2)
a specified term subject to terms and conditions; s6b
shall not create an interest which vests freehold interest in that land; s9
A person shall not create an interest in, or right over, land in Ghana which vests in another person who is not a citizen of Ghana, a freehold interest; s10(1)
farming rights on stool, clan or family land shall not exceed (a) in the case of poultry farming or the cultivation of cereals, a term of ten years; s22(1)
A person shall not create an interest that vests in a lease

hold for a term that exceeds fifty years at any one time; s10(6)
Cannot effect the granting of a right or title to or an interest in minerals in land or timber or rubber on the land; s21.
farming rights on stool, clan or family land shall not exceed in the case of ranching or the cultivation of permanent crops, a term of fifty years.
A grant or the aggregate of grants of stool, clan or family land to any one person shall not exceed in respect of mining rights, 15.80 square kilometres for a grant or in aggregate 155.40 square kilometres; S22(2)
A grant or the aggregate of grants of stool, clan or family land to any one person shall not exceed in respect of timber rights, 103.40 square kilometres, for a grant or in aggregate 621.60 square kilometres; ; S22(2)
A grant or the aggregate of grants of stool, clan or family land to any one person shall not exceed in respect of the right to cultivate rubber or any other plantation other than timber or the right to engage in animal husbandry including ranching 2.59 square kilometres for a grant or in aggregate 7.77 square kilometres for an individual; ; S22(2)
A grant or the aggregate of grants of stool, clan or family land to any one person shall not exceed in respect of the right to cultivate rubber or any other plantation other than timber or the right to engage in animal husbandry including ranching 12.95 square kilometres for a grant or in the aggregate 25.90 square kilometres for a body corporate or an incorporated body of persons.; S22(2)
) prompt payment of fair and adequate compensation which in any case shall not be less than forty percent of the plots of land or the market value of the plots of land being taken; s50(23)
where possible, providing suitable alternative land to the holder of the usufructuary interest in respect of the land; s50 (23)
right to damages or compensation for a breach of covenant shall not exceed the amount by which the value of the reversion
a mortgage; s82(a)
an easement; s82(b)
a restrictive covenant; s82(c)
profit a prendre; s82(d)
power of attorney; s82(e)
a contractual licence; s82(f)
a user right under a Certificate of Allocation; s82(g)
The State shall not transfer land held in trust under section 105 of land Act 2019; s105 (3)
a right of way; s121
a right of water; s121
an electric supply line, a telephone and telegraph line or pole, a pipeline, aqueduct, canal, weir and dam erected, constructed or laid in pursuance or by virtue of a power conferred by an enactment; s121
the survivor of the proprietors is not entitled to exercise alone the powers of trust which were vested in them; s181
Caveat; s184
an order prohibiting or restricting a transaction in respect of that land or interest in land; s191(1)
lien,
charge
Where a purported disposition, including a disposition by the will of a deceased proprietor, of land or interest in land is made to an infant, the infant shall not be registered as proprietor of that land or interest until that infant attains the age of eighteen years; s167.(1)
Where a lease in respect of bare land is granted by a person who holds an allodial or usufructuary

interest in the land and the lessee is an indigene of the area where the land is situated, the lease is subject right to automatic renewal of lease where the lessee has developed; s50
The registration of a person as the proprietor of land or a holder of an interest in land does not confer on that person a right to minerals; s119 (4)
The State may compulsorily acquire any land where the acquisition of that land is necessary s233. (1)
Restriction, thus The Court may on the application of a person interested in a land or an interest in land after make an court order prohibiting or restricting a transaction in respect of that land or interest in land; s191(1)
any qualifications which affects the title; s112(c)

APPENDIX 8: LIST OF RESTRICTION TYPES IN GHANA PER ACT 924

Restriction Type Planning restrictions per land portion of Act 925 section(s)
Where the context requires, a person who plans to carry out physical development or any physical development of a scale which requires it taking into account the prescription of the District Spatial Development Framework shall comply with the District Spatial Development Framework and with the relevant structure plan and local plan. s61.
A physical development that is to be carried out in an area for which the District Spatial Planning Committee has approved a local plan shall be carried out in accordance with the details of the local plan. s79.
An approved zoning scheme shall be used to determine the user rights for a part of or the whole of a parcel of land within the district. s87(1)
A person shall not undertake any physical development of land within a district unless that person has been issued with a permit by the District Assembly within the jurisdiction in which the land is situated.s113(1)
A person shall not carry out physical development within this country unless the development is carried out in accordance with a permit issued under this Act. s117(1)
Where substantial damage to the environment, public amenities or public health is caused or likely to be caused by nuisance or is likely to result from the action or inaction of a person, a District Assembly may serve notice in the prescribed form on the person responsible for the nuisance, requiring that person to abate the nuisance within the time specified in the notice in accordance with the relevant laws and directives issued by the Environmental Protection Agency. s120.(1)
The Minister responsible for Water Resources, Works and Housing shall, in consultation with building industry practitioners, publish a building code defining the scope and standards for buildings and structures and matters related to the structural integrity of buildings. s 122.
A person shall not (a) enter into an agreement for the sale, trade, alienation or disposal in any other way of a plot of any size, or (b) grant an option to buy or to obtain land, in a town established or extended under subsection (1), except in accordance with procedures specified in sections 127 and 128 for that purpose. S136 (2)
. A conveyance, lease or any other disposal of a subdivided or consolidated land is void unless the conveyance, lease or disposal complies with sections 143, 146 and 148. s144
A person shall not use a building for any purpose or permit a building to be used for a public purpose unless a certificate of habitation for that building has been issued by the District Assembly pursuant to the National Building Regulations, 1996 (L.I. 1630). s161.

APPENDIX 9: LIST OF ALL ADMINISTRATIVE SOURCE TYPES IN GHANA PER ACT 1036

Administrative Source Type, Portion of the law (Act 1036) to find it. (section= (s))			
Contract, s7a, s34	conveyance from the State, s64	by oral grant under customary law, s36	provisional landcertificate, s113
Agreement, s7b,s44	a final judgment of a court of competent jurisdiction, s64	a lease, s 50	Court order, s141(4)
customs, traditions and practices, s11	a power of attorney, s65	a deed, s58	Mortagage Instrument, s148(2)
customary law and usage, s19(3)a	Supplemental instrument, s66	licence s61,	Mortgage instrument of variation, s150
management plan, s19(3)b	vesting assent, s68	an enactment, s64	Mortgage transfer instrument, s152
local planning arrangement, s19(3)b	a conveyance, s70	a grant from the State, s64	instrument for discharge of mortgage, s153(3)
operation of law	an assignment, s70(1)	vesting order from the State, s64	easement instrument, s157(1)
operation of the rules of equity relating to the creation or operation of resulting, implied or constructive trusts, s36	a sublease, s70(1)	conveyance from the State, s64	cancellation of easement instrument, s160(1)
order of the court, s 36	a trust, s70(1)	a final judgment of a court of competent jurisdiction, s64	cancellation profit instrument, s160(1)
will or upon intestacy, s36	a Certificate of Allocation, s82	a power of attorney, s65	cancellation restrictive covenant instrument, s160(1)
prescription; s36	a land certificate s102	Supplemental instrument s66	contractual licence s162
by a lease for a term not exceeding three years, whether or not the lessee is given power to extend the term, s36	information or explanation in respect of an interest, s102(1)b	vesting assent, s68	a disposition, s167(1)
a licence, s36	statutory declaration, 103(2)	a conveyance, s70	an intestacy, s167(1)
Profit, s36	evidence of proof of possession, s103(3)	an assignment, s70(1)	notice of revocation, s170(3)
a concession required by an	common knowledge, s106(1)	a sublease, s70(1)	Probate, 174(1)

enactment to be in writing, s36			
a restriction, s207(1)	the Limitations Act, 1972 (N.R.C.D. 54), s111(2)	a trust, s70(1)	letters of administration, 174(1)
a court judgment, s207(1)	provisional land certificate, s113	a Certificate of Allocation, s82	the resolution or order, s177(1)
Certificate of registration, 216	Court order, s141(4)	a land certificate, s102	a certificate of sale, s178
a Certificate of Allocation, s235(3)	Mortagage Instrument, s148(2)	information or explanation in respect of an interest, s102(1)b	A Judge's Certificate, 179(4)
a note of the intended compulsory acquisition, s243	Mortgage instrument of variation, s150	statutory declaration, 103(2)	
Executive Instrument, s266	Mortgage transfer instrument, s152	evidence of proof of possession, s103(3)	
vesting order, s280	instrument for discharge of mortgage, s153(3)	common knowledge, s106(1)	a cadastral plan, s182(5)
Marriage certificate, (See Cap 127)			
Sowing tenure,	easement instrument, s157(1)	the Limitations Act, 1972 (N.R.C.D. 54), s111(2)	Caveat, s184
a conveyance, s207(1)	a certificate of purchase issued by a court, s207(1)	a certificate of purchase under the Borrowers and Lenders Act, 2008, (Act 773); s207(1)	an order of the Land Registrar, s186.

APPENDIX 10: LIST OF MORTGAGE TYPES IN GHANA PER FIRST NATIONAL BANK(FNB) PRODUCTS AND HOME FINANCE COMPANY (HFC) BANK

Mortgage Types	
1.	Customary Pledge
2.	Equity Release Mortgage
3.	Fixed-Rate Mortgage
4.	Home Completion Mortgage
5.	Home Construction Mortgage
6.	Home Improvement Mortgage
7.	Level Payment
8.	Linear
9.	Microcredit
10.	Save To Own Mortgage
11.	Variable Rate Mortgage
12.	Buy Build Own A Home Mortgage

13.	HFC Public Sector Home Scheme
	According to ('HFC Bank - Mortgage Banking', n.d.; 'Home loan - Home loan - FNB', n.d.)

APPENDIX 11: LIST OF STEPS TO CONVERT LTCQ TO LT+ IN ONTARIO

The steps of upgrading title in Ontario
1. Production of a draft reference plan by an Ontario Land Surveyor,
1a. If the boundaries of the parcel are different (more or less) than that of the parcel in the register. A new plan would be made, and the attention of Land Registry Office staff would be drawn to the difference.
1b. The owner may have a right to title, to a limited interest or right to use of the additional land. This decision will depend on the surveyor, solicitor and the owner should discuss their course of action per the law A title search or review a solicitor. The same approach is used when there is a lost land to adverse possession.
2. Preparation and service of a notice of application and copy of the draft reference plan, on all persons entitled to notice.
3. Objection resolutions
4. Application to amend the register by removing qualifiers and entering applicant as owner with an absolute title. system

('Land Titles Conversion Qualified (LTCQ) to Land Titles Plus (LTplus) - Client guide | Ontario.ca', n.d.)

APPENDIX 12: THE STEPS IN MAKING AND PERFECTING A POSSESSORY CLAIM ARE: PER SYSTEM IN ONTARIO

The steps in making and perfecting a possessory claim are: per system in Ontario
"The applicant must register a Notice of Claim (Appendix L) attached to a Form 4 – Document General prior to registering the Notice of Application. It must be supported by Declarations of Possession covering at least 20 years (Note: Proof of possession for 10 years will only support a claim for the possessory title). The Notice of Claim must set out the type of title interest claimed and have a registerable description of the lands prepared according to the provisions of Regulation 43/96 under the Registry Act (i.e. Part on Reference Plan.)
The registered owner, any mortgagees/chargees and any other parties with a registered interest, of the land being claimed by possession or, if any of the parties are deceased their estate, must be served with and receive Notice of Application; and
A Covenant to Indemnify the Land Titles Assurance Fund (Form 54, in Regulation 690, R.R.O. 1990, made under the Land Titles Act, [Appendix M]) must be filed with the Director."

('Land Titles Conversion Qualified (LTCQ) to Land Titles Plus (LTplus) - Client guide | Ontario.ca', n.d.)

