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Key words: profile; administration; ownership rights; 3D;

SUMMARY

In our earlier study, the land administration system in Saudi Arabia has been analyzed to develop the initial country profile based on LADM. The testing and validation of the initial country profile have shown that only the necessary information has been covered, and there is much critical information related to the property registration still not covered. Therefore, this paper proposes the methodology of improving the initial country profile by including new classes and attributes to the spatial and non-spatial classes. For the development of the LADM profile for the Kingdom of Saudi Arabia, the following steps have been applied:

- Conducting interviews with the stakeholders to collect information about the regulations of the land/building ownership.
- Validating and testing the current country profile.
- Collecting a real use case data to assess the model

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1. INTRODUCTION

The initial country profile of Saudi Arabia based on LADM has covered the law and regulations of the property registration system In Saudi Arabia (Alattas et al., 2019). The regulations of the four sectors that are responsible for the land administration in Saudi Arabia (Ministry of Municipal and Rural Affairs, Ministry of Justice, Real Estate General Authority, and Ministry of Housing) have been analyzed and studied to develop the initial country profile to reflect the local land administration system. The initial country profile has covered the land administration system (current situation) after conducting interviews with all the stockholders, studying and analyzing the current system.

Nowadays, the Kingdom has a new vision (Vision 2030), and to achieve the goals of the Kingdom's vision, the government has emphasized the importance of having better life quality for the residents of Saudi Arabia in many areas such as housing and real estate market (https://vision2030.gov.sa). For this reason, the four sectors that are responsible for the land administration in Saudi Arabia have many initiatives and projects to improve these aspects, such as housing program (https://vision2030.gov.sa/ar/programs/Housing) and Quality of Life Program (https://vision2030.gov.sa/ar/programs/QoL). The Ministry of Housing has many projects in the area of property ownership and the property subdivision to enhance the quality of the property registration. The Real Estate General Authority is responsible for the regulations of the real estate market, and there many projects under development in the current time.

However, the initial country profile has covered only the primary information of the land administration system in Saudi Arabia. The initial country profile has been used as a starting point for the representation of the current system. Therefore, this paper proposes further the development of the current country profile of the Kingdom of Saudi Arabia by including all the data that requires to complete the registration of the property from all the sectors. The current country profile will be improved by introducing missing classes and attributes to the spatial and non-spatial classes. For the development of the LADM profile for the Kingdom of Saudi Arabia, the following steps will be applied:

- Conducting interviews with the stakeholders to collect information about the regulations of the land/building ownership.
- Validating and testing the current country profile.
- Collecting a real use case information to assess the model.

The proposed model aims to build a better communication system between all the stakeholders to secure the land registration by including all the information that is required to issue the property registration document.

This paper is organized as follows: Section 2 describes the current land administration system in Saudi Arabia. The methodology of improving the initial LADM country profile of Saudi

Arabia is proposed in section 3. The improvement of the country profile of Saudi Arabia based on LADM is present in section 4, finally the paper end in section 5 with main conclusions and future work.

2. THE CURRENT LAND ADMINISTRATION SYSTEM IN SAUDI ARABIA

The land administration system is under the responsibilities of four different stakeholders (Ministry of Municipal and Rural Affairs, Ministry of Justice, Real Estate General Authority, and Ministry of Housing). They are responsible for all types of information related to the registration of the ownership, such as technical data and legal data. The land administration system in Saudi Arabia covers two main types of parcels: public parcels and private parcels. The current system does not register the public parcels, and they are considered under the ownership of the government. On the other hand, private parcels could have different types of owners, such as government ownership, ownership related to the business industry, or induvial ownership (a group of private parties). The four stakeholders (Ministry of Municipal and Rural Affairs, Ministry of Justice, Real Estate General Authority, and Ministry of Housing) have different tasks during the registration of the ownership.

