FIG WARSAW CONGRESS 2022

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11–15 SEPTEMBER 2022
Warsaw, Poland

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LADM in the Classroom

Making the Land Administration Domain Model Accessible

Christiaan Lemmen, Malumbo Chipofya, Andre da Silva Mano, Dennis Ushiña Huera, Abdullah Kara, Peter van Oosterom, Javier Morales, Paula Dijkstra, Jaap Zevenbergen

13 September 2022, 14:30–15:30 hours,

TS06F: LADM in the Classroom – Making the Land Administration Domain Model Accessible

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Introduction

Chrit Lemmen, Abdullah Kara, and **Peter van Oosterom** (editors LADM edition II, various parts)

13 September 2022, 14:30–15:30 hours,

TS06F: LADM in the Classroom – Making the Land Administration Domain Model Accessible

Brief history

- FIG Congress 2002, Washington, proposal to create core cadastral domain model (CCDM) within FIG to avoid confusion
- FIG Congress 2006, Munich, after several iterations verion 1.0 of CCDM is ready, plans to submit to ISO
- ISO/TC211 2008, CCDM submitted by FIG, but rather soon renamed to Land Adminsitration Domain Model (LADM)
- UN-Habit, GLTN, FIG, ITC work in parallel on a profile for developing countries: Social Tenure Domain Model (STDM)
- ISO/TC211, 2012, LADM accepted as International Standard (IS 19152) with STDM as informnative annex
- Today:
  - Over 40 countries have published a LADM country profile, nearly 10 are in production
  - Support by World Bank, UN-Habitat, and other funding organizations
  - Revison has changed and LADM edition II will be multi-part

What next?

- The multi-part edition of LADM conisits of (expected publication dates from end 2023 for part 1 to 2025/26 for part 6):
  - Part 1 – Generic Conceptual Model
  - Part 2 – Land Registration
  - Part 3 – Marine Georegulation
  - Part 4 – Valuation Information
  - Part 5 – Spatial Plan Information
  - Part 6 – Implementation

} Scope of current LADM edition

- The increasing use of LADM requires education both of regular students, but also of mid-term carreer professionals
- Learning from the ISO standard 19152 has proven to be rather difficult, today a better approach is launched

School for Land Administration Studies

Paula Dijkstra

Kadaster International

Mission

To build land administration capacity in developing and emerging economies

by supporting the creation of enabling institutional environments, networks, and change agents

Capacity Building in Land Administration

- Scientific
  - concepts
  - models
  - methodology

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- Operational
  - operations
  - management
  - governance

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LADM in the Classroom

Making the Land Administration Domain Model Accessible

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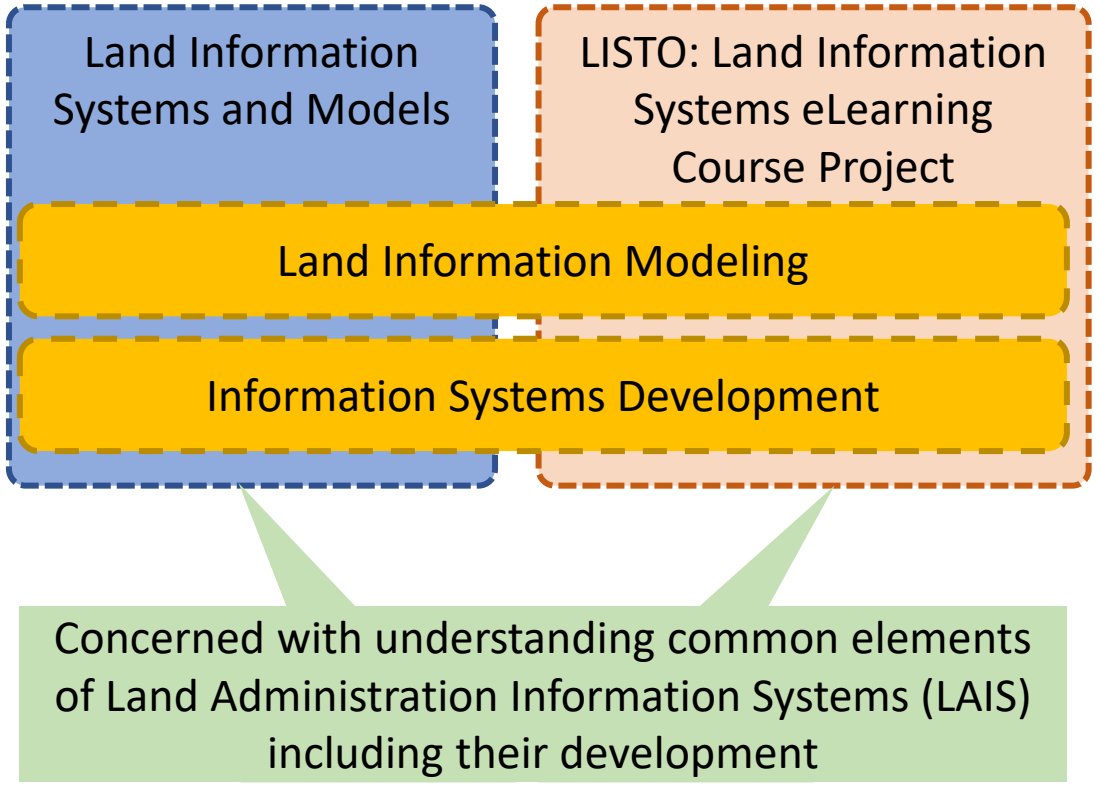
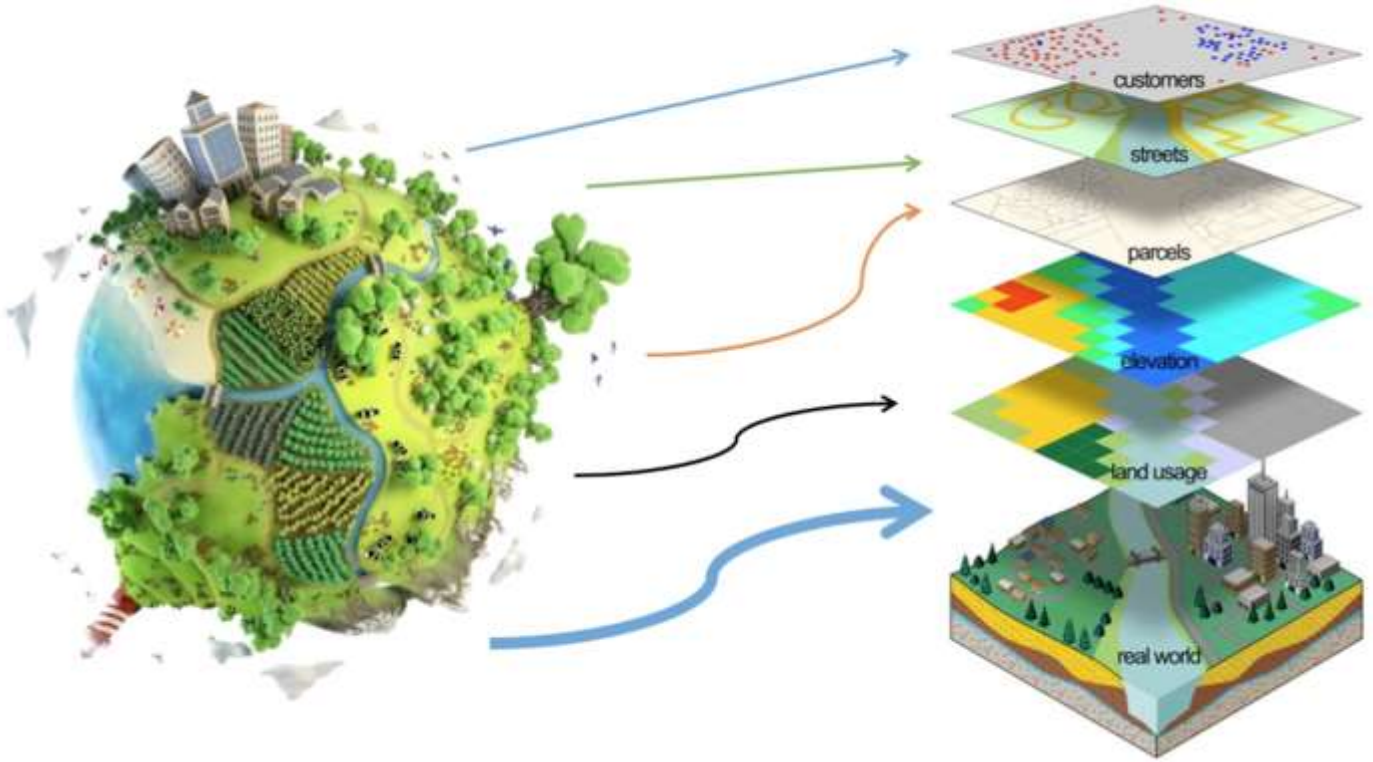
Teaching information modeling for LA