APPENDIX 13: LIST OF RESPONSIBILITY TYPES IN ASANTEMAN TRADITIONAL AREA

the responsibility types at the Asante,
To pay the ground rent hereby reserved to the Office of the administrator of stool lands, Ashanti Region Kumasi at the time and in the manner aforesaid

Within 5 years from the date thereof or within such further period as the lessor may from time to time in writing, commence, erect and complete within a reasonable time on the demised premises proper substantial and approved buildings in accordance with plans and specification submitted to and approved by the appropriate local government authority or other statutory body
To pay and discharge all the existing and future rates, taxes, duties, levies assessments, impositions and outgoings whatsoever imposed on the demised premises or any building or buildings which may be erected thereon during the said term hereby granted or imposed upon or payable by the owner or occupier in respect thereof PROVIDED that in the event of the LESSEE at any future date being found liable for payment of all or any part of any such rates, taxes, charges assessments impositions and outgoings whatsoever as aforesaid then and in any such case it shall be lawful for the LESSOR to add such amount so paid to the amount of rent payable next after such payment by the LESSEE and to enforce the payment by the LESSEE of such amount as if the same had been rent hereby reserved and then due and in arrears
And also will at all times during the said term the said demised premises together with all the buildings developed thereon and all additions made thereto and the walls, fences, drains, yards, compounds and appurtenances, thereof in good and substantial repair and condition and will provide a proper sanitary dustbin and dispose of all rubbish and refuse either by placing it therein or by burning it in such manner as not to cause annoyance to neighbouring residents
And also will permit the LESSOR or Asantehene or the Government or their duly authorized agents at any time between the hours of Six o'clock in the forenoon and Six o'clock in the afternoon to enter upon the demised premises and any buildings at any time during the said term erected thereon and examine the state of repair and condition thereof and will repair and make good within a reasonable time all defects of which notice in writing shall be given by the LESSOR to the LESSEE or the agent of the LESSEE
And also will permit the LESSOR or Asantehene or the Government or their duly authorized agents to enter upon the demised premises for the purpose of constructing, laying down, altering, cleansing, or maintain any sewers, water course, cesspool, gutters, drains, water pipes or electric wires or cables which the government or its duly authorized agents officer or representative may consider necessary either for the accommodation of any adjoining property or for any other purpose whatsoever doing as little damage as may be to the demised premises and restoring the surface of the soil and everything erect thereon without any unreasonable delays
That the LESSEE will pay to the LESSOR the fee eligible for the preparation of the Lease and consent to assign or mortgage the Plot.
At the expiration or sooner determination of the term hereby granted to surrender and peacefully deliver up the premises with all buildings erected thereon to the LESSOR in good reasonable condition and state of repair reasonable wear and tear excepted as shall be in accordance with the covenants mentioned above without any claims for compensation whatsoever.
another responsibility type is the death duties (Ayibuadie) (Rattray, 1932). there is no evidence that this death duties still exist in the lower parts of the Asante social structure, but it may still exist in the higher levels.

APPENDIX 14: LIST OF RESTRICTION TYPES IN ASANTEMAN TRADITIONAL AREA

The restriction types in Asante
all members of Asanteman have profit a prendre rights to any natural objects on the land of others (for example a hunter can hunt on any land, people can collect herbs, snails, fish, set trap for game on any land etc)
To Use the land for only the purpose for which it was given (eg. Residential)
Not to assign, mortgage, sublet, or part with the possession of the demised plot or any part thereof or any interest therein without obtaining the prior consent in writing of the LESSOR and Asantehene, such consent not to be unreasonably withheld
Not to do or permit to be done upon the premises or any part thereof any act which may be or become a nuisance, damage, annoyance or inconvenience to the LESSOR or occupiers of adjoining or neighbouring properties or the neighbourhood in particular no to use or permit to be used the demised premises or any part thereof for any noxious offensive trade or business whatsoever
Not to use or permit to be used the premises or any part thereof for any illegal or immoral purpose
Not to change the purpose of use as contained herein without the prior written consent of the LESSOR, Asantehene and the Local Planning Authorities
The Lessee has full power to grant the lease of the said premises on the terms and conditions herein contained (general restriction type. Mostly on imposed on the land rights of an allodial, freehold interest holders and head lessors of a lease)
That the Lessee paying the consideration stated above and paying the ground rent hereby reserved and performing and observing the covenants and conditions herein on his part contained shall quietly hold and enjoy the demised premises during the said term without any interruption by the lessor or confirming party or any person rightfully claiming under or in for them subject to lessee perform all responsibilities and restrictions (general restriction type. Mostly on imposed on the land rights of an allodial, freehold interest holders and head lessors of a lease)

APPENDIX 15: LIST OF RESPONSIBILITY TYPES IN DAGBON TRADITIONAL AREA

The responsibility types at the government level,
That the lessee will from time to time during the said term pay unto the administrator of stool land the yearly rent hereby reserved at the times and in the manner aforesaid which rent shall be revised every fifth year of the said term
And also will within three (3) years from the date hereof or within such further period as the lessee may from time to time appoint in writing erect and complete on the demised premises proper substantial and approved buildings and will not build as aforesaid until plans (including as site plan) and general specification of any proposed building have been submitted to the Town and Country Planning Department. (time unique)

And also will bear, pay and discharge all the existing and future rates, charges, assessments, impositions and outgoings whatsoever imposed on the said premises or any building or buildings which may be erected thereon during the said term hereby granted or imposed upon or payable by the owner or occupier in respect there PROVIDED that in the event of the LESSOR at any future date being found liable for payment of all or any part of any such rates, taxes, charges assessments impositions and outgoings whatsoever as aforesaid then and in any such case it shall be lawful for the LESSOR to add such amount so paid to the amount of rent payable next after such payment by the LESSOR and to enforce the payment by the LESSEE of such amount as if the same had been rent hereby reserved and then due and in arrears
And also will at all times during the said term the said demised premises together with all the buildings developed thereon and all additions made thereto and the walls, fences, drains, yards, compounds and appurtenances, thereof in good and substantial repair and condition and will provide a proper sanitary dustbin and dispose of all rubbish and refuse either by placing it therein or by burning it in such manner as not to cause annoyance to neighbouring residents
And also will if and when required so to do connect the building upon the demised premises with any water-borne sewerage system where such exist or may eventually be installed and for the purpose of such water-bone sewerage system will also connect the building upon the said demised premised with the nearest water main
And also will permit the Lessor or the duly authorized agents at any time between the hours of Six o'clock in the forenoon and Six o'clock in the afternoon to enter upon the demised premises and any buildings at any time during the said term erected thereon and examine the state of repair and condition thereof and will repair and make good within a reasonable time all defects of which notice in writing shall be given by the Lessor to the Lessee or the agent of the Lessee
And also will permit the Lessor or the duly authorized agents to enter upon the demised premises for the purpose of constructing, laying down, altering, cleansing, or maintain any sewers, water course, cesspool, gutters, drains, water pipes or electric wires or cables which the lessor or its duly authorized agents officer or either of them may consider necessary either of the accommodation of any adjoining property or for any other purpose whatsoever doing as little damage as may be to the demised premises and restoring the surface of the soil and everything erect thereon without any unreasonable delays.
And also, will at the expiration of the term of the lease hereby reserved, the lessee shall have the option for renewal of the lease for a further term as agreed upon between the Lessor and the lessee. (Unique)
And also will if so required by the lessor during the said term keep all buildings and additions upon the demised premises insured against fire in an insurance office to be approved by the lessor and in the full value thereof and whenever required will produce to the lessor or to the duly authorized agents of the policy and receipt for the last premium paid in respect of such insurance and it the said building shall be destroyed or damaged by fire at any time will expend the moneys received in respect of such insurance in rebuilding and reinstating the same and if such moneys are insufficient for the purpose will provide and pay the additional sum required for completion of such rebuilding or reinstatement (Unique Here)

APPENDIX 16: LIST OF RESPONSIBILITY TYPES IN DAGBON TRADITIONAL AREA

the responsibility types at the chieftaincy level
When a Tindaana allocates land to a party, that party is to give the Tindaana annually animal to be used for sacrifice by the Tindaana.
It is the responsibility of the party to enter into a formal lease with the Yaa Naa within six months after the use right has been given

APPENDIX 17: LIST OF RESTRICTION TYPES IN DAGBON TRADITIONAL AREA

The customary level restriction types in Dagbon
The applicants are expected to use the land for only the use for which the grant was made
The applicant cannot alienate the use right to other parties outside his/her household without the consent of the sub-chief.
All members of the town where the land is located have profit rights on any tree bearing fruit like mango located on the subject land,
The applicant can cut any fruit-bearing/economic tree that existed on the land before the grant was made without the consent of the sub-chief.
The applicant is not supposed to allow immoral and illegal activities on the subject land

APPENDIX 18: LIST OF RESTRICTION TYPES IN DAGBON TRADITIONAL AREA

The government-level restriction types Dagbon
And also without the prior consent in writing of the Lessor assign, underlet, mortgage or part with the possession of the said demised premises or any part thereof or any building or buildings erected thereon or any part of such building or building or any interest
1. To Use the land for only the purpose for which it was given (eg. Residential)
Not to do or permit to be done upon the premises or any part thereof any act which may be or become a nuisance, damage, annoyance or inconvenience to the LESSOR or occupiers of adjoining or neighbouring properties or the neighbourhood and in particular not to use or permit to be used the demised premises or any part thereof for any noxious offensive trade or business whatsoever and *will not keep or allow to be kept upon the said demised premises any horse, donkey, cattle, sheep, goat, pig, or guinea fowl* (the first part common but the highlighted last part is unique to Customary area.(
Not to alter the structure of or add to the buildings nor to erect any other building or structure until plans (including a site plan) and general specification have submitted to and approved by the lessor or by the duly authorized agents or the lessor and the lessor hereby covenants with the rent hereby reserved and observing and performing the several covenants and stipulation herein on.
The general restriction types as seen in Appendix 7, 8 and 14. Mostly on imposed on the land rights of an Allodial, freehold interest holders and head lessors of a lease stated earlier in this study.

APPENDIX 19: LIST OF RESPONSIBILITY TYPES IN FIEVE TRADITIONAL AREA

The responsibility types in Fieve
To pay the annual ground rent of fifty Ghana cedis hereby renewable every five years
To develop the said land within three years

Not to allow in or about the demised land anything which may be or become a danger or annoyance to the lessor or any owner or occupier of the adjacent property.
At the expiration or sooner determination of the term hereby created and or any renewal thereof to yield up to the lessor the demised land.
Pay rent of five (5%) of the total toll collected each market day.
That fifty (50%) of revenue collected by the District Assembly each market day shall be paid to the Lessor.

APPENDIX 20: LIST OF RESTRICTION TYPES IN FIEVE TRADITIONAL AREA

The customary restriction types in Fieve
The lessee shall upon notifying the Lessor be entitled to charge or mortgage at Law or in equity, assign, sublet or part with the possession of the land or any part thereof or any building thereon or any interest therein
To use the said land for the purpose for which it was granted only (eg. Tolaku Market)
The general restriction types as seen in Appendix 7, 8 and 14. Mostly on imposed on the land rights of an Allodial, freehold interest holders and head lessors of a lease stated earlier in this study.

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APPENDIX 21: LIST OF RESPONSIBILITY TYPES IN GBAWE TRADITIONAL AREA

The responsibility types on Gbawe lands
The land owner must contribute to the Gbawe family when it is celebrating its '*Homowo*' festival
The responsibility types is similar to the general responsibility type in appendixes 6, 13 and 15

APPENDIX 22: LIST OF RESTRICTION TYPES IN GBAWE TRADITIONAL AREA

The types of restriction on Gbawa land
All member of the community have profit rights on any fruit bearing plant on the land
The general restrictriction types as seen in Appendix 7, 8 and 14

APPENDIX 23: LIST OF RESTRICTION TYPES IN BOLGA TRADITIONAL AREA

the restriction types in Bolga
The Tindaana has profit right to all '*doro'* tree in his jurisdiction. Thus he can take fruits from this tree without compensating the land holder.
The general restriction types as seen in Appendix 7, 8 and 14

APPENDIX 24: LIST OF RESPONSIBILITY TYPES IN TECHIMAN TRADITIONAL AREA

the responsibility types Techiman
The applicant shall pay the necessary fees involved.
The applicant shall within 12 months of allocation commence and complete construction on the said plot within 2 years.

That the recipient/applicant shall upon acquisition of land/building plot pay an annual ground rent to the stool lands administrator
That within a period of one year after allocation the applicant/allotee shall obtain the requisite concurrence and permits from the LC or Techiman municipal assembly.