The Ministry of Municipal and Rural Affairs is responsible for planning the cities and define the land use for each district and parcel. Also, it is responsible for providing the construction code and regulation for all types of buildings and infrastructure. The Ministry of Municipal and Rural Affairs creates and maintains all public areas such as Gardens, squares, and parks by defining the regulation for each type (https://www.momra.gov.sa). Additionally, licensing all types of business activities is under their responsibilities by defining the rights, restrictions, and responsibilities based on the type of activity. Furthermore, the Ministry of Municipal and Rural Affairs is the source of all types of technical data related to the planning of the cities, such as survey data, land use, and building requirements and regulations.

The Ministry of Housing is responsible for the housing market in Saudi Arabia by defining the regulation to provide a well structure market. It has many initiatives to support its goals, such as unit subdivision, owner's association, rent program, white land regulations, and Building Technology Initiative (https://www.housing.gov.sa/ar/initiatives). The ministry has defined the unit subdivision regulation to improve the registration of the ownership of each property (https://www.housing.gov.sa). The ministry has issued the System of procedures that include all the requirements to registrar each unit and that by applying through an architecture firm to ensure applying all the requirements.

The third stakeholder that responsible for the land registration system is Real Estate General Authority and it is under the authority of Ministry of Housing. It is responsible for the issuing and maintain all the regulations that related to the real estate market. Additionally, it is responsible for issuing the title registration documents for all types of property (https://rega.gov.sa).

The Ministry of Justice is considered as the last stakeholder that involved in the property registration and their responsibility is to provide the deed registration to the owner after

receiving all the required information from the other stakeholders (https://www.moj.gov.sa). The process of issuing the deed registration document has different process based on the type of property. The process of transfer the ownership of a parcel or a unit that has a deed registration document will start by applying to the transfer request from the owner and the buyer to the Ministry of Justice. Then the Ministry of Justice will check the status of the deed registration document and based on the that the Ministry of Justice has the rights of contacting the Ministry of Municipal and Rural Affairs for additional information or issuing the new deed documents directly in the same time as shown in Figure 1.

Figure 1: process of transfer the ownership (deed registration)

The second type of the property registration is the unit subdivision or a building. This type of property registration start by applying a request to the Ministry of Housing through an architecture firm. The architecture firm will check all the technical data based on the data that is available from the Ministry of Municipal and Rural Affairs. Then the request will be sent to the Ministry of Housing to apply and check all the require information for this type of request. If all the request has passed all the requirement, the Ministry of Justice will be informed to issuing a new deed registration documents for each unit of the building as shown in Figure 2.

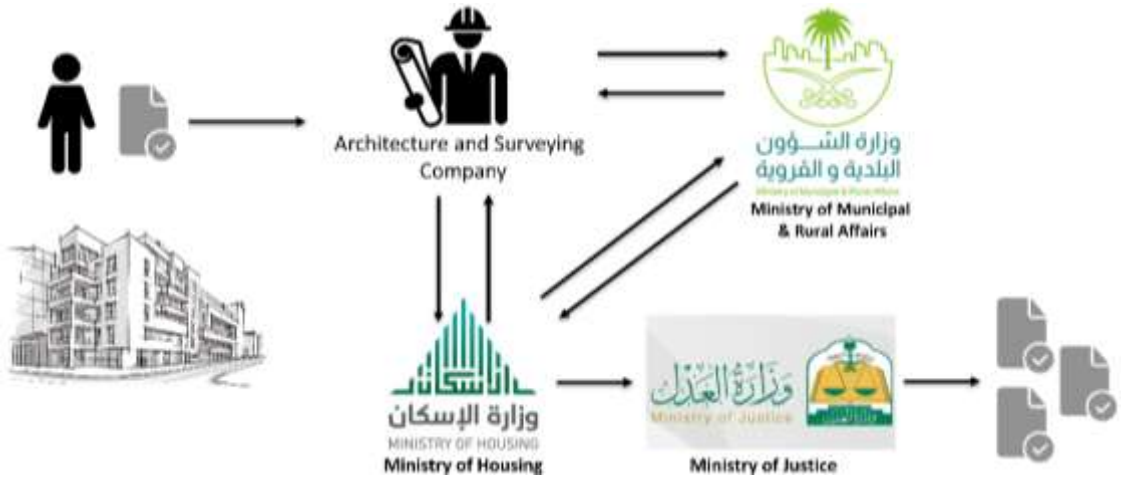

Figure 2: process of unit subdivision (deed registration)