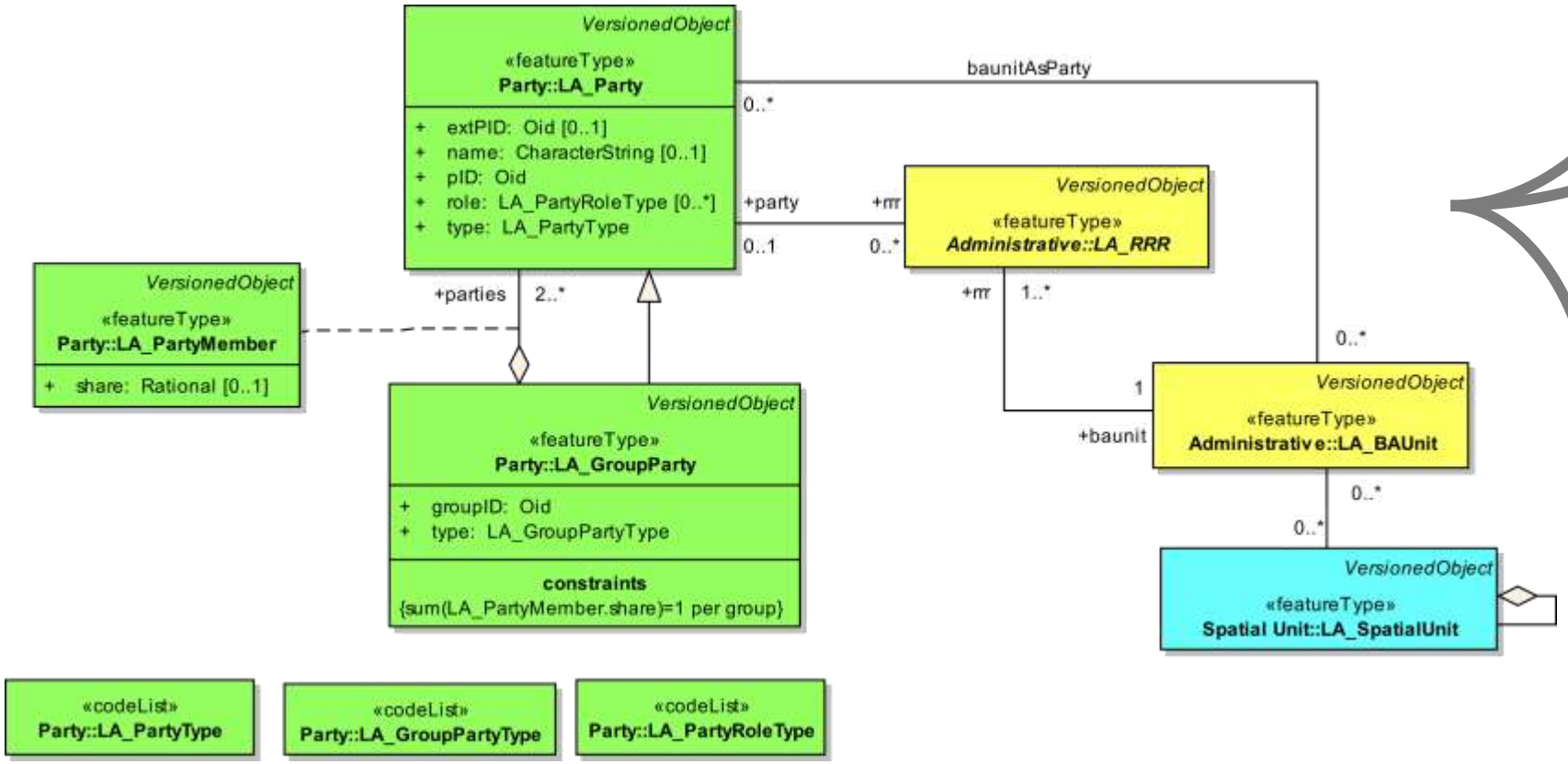
Teaching information modeling for LA

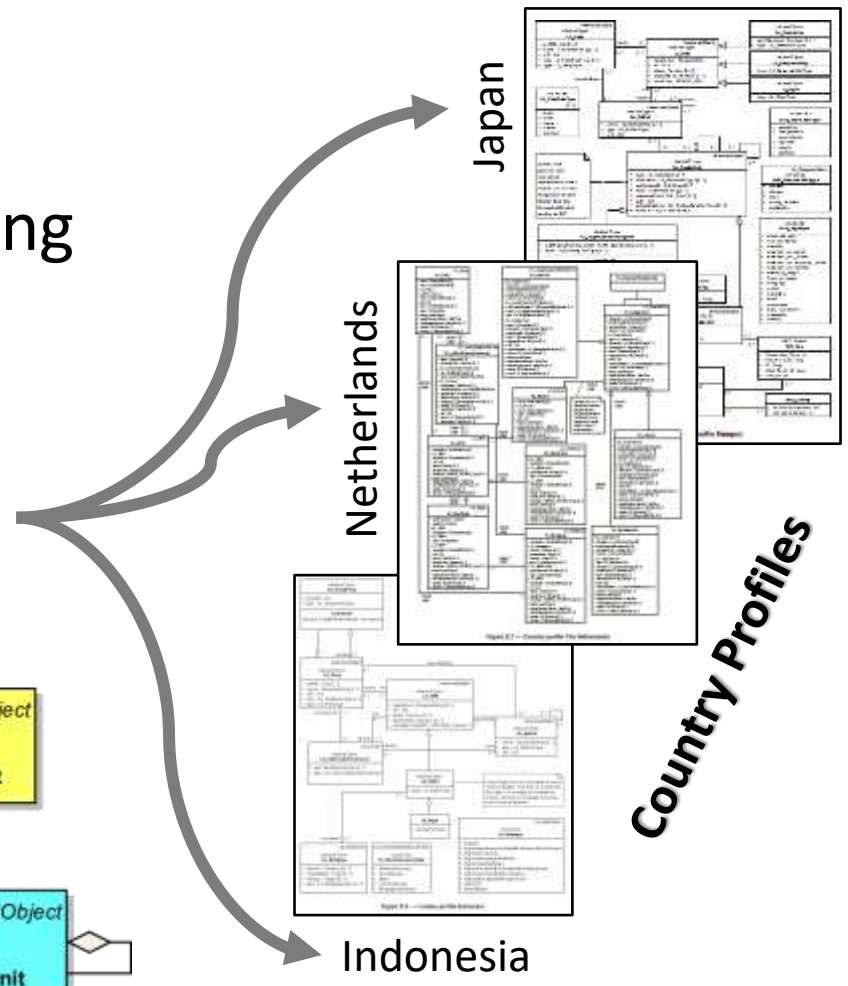
- Why do we teach LA Info. modeling? What do we want to teach the students?



LADM in the Classroom

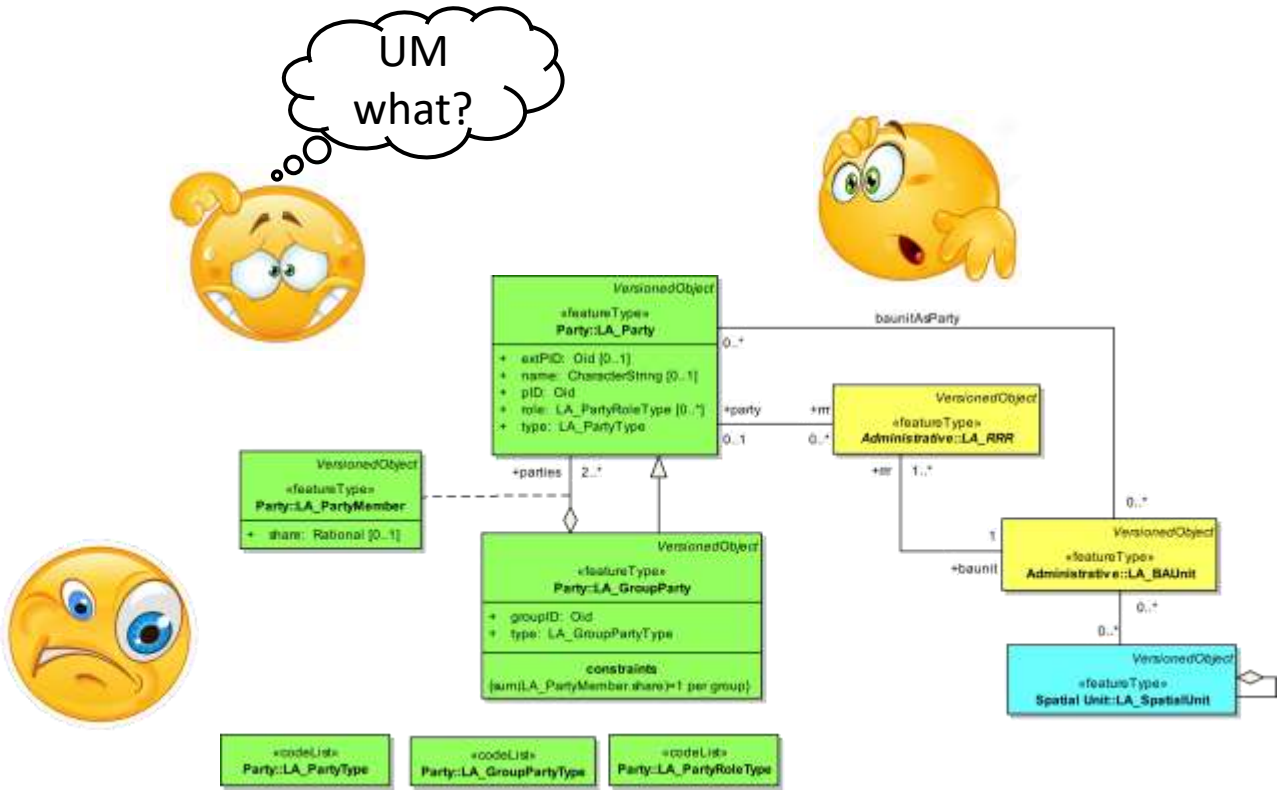
- Benefits of LADM for teaching LA info. modeling