APPENDIX 25: LIST OF RESTRICTION TYPES IN TECHIMAN TRADITIONAL AREA

the restriction types Techiman
The applicant should not use the approved land or building plot for any purpose other than which has been specified in the chit.
If the applicant finds any cash crops on the plot allocated the Techiman traditional authority should be notified to give the farm owner duration to harvest that crop and vacate the said land before development commence.
The Techiman stool reserves the right to re-enter the land or building plot if any of the above conditions are not complied with.
The general restriction types as seen in Appendix 7, 8 and 14

APPENDIX 26: LIST OF RESPONSIBILITY TYPES IN WASSA TRADITIONAL AREA

The responsibility types Wassa
The allotee will within one year commence and within three years complete building on the said plot
The general responsibility type in appendixes 6, 13 and 15

APPENDIX 27: LIST OF RESTRICTION TYPES IN WASSA TRADITIONAL AREA

The restriction Types in Wassa
It prohibited to bring dogs to the land
It prohibited to bring a goat to the land
It prohibited to work on the land on '*adimu'* or '*3dimu'*(the spelling could be different). This a Friday. They occur on the Friday three weeks after the last '*adimu*' Friday. On this Friday it is prohibited to work on the land in Wassa Amenfi unless consent is granted by the chief
The general restrictriction types as seen in Appendix 7, 8 and 14

APPENDIX 28: EXPLANATION FOR THE CONTENT OF THE PARTY PACKAGE OTHE COUNTRY PROFILE

APPENDIX 28 A: PARTY PACKAGE CLASSES

Party Package Classes	
LADM Classes	Explanation
GH_Party	Information taken on each party involved in the registration process
GH_PartyMember	This contains information about a party that links that party to a group of parties

GH_GroupParty	refers to Information about a group of parties involved in the registration

APPENDIX 28 B: GH_PARTY CLASS

GH_Party			
Attributes	**Value Type**	**Multiplicity**	**Explanation**
addressType	GH_AddressType	1..*	This is the residential address of the party. If it is a business the registered office of the business. See Section 70 of ACT 1036. it is mandatory.
dateOfBirth	Date	1..1	This is the date of birth of the parties. This helps to determine the age of the parties. Because per the law Minors cannot hold land as proprietors under the title system(see Section 280 of Act 1036). Also in the deeds system, minors do not have the legal capacity to enter into contracts. The Customary authorities also do not transact land with minors.
biometric	GH_BiometricType	0..*	The law prescribes that the biometric details of the party need to be taken by the title registry but does specify with one. (see section 110 of Act 1036)
citizenshipStatus	GH_CitizenStatusType	1..1	This collects information about the citizenship of the party. Needed to be exempted from some landholding restriction like a foreigner cannot have freehold interest in land etc
emailAddress	String		this means the email address of the party
endorsement	GH_SignatureType	1..*	refers to any way to know consent was given by the party. This could be through signature, embossment, seal, marking etc (see Section 68 of Act 1036)
fullName	CharacterString	1..1	refers to the full name of the party as it appears on the administrative source document
sex	GH_SexType	0..1	means the sex of the party if they are a natural person. (see ISO/IEC (2004))
hometown	String	0..1	refers to the cottage, village, town, or city where the party is an indigene of that customary area
literacy	GH_LiteracyType	0..1	refers to whether the party can read and write or otherwise. Per Section 209 of Act 1036. this must be known
maritalStatus	GH_MaritalStatusType	0..1	refers to the marital status of the party at the time of registration. Per Section 97 of Act 1036, this must be present
mobileNumber	Integer	0..1	refers to the mobile number of the party. This is a requirement at mostly the CLSs in Ghana. Currently, there are no privacy breaches like in other countries
nationalID	GH_NationalIDNumber	0..1	refers to the unique ID number of any of the external national ID cards.
nickname	String	0..1	refers to the alias name of the party.
occupation	String	0..1	This is the job of the party. (See LTRD Mortgage Application form)

picture	int	0..1	refers to a passport picture of the party. This is a must per Section 110 of Act 1036
pID	Oid	1..1	refers to the unique ID given to each party in the land administration infrastructure
postalAddress	String	0..1	refers to the postal address or post office box number of the party. This is a must per Section 70 of Act 1036
reference	String	0..1	This is the local identification of a party in their respective organization. (see Mortgage application form)
role	GH_PartyRole	0..*	refers to the capacity of the party or the role of the party in the data update and maintenance process
taxIdentificationNumber	Integer	0..1	refers to the Ghana tax identification number (TIN). Thus, a unique number for each taxpayer in Ghana.
telephoneNumber	Integer	0..1	refers to the landline or telephone number of the party
type	GH_PartyType	1..1	refers to the type of the party

APPENDIX 28 C: GH_PARTYMENBER CLASS

GH_PartyMenber			
Attributes	Value Type	Multiplicity	Explanation
Proof	GH_PartyMemberProofType	0..1	refers to proof that indicates that the party is a member of a group of parties
Share	Fraction	0..1	refers to share that party has in the group of parties

APPENDIX 28 D: GH_GROUPPARTY CLASS

GH_GroupParty			
Attributes	Value Type	Multiplicity	Explanation
groupID	Oid	0..1	this is a unique identifier of a group
groupType	GH_GroupType	0..1	the type of a group

APPENDIX 28 E: CODE LISTS FOR PARTY PACKAGE

codelist for Party Package		
LADM codelist	Explanation	Values
GH_CitizenStatusType	List of citizenship states relevant to land registration in Ghana	Ghanaian/Non-Ghanaian
GH_SexType	refers to list of various sex per ISO/IEC (2004)	Female/Male/Not Known/Not Applicable
GH_MaritalStatusType	refers to list of various marrital status of a person in Ghana	Divorced/Married/Registered Partnership/Separated/Single/ Widowed

GH_PartyRole	List of all capacities and roles of a party in land registration in Ghana	See Appendix 4
GH_PartyType	List of all party type in Ghana	Natural/Non-Natural/Group/BAUnit
GH_PartyMemberProofType	List of all proof that would like a party to a group party	akoa' and 'wura' Relationship (example is owing allegiance see Section 5(9) of Act 123) /allocation document/ business registration document/ change of occupant of a stool, skin, or family and clan heads letter (see Section 182 of Act 1036)/customary common knowledge/ deed instrument/ family file/ gazette/ group constitution/ List provided by CLS (see Section 15 of Act 1036)/ Marriage certificate
GH_LiteracyType	refers to a list to indicate whether the party can read and write or otherwise	illiterate/ literate
GH_GroupType	List of all the group types in Ghana	Appendix 3

APPENDIX 28 F: DATA TYPES FOR PARTY PACKAGE

DataTypes for PartyPackage			
LADM Data type	Explanation	Values	Values
GH_BiometricType	refers to the list of existing biometric details that can be collected.	byte/string/int/ Multimedia	DNA/Fingerprint/Physiological Recognition/
GH_SignatureType	refers to the list of all the acceptable forms of given consent in a written form	int/int/int/int/int/int	signature/embossement/initials/seal/thumbprint/marking
GH_Address Type	The various types of residential address system of the party in ghana	1. String 2.Int 3.CharacterString 4.CharacterString 5. CharaterString	1. digitalAddress-The Ghana Post GPS address 2.geoCodedPictureOfTheHouse-A georeference picture 3. houseNumber-the normal house number 4. referenceLocation-using a well know subject or feature as the address 5. verbalDirection-a verbal direction to the house
GH_NationalIDNumber	refers to an ID number from any of the existing national ID cards	string/string/string/ string/string	driversLicence/ghanaCardID/ nationalHealthInsuranceID/passportID/voterID

APPENDIX 29: EXPLANATION OF THE CONTENTS OF THE ADMINISTRATION PACKAGE

APPENDIX 29 A: ADMINISTRATIVE PACKAGE CLASSES

Administrative Package Classes	
LADM Classes and Data Types	Explanation
GH_RRR	This is an abstract class adapted from LA_RRR from ISO 19152 (ISO, 2012)
GH_Right	This a specialized class of GH_RRR. This class has an instance of a right. It is an adaptation of LA_Right from ISO 19152
GH_Responibility	This a specialized class of GH_RRR. This class has an instance of a responsibility. It is an adaptation of LA_Right from ISO 19152
GH_Restriction	This a specialized class of GH_RRR. This class has an instance of a restriction. It is an adaptation of LA_Right from ISO 19152
GH_Mortgage	This a leaf class that inherits from GH_RRR and GH_Restriction. An instance of this class is a mortgage restriction. This mortgage is always connected to a particular registered land right. It is an adaptation of LA_Mortgage from ISO 19152
GH_Contractual Licence	Contractual licence is a unique licence issued by the LC of Ghana for the use and enjoyment of state lands (see Section 162 of Act 1036). This a leaf class that inherits from GH_RRR and GH_Right. An instance of this class is a contractual licence.
GH_Easement	This a leaf class that inherits from GH_RRR and GH_Restriction. An instance of this class is an easement (see Section 157).
GH_Caveat	This is a leaf class that inherits from GH_RRR and GH_Restriction. An instance of this class is a caveat with means a restriction prohibiting the Land registrar from registering a transaction on a particular basic administrative unit until a certain condition is met. An example of such a condition can be until a land litigation is resolved etc. See section 184 of Act 1036
GH_ProfitAPrendre	This a leaf class that inherits from GH_RRR and GH_Restriction. An instance of this class is a profit a prendre (see Section 157).
GH_BAunit	This is a class adapted from LA_Baunit in ISO 19152 (ISO, 2012.) An instance of this class is a basic administrative unit. A basic administrative unit is an administrative entity, subject to registration (by law), or recordation [by informal right, or customary right, or another social tenure relationship], consist of zero or more spatial units (ISO, 2012)
GH_AdministrativeSource	This is a specialized class that inherits from GH_Source. An instance of this class is an administrative source (ISO, 2012). This class is an adaptation of LA_AdministrativeSource from ISO 19152.
LA_RequiredRelationshipBAunit	This describes the relationships to the Baunits in the system. (See ISO, 2012)
GH_RentPayment	Rent payment is a prevalent responsibility by the lessee to pay ground rent to the lessor through the office of administrator of stool land. Example of such rent payment in Section 6 of Act 123. This a leaf class that inherits from GH_RRR and GH_Responsibility. An instance of this class is ground rent.
GH_PurposeForWhichTheLandW	All customary grants have a restriction on it, to only use the land for the purpose for which that customary grant was made

asGiven	
GH_UseRestriction	All spatial units in Ghana have a planning restriction relating to their use. This is imposed by the zoning scheme of that area prepared by LUPSA
GH_JurisdictionalAndCulturealRestriction	This means any taboos or customary restrictions imposed on a given spatial unit. This could be Adimu in Wassa Amenfi, no hunting taboos etc.
GH_RestrictiveCovenant	This refers to any agreed restrictions imposed on the party by the other party. See Section 158 of Act 1036
GH_OtherResponsibility	This is a class for any other responsibility imposed on the party which is not covered in the code list for responsibility type

APPENDIX 29 B: GH_RRR CLASS

GH_RRR			
Attributes	Value Type	Multiplicity	Explanation
description	CharacterString	0..1	This refers to a description of the right, restriction or responsibility(RRR) including nature of the RRR and other information that must be present on must be known about that RRR.
eLISCaseNumber	int	0..1	This is a unique number that is given to each electronic lodgement or transaction by the enterprise land information system of ghana at the LC
entryNumberLTRD	int	0..1	This is a unique number given to each RRR enter on a land register(folio) in Title registration by the LTRD. (See a land title register)
registrationNumberLTRD	String	0..1	This is a unique number given to each RRR upon registration in the title register in only the title registration system
registrationNumberPVLMD	String	0..1	This is a unique number given to each instrument or document containing RRR upon registration or entering in the deeds register kept by the PVLMD
remarks	CharacterString	0..1	This refers to a remark on the right, restriction or responsibility(RRR) that must be present or must be known about that RRR.
rID	Oid	1..1	This is a unique ID number to be generated for each RRR registered or recorded in the system.
share	Fraction	0..1	Share means the proportion of each RRR held by a party. See ISO 19152.
shareCheck	boolean	0..1	This ensures that the combination of shares of each RRR is equaled to 1
startDate	DateTime	0..1	This refers to a start date of the right, restriction or responsibility(RRR).
timeSpec	ISO8601_ISO14825_Type	0..1	The term of the RRR. Thus, the operational use of a right in time-sharing (ISO, 2012).

APPENDIX 29 C: GH_RIGHT CLASS

GH_Right			
Attributes	Value Type	Multiplicity	Explanation
type	GH_RightType	1	This refers to the Right (or interest) being registered or recorded. Thus, the type of the right
GH_UseRestriction			
Attributes	Value Type	Multiplicity	Explanation
use	GH_LandUse Type	1	This refers to the use of the spatial unit

APPENDIX 29 D: GH_OTHERRESPONSIBILITY CLASS

GH_OtherResponsibility			
Attributes	Value Type	Multiplicity	Explanation
type	CharacterString	0..*	This refers to any responsibility imposed

APPENDIX 29 F: GH_PURPOSEFORWHICHTHELANDWASGIVEN CLASS

GH_PurposeForWhichTheLandWasGiven			
Attributes	Value Type	Multiplicity	Explanation
purpose	GH_LandUse Type	1	This refers to the use for which the land was given.