The third type of property registration is related to the land subdivision into several parcels, and it has two different cases, first, if the land has a deed registration documents (for example own by individual or company), and second if the land does not have a deed registration documents (public land own by the government). In the case of land has a deed registration document, the owner should start the request by hiring a certified architecture and surveying firm to subdivide the land into several parcels (create the master plan) based on the regulations of the Ministry of Municipal and Rural Affairs. Then, by having the master plan, the Architecture and surveying firm has to apply to the Ministry of Municipal and Rural Affairs for their approval. Next, the Ministry of Justice will receive the required data from the Ministry of Municipal and Rural Affairs to issuing the deeds registration documents for each parcel as shown in Figure 3.

The second case, when the land owns by the government, the Ministry of Municipal and Rural Affairs will hair a certified architecture and surveying firm to subdivide the land into several parcels (create the master plan) based on the regulations of the Ministry of Municipal and Rural Affairs. Then, the Ministry will approve the master plan for the land to issue the deeds registration documents for each parcel through the Ministry of Justice as shown in Figure 3.

Figure 3: process of land subdivision into several parcels (deed registration)

The last type of Property registration is the title registration and it is under the responsibility of the Real Estate General Authority. The process of issuing the title registration starts by applying a registration request to the Real Estate General Authority to convert the deed registration documents into a title registration. The Real Estate General Authority will communicate all the stockholders to collect and check the deed documents information and then issuing the title registration document as shown in Figure 4.

Figure 4: process of issuing title registration documents

3. METHODOLOGY OF IMPROVING THE INITIAL LADM COUNTRY PROFILE OF SAUDI ARABIA

Several countries have developed their LADM country profile by following different approaches without a specific roadmap or methodology, and that has increased the need to create an essential outline that has to be followed to develop a country profile (Kalogianni et al., 2019). Therefore, the annex D of ISO 19152 LADM Edition II included a proposed methodology for developing a country profile (Lemmen et al., 2019), and it included a list of principles that has been used during the developing of the initial country profile of Saudi Arabia, such as:

- Analyzing the local law and regulations of the land administration system.
- Descripting the current situation of the land administration system according to the current registration system.
- Mapping the main elements between the local land administration system and LADM.

The Initial country profile has been developed based on the relationship between all the stockholders to represent the land administration system in Saudi Arabia (Alattas et al., 2019). Therefore, all the information in Section 2 has been taken into consideration during the process of developing the initial country profile. As a result of the developing process, the initial profile has represented the basic information of the current land administration system. The initial profile represented the spatial and non-spatial classes of LADM.

The Spatial classes have included the SA_SpatialUnit, and it has two subclasses SA_LandParcel and SA_BuildingUnit, to represent the parcel and building. The SA_BuildingUnit has three subclasses SA_InnerUnit (to represent the unit such as an apartment, an office, clinic, etc.), SA_AmenitiesUnit (to represent services unit such as storage unit), and SA_SharedAreaUnit (to represent all the areas that have shared ownership between the owners such as corridor). All the three classes have an association relationship with SA_BoundaryFaceString for the representation of the 2D boundary information (in current land

administration system in Saudi Arabia, the representation of all the inner units is in 2D and that by including all the 2D floor plans to subdivision request). On the other hand, the SA_LandParcel has one subclass SA_AmenitiesUnit. The SA_BoundaryFaceString has an association relationship with SA_Point to have zero, three, or more points for each unit. Furthermore, the SA_SpatialSource has an association relationship with each of SA_SpatialUnit and the SA_Point.

