



UNGEONOW 2024
首届联合国地信周



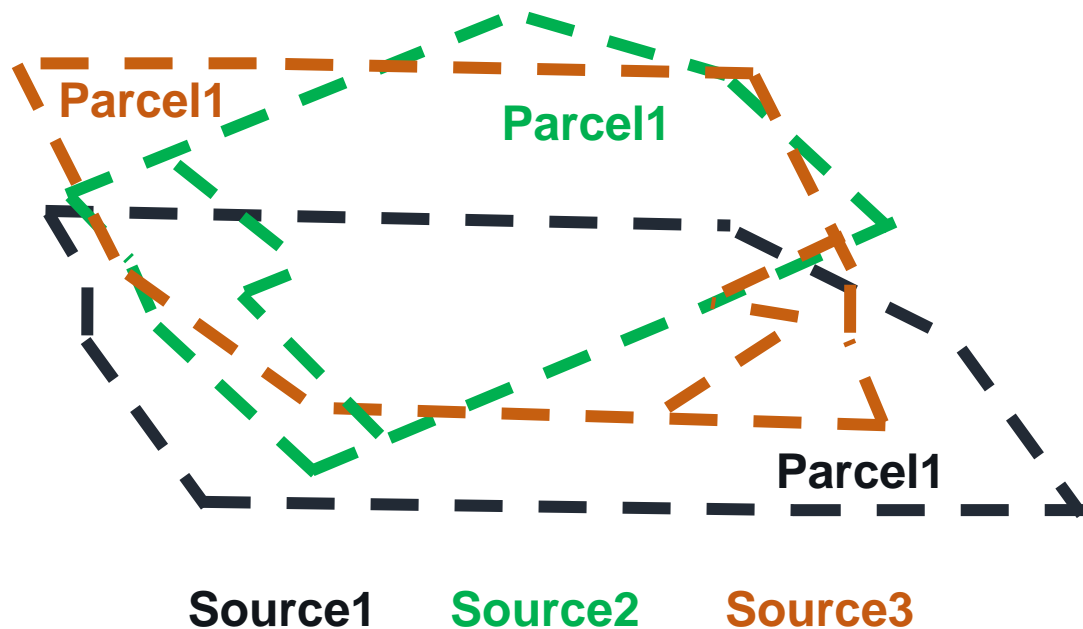
Brazil Towards a Multipurpose Rural Cadastre

Thiago Marra

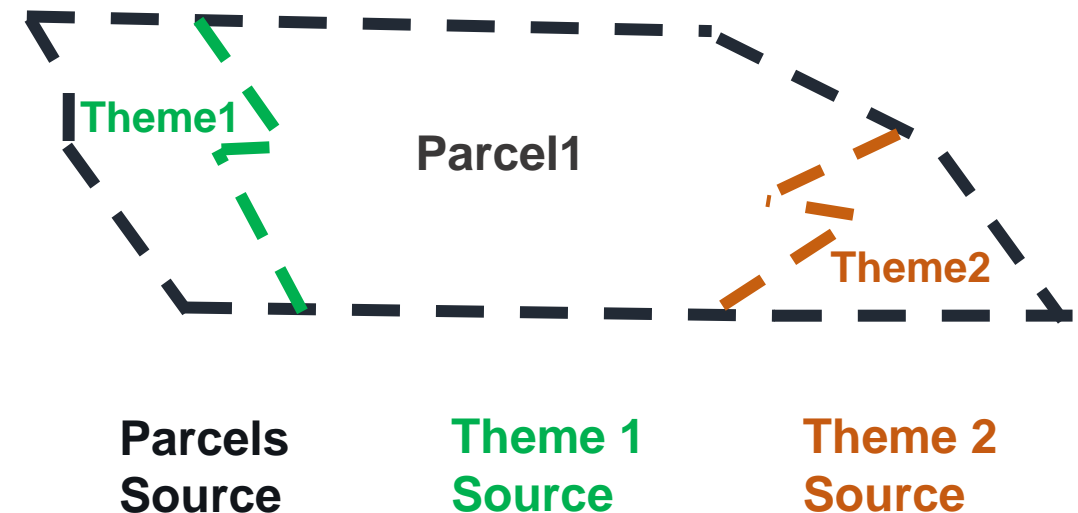
**National Institute of Colonization and Agrarian Reform - INCRA
Ministry of Agrarian Development - MDA
Brazil**