APPENDIX 29 G: GH_RESTRICTIVECOVENANT CLASS

GH_RestrictiveCovenant			
Attributes	Value Type	Multiplicity	Explanation
type	CharacterString	0..*	This refers to any restrictive covenants imposed on that spatial unit

APPENDIX 29 H: GH_JURISDICTIONALANDCULTURALRESTRICTION CLASS

GH_JurisdictionalAndCulturalRestriction			
Attributes	Value Type	Multiplicity	Explanation
type	CharacterString	0..*	This refers to any taboo or customary restriction imposed by the allodial owner. See Act 1036

APPENDIX 29 I: GH_RESPONSIBILITY CLASS

GH_Responsibility			
Attributes	Value Type	Multiplicity	Explanation

type	GH_ResponsibilityType	1..1	This refers to the responsibility (including express and implied covenants attached to the right that requires the right holder to bear some responsibility with respect to holding that spatial unit) being registered or recorded. Thus, the type of responsibility (ISO 19152).

APPENDIX 29 J: GH_RESTRICTION CLASS

GH_Restriction			
Attributes	Value Type	Multiplicity	Explanation
memorials	CharacterString	0..1	refers to notes made by the responsible party registering the restriction to remind them of something associated with the restriction. (See the outside of a folio or a land title register in Ghana)
partyRequired	Boolean	0..1	This refers to whether that restriction is associated with a party or not during registration (ISO, 2012). An example is the zoning restriction imposed in Section 87 of Act 925
type	GH_RestrictionType	1..1	This refers to the restriction (including, statutory restrictions, planning restrictions, restrictive covenants, customary taboos etc) being registered or recorded. Thus, the type of the restriction

APPENDIX 29 K: GH_RENTPAYMENT CLASS

GH_RentPayment			
Attributes	Value Type	Multiplicity	Explanation
rentAmount	Currency based on ISO 4217	1..1	This refers to the amount of ground rent paid. See a lease or indenture document in Ghana)
rentDueDate	DateTime	1..1	This refers to the date on which the rent is due to be paid. (See a lease or indenture document in Ghana)
rentPaymentIntervals	ISO8601_ISO14825_Type	1..1	This refers to the time intervals between different rent payments. (See a lease or indenture document in Ghana)
rentRevisionIntervals	ISO8601_ISO14825_Type	1..1	This refers to the interval between rent review periods. (See a lease or indenture document in Ghana)

APPENDIX 29 L: GH_MORTGAGE CLASS

GH_Mortgage			
Attributes	Value Type	Multiplicity	Explanation
amount	currency based on ISO 4217	0..1	This refers to the mortgage amount. (Example is seen on a mortgage application form by the LTRD)

interestRate	Real	0..1	This refers to the interests rate or return on capital attached to the mortgage amount
ranking	integer	0..1	This refers to the arrangement of the mortgages, if there are more than one mortgage associated with a given right
repaymentTimeInterval	ISO8601_ISO14825_Type	0..1	This refers to the repayments interval or the return of capital attached to the mortgage amount
type	GH_MortgageType	0..1	Refers to the type of mortgage. (Example is a home purchase Mortgage (see Home Finance Company Bank, First National Bank Ghana, 2021)

APPENDIX 29 M: GH_PROFITAPRENDRE CLASS

GH_ProfitPrendre			
Attributes	Value Type	Multiplicity	Explanation
exclusivelyenjoyedByGrantee	Boolean	1..1	This refers to whether the profit is to be enjoyed by only the grantee or not. See Section 159 (2d) of Act 1036
natureOfProfit	String	1..1	This is a description of the form of the profit. See Section 159 of Act 1036
profitInGross	Boolean	1..1	This means whether the profit is enjoyed in gross or in appurtenance with other spatial units. See Section 159 (2c) of Act 1036

APPENDIX 29 N: GH_CAVEAT CLASS

GH_Caveat			
Attributes	Value Type	Multiplicity	Explanation
reason	Character String	1..1	This refers to the reasons why the party is making that caveat. See Section 184 (2) of Act 1036

APPENDIX 29 O: GH_EASEMENT CLASS

GH_Easement			
Attributes	Value Type	Multiplicity	Explanation
easementType	GH_EasementType	1..1	This refers to the type of easement (see Sectionn157 of Act 1036)
natureEasement	Character String	1..1	This refers to the description of the easement (see Section 157 of Act 1036)

APPENDIX 29 P: GH_CONTRACTUALLICENCE CLASS

GH_ContractualLicence			
Attributes	Value Type	Multiplicity	Explanation
lenghtOfNoticeRequired	ISO8601_ISO14825_Type	1..1	This refers to the length noticed required before the termination of the contractual licence (see Section 162 (3f) of Act 1036)
use	GH_LandUseType	1..1	The use of the land. (see Section 162 (3e) of Act 1036)

APPENDIX 29 Q: GH_ADMINISTTRATIVESOURCE CLASS

GH_AdministrativeSource			
Attributes	Value Type	Multiplicity	Explanation
consideration	String	0..1	This is the consideration given for that right. This is a mandatory requirement. See Section 163(2) of Act 1036
considerationAcknowledged	boolean	0..1	This shows whether the consideration or purchase price has been received. This is legally mandated see Section 163(2) of Act 1036
text	MultiMediaType based on ISO/IEC 13240	0..1	The content of the document (ISO, 2012)
type	GH_AdministrativeSourceType	0..1	the type of document (ISO, 2012)

APPENDIX 29 R: LA_REQUIREDRELATIONSHIPBAUNIT CLASS

LA_RequiredRelationshipBAuint			
Attributes	Value Type	Multiplicity	Explanation
relationship	CharacterString	1..1	This refers to the relationship between Baunits (ISO, 2012). For example the relationship between the same BAUnit recorded in the three different systems can be shown here.

APPENDIX 29 S: GH_BAUNIT CLASS

GH_BAunit			
Attributes	Value Type	Multiplicity	Explanation
certificateIssuedDateLTRD	DateTime	0..1	This is the date on which a certificate is issued for a BAUnit in the land title system by LTRD. (See LTRD land register).
certificateNumberLTRD	int	0..1	This is the certificate number of the Land certificate issued with respect to a particular BAUnit in the Title System by the LTRD. (See LTRD Land register)

certificateSerialNumberLTRD	String	0..1	This is the serial number of the certificate issued with respect to a Baunit in the title registration system by the LTRD. (see LTRD Land register)
folioNumberLTRD	int	0..1	This is the folio number of the folio for that BAUnit in the Title registration System. (see LTRD land register or folio)
name	CharacterString	0..1	The name of the basic administrative unit (ISO, 2012)
qualificationsWhichAffectsThetitle	CharacterString	0..*	These are the qualifications attached to a provisional title (See Section 112 (2c) of 1036) or a qualified title (a title administratively converted from deeds to title as used in POLARIS in Ontario) which affect the BAUnit.
titleNumberPVLMD	String	0..1	refers to the unique identification number of the physical file (a title file of PVLMD) which contains all the deeds or source instruments that are evidence of all RRR associated with that particular BAUnit in the deed registration system by PVLMD.
titleType	GH_TitleType	0..1	This refers to the nature of the title on the BAUnit. Thus, the BAUnit could be in the deeds, informal, customary etc. This attribute could enable easy mass conversion of Baunits from one registration system to the other. For example, a BAUnit registered under customary registration system by CLS (referred to as with customary title) could be easily converted to a registered substantive title in the title registration system by LTRD.
type	GH_BAunitType	0..1	This refers to types of basic administrative units in Ghana. Example is a stool land (referred to as Stool land unit). See Section 13, 19, 269 of Act 1036.
uID	Oid	1..1	The unique identifier of a BAUnit in this system.
volumeNumberLTRD	int	0..1	This means the volume number of the volume where the folio of a BAUnit in the title registration system can be found. See a land register or folio by the LTRD.

APPENDIX 29 T: LIST OF CODE LIST FOR ADMINISTRATIVE PACKAGE

codelist for Administrative Package		
LADM codelist	Explanation	values
LA_AvailabilityStatus	List of all the various status a source document could be in per ISO 19152	archiveConverted/archiveDestroyed,/archiveIncomplete, archiveUnknow/docAvailable

GH_Title Type	List of all the current and future suggested legal frameworks or registration systems under which a basic administrative unit could be registered or recorded in Ghana	**customaryTitleCLS**(meaning recorded under the customary registration system)/**deedTitlefilePVLMD**(meaning recorded under the deed registration system)/**goodTitle** (meaning title derived from an enactment etc. recorded under the title registration system per Section 64 of Act 1036) /informalTitle (meaning title produced from recording Baunits under the proposed informal registration system)/**provisionalTitle** (recorded under the title registration system see Section 112 of Act 1036)/**qualifiedTitle**(a suggested form of title by the study, produced from adminstratively converting an existing registered deed to a title as used in Ontario/**SubstantiveTitle**(a title to land recorded under the title registration system in Ghana. see Section 114 (3) of Act 1036).
GH_BAunitType	List of all BAUnit Types in Ghana	**BasicPropertyUnit**(lands under informal use example shacks in slums), **clanLandUni**t (Clan lands), **commonLandUnit** (common land see Section 19 of Act 1036)/**familyLandUnit**(family land)/**groupLandUnit**(group lands)/**individualLandUnit** (individual lands)/**landHeldByTheStateInTrust** (see Section 105 of Act 1036)/ **publicRoadUnit** (public roads)/ **publicSpaceUnit** (Public space. see 145 of Act 925)/ **skinLandUnit**(skin lands)/**stateLandUnit** (state lands)/ **stoolLandunit** (stool lands)/ **unclaimedLandUnit** (unclaimed lands, see Section 90 of Act 1036)/**vestedLandUnit** (vested lands)
GH_RightType	This refers to a list of all the right bundle of rights/interest that exist in land in Ghana	See appendix 5
GH_ResponsibilityType	This refers to a list of all of the responsibility types that exist in land in Ghana	See appedixes 6, 13, 15, 16, 19, 21, 24, 26
GH_RestrictionType	This refers to a list of the restriction types that exist in land in Ghana	See appendixes 7, 8, 14, 17, 18, 20, 22, 23, 25, and 27
GH_MortgageType	This is a list of mortgage types in Ghana using the mortgage products of the land mortgage provider in Ghana. (see Home finance company HFC Bank and First National Bank)	customaryPledge/equityReleaseMortgage/fixedRateMortgage /homeCompletionMortgage/homeConstructionMortgage/homeImprovementMortgage/homePurchaseMortgage/levelPayment/linear/microcredit/saveToOwnMortgage/variableRateMortgage
GH_EasementType	This is a list of the types of easements in Ghana	easementByNecessity/expressEasement/impliedEasement/ prescriptiveEasement

GH_Land UseType	This is a list of all land-use type in Ghana per Zoning Guidelines and Planning Standards 2011 of the land use and spatial planning authority of Ghana	(LUPSA, 2011)
GH_Administrative SourceType	list of all forms of administrative sources used in land registration systems in Ghana	See Appendix 9

APPENDIX 30: EXPLANATION FOR THE CONTENT OF SPATIAL UNIT PACKAGE

APPENDIX 30 A: LIST OF CLASS OF SPATIAL UNIT PACKAGE

Spatial Unit Package Classes	
LADM Classes	Explanation
GH_SpatialUnit	This refers to the spatial objects capable of being registered in Ghana. This is in Ghana could be a land parcel. This class is an adaptation of the LA_Spatial unit. This is a generalized class, however, it is not an abstract class. An instance of this class is a spatial unit which could be a parcel of land.
LA_SpatialUnitGroup	This class refers to various groups to which these spatial units can be grouped. Example into towns, district, LTRD sectional maps etc.
LA_RequiredRelationshipSpatialUnit	This refers to the required relationships that may exist between two spatial units (ISO, 2012)
GH_Level	This is an adaptation of LA_Level to Ghana's context. A level means a set of the spatial unit with geometric and/or topological and/or thematic coherence (ISO, 2012)
GH_LegalSpaceBuildingUnit	This is a specialized class of GH_SpatialUnit. This is the class where the attributes of all building spatial units are described. It is adapted from (LA_LegalSpaceBuildingUnit ISO, 2012)
LA_LegalSpaceUtilityNetwork	The LegalSpaceUtilityNetwork is the class where all utility networks will be described. In Ghana, utility networks are usually different and less complicated as of now hence are not recorded. However, this is expected to change in the future