The Non-Spatial classes have included the party package, and it consists of SA_Party, SA_GroupParty, and SA_PartyMember. The SA_Party class has one additional attribute to represent the nationality of the party. Furthermore, the administrative package consists of SA_RRR, and it has three subclasses SA_Right, SA_Responsibility, and SA_Restriction. The SA_Mortgage is a subclass of SA_Restriction, and an association relationship with SA_Right. As mentioned before, the initial country profile has covered only the basic information for the current land administration system after conducting many interviews with different stakeholders. However, the amount of data that has been collected not sufficient for a complete representation of the current system. Therefore, another approach has been used to collect all the information that has to be documented in the registration process from all the stakeholders.

The new approach has focused on collecting several deed registrations documents for different types of properties, such as land parcels, buildings, apartments units. Each type of deed registration documents that belong to one type of property will be used to extract all the information that has been included by the stakeholders during the registration. Then, a complete list of the information that has been extracted will be grouped under the type of property. By doing the same for all types of properties, there will be several lists that include unique attributes for each type of property.

The next step is to compare all the lists to extract the repeated (common) attributes and define them as non-optional attributes, and they have to be listed in a new list called Registration deed information for Saudi Arabia. The other attributes that not have been duplicated will be defined as an optional attribute based on the condition of property registration type, and they will be added to the new list Registration deed information for Saudi Arabia. The attributes of the new list will be analyzed to assign each attribute to the correct class in the country profile.

4. IMPROVING COUNTRY PROFILE OF SAUDI ARABIA BASED ON LADM

The improvement process for the country profile started by collecting several deed registrations documents for various types of pf properties. There are three types of properties have covered in this process: apartment property, single house property, and land parcel property, and they considered as the most common types of properties in the land administration system of Saudi Arabia. The deed registrations documents that belong to apartment unit property type have been analyzed to extract the essential information that has been used during the registration, and 35 attributes have been extracted, as shown in Figure 5. The same process has been repeated for the house property, and there were 34 attributes, and in the case of land parcel property, there were 16 attributes. Furthermore, there are 16 attributes duplicated in all the three lists, and they have considered as non-optional attributes, such as parcel No., district No., district name, city,

ownership boundary, etc. The other attributes have been considered as optional attributes based on the condition of the property registration. The next step is to list all the attributes to the new list Registration deed information for Saudi Arabia, as shown in Figure 5. All attributes have been analyzed, and they represent three different types of information: party information, Spatial information, and administrative information. Then, each attribute has been assigned to the related class in the country profile, as shown in Figure 6. Additionally, the data type of each attribute has been defined based on the input information type, and for the attributes that have a code list, the possible values of the code list has been defined.

Figure 5: Deed registration information

Registration Deed information FOR SA	LADM classes	Datattype	Code list	Code list value
property Type	SA_SpatialUnit		SA_TypeOfProperty	parcel, buiding
Property No.	SA_InnerUnit	integer		
Floor No.	SA_InnerUnit	integer		
parcel No.	SA_LandParcel-SA_InnerUnit	varchar		
district No.	SA_SpatialUnit	varcher		
district name	SA_SpatialUnit	varchar		
city	SA_SpatialUnit	varchar		
ownership boundary	SA_LandParcel-SA_InnerUnit	varchar		
property area (Sq.M)/ area (Sq.M)	SA_LandParcel-SA_InnerUnit	double		
Technical report No.	SA_AdministrativeSource	varchar		
Date of theTechnical report	SA_AdministrativeSource	date		
Technical report source	SA_AdministrativeSource	varchar		
Notaries registration No.	SA_AdministrativeSource	varchar		
Notaries registration date	SA_AdministrativeSource	date		
percentage of the property area to the parcel area	SA_InnerUnit	varchar		
property share from the parcel area (Sq.M)	SA_InnerUnit	varchar		
Registration deed number of the previous owner/ previous registration deed number	SA_AdministrativeSource	varchar		
Floder No.	SA_AdministrativeSource	varchar		
Date of the Deed registration of the previous owner/ previous registration deed date	SA_AdministrativeSource	date		
Name	SA_Party	varchar		
Nationality	SA_Party		SA_nationalityType	saudi, Gulf country,others
Type	SA_Party		SA_IdType	national ID, passport
Id No.	SA_Party	varchar		
mortgage source	SA_MortgageSourceOne	varchar		
commercial Registration	SA_MortgageSourceOne	varchar		
registration number for mortgage letter	SA_MortgageSourceOne	varchar		
registration date for mortgage letter	SA_MortgageSourceOne	date		
notaries registration number for mortgage letter	SA_MortgageSourceOne	varchar		
notaries registration date for mortgage letter	SA_MortgageSourceOne	date		
mortgage amount from source	SA_MortgageSourceOne	double		
mortgage source	SA_MortgageSourceTwo	varchar		
commercial Registration	SA_MortgageSourceTwo	varchar		
registration number for mortgage letter	SA_MortgageSourceTwo	varchar		
registration date for mortgage letter	SA_MortgageSourceTwo	date		
notaries registration number for mortgage letter	SA_MortgageSourceTwo	varchar		
notaries registration date for mortgage letter	SA_MortgageSourceTwo	date		
mortgage amount from source	SA_MortgageSourceTwo	double		
property total mortgage	SA_Mortgage	double		
duration installment (No.of months)	SA_Mortgage	integer		
installment amount	SA_Mortgage	double		
installment starting date	SA_Mortgage	date		
shariah Board authorization No.	SA_Mortgage	varchar		
shariah Board authorization date	SA_Mortgage	date		
registration deed No.	SA_AdministrativeSource	varchar		
registration deed date	SA_AdministrativeSource	date		
The New attributes for the classes of the country profile of SA				