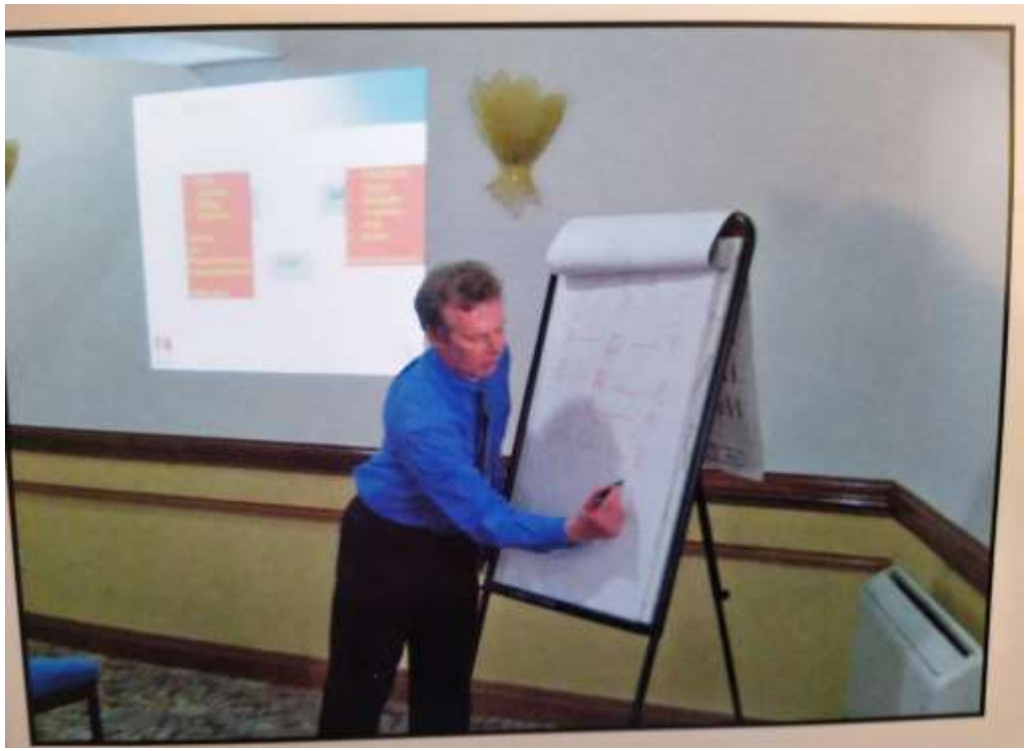




LADM in the Classroom

- But teaching LADM itself can be challenging





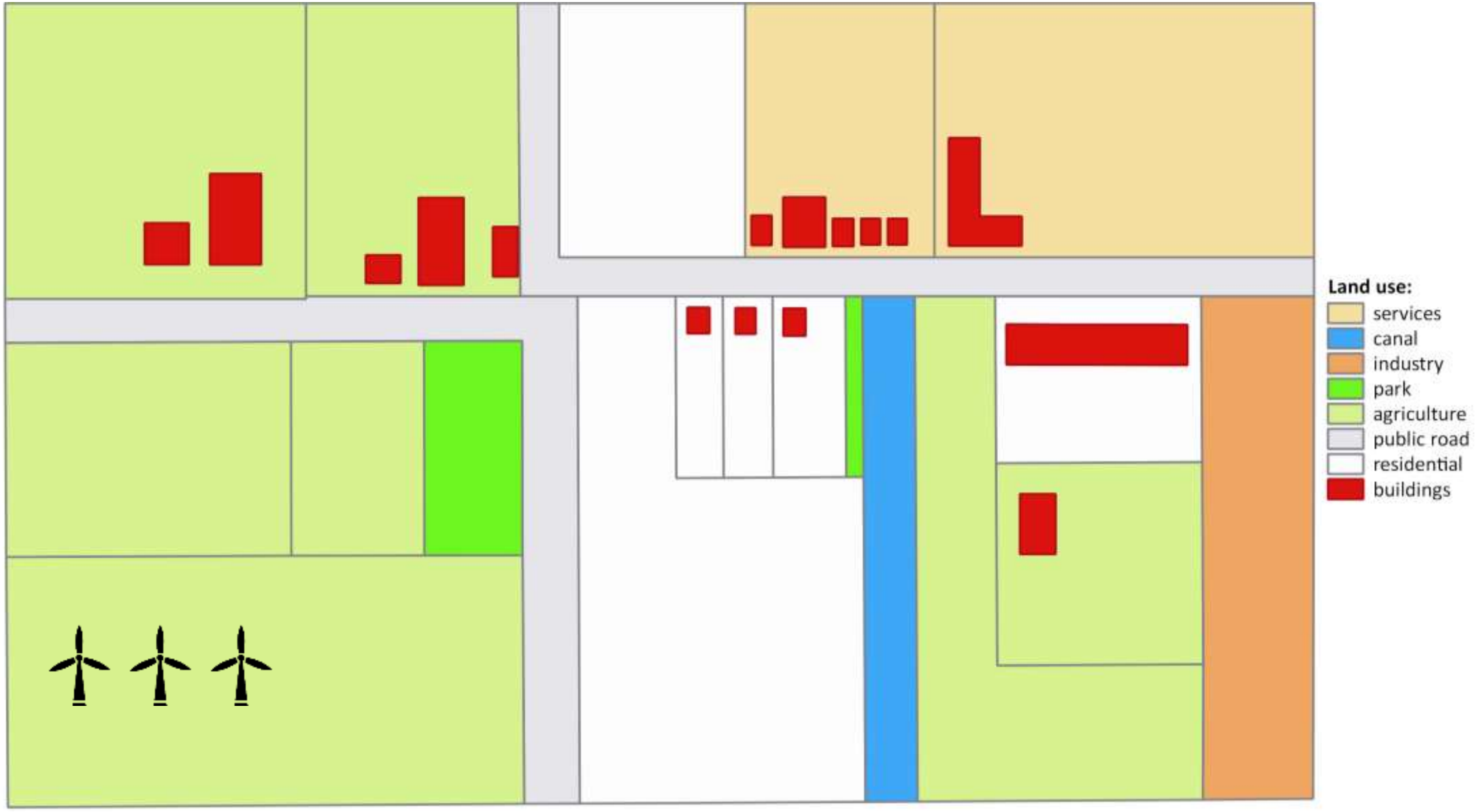
LADM in the Classroom

some guiding principles through examples

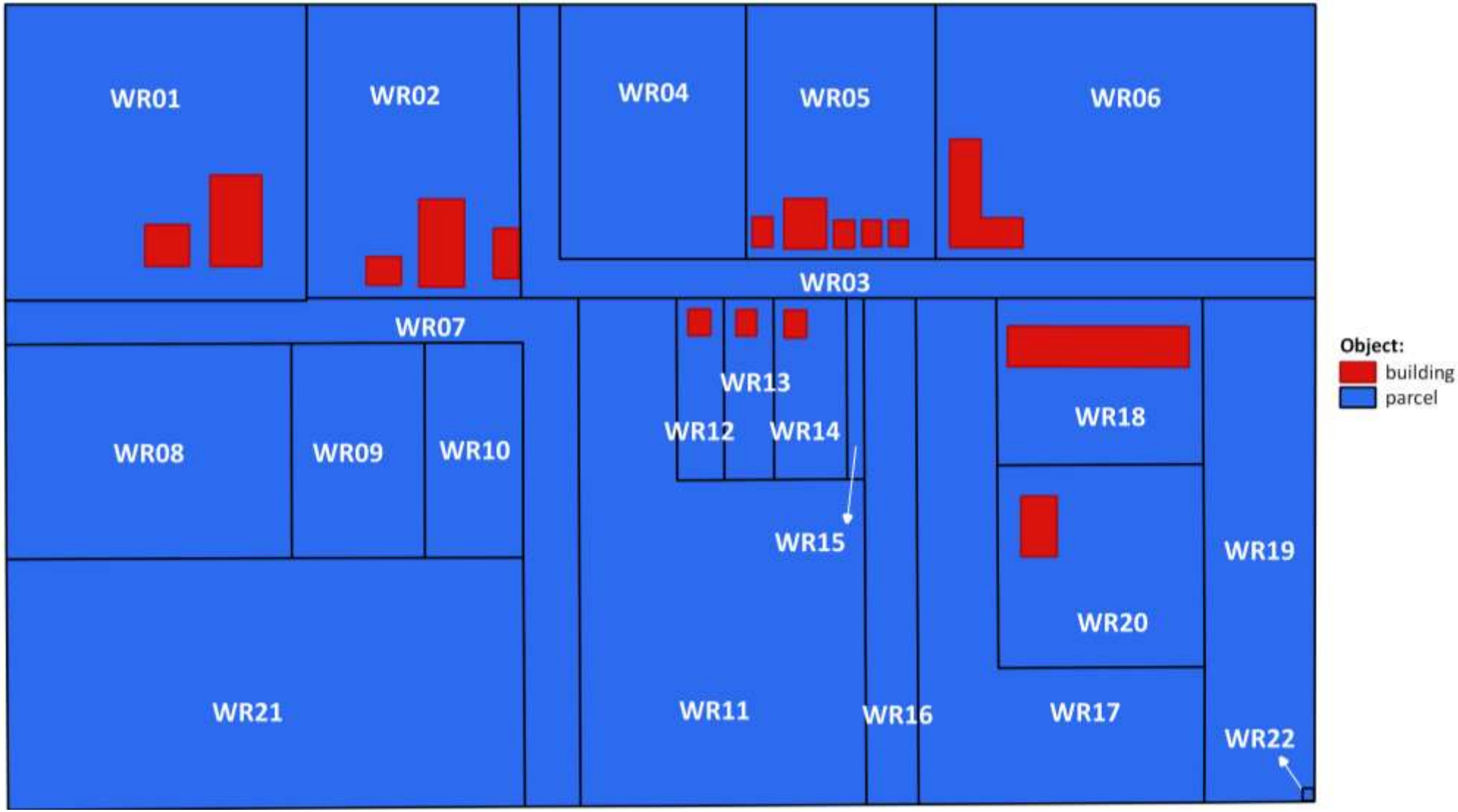
1. Base all content on a **unified** (exemplary) **case study**
2. Use a consistent **presentation structure**
3. Incremental and **progressive knowledge and skill development**
4. Demonstrate subtle implications of design choices through **alternative models** for a given scenario
5. Complexity beyond the conventional models: **customary tenure** models
6. **Reinforce learning** through exercises supported by a comprehensive dataset and tool setup

Unified Case Study: Waterriver

Welcome to the Municipality Waterriver



The Cadastral Map



Structure of the content

1

Tomas, Elisabeth and Monique's situations can be depicted with the LADM. In the LADM the administrative/legal data, the 'registry', and the spatial data, the 'cadastre', are represented in one integrated model. A good way to introduce the structure of this model is to start with concrete depictions of how the records relate. Taking the case of Monique, Figure 6 presents a reader friendly schematic showing which objects are involved and how they relate to each other. This directly translates to the more UML-like instance diagram in Figure 10.

Implementing the dataset in an actual database allows us to create exercises to form part of the learning material. Exercises can be developed objectively at several levels of the Bloom taxonomy of learning (Anderson et al., 2001). As a proof of concept, we present three levels of complexity of exercises developed using the implementation setup and dataset. The first two levels are illustrated with simple examples.

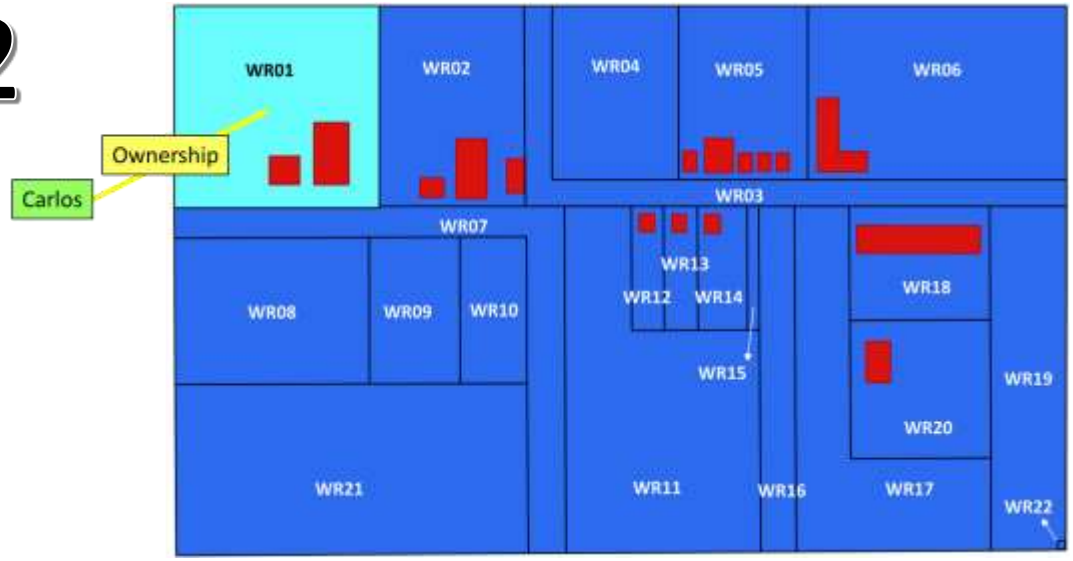
The most basic exercise addresses the base (knowledge) and second (comprehension) tiers of the Bloom cognitive model. The student is asked to draw the UML instance diagrams for a given scenario and to identify the UML class of each object in the diagram. For example:

This exercise assesses how the student has assimilated the core LADM classes and the idea that a class represents a group of objects of the same kind such as a party. It also shows that the student can use the core LADM classes to describe a specific scenario. The solution to problem 1.a. would look exactly like the bottom row of boxes in Figure 18 (a) or (b), except the class of each object would be included in the diagram or as a separate descriptive text. It should be noted that from this initial problem, questions related with other knowledge areas such as model representation in relational database tables, basic SQL query syntax or and spatial representations may be derived.

A student who answers all basic problems such as problem 1 correctly would be ready to tackle more challenging problems involving the application of the knowledge to several different scenarios not directly presented in the examples. This is where the concept of country profile becomes a useful teaching tool as it provides real-world land administration models. Consider the problem presented below:

1. Given the initial scenario shown in Figure 17, where Monique owns an apartment, laundry room, and parking space in an apartment complex (as depicted in Figure 4),
    a. redraw the instance diagram where a single entity, Galaxy Properties, buys out the entire property. In the new scenario Galaxy Properties now owns both the land and all the structures on the residential complex.
    b. Write the SQL queries required to update the data to reflect the new scenario.

2



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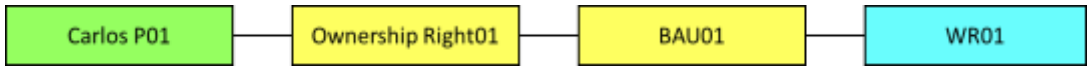


4

	p_id	name
1	P01	Carlos

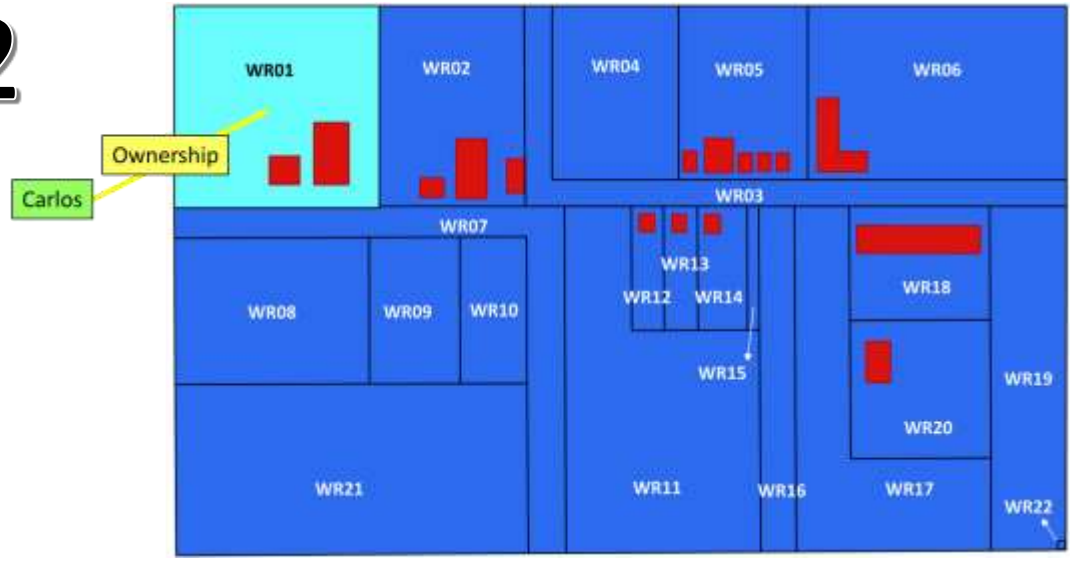
	r_id	type	share
1	Right01	Ownership	

	bau_id
1	BAU01

	su_id	area	geom	...
1	WR01			

1

2



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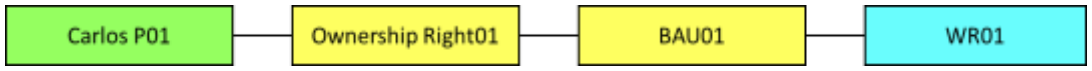