APPENDIX 30 B: GH_SPATIALUNIT CLASS

GH_SpatialUnit			
Attributes	Value Type	Multiplicity	Explanation
area	GH_AreaValue	0..*	This refers to the total covered by the 2D spatial unit
dimension	LA_DimensionType	0..1	Refers to the dimension of the spatial unit
districtMMDAs	char	0..1	This refers to the Metropolitan, Municipal, or District(MMDAs) where the spatial unit is located

extAddressID	ExtAddress	0..*	Any external address system given to the spatial unit. Example could be the GhanaPostGPS address, house number of the spatial unit etc.
label	CharacterString	0..1	This is a textual description of the spatial unit (See Sections 110 and 220 of Act 1036 which explains why this attribute is legally mandated in Land title registration and deeds registration respectively.
locality	String	1..1	This refers to the name of the area, town, village, cottage or city where the spatial unit is located. (See a site plan)
BlockNumberLTRD	int	0..1	This refers to the number of the block in which the spatial unit is located in the title registration system
DistrictNumberLTRD	int	0..1	This means the number of the Land Title registration district where the spatial unit is located under title registration
ParcelNumberLTRD	Real	0..1	This means the unique parcel number given to the spatial unit on a parcel plan by/ the LTRD under the title registration system
SectionNumberLTRD	int	0..1	This refers to the number of the sectional map on which the spatial unit can be located
referencePoint	GM_Point	0..1	The coordinates of a point inside the spatial unit (ISO, 2021)
region	GH_RegionType	1	This is the name of the region within which the spatial unit is located. An example is Ashanti Region
streetAddress	String	0..1	This is the unique number given to the spatial unit under street address system. An example is plot 7 Agyeiwaa crescent (see site plan)
suID	GLPIN	1	This refers to the unique identifier given to each spatial unique.
surfaceRelation	LA_SurfaceRelationType	0..1	This is the relation between the spatial unit and the surface of the land. For example, a mineral right could be attached to a spatial unit below the surface of the land (see Act 703), while other people may have the surface rights (example leasehold) on a spatial unit on or above the surface of that same land.
traditionalAreaName	GH_TraditionalArea	0..1	This is the name of the traditional area (customary area) where the spatial unit is located. Example is Kumasi traditional Area
volume	LA_VolumeValue	0..*	This refers to the volume of the 3D spatial unit (ISO, 2012)

APPENDIX 30 C: GH_SPATIALUNITGROUP CLASS

LA_SpatialUnitGroup			
Attributes	Value Type	Multiplicity	Explanation
hierachyLevel	Integer	1..1	This means the hierarchy of an administrative or zoning subdivision (ISO, 2012)
label	Character String	0..1	A short text describing the spatial unit group. An example is a spatial unit group that forms a town etc.

name	Character String	0..1	The name of the spatial unit group (ISO, 2012). Example if the spatial unit group is a town the name could be Ashtown.
referencePoint	GM_Point (type from ISO 19107)	0..1	The coordinates of a point within the spatial unit group (ISO, 2012)
sugID	Oid	1..1	This refers to a unique identifier for each spatial unit group. The format will be an automatically generated number using entries from this class. This could be discussed

APPENDIX 30 D: GH_LEVEL CLASS

GH_Level			
Attributes	Value Type	Multiplicity	Explanation
lID	Oid	1..1	This unique identifier for the level (ISO, 2012)
name	CharacterString	0..1	This is the name given to the level
registerType	GH_registerType	0..1	This refers to the register type of the content of the level. Example could be the title register, deeds register etc
structure	LA_StructureType	0..1	The structure of the level geometry
type	GH_LevelContentType	0..1	The type of the content of the level

APPENDIX 30 E: LA_REQUIREDRELATIONSHIPSPATIALUNIT CLASS

LA_RequiredRelationshipSpatialUnit			
Attributes	Value Type	Multiplicity	Explanation
relationship	ISO19125_Type	1..1	This refers to a description of the relationship between spatial units

APPENDIX 30 F: GH_LEGALSPACEBUILDINGUNIT

GH_LegalSpaceBuildingUnit			
Attributes	Value Type	Multiplicity	Explanation
block	char	0..1	The is the block identifier of a building under title system in Ghana. See a strata plan
extPhysicalBuildingUnitID	ExtPhysicalBuildingUnit	0..1	This is an external address given to that building spatial unit. Example is a house number.
lot	Real	0..1	This refers to the lot identifier given to the building spatial unit under title registration in Ghana. See a strata plan
strataPlan	String	0..1	This is the identifier each building spatial unit under title registration system in Ghana. See a strata plan
type	GH_Building	0..1	This refers to the type of the building spatial unit.

	UnitType		
unitEntitlement	String	0..1	This refers to the unit entitlement identifier given to each building spatial unit under the title registration system in Ghana

APPENDIX 30 G: LIST OF CODE LIST AND DATATYPES FOR SPATIAL PACKAGE

code list and Datatypes for Spatial Package		
LADM code list	Explanation	values
LA_UtilityNetworkStatusType	List of all the status of a utility network per ISO 19152	inUse/outOfuse/Planned
LA_SurfaceRelationType	List of all surface relations per ISO 19152	mixed/below/above/onSurface
LA_DimensionType	List of all dimensions per ISO 19152	0D/1D/2D/3D/liminal
LA_VolumeType	List of all type of volumes in land administration per ISO 19152	officialVolume/nonOfficalVolume/calculatedVolume/ surveyedVolume
GH_LevelContentType	The list of all the contents a level can have in Ghana	Right (interest)/restriction/responsibiltiy/mixed/informal/ building/network
LA_AreaType	List of all the area types per ISO 19152	officialArea/nonOfficalArea/calculatedArea/ surveyedArea
GH_RegisterType	List of all the register types in Ghana	***all*** (a combination of all registers)/ ***customaryRegisterCLS*** **(**the customary register of the CLSs, separated based on the traditional area (GH_TraditionalAreas) as practised in Ghana. Hence each CLS will have control of their register. /***deedsRegisterLC***(the deed register of the LC, separated based on the regions (GH_regionType) as practised in Ghana. Hence each regional LC will have control of their deeds register.)/ /***forestRegisterFC*****(**the register kept by the Forestry Commission used to register Timber rights)/ ***informalRegister*** (the proposed register for recording informal land rights in informal areas)/ ***mineralCommissionDistrictRigister***(the register of District offices of the Minerals Commission (MC) to register mineral rights of small scale miner in Section 90 of Act 703. The register is divided based on the district office (GH_MineralDistrictOffice))/***mineralRightRegisterMC*** (MC register to register mineral rights, see Section 103 of Act 703. This will be divided based on the MC office)/ ***stateLandsRegister*** (a proposed register to register the

		state allodial ownership rights on state lands and other transaction on state lands which are currently not registered in the deeds and title registration system. the register is divided into regions to the each regional LC will have control of their register)/ ***titleRegisterLC*** (the title register of the LC separated based on the regions (GH_regionType) as practised in Ghana. Hence each regional LC will have control of their title register.)/ ***vestedLandsRegister*** (a proposed register for land rights transactions on only vested lands. Divided into regions so that each LC will have control on their own register)
LA_UtilityNetworkType	List of network type per ISO 19152	chemicals/ electricity/ gas/ heating/ oil/ telecommunication/ water
GH_UnitOfMeasureType	the list of units of measure and area measures used in land administration in Ghana	acre/ feet/ hectare/ squareFoot/squareMeter
GH_BuildingUnitType	List of buildng unit type in Ghana	condominium/ detached/ floorOfApartment/individual/informalUnitOrKioskOrShack/multiStoreyBuilding/semiDetached/Share/Shop
GH_TraditionalArea	List of all traditional areas in Ghana	See appendix 35 (COLANDAF, 2019)
GH_RegionType	List of all regions in Ghana	ahafo/ashanti/bono/bonoEast/central/eastern/greaterAccra/northEast/northern/oti/savannah/upperEast/upperWest/volta/western/westernNorth
GH_MineralDistrictOffice	The name of a Minerals Commission District offices in Ghana. Who registers mineral rights of small scale miners (Section 90 of Act 703	name
GH_Glpin	The Ghana Land parcel identification Number. A unique identifier of each spatial unit in Ghana	Glpin
LA_StructureType	List of all the geometry structure type of a spatial unit per ISO 19152	point/polygon/text/topological/unstructuredLine/sketch

APPENDIX 30 F: LA_LEGALSPACEUTILITYNETWORK CLASS

LA_LegalSpaceUtilityNetwork			
Attributes	Value Type	Multiplicity	Explanation
extPhysicalNetworkID	ExtPhysicalUtilityNetwork	0..1	A reference to the physical (technical) description of the utility network (ISO, 2012)

status	LA_UtilityNetworkStatusType	0..1	The status of the utility network (ISO, 2012)
type	LA_UtilityNetworkType	0..1	The type of the utility network (ISO, 2012)

APPENDIX 31: EXPLANATION OF THE CONTENT OF SURVEY AND REPRESENTATION SUB PACKAGE

APPENDIX 31 A: LIST OF CLASSES IN THE SURVEY AND REPRESENTATION PACKAGE CLASSES

Survey and Representation Sub Package Classes	
LADM Classes	Explanation
GH_BoundaryFaceString	This class is an adaptation of LA_BoundaryFaceString. A boundary face string means the boundary enclosing the outside of a spatial unit (ISO, 2012)
GH_Point	This class is based on LA_Point (ISO, 2012). A point 0-dimensional geometric primitive having coordinates of a position.
LA_BoundaryFace	This class is an adapted Ghanaian version of LA_BoundaryFace from ISO 19150. An instance of this class is a boundary face used to represent a boundary in 3D (ISO, 2012)
GH_SpatialSource	This class is a specialized class of GH_Source. An instance is a spatial source which could be a document that provides evidence of facts on the spatial unit. GH_SpatialSource is based on LA_Source

APPENDIX 31 B: GH_SPATIALSOURCE CLASS

GH_SpatialSource			
Attributes	Value Type	Multiplicity	Explanation
approvalDateOfSourceLayout	Date	0..1	This is the date on which the planning layout on which the subject plan (example site plan) which is the spatial source was approved by the land use and spatial planning authority
barcode	VarChar	0..1	This is the barcode on a cadastral plan
ccNumber	Real	0..1	This refers to the CC Number on a parcel plan. See LTR parcel plan
dateSignedByDirectorOfSurvey	Date	0..1	This means the date on which the spatial source document was signed by the director of survey and mapping division or his representative. See Section 109 of Act 1036.
grid	String	0..1	This refers to the name of the grid (Example national grid) used in which the subject plan
lodgementFileNumberSMD	String	0..1	This is the unique number of the physical file in which all the paperwork and subject plan are store at the SMD.
Plan LTR	String	0..1	This refers to the Land title registry (LTR) plan on which the subject plan can be found at the LTR. This number is also the prefix of all the parcel corners. See a parcel plan by

			the LTRD
measurements	OM_Observation, based on ISO 19156	0..*	The observations and measurements (Van Oosterom, Lemmen, Uitermark, Boekelo, & Verkuijl, 2011)
planNumber	String	0..1	This is the unique number given to that plan (spatial Source) by the LTRD. See Parcel plan
planScale	Integer	0..1	This means the scale of the subject plan
procedure	OM_Process, based on ISO 19156	0..1	The survey method used (ISO, 2012) (Van Oosterom et al., 2011)
qrCode	QR_Code	0..1	This is the QR code on the plan. This is based on a future requirement that the SMD will change from using a barcode to QR code very soon.
regionalNumber	String	0..1	This means a cadastral number or regional number, a unique number given to any survey work done in Ghana approved by the SMD. See cadastral plan
registryMapNumberLTRD	String	0..1	This is the number of the registry map where the parcel on the subject plan can be found under the LTR. See lower left bottom corner of a parcel plan.
sheetNumber	String	0..1	This refers to the sheet number of the subject plan. See a Strata plan
text	MultiMediaType	0..1	The contents of the spatial source document
tsReferenceNumber	String	0..1	This is the unique TS reference number of that specific plan used in the title registration system. See Strata plan
type	GH_SpatialSourceType	0..1	This is the type of the spatial source
unitOfMeasure	GH_UnitOfMeasure	0..1	This is the unit of measure (example feet) on the spatial source. See parcel plan.
zNumber	String	0..1	This is the unique reference number of that particular plan. See cadastral plan