Figure 6: New attributes for the country profile

By having all the new attributes, the earlier proposed UML class diagram has been updated in Enterprise Architect (EA). The non-spatial classes consist of the Party package and the

administrative package, as shown in Figure 7. The Party package consists of SA_Party class, and it has three additional attributes: nationalID, Nationality, and type (represents the ID type). The attributes of SA_Party are non-optional. The SA_GroupParty and SA_PartyMember inherit the same attributes from LA_PartyMember and LA_GroupParty. The administrative package consists of the SA_BAUnit, SA_RRR (Including SA_Right, SA_Responsibility, and SA_Restriction as subclasses), SA_AdministativeSource, and SA_Mortgage. The SA_AdministativeSource contains additional attributes to the inherited attributes from the LA_AdministativeSource. The registration deed No. and registration deed date attributes are non-optional, and the rest of the attributes are considered as optional attributes based on the condition of the property registration. The SA_Mortgage class has additional attributes, and only the shariah Board authorization No. and shariah Board authorization date are optional attributes. Furthermore, The SA_Mortgage abstract class has two subclasses SA_MortgageSourceOne and SA_MortgageSourceTwo, to represent different mortgage sources. The current land administration system in Saudi Arabia registers all mortgage sources, such as bank mortgage, government mortgage or both. Only the attributes of SA_MortgageSourceOne are non-optional, and the SA_MortgageSourceTwo is optional when there is only one source of mortgage.

The spatial classes consist of SA_SpatialUnit abstract class, and it has four additional attributes (property Type, district No., district name, and city), and all of them are considered as non-optional attributes, as shown in Figure 8. The SA_LandParcel and SA_BuildingUnit are subclasses of the SA_SpatialUnit, and they have additional attributes that considered as non-optional attributes. The SA_LandParcel has five attributes (parcel No., area, ownership boundary, type (to represent the type of parcel) and reference) to represents primary information about the parcel. The SA_BuildingUnit has four attributes (parcel No., reference, type (to represent the type of the building) and numberOfFloor) to represents the primary information about the building. The SA_InnerUnit (to represent the unit such as an apartment), SA_AmenitiesUnit (to represent services unit such as storage unit), and SA_SharedAreaUnit (to represent all the areas that have shared ownership between the owners such as corridor) are subclasses of SA_BuildingUnit. Each of these classes has several attributes that are considered as non-optional attributes. The rest of the spatial classes are inherited from the original classes of LADM. Figure 9 has shown the values of the code lists.