4

	p_id	name
1	P01	Carlos
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

	r_id	type	share
1	Right01	Ownership	
2			
3			
4			
5			
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7			
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11			
12			
13			
14			
15			
16			

	bau_id
1	BAU01
2	
3	
4	
5	
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11	
12	
13	
14	
15	
16	

	su_id	area	geom	...
1	WR01			
2				
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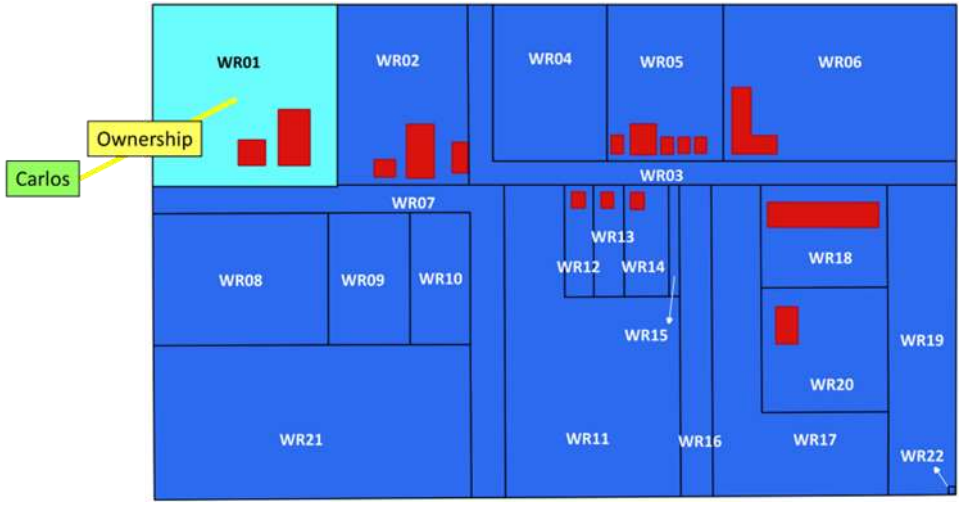
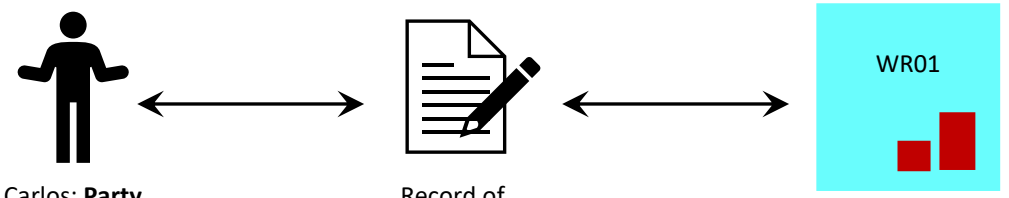
21				

Progressive knowledge and skill development

1





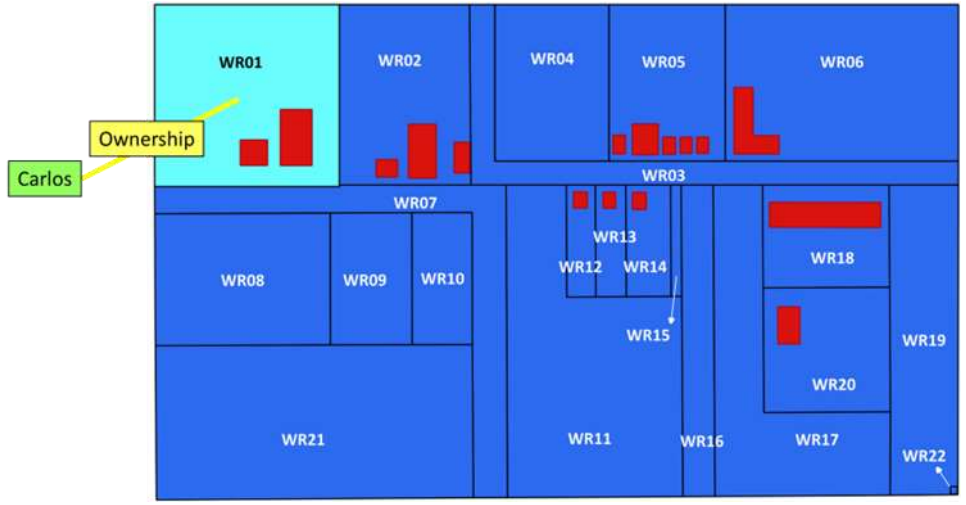
Carlos: **Party**
Every land rights holder is called a party in LADM

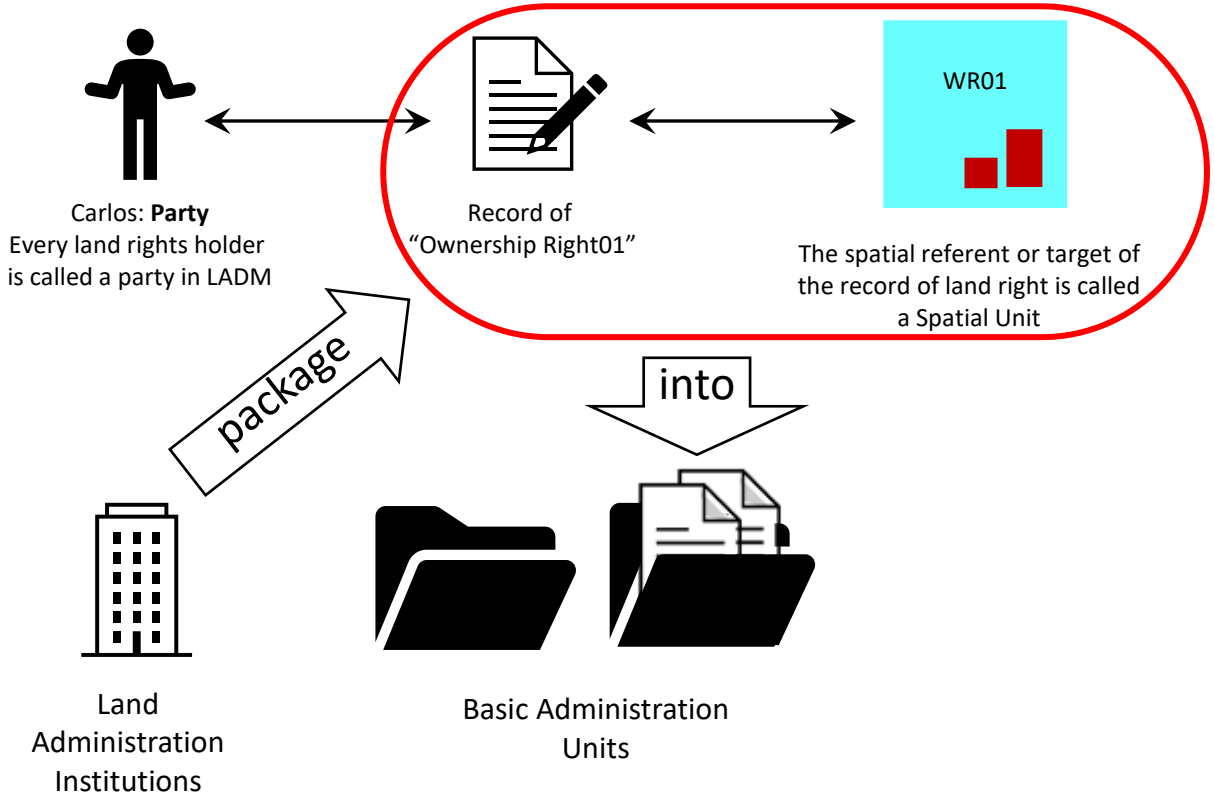
Record of "Ownership Right01"

The spatial referent or target of the record of land rights is called a Spatial Unit

2

1





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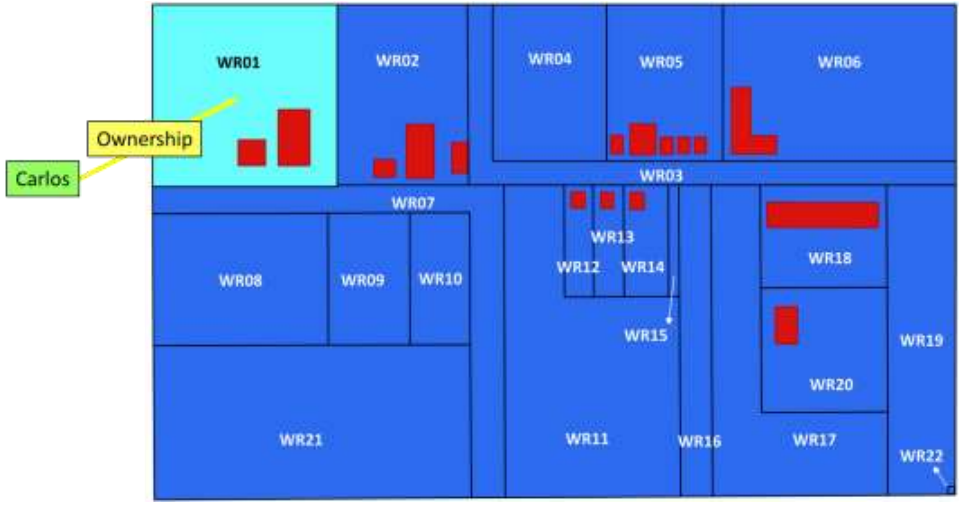
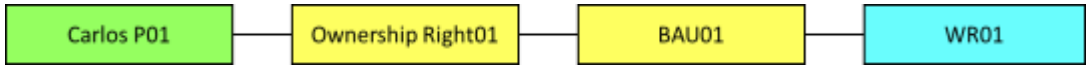