APPENDIX 31 C: GH_POINT CLASS

GH_Point			
Attributes	Value Type	Multiplicity	Explanation
beaconIdentifier	String	0..1	This is the unique number given to each point of the parcel corner on the subject plan. It normally uses the regional number as the prefix. See cadastral plan
estimatedAccuracy	Length	1	This is the estimated errors associated with each point
interpolationRole	LA_InterpolationType	1	Refers the role of the point in the structure of a straight line or curve (ISO, 2012)

monumentation	GH_MonumentationType	0..1	The type of monumentation on that point (ISO, 2012)
originalLocation	GM_Point (type from ISO 10107)	1	These are the calculated coordinates, based on measurements and observations
pID	Oid	1	This refers to the unique identifier given to each point in this system.
pointType	GH_PointType	1	The type of point (ISO, 2012)
productionMethod	LI_Lineage	0..1	Lineage
transAndResult	LA_Transformation	0..*	Transformation and transformed location

APPENDIX 31 D: GH_BOUNDARYFACESTRING CLASS

GH_BoundaryFaceString			
Attributes	Value Type	Multiplicity	Explanation
approximateSituation	CharacterString	0..1	This refers to the degree of accuracy or the approximate situation of the boundary in the case of a general boundary. See Section 91 of Act 1036 on why this is a mandatory attribute under the title registration system
bfsID	Oid	0..1	This refers to the unique identifier for that boundary face string.
boundaryType	GH_BoundaryType	1	this refers to the type of boundary
geometry	GM_MultiCurve (type from ISO 19107	0..1	The boundary represented via a curve at ground level
locationByText	CharacterString	0..1	This refers to a textual representation of the boundary (ISO, 2012)

APPENDIX 31 E: LA_BOUNDARYFACE CLASS

LA_BoundaryFace			
Attributes	Value Type	Multiplicity	Explanation
bfID	Oid	1..1	This is the unique identifier of that boundary face
geometry	GM_MultiSurface based on ISO 19107	0..1	The boundary represented via a surface in 3D (ISO, 2012)
locationByText	CharacterString	0..1	This refers to a textual representation of the boundary (ISO, 2012)

APPENDIX 31 F: LIST OF CODE LISTS AND DATA TYPES FOR SURVEYING AND REPRESENTATION PACKAGE

code list and data types for Survey and Representation Package		
LADM codelist	Explanation	values

GH_MonumentationType	List of all monumentation used in Ghana	beacon/ cornerstone/ creek/ hill/ landmark/ marker/notMarked/ pillarTypeC/river/rock/ tree
GH_SpatialSourceType	List of all present and future spatial sources used in Ghana	cadastralPlanByLicenceSurveyor/ cadastralPlanBySMDSurveyor/ commonKnowledge/ FieldSketch/ gnssSurvey/ landManagementCommittee/ mobilePhoneGnssSurvey/ oralTradition/ orthophoto/ parcelPlan/ relativeMeasurement/ satelliteImage/ sitePlan/ strataPlan/ testimonial/ topoMap/ unmannedAerialVehicleImage/ video
GH_BoundaryType	List of all boundary types that could exist in Ghana	dynamicBoundary/fixedBoundary/fuzzyBoundary/generalBoundary
LA_InterpolationType	List of all roles a point can play in a straight line or curve per ISO 19152	end/isolated/mid/midArc/start
GH_PointType	List of all point types in Ghana	checkPoint/controlPoint/noSource/source
LA_Transformation	list of tranformation approach per ISO 19152	**transformationValue**(description of the transformation method used to get the associated location. This is done using CC_OperationMethod from ISO 19111)/ **transformedLocated(**location obtained from the transformation operation method (ISO, 2012). This location is in GM_Point from ISO 19107)

APPENDIX 32: EXPLANATION OF THE CONTENT OF THE SPECIAL CLASSES IN THE COUNTRY PROFILE

APPENDIX 32 A: LIST OF SPECIAL CLASSES AND DATA TYPES

Special Classes and Data Types	
LADM Classes and Data Types	Explanation
versionedObject	This class stows historical data in the database. It is a generalized class hence all other classes inherit from it. (See ISO 19152)
fraction	This is a generic data type adapted from the LADM to enable the country profile to support fractions (See ISO 19152)
Oid	This is a generic data type adapted from the LADM to enable the country profile to support unique object identifiers (See ISO 19152). The initial proposal for the format of this data type is that they should be automatically generated in the database using some attributes. However, this proposal on the format should be discussed and agreed on further studies on the LADM country profile for Ghana.
GH_Source	This is an abstract class that has two specialized classes; GH_AdministrativeSource and GH_SpatialSource used to stow land records or proof that supports or back that registration instance

APPENDIX 32 B: VERSIONEDOBJECT CLASS

VersionedObject			
Attributes	Value Type	Multiplicity	Explanation
beginLifespanVersion	DateTime, using ISO 19108	1..1	Start time of a specific instance version (ISO, 2012)
endLifespanVersion	DateTime, using ISO 19108	0..1	End time of a specific instance version (ISO, 2012)
quality	DQ_Element, using ISO 19115	0..*	Quality of a specific instance (ISO, 2012)
source	CI_ResponsibleParty, using ISO 19115	0..*	Responsible organization of a specific instance version (ISO, 2012)

APPENDIX 32 C: FRACTION CLASS

fraction			
Attributes	Value Type	Multiplicity	Explanation
denominator	int	1..1	the bottom number in the notation of a fraction (ISO, 2012)
numerator	int	1..1	the top number in the notation of a fraction (ISO, 2012)

APPENDIX 32 D: OID CLASS

Oid			
Attributes	Value Type	Multiplicity	Explanation
localId	characterString	1..1	the unique object identifier, automatically generated
namespace	characterString	1..1	an identifier for the data source of the spatial object

APPENDIX 32 F: GH_SOURCE CLASS

GH_SOURCE			
Attributes	Value Type	Multiplicity	Explanation
acceptance	DateTime, ISO 19108	1..1	The date and time, on which the source document was accepted by the legally authorized organization. (Examples can be seen in Section 124 and Section 212 of Act 1036 etc)
availabilityStatus	LA_AvailabilityStatusType	1..1	This is class adapted from the LADM to provide the availability status of the Source (ISO, 2012)
concurranceOrConsentDate	DateTime	0..1	refers to the date (and time) on which concurrence was given in case of stool, skin, clan or family OR consent was given in case of state and vested lands by the regional LC on the source Instrument/document. This is a mandatory requirement per Section 182(11) of Act 1036
correspond	String	0..1	refers the unique number of the physical file (Correspondance

anceFileNumberPVLMD			file of PVLMD) in which the source document is been stored at the PVLMD of the LC
dataOfInstrument	DateTime	1..1	refers to the date and/or time on which the source document(or instrument) was made. Example could be seen in Section 71 and Part VIII of the Second Schedule of Act 1036
documentNumberPVLMD	String	0..1	refers to the unique number given to the source document or instrument when concurrence or consent was given by the Regional LC
extArchiveIDInformalOrg	ExtArchive	0..1	refers to the unique reference number given to the source document or instrument when recorded by an external informal land registration authority. Example is the unique number given by Meridia in their database.
fileNumberLVD	String	0..1	refers to the unique reference number given to the source document or instrument by the Land Valuation Division of the LC when it was stamped by them. (See section 165 of Act 1036) to see why stamping is important
lifeSpanStamp	DateTime	0..1	refers to the expected life span of the source document in the system (ISO, 2012). An example can be found in Section 166 of Act 1036 where the law gives the life span for each source instrument used in land title registration.
lodgementFileNumberLTRD	String	0..1	refers to the unique number of the physical file (LTR Jacket or File) in which the source instrument is being kept at the LTRD of the LC
maintype	CI_PresentationFormCode	0..1	The type of document (ISO, 2012)
proofDate	DateTime	0..1	The date and time on which the source document or instrument was proof before an authorized person. (See Section 209 of Act 1036)
quality	DQ_Element	0..*	The quality of the Source (ISO, 2012)
recordation	DateTime, ISO 19108	0..1	The date and time, on which the source document was registered or recorded by the legally authorized organization. (Examples can be seen in Section 216 of Act 1036 and registration date used the current in the current land title register)
referenceNumberCLS	String	0..1	refers to the unique reference number given to the source document or instrument by the CLSs when a document or an instrument is stored in their databases.
sID	Oid	1..1	refers to a unique identifier to be assigned to each source document or instrument sourced in this system. Its format could be discussed. However, at this stage of development of the model will be an automatically generated ID using attribute instance from this class.
source	CI_ResponsibleParty	0..*	the responsible party of the source document or instrument (ISO, 2012).
submission	DateTime	0..1	The date and time on which the source document or

			instrument was presented to the authorized responsible registration organization. An example can be seen in Sections 216 of 1036 which explains submission in deeds registration.

APPENDIX 32 G: LIST OF CODE LIST FOR SPECIAL CLASSES

code list for Special classes	
LADM external ISO standards and codelist	Explanation
CI_PresentationFormCode	This is from a different ISO standard
CI_ResponisbleParty	This is a data type with its attributes in a different ISO standard (ISO 19115) (Van Oosterom et al., 2011)
DQ_Element	This a generalized class with various specialised classes in a different ISO standard (ISO 19115). (Van Oosterom et al., 2011)
LA_AvailabilityStatusType	refers to a list of all status or state a document can be per ISO 19152

APPENDIX 33: EXPLANATION OF THE LINK IN THE COUNTRY PROFILE

APPENDIX 33 A: LIST OF ASSOCIATION BETWEEN CLASSES

Association between The LADM country profile for Ghana Classes						
class 1	**class 2**	**Association name**	**Role name End 1**	**Multiplicity**	**Role name End 2**	**Multiplicity**
GH_AdministrativeSource	GH_BAUnit	unitSource	source	0..*	unit	0..*
GH_AdministrativeSource	GH_Party	conveyancerSource	source	0..*	conveyancer	1..*
GH_AdministrativeSource	GH_RRR	rrrSource	source	1..*	rrr	0..*
GH_AdministrativeSource	LA_RequiredRelationship -BAUnit	relationSource	source	0..*	requiredRelationBaunit	0..*
GH_BAUnit	GH_BAUnit	relationBaunit	unit1	0..*	unit2	0..*
GH_BAUnit	GH_RRR	baunitRrr	unit	1	rrr	1..*
LA_BoundaryFace	GH_SpatialSource	bfSource	bf	0..*	source	0..*
LA_BoundaryFace	GH_SpatialUnit	minus	bf	0..*	su	0..*
LA_BoundaryFace	GH_SpatialUnit	plus	bf	0..*	su	0..*
GH_BoundaryFaceString	GH_SpatialSource	bfsSource	bfs	0..*	source	0..*
GH_BoundaryFaceString	GH_SpatialUnit	minus	bfs	0..*	su	0..*

GH_BoundaryFaceString	GH_SpatialUnit	plus	bfs	0..*	su	0..*
GH_Mortgage	GH_Right	mortgageRight	mortgage	0..*	right	0..*
GH_Party	GH_BAUnit	baunitAsParty	party	0..*	unit	0..*
GH_Party	LA_GroupParty	members	parties	2..*	group	0..1
GH_Point	LA_BoundaryFace	pointBf	point	0,3..*	bf	0..*
GH_Point	GH_BoundaryFaceString	pointBfs	point	0,2..*	bfs	0..*
GH_RRR	GH_Party	rrrParty	rrr	0..*	party	0..1
GH_SpatialSource	GH_BAUnit	baunitSource	source	0..*	unit	0..*
GH_SpatialSource	GH_Party	surveyorSource	source	0..*	surveyor	1..*
GH_SpatialSource	LA_RequiredRelationship-SpatialUnit	relationSource	source	0..*	requiredRelationshipSu	0..*
GH_SpatialSource	Point	pointSource	source	0..*	point	1..*
GH_SpatialUnit	GH_BAUnit	suBaunit	su	0..*	baunit	0..*
GH_SpatialUnit	GH_Level	suLevel	su	0..*	level	0..1
GH_SpatialUnit	GH_Point	referencePoint	su	0..1	point	0..1
GH_SpatialUnit	GH_SpatialSource	suSource	su	0..*	source	0..*
GH_SpatialUnit	GH_SpatialUnit	relationSu	su1	0..*	su2	0..*
GH_SpatialUnit	GH_SpatialUnit	suHierarchy	su1	0..*	su2	0..1
GH_SpatialUnit	LA_SpatialUnitGroup	suSuGroup	part	0..*	whole	0..*
LA_SpatialUnitGroup	LA_SpatialUnitGroup	suGroupHierarchy	element	0..*	set	0..1