- Brazilian Land Administration is huge but fragmented
 - Urban Cadastres are taken care by municipalities (~5,570)
 - Rural Cadastre is Federal
 - Federal agencies have a strong "silo administration tradition"

As is



As it should be

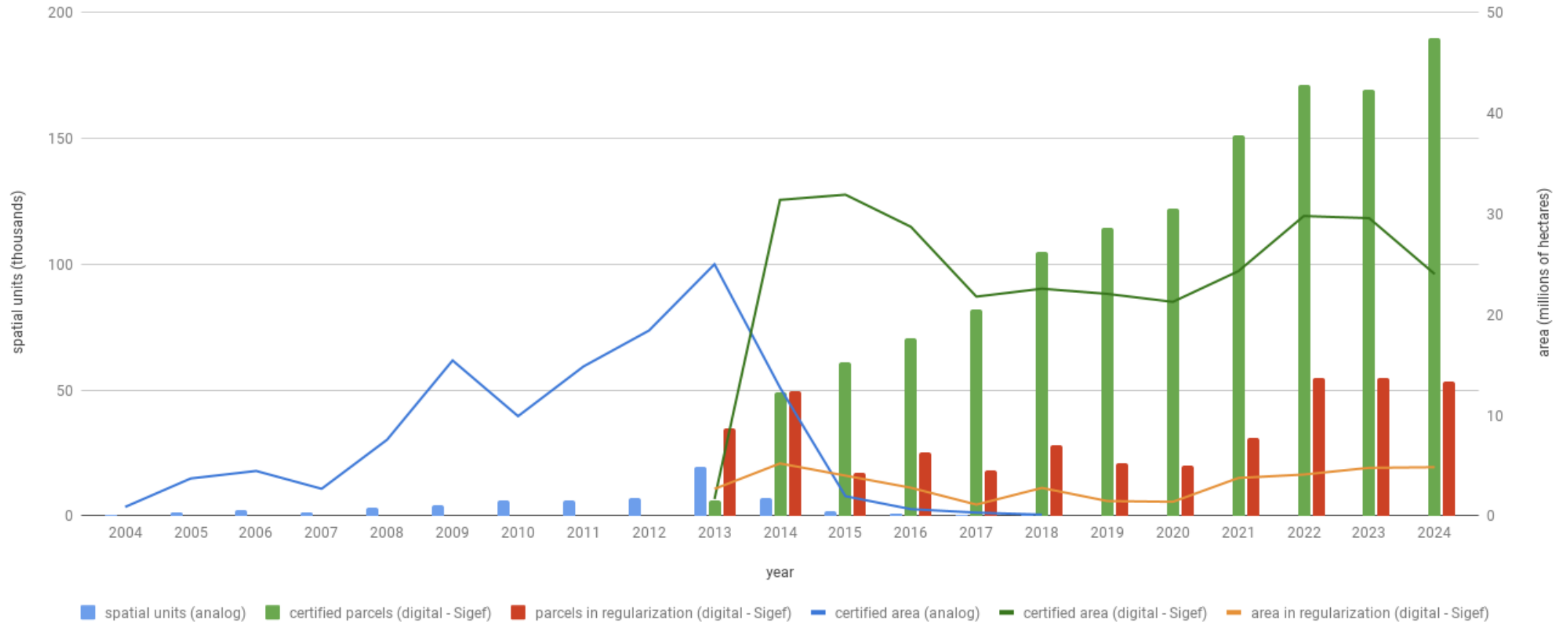