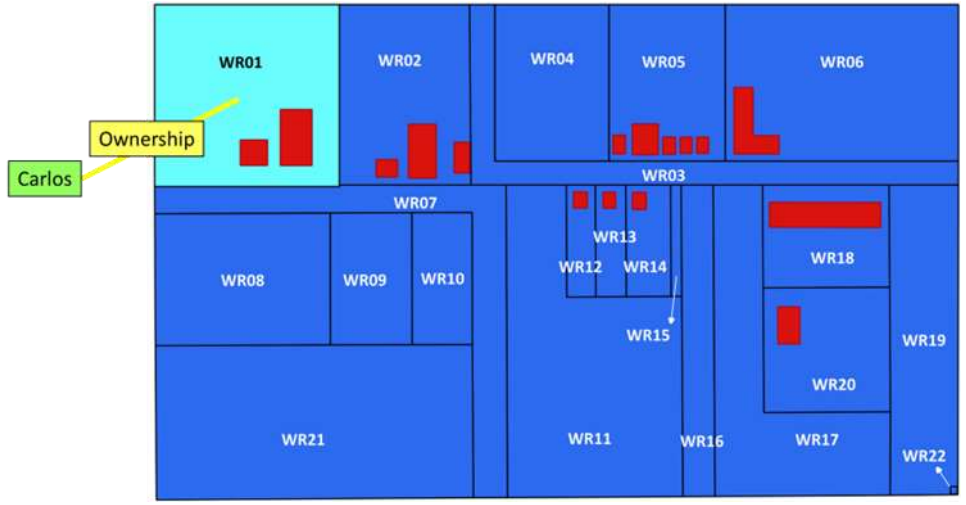
	p_id	name
1	P01	Carlos

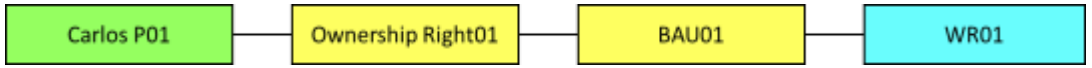
	r_id	type	share
1	Right01	Ownership	

	bau_id
1	BAU01

	su_id	area	geom	...
1	WR01			

2





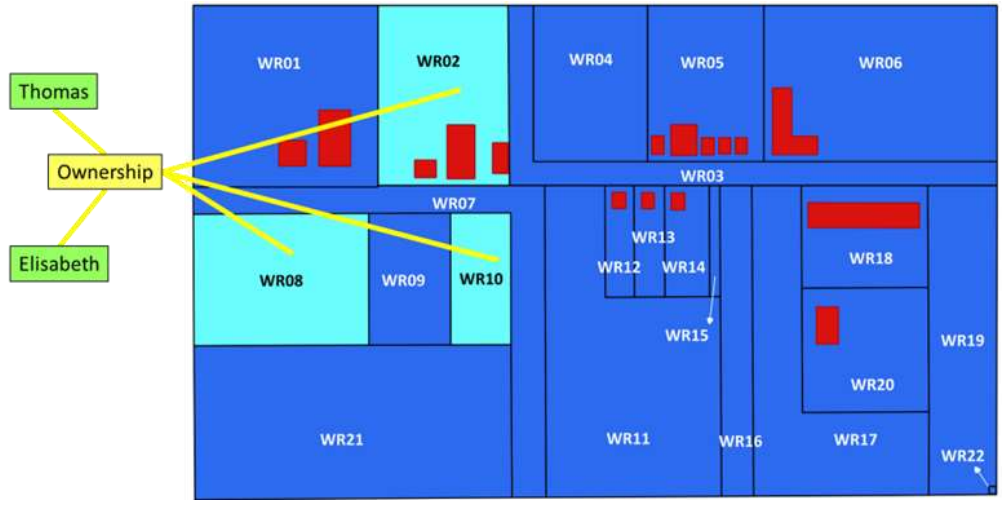
	p_id	name
1	P01	Carlos

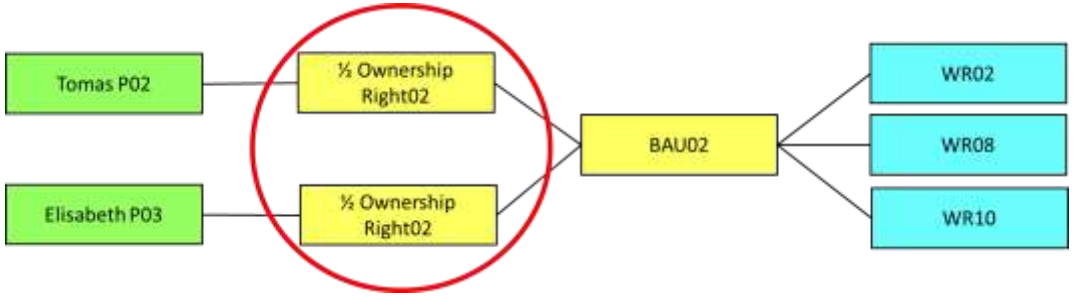
	r_id	type	share
1	Right01	Ownership	

	bau_id
1	BAU01

	su_id	area	geom	...
1	WR01			

3





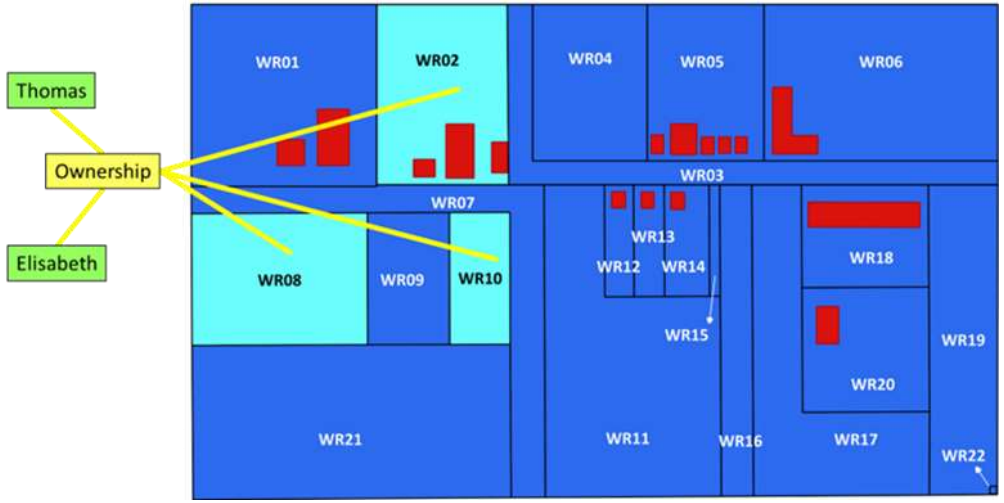
	p_id	name
1	P01	Carlos
2	P02	Thomas
3	P03	Elisabeth

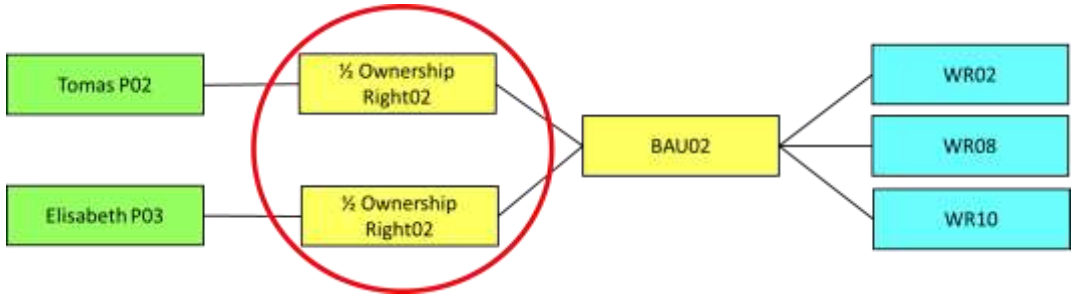
	r_id	type	share
1	Right01	Ownership	
2	Right02	Ownership	1/2
3	Right02	Ownership	1/2

	bau_id
1	BAU01
2	BAU02

	su_id	area	geom	...
1	WR01			
2	WR02			
8	WR08			
10	WR10			

3





	p_id	name
1	P01	Carlos
2	P02	Thomas
3	P03	Elisabeth
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

	r_id	type	share
1	Right01	Ownership	
2	Right02	Ownership	1/2
3	Right02	Ownership	1/2
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