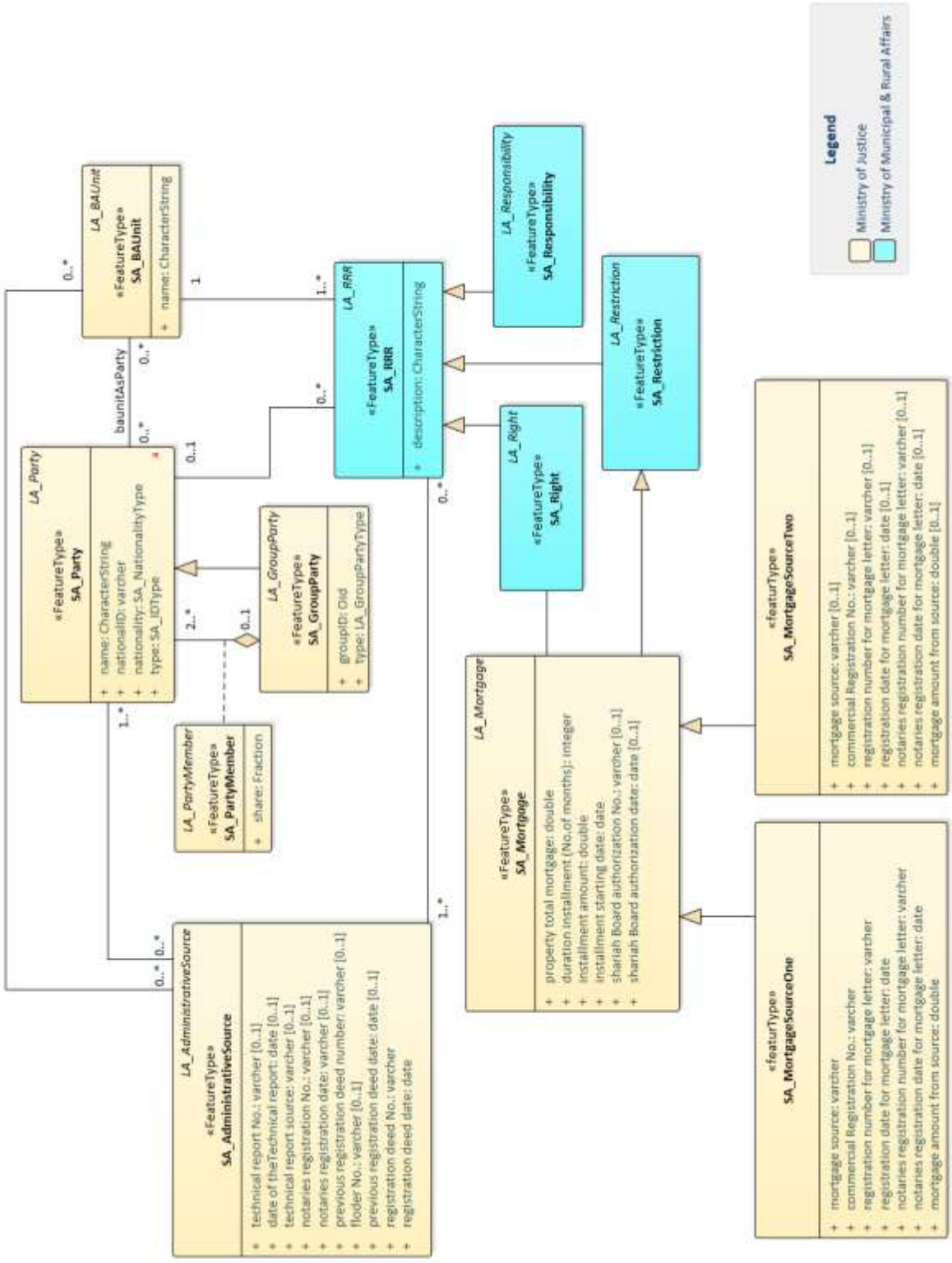

Figure 7: Non-spatial classes of the country profile of Saudi Arabia

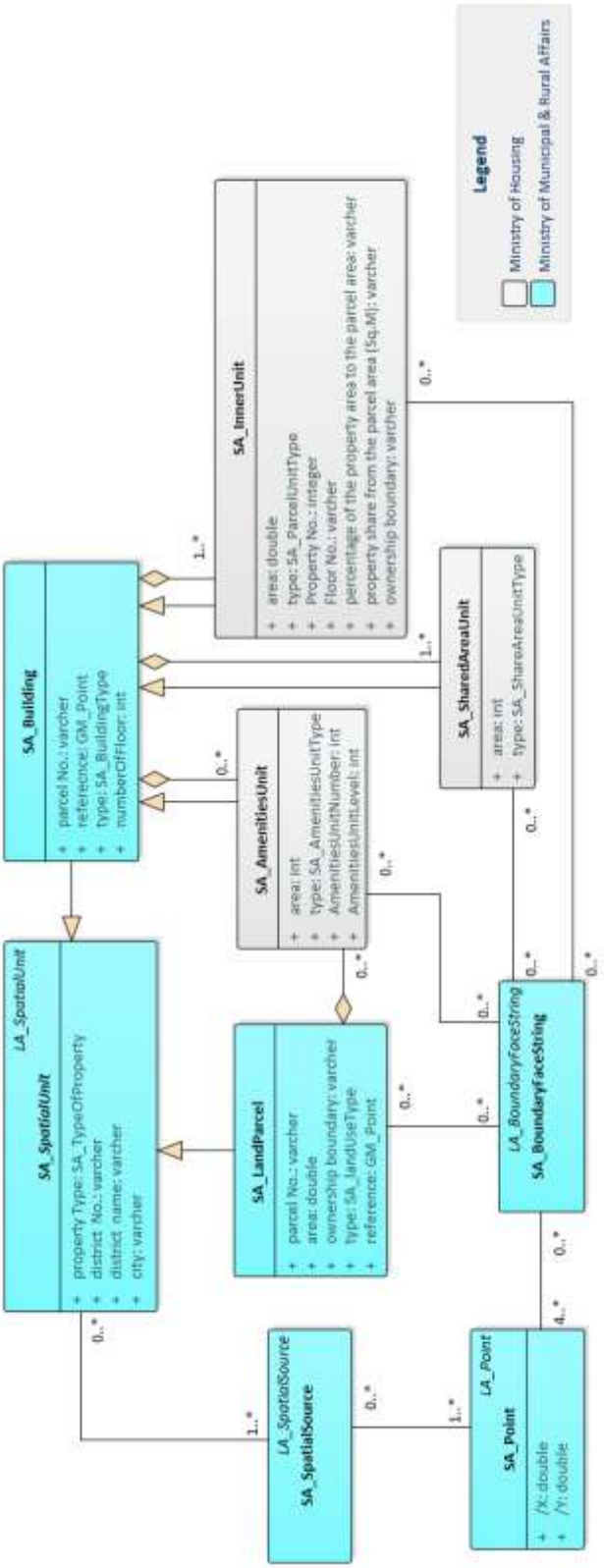

Figure 8: Spatial classes of the country profile of Saudi Arabia

Figure 9: Code lists of the country profile of Saudi Arabia

5. CONCLUSION AND FUTURE WORK

The land administration system in Saudi Arabia is under the responsibility of four stakeholders, and each of them has several tasks during the registration of property. These tasks require communications between all the stakeholders to provide the ownership documents. For this reason, the initial country profile has been developed to improve the interoperability between all the stakeholders and to represent the land administration system in Saudi Arabia based on LADM. However, by testing and validating the initial country profile, the result has shown that only the basic information of the land administration system has been represented. Therefore, a new approach has been used to extract all the essential information from the land administration system by collecting several deed registrations for different types of properties and compare between them to extract the optional and non-optional attributes. Then, all attributes have been grouped into three different categories based on their types (spatial information, party information, and admistrative information). These categories have been used later to assign each attribute to the related class in the country profile UML class diagram in EA. By having additional attributes, the initial country profile has been extended to reflect the land administration system in Saudi Arabia.