APPENDIX 33 B: LIST OF AGGREGATIONS BETWEEN CLASSES

The aggregation between the classes of the LADM country profile for Ghana					
class 1	**class 2**	**Role name End 1**	**Multiplicity**	**Role name End 2**	**Multiplicity**
GH_Party	LA_GroupParty	parties	2..*	group	0..*
GH_SpatialUnit	GH_SpatialUnit	element	0..1	set	0..*
LA_SpatialUnitGroup	LA_SpatialUnitGroup	element	1..*	set	0..1

APPENDIX 33 C: LIST OF GENERALIZATIONS BETWEEN CLASSES

The generalization between the classes of the LADM country profile for Ghana	
Superclass	**Subclass**
GH_Restriction	GH_Mortgage
GH_Restriction	GH_Caveat
GH_Restriction	GH_ProfitAPrendre

GH_Restriction	GH_Easement
GH_Restrction	GH_RestrictiveCovenant
GH_Restrction	GH_UseRestriction
GH_Restrction	GH_JurisdictionalAndCulturalRestriction
GH_Restrction	GH_PurposeForWhichTheLandIsGiven
RRR	GH_Right
RRR	GH_Restriction
RRR	GH_Responsibility
GH_Responsibility	GH_RentPayment
GH_Responsibility	GH_OtherResponsibilties
GH_Right	GH_ContractualLicence
GH_Party	LA_GroupParty
GH_Source	GH_AdministrativeSource
GH_Source	GH_SpatialSource
GH_SpatialUnit	GH_LegalSpatialBuildingUnit
GH_SpatialUnit	LA_LegalSpaceUtilityNetwork
LA_VersionedObject	GH_RRR
LA_VersionedObject	GH_BAUnit
LA_VersionedObject	LA_RequiredRelationshipBAUnit
LA_VersionedObject	LA_RequiredRelationshipSpatialUnit
LA_VersionedObject	GH_SpatialUnit
LA_VersionedObject	LA_SpatialUnitGroup
LA_VersionedObject	GH_Level
LA_VersionedObject	LA_BoundaryFace
LA_VersionedObject	GH_BoundaryFaceString
LA_VersionedObject	GH_Point
LA_VersionedObject	GH_Party
LA_VersionedObject	GH_PartyMember

APPENDIX 34: AUTHENTICATION FRAMEWORK

Attestation of the incorporation of all requirements in the LADM country profile for Ghana			
Criteria		**Requirement Number. (See Sections 4)**	Incorporated?
The LADM Country Profile Classes, Data Types, Codelists	**Attributes**		
GH_Source	accptance	34, 56, 57, 82, 188, 189,	Yes
	concurranceOrConsentDate	26,	Yes
	correspondanceFileNumberPVLMD	57	Yes
	dataOfInstrument	36	Yes
	documentNumberPVLMD	59,	Yes

	extArchiveIDInformalOrg	219	Yes
	fileNumberLVD	26	Yes
	lifeSpanStamp	26	Yes
	lodgementFileNumberLTRD	34	Yes
	proofDate	26	Yes
	quality	36	Yes
	recordation	59, 65, 56	Yes
	referenceNumberCLS	83, 101, 134, 205,	Yes
	source	36	Yes
	submission	56	Yes
GH_Party		3, 6, 54, 68, 69, 70, 71, 72, 73, 74, 89, 90, 107, 121, 142, 143, 144, 158, 172, 196, 211,	Yes
	addressType	54, 212	Yes
	dateOfBirth	54	Yes
	biometric	52	Yes
	citizenshipStatus	174	Yes
	emailAddress	6, 133	Yes
	endorsement	8,	Yes
	fullName	54	Yes
	sex	89, 143, 172, 211	Yes
	hometown	173	Yes
	literacy	54	Yes
	maritalStatus	7,	Yes
	mobileNumber	90	Yes
	nationalID	5, 53, 92, 123, 159, 174	Yes
	nickname	211	Yes
	occupation	213	Yes
	picture	122, 160,	Yes
	postalAddress	4	Yes
	reference	6	Yes
	role	11, 14, 42, 62, 75, 93, 125, 126, 161, 178, 198, 214	Yes
	taxIdentificationNumber	10,	Yes
	telephoneNumber	16,	Yes
	type	17, 91, 94, 109, 124, 145, 163,	Yes

		179, 197	
GH_PartyMenber	Proof	18, 76,	Yes
	Share	9, 77, 96, 111, 129, 164, 181, 200	Yes
			Yes
GH_GroupParty	groupID	12, 13, 76, 95, 110, 127, 162, 180, 199	Yes
	groupType	12	Yes
GH_CitizenStatusType		6	Yes
GH_PartyRole		15,	Yes
GH_PartyType		17	Yes
GH_PartyMemberProofType		18	Yes
GH_GroupType		12	Yes
GH_BiometricType		52	Yes
GH_SignatureType		213	Yes
GH_AddressType		212	Yes
GH_NationalIDNumber		5	Yes
GH_RRR		26, 151, 157, 188,	Yes
	description		Yes
	eLISCaseNumber	49,	Yes
	entryNumberLTRD	35,	Yes
	registrationNumberLTRD	35	Yes
	registrationNumberPVLMD	59,	Yes
	remarks	36	Yes
	share	9, 77, 96, 111, 129, 164, 181, 200	Yes
	startDate	26	Yes
	timeSpec	26	Yes
GH_Right			Yes
	type	26	Yes
GH_Responsibility		21, 217	Yes
	type	26	Yes
GH_Restriction		217	Yes
	memorials	36	Yes
	type	26	Yes
GH_RentPayment		26, 80, 135,	Yes
	rentAmount	26, 80, 135,	Yes
	rentDueDate	26, 80, 135,	Yes
	rentPaymentIntervals	26, 80, 135,	Yes

	rentRevisionIntervals	26, 80, 135,	Yes
GH_Mortgage		33,	Yes
	amount	33,	Yes
	interestRate	33,	Yes
	ranking	33,	Yes
	repaymentTimeInterval	33,	Yes
	type	33,	Yes
GH_ProfitPrendre		32,	Yes
	exclusivelyenjoyedByGrantee	32,	Yes
	natureOfProfit	32,	Yes
	profitInGross	32,	Yes
GH_Caveat		29,	Yes
	reason	29,	Yes
GH_Easement		31,	Yes
	easementType	31,	Yes
	natureEasement	31,	Yes
GH_ContractualLicence		27,	Yes
	lenghtOfNoticeRequired	27,	Yes
	use	27,	Yes
GH_AdministrativeSource		55,	Yes
	consideration	26,	Yes
	considerationAcknowledged	26,	Yes
	text	25, 55, 59, 79, 82, 100, 116, 133, 149, 166, 185, 204, 206, 215, 216,	Yes
	type	25, 55, 59, 79, 82, 100, 116, 133, 149, 166, 185, 204, 206, 215, 216,	Yes
GH_BAunit		3, 36, 135, 141,	Yes
	certificateIssuedDateLTRD	36	Yes
	certificateNumberLTRD	36	Yes
	certificateSerialNumberLTRD	36	Yes
	folioNumberLTRD	35	Yes
	qualificationsWhichAffectsThetitle	64	Yes
	titleNumberPVLMD	59, 63,	Yes
	titleType	26, 58,	Yes
	type	3	Yes
	volumeNumberLTRD	35	Yes
GH_TitleType		26, 58,	Yes

GH_BAunitType		3	Yes
GH_RightType		19, 28, 78, 112, 113, 146, 165, 182, 201	Yes
GH_ResponsibilityType		20, 23, 80, 98, 114, 131, 147, 166, 183, 202	Yes
GH_RestrictionType		24, 30, 81, 99, 115, 132, 148, 167, 184, 203	Yes
GH_MortgageType			Yes
GH_EasementType			Yes
GH_LandUseType			Yes
GH_AdministrativeSourceType		25, 55, 59, 79, 82, 100, 116, 133, 149, 166, 185, 204, 206, 215, 216,	Yes
GH_SpatialUnit		38, 84, 117, 118, 136, 152, 168, 169, 190, 207, 220,	Yes
	area	38	Yes
	dimension	38	Yes
	districtMMDAs	38	Yes
	extAddressID	38	Yes
	label	26	Yes
	locality	38	Yes
	BlockNumberLTRD	45	Yes
	DistrictNumberLTRD	45	Yes
	ParcelNumberLTRD	45	Yes
	SectionNumberLTRD	45	Yes
	referencePoint	40	Yes
	region	38	Yes
	streetAddress	43	Yes
	suID	48	Yes
	traditionalAreaName	66	Yes
LA_SpatialUnitGroup		44, 45	Yes
	label		Yes
	name		Yes
GH_Level		61, 86, 87, 88, 97, 102, 104, 105, 106, 119, 120, 138, 139, 140, 154, 155, 156, 170, 171,	Yes
	name		Yes
	registerType		Yes
	structure		Yes

		192, 193 94, 209, 210,	
GH_LegalSpaceBuildingUnit		46,	Yes
	block	46,	Yes
	extPhysicalBuildingUnitID	46,	Yes
	lot	46,	Yes
	strataPlan	46,	Yes
	type	37	Yes
	unitEntitlement	46	Yes
LA_DimensionType		48	Yes
LA_AreaType		44,	Yes
GH_RegisterType		67	Yes
GH_UnitOfMeasureType		45,	Yes
GH_BuildingUnitType		37,	Yes
GH_TraditionalArea			Yes
GH_RegionType		44, 45	Yes
GH_MineralDistrictOffice			Yes
GH_Glpin		48,	Yes
LA_StructureType		156	Yes
GH_SpatialSource		40, 45, 46, 48, 50, 85, 153, 191, 208,	Yes
	approvalDateOfSourceLayout	43	Yes
	barcode		Yes
	ccNumber	45	Yes
	dateSignedByDirectorOfSurvey	45	Yes
	grid	45	Yes
	lodgementFileNumberSMD	42	Yes
	Plan LTR	45	Yes
	measurements	45	Yes
	planNumber	45	Yes
	planScale	45, 45	Yes
	procedure	40,	Yes
	qrCode	53,	Yes
	regionalNumber	39,	Yes
	registryMapNumberLTRD	45	Yes
	sheetNumber	46,	Yes
	tsReferenceNumber	46	Yes
	type	44, 45	Yes
	unitOfMeasure	45	Yes
	zNumber	44	Yes
GH_Point		43, 47,	Yes
	beaconIdentifier	41, 44	Yes

	estimatedAccuracy	40,	Yes
	monumentation	41	Yes
	originalLocation	41, 44	Yes
	pointType	40,	Yes
	productionMethod	40	Yes
	transAndResult	40,	Yes
GH_BoundaryFaceString		51,	Yes
	approximateSituation	47,	Yes
	boundaryType	2, 26,	Yes
	geometry	41, 44	Yes
	locationByText	26,	Yes
LA_BoundaryFace			Yes
	geometry	41, 44	Yes
GH_MonumentationType	locationByText	106	Yes
GH_SpatialSourceType		60,	Yes
GH_BoundaryType		26	Yes
GH_PointType		40	Yes

APPENDIX 35: LIST TRADITIONAL AREAS IN GHANA

List of all Traditional Areas in Ghana (COLANDEF, 2011)				
Kumasi	Goaso	Katiu	Namberi	Wusuta
Mampong	Hwidiem	Nakong	Saboba	Tafi
Essumeja	Japekrom	Chiana	Yendi	Vakpo
Adansi	Kenyasi No 1	Bolga	Dindani	Aveme
Nsuta	Kenyasi No 2	Talensi	Kpansenkpe	Alavanyo
Kumawu	Konkoma	Navrongo	Wungu	Nyagbo
Juaben	Kukuom	Neligu	Yunyuo	Batto
Kokofu	Kwatwoma	Sirigu	Bunkrugu	Tefle
Bakwai	Mim	Paga	Soo	Holuta
Denyase	Mo	Zoarungu	Kurigu	Avenor
Offinso	Nkomi	Koloko	Yagbon	Kpedze
Ejisu	Nkoranza	Nandom	Kpembi	Matsi
Asokore	Nsawkaw	Tumu	Wasipe	Adaklu
Tepa	Nsooatre	Dorimon	Bole	Tinyigbe
Agogo	Ntotroso	Wechiau	Kusawgu	Kpoeta
Manso Nkwanta	Offuman	Daffiama	Kong	Bowiri
Bompata	Prang	Lawra	Sonyo	Agave
Obogu	Sampa	Gwollu	Damongo	Dzolo
Asankare	Sankore	Jirapa	Debri	Mafi
Agona	Seikwa	Issah	Chori	Abutia
Ofoase	Suma	Wala	Mankpan	Have
Kwamang	Sunyani	Wellembele	Tuluwe	Worawora
Asuboa	Tano	Kaleo	Kulaw	Some
Mpasaaso	Tain	Lambussie	Kpashegu	Todome
Mabang	Techiman	Bussie	Busunu	Akome