	bau_id
1	BAU01
2	BAU02
3	
4	
5	
6	
7	
8	
9	
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11	
12	
13	
14	
15	
16	

	su_id	area	geom	...
1	WR01			
2	WR02			
3				
4				
5				
6				
7				
8	WR08			
9				
10	WR10			
11				
12				
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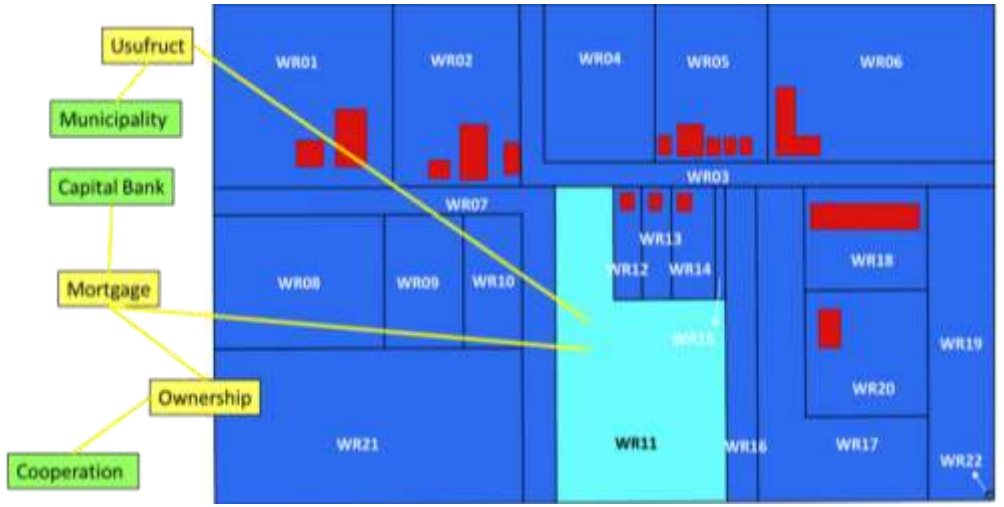
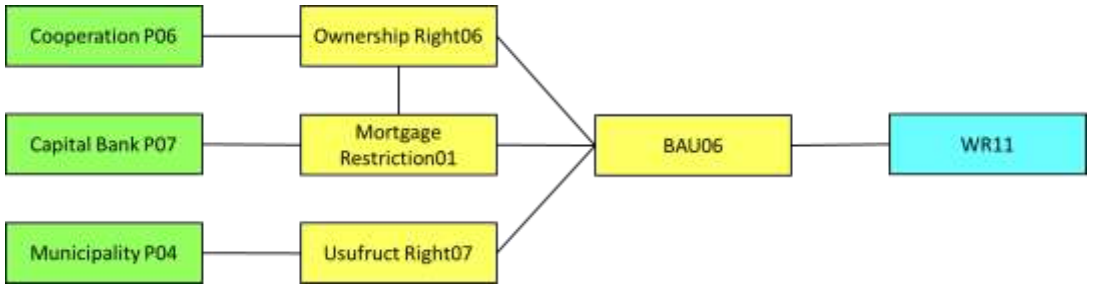
19				
20				

4





	p_id	name
1	P01	Carlos
2	P02	Thomas
3	P03	Elisabeth
4	P04	Municipality
5	P05	Anna
6	P06	Cooperation
7	P07	Capital Bank
8		
9		
10		
11		
12		
13		
14		
15		
16		

	r_id	type	share
1	Right01	Ownership	
2	Right02	Ownership	1/2
3	Right02	Ownership	1/2
4	Right03	Ownership	
5	Right04	Ownership	9/10
6	Right04	Ownership	1/10
7	Right05	Ownership	
8	Right06	Ownership	
9	Right07	Usufruct	
10			
11			
12			
13			
14			
15			
16			

	r_id	type	share
1	Restr01	Mortgage	
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

	bau_id
1	BAU01
2	BAU02
3	BAU03
4	BAU04
5	BAU05
6	BAU06
7	
8	
9	
10	
11	
12	
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14	
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16	

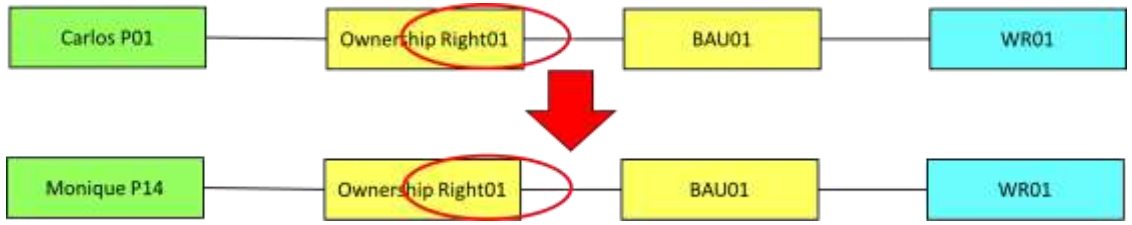
	su_id	area	geom	...
1	WR01			
2	WR02			
3	WR03			
4	WR04			
5	WR05			
6	WR06			
7	WR07			
8	WR08			
9	WR09			
10	WR10			
11	WR11			
12	...			
13	...			
14	...			
15	...			
16	...			
17	WR17			
...	...			
...	...			
26	WR20			

Alternative modeling choices

Implications of design choices

Demonstrate other advanced concepts: e.g. Transactions

	r_id	la_right_type	begin_lifespan	end_lifespan
1	Right01	Ownership	20150403, 08:29	20210826, 14:04
2	**Right18**	Ownership	20210826, 14:04	99999999, 23:59
3				



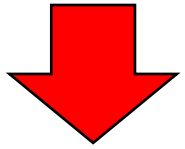
	r_id	la_right_type	begin_lifespan	end_lifespan
1	Right01	Ownership	20150403, 08:29	20210826, 14:04
2	**Right01**	Ownership	**20210826, 14:04**	99999999, 23:59
3				

	p_id	name
1	P01	Carlos
2	P02	Thomas
3	P03	Elisabeth
..	...	...
13	P13	Association of Owners
14	P14	Monique
15	P15	Eco Investment

	r_id	type	share	t_min	t_max
1	Right01	Ownership		20150403, 08:29	99999999, 23:59
2	Right02	Ownership	1/2	...	...
3	Right02	Ownership	1/2		
..	...	...	..		
17	Right14	Ownership			
18	Right15	Ownership			
19	Right16	Ownership		20140730, 10:15	99999999, 23:59

	bau_id	t_min	t_max
1	BAU01	20150403, 08:29	99999999, 23:59
2	BAU02	...	...
3	BAU03		
...	..		
12	BAU12	20140730, 10:15	99999999, 23:59
13	BAU13		
14	BAU14		

	su_id	...
1	WR01	...
2	WR02	
3	WR03	
...	...	
22	WR18-4	
23	WR18-5	
24	WR18-6	



	p_id	name
1	P01	Carlos
2	P02	Thomas
3	P03	Elisabeth
..	...	...
13	P13	Association of Owners
14	P14	Monique
15	P15	Eco Investment

	r_id	type	share	t_min	t_max
1	Right01	Ownership		20150403, 08:29	20210826, 14:04
2	Right02	Ownership	1/2	...	...
3	Right02	Ownership	1/2	...	
..	...	...	..	...	
19	Right16	Ownership		20140730, 10:15	99999999, 23:59
20	Right17	Ownership			
...	...	...	...	...	
24	Right18	Ownership		20210826, 14:04	99999999, 23:59