The proposed model will be further validated and tested in our future work by creating instance-level diagrams with real data. Then, a 3D country profile will be proposed to improve the registration system in Saudi Arabia. The following step will be developing a technical model and database for the country profile. Furthermore, a user interface will be developed for the visualization aspect of the ownership for parcels and building/unit. Additionally, future work will include different types of information, such as indoor, subsurface, marine, valuation/taxation, and spatial planning information as now being developed by ISO TC 211 in LADM version two (Lemmen et al., 2019).

REFERENCES

Alattas, A., van Oosterom, P. and Zlatanova, S. (2019). Initial Country Profile of the Kingdom of Saudi Arabia based on LADM. In: 8th International FIG workshop on the Land Administration Domain Model.

Housing program. (n.d.). Retrieved February 6, 2020, from https://vision2030.gov.sa/ar/programs/Housing.

Kalogianni, E., Kalantari, M., Dimopoulou, E., and van Oosterom, P. (2019). LADM country profiles development: aspects to be reflected and considered. In: 8th International FIG workshop on the Land Administration Domain Model.

Lemmen, C. H. J., van Oosterom, P. J., Kara, A., Kalogianni, E., Shnaidman, A., Indrajit, A., & Alattas, A. (2019, October). The scope of LADM revision is shaping-up. In 8th Land Administration Domain Model Workshop 2019.

Programs and initiatives. (n.d.). Retrieved February 6, 2020, from https://www.housing.gov.sa/ar/initiatives.

Quality of Life Program. (n.d.). Retrieved February 6, 2020, from https://vision2030.gov.sa/ar/programs/QoL.

Real estate ownership and sorting system. (n.d.). Retrieved February 3, 2020, from https://www.housing.gov.sa/ar/regulations.

Real estate ownership. (n.d.). Retrieved February 3, 2020, from https://www.moj.gov.sa/ar/SystemsAndRegulations/Pages/default.aspx.

Saudi Arabia Vision 2030. (n.d.). Retrieved from https://vision2030.gov.sa/ar.

The system of municipalities and villages issued by the Royal Decree No. M / 5. (n.d.). Retrieved February 3, 2020, from https://www.momra.gov.sa/GeneralServ/Forms.aspx?id=2.

The organization of the General Authority for Real Estate. (n.d.). Retrieved February 3, 2020, from https://rega.gov.sa/AboutUs.

BIOGRAPHICAL NOTES

Abdullah Alattas is a PhD candidate at the section 'GIS Technology', Faculty of Architecture and the Built Environment, Delft University of Technology (TU Delft). He is a lecturer at the Geomatics department at the Faculty of Environmental Design, King Abdulaziz University in Jeddah, Saudi Arabia. In 2014, he obtained a master's degree in Cartography from the international Master program that is a cooperation of: Technische Universität München (TUM), Department of Cartography, Technische Universität Wien (TU Vienna), Research Group Cartography, and Technische Universität Dresden (TU Dresden), Institute for Cartography. In 2008, he received a bachelor's degree in architecture from Faculty of Environmental Design, King Abdulaziz University in Jeddah, Saudi Arabia.

Peter van Oosterom obtained an MSc in Technical Computer Science in 1985 from Delft University of Technology, The Netherlands. In 1990 he received a PhD from Leiden University. From 1985 until 1995 he worked at the TNO-FEL laboratory in The Hague. From 1995 until 2000 he was senior information manager at the Dutch Cadastre, where he was involved in the renewal of the Cadastral (Geographic) database. Since 2000, he is professor at the Delft

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Sisi Zlatanova obtained her MSc in Geodesy, Photogrammetry and Cartography at the University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria in 1984 and specialised Applied Mathematics at Technical University Sofia. She has received her PhD degree from Graz University of Technology, Austria in 2000. She worked as a software developer at Bulgarian Central Cadastre (1985 -1989), assistant professor at University of Architecture and Civil Engineering, Sofia (1989-1999) and associate professor at the Delft University of Technology (2000-2017. Since 2018 she is a professor at the University of New South Wales, Faculty of Built Environment, Sydney, Australia. She is the current president of ISPRS Technical Commission IV 'Spatial Information Science'.

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