Amoafo	Wenchi	Nadowli	Buipe	Sefwi Anhwiaso
Beposo	Wiase	Pulima	Nakpah	Eastern Nzema
Domeabra	Yamfo	Zini	Wulensi	Nsein
Gyadam	Yeji	Ullo	Bakpaba	Essikado
Mamfo	Abeadze	Bawiesibelle	Dakpam	Wassa Amenfi
Juansa	Asebu	Banu	Chamba	Lower Axim
Asamang	Eguafo	Bulenga	Ivo	Ajomoro
Adankragya	Denkyira	Takpo	Kaliga	Ahanta
Kuntanase	Komenda	Guli	Yani	Lower Dixcove
Sabronum	Mankessim	Sankana	Bambo	Western Nzema
Abease	Effutuakwa	Sing	Gondogu	Mpohor
Acherensua	Awutu	Manwe	Bimbila	Gwira
Enyan Denkyira	Abrem	Charikpong	Kuloh	Sefwi-Chrano
Twifo Mampong	Akwamu	Kperisi	Likpe	Suaman Dadieso
Gomoa Ajumako	New Juaben	Busa	Anfoega	Upper Dixcove
Agona Nsaba	Bosso	Funsi	Asogli	Secondi
Akyem Abuakwa	Adjaade	Kojokperi	Gbi	Upper Axim
Ahafo south	Akrodie	Kundugu	Nkonya	Sefwi Wiawso
Ahafo North	Amantin	Kuga	Ve	Sefwi Bekwai
Awua-Domase	Atebubu	Gushiegu	Krachie	Aowin
Yilo Krobo	Akroso	Kunbungu	Santrokofi	Wassa Fiase
Manya Krobo	Badu	Tolon	Tepa	Fodome
Akim Bosome	Banda	Yelzoli	Hokpe	Chereponi
Akim Kotoku	Bassa	Gulkpegu	Akpini	Bongo
Kayoro	Bechem	Nanton	Peki	Assin Atandanso
Dormaa	Berekum	Sunson	Amfoita	Logba
Drobo	Kwahu	Gundogu	Bejamse	Sanguli
Duayaw Nkwanta	Akuapem	Karaga	Ziavi	Nangodi
Dwan	Anum	Mion-Sambu	Leklebi	Breman Essiam
Dwenem	Naaga	Tidjo	Afloa	Kajebi
Odomase No. 1	Sakoti	Yo-Savelgu	Agotime	Nakali
Kwamamkese	Bawku	Sanarigu	Atwode	Builsa
Enyan Abaasa				

APPENDIX 36: INTERVIEW GUILD FOR CUSTOMARY LAND SECRETARIATS (SECRETARIAT ADMINISTRATOR)

PARTY

1. a. What are the attributes you need about a person before they can register their lands in the Customary register?

b.What changes do you expect to happen to these attributes in the future?

2. What are the all the various function/roles a party to a land transaction or interest in land can play in the land transaction? (i.e land owning group, grantor, grantee, proprietor, executor etc.)

3. a. What attributes or information do you collection about groups (like a company, family etc) before you register them?

b. What changes do you expect to happen to these attributes in the future?
4. How do you determine the membership of a group and the share each member own in a registered? How is this recorded in the land register of this CLSs?
5. Tell me what is the nature or kind of people or groups you register in the land register. For example, a chief, a Tendaba, company etc?
6. Describe the various designations or positions of staff in this CLS involve in the land registration process and the functions performed by each position. (not the name of the people in these positions)

Administrative.

1. Describe the customary land tenure situation in this region (i.e. the history, who oversees land ownership and others). For example *A conveyance is deemed to have been executed by a stool, skin, clan or family if the instrument is executed by all the individuals whose consent is by customary law a necessary condition for the conveyance to bind the stool, skin, clan or family. S68 (10)*
2. Describe the groups and individuals that owns land in the jurisdiction of this CLS?
3. How does these land-owning groups and individuals relate to one another and documents that proof these?

4. Tell me all the different types of land transactions (customary) you register in this land registry? (eg leasing etc).
5. What are the documents you accept as sufficient evidence to back an interest in land before you register that interest?
6. When a person submits a document for registration what are the various attributes or information the document should contain before it is accepted?
7. How is the process of filling or storing a document done in this CLSs? (i.e what information do you add to the raw document submitted for registration before they are filed for easy retrieval and others)
8. What are the various forms interests and rights in land prevailing in the jurisdiction of this CLS?
9. Please per Law one function of a CLS is to "*provide a list of existing customary interests and rights in land in the area of operation of the Customary Land Secretariat including indication of persons with the capacity to make grants of the interests and rights in that area*" 15(1)b. Can I get a copy of this list?
10. If a person has interest or rights in land in this area describe all the established customary duties or responsibility they have to do (i.e.jurisdictional and cultural rights of the stool, skin,

clan or family which holds the allodial title over such holder). (eg ground rent). How are these registered in this CLSs if they are registrable
11. a. What are all the customary restrictions that are associated with land in this area.

b.How are these registered in this CLSs if they are registrable
12. Do you have different registers (like a separate register for oral grants s37(3) etc). if yes what are the names of registers
13. What is the nature or form of the register(s). (i.e composition of the register)

Can I take pictures or get an old copy?

SPATIAL

1. a. What spatial units are capable of being registered in this register (e.g parcel? Flats? utility network)?

b. What changes do you expect in the future?

2. a. What attributes do you want to know about each spatial unit before it can be registered? b. What changes do you expect to happen to these attributes in the future?
3. Tell be about various ways of determining customary boundaries including any manner that is customary among the persons who will use land in this area?
4. a. What documents are used to show customary boundaries?

b. In what other forms are customary boundaries presented when they are brought for registration in this customary register?
5. What are the attributes or information that must be present on such documents or forms used to represent or show boundaries of land before it is accepted and registered here?
6. *An application for the registration of allodial title which is evidenced by an instrument land shall not be processed unless there is attached to the instrument an approved plan of the land. s182.* Please what are the structure of such plans (i.e. topological polygons?) can I see and take pictures of such a plans?
7. Do you have any models (maps) that show all the lands that have been registered in this CLS, if yes how do you generate them and what information must they have including its features, dimension, and structure of such models.?

APPENDIX 37: GENERIC INTERVIEW QUESTION GUIDE FOR DEED AND TITLE REGISTRATION (LAND REGISTRAR)

Person
1. What type of data or attributes do you collect about a person?
2. What attributes do you expect to be added or removed from these attributes in the future?
3. What types of party(ies) can exist in land registration in Ghana?
4. What are the roles a party can play in the registration process eg. can I person represent another person, grantor etc?

Rights
1. Which interests, rights, responsibilities and restrictions do you register?
2. How do you collect these interests, rights, responsibilities, and restrictions?
3. What changes do you expect on the collection methods in the future?
4. What attributes do you collect about these interest, rights, responsibilities, and restrictions?
5. How do expect these attributes to change in the future?
6. Can there be a share in the rights and interests you collect and how do you calculate those shares?

Parcels.
1. What spatial units do you collect? (e.g. Parcel, flats etc.)
2. What attributes do you collect about each spatial unit?
3. How do you expect these attributes to change in the future?
4. How do you collect parcel data in Ghana? (i.e. boundaries? Or should all neighbours be presents? or do you use satellite image, aerial photos etc?)
5. How are the parcels represented in the paper-based system in the registry? (i.e. scale,? field observation?, maps?, plan?) including its features, dimension, and structure of such models.

Documents
1. What are the names of all the type of documents you accept as valid evidence to proof that a land right/interest has been transferred or proof that back the land right/interest of a person?
2. Do you think these documents can be in a digital form in the future?
3. What attributes should be present on each source document you accept?
4. How do you expect these attributes to change in the future?

5. In what way is information store in the registry? (i.e. are all documents (plans, instruments etc) stored together at the one department (eg. LTRD) or store separately in different departments (LTR, SMD, PVLMD etc))

Miscellaneous

1. Do you have a data model if yes can get it?
2. What are the effects or benefits of registering land in this land register?
3. Which extra data (including documents) would you need to perform a conversion of parcel in the deed system to that same parcel in the title system in Ghana?
4. Do you think using mobile apps this information about people, rights, parcels, and documents can be collected in an integrated way or separately in the field?

APPENDIX 38: SEMI STRUCTURE INTERVIEW GUIDE SURVEY AND MAPPING DIVISION (SURVEYOR).

1. a. What spatial units are capable of being registered in this register (e.g parcel? Flats? utility network)?

b. What do you expect this to change in the future?

2. a. What essential information do you want to know about each spatial unit before it can be registered?

b. What changes do you expect this to change in the future?

3. What are the names of all the documents you accept as a valid evidence to back the spatial extent of an interest in land presented for registration? (i.e. source documents that show the location and boundaries of land submitted for registration.) can I get copies of these documents?

4. Describe all the essential features that must be present in such documents before they are accepted for registration?

5. What are all the essential information added, to documents that shows the spatial extent of a spatial unit before they are stored or filed, for easy identification, retrieval etc.?

6. Please how do you enter areas and dimensions? (i.e types of area do you use. surveyed area?)

7. *An application for the registration of allodial title which is evidenced by an instrument land shall not be processed unless there is attached to the instrument an approved plan of the land. s182.* Please what are the structure of such plans (i.e. topological polygons? Lines? etc.). can I see and take pictures of such a plans?

8. Please describe how the spatial extents of registered lands are recorded in the registry (e.g registry maps? Plotting? Etc.) including its features, dimension, and structure of such models?

9. Do you use different models to for recording or representing boundaries of registered lands in Ghana? If yes what is the dimensions, features and structure of such models?

10. Does the department have different models for land registered in the deed system and land registered under the Title system? (Example *Before the declaration of an area as a registration district, the Lands Commission shall direct the Director of Survey and Mapping Division acting in consultation with the Director of the Land Registration Division to prepare for that area a map or series of maps, to be called a registry map, which shall be maintained at the Land Registration Division).* If yes what are their names, features, dimension, and structure of such models?

11. How do the survey and mapping division deal with the representation registered lands with fixed boundaries and lands with general boundaries in these registry models? (Example. *The registry map and any plan filed in the Registry indicate only the approximate boundaries and the approximate situation of a parcel shown on the map and the plan. S91)*

12. Can I see and take pictures these models?

13. Describe how 3d spatial units (i.e condominium, flats etc) are represented in the models?

14. How do you derive refence points in surveying spatial units?

15. How do surveyors indicate and demarcate land boundaries in Ghana?

16. From a reference point, describe the various surveying methods surveyors in Ghana use to derive the boundaries of a spatial unit
17. Describe the various types of points you can have in a boundary (e.g. control point) and all types of interpolation method surveyors normally used to join these points to get a complete boundary?
18. Please tell me how monumentation of spatial units are done?
19. Mention all the types objects and forms monumentation in Ghana?
20. What are the names of all the accepted coordinate reference systems used in the survey of land boundaries in Ghana?

21. Can I get a copy of the established regulations for the registration of condominiums and flats? *An interest in a condominium, an apartment and a flat shall be registered in accordance with Regulations made under this Act.s81 (2)*
22. Can I get a copy of the established regulation for erecting monumentation in Ghana. *An official surveyor or licensed surveyor who has been authorised by the Land Commission shall, where the boundaries of a land under survey have not already been correctly marked in the prescribed manner, mark out the boundaries of the land in the manner prescribed by Regulations. S 26*
23. Do you have established regulations for indicating, demarcating and surveying land boundaries? If yes can I a copy.

APPENDIX 39: INTERVIEW GUIDE ONTARIO DEEDS TO TITLE CONVERSION PROCESS

What measures were put in place before the start of the deed to title conversion process in Ontario?
How was the deed to title conversion process done in Ontario?
If a person had a deed back then, what additional documents or information did they need to have their deeds converted to a title?
What were the administrative procedures established to ensuring that the deeds to title conversion process went quickly and smoothly?
What are some of the major challenges encounter in the process and what solution was generated for each challenge?
What tools/technologies are available now or in the future do you think can help to improved a deed to title conversion process?
Can you suggest some document or scientific document that will give me more information on this subject?
What improvements could be achieved by converting deeds to title?
Are there extra costs for the citizens? Or is it less expensive?
What are the lessons learnt?
What are your recommendations to other countries that have such a process in mind?
Would the Deeds to Title conversion better work in digital or in paper-based environment?