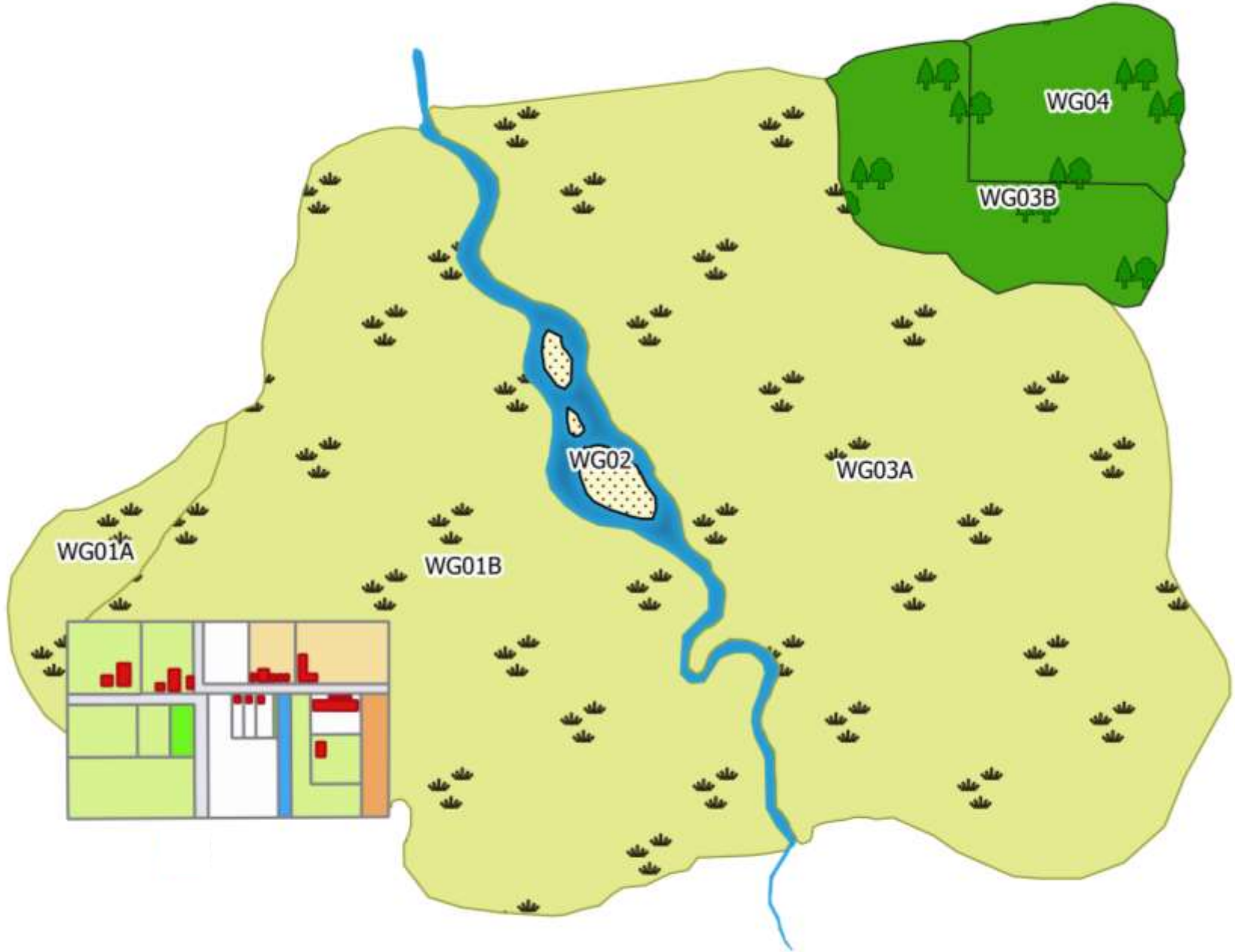
	bau_id	t_min	t_max
1	BAU01	20150403, 08:29	20210826, 14:04
2	BAU02	...	...
3	BAU03		
...	..		
11	BAU12	20140730, 10:15	99999999, 23:59
12	BAU13		
13	BAU14	20210826, 14:04	99999999, 23:59

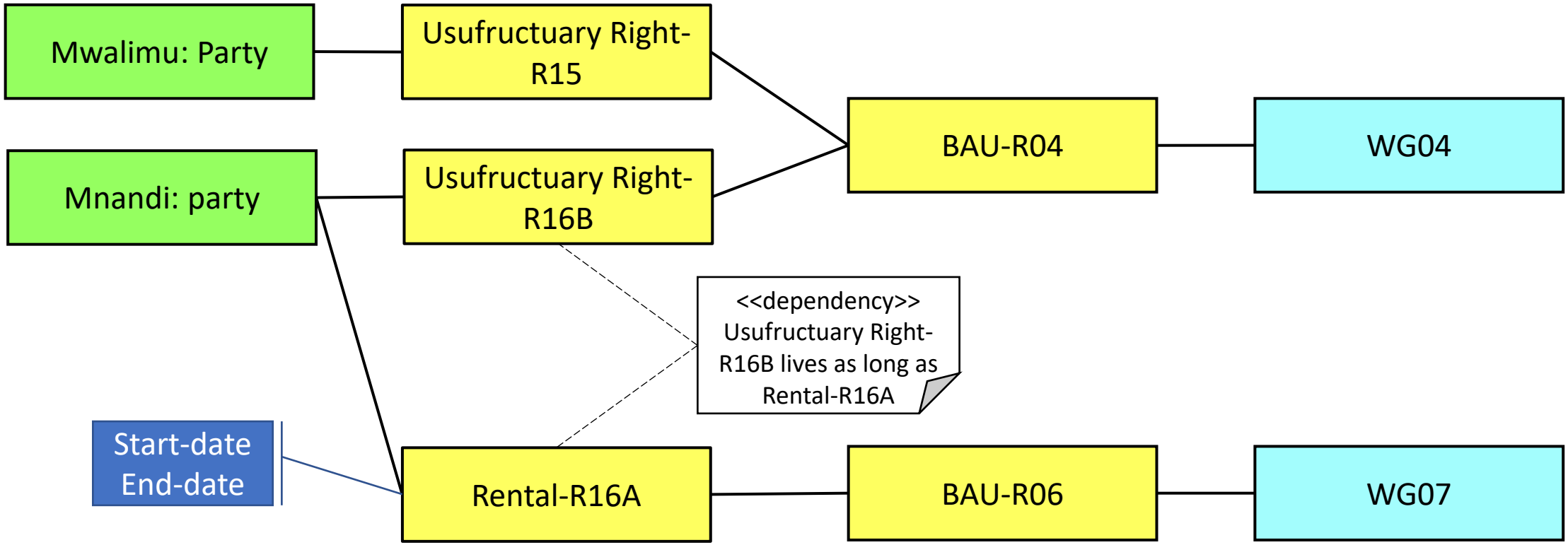
	su_id	...
1	WR01	...
2	WR02	
3	WR03	
...	...	
22	WR18-4	
23	WR18-5	
24	WR18-6	

Customary tenure relations

A drive on the outskirts of Waterriver

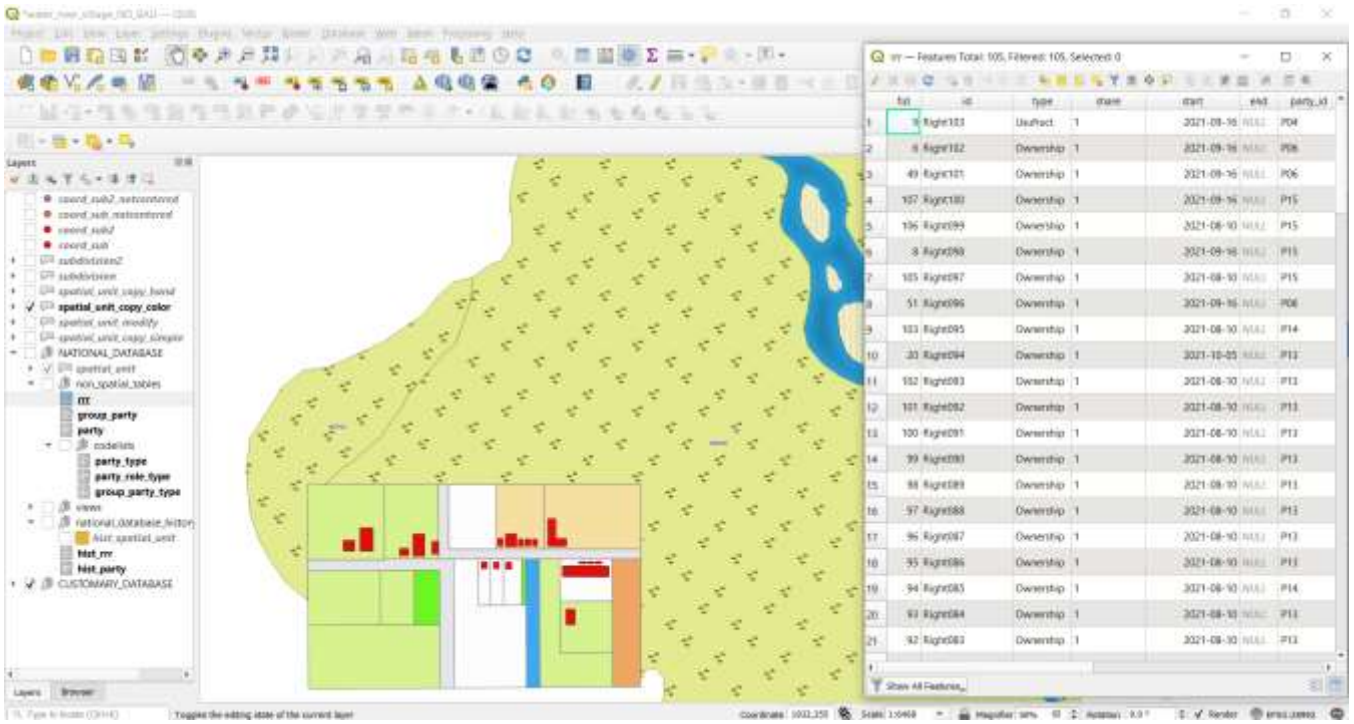
Show how to model more complex land tenure domains


WG04
WG03B
WG02
WG03A
WG01A
WG01B



	r_id	la_right_type	begin_lifespan	end_lifespan
1	Right-R15	Usufructuary	2022-09-01	–
2	Right-R16A	Rental	2022-rainy-season-start	2022-rainy-season-end
3	Right-R16B	Usufructuary	–	–

primaryRight(FK)	dependentRight (FK)
Right-R15	Right-R16A
Right-R16A	Right-R16B



Reinforcing learning

Exercises supported by a comprehensive dataset with a QGIS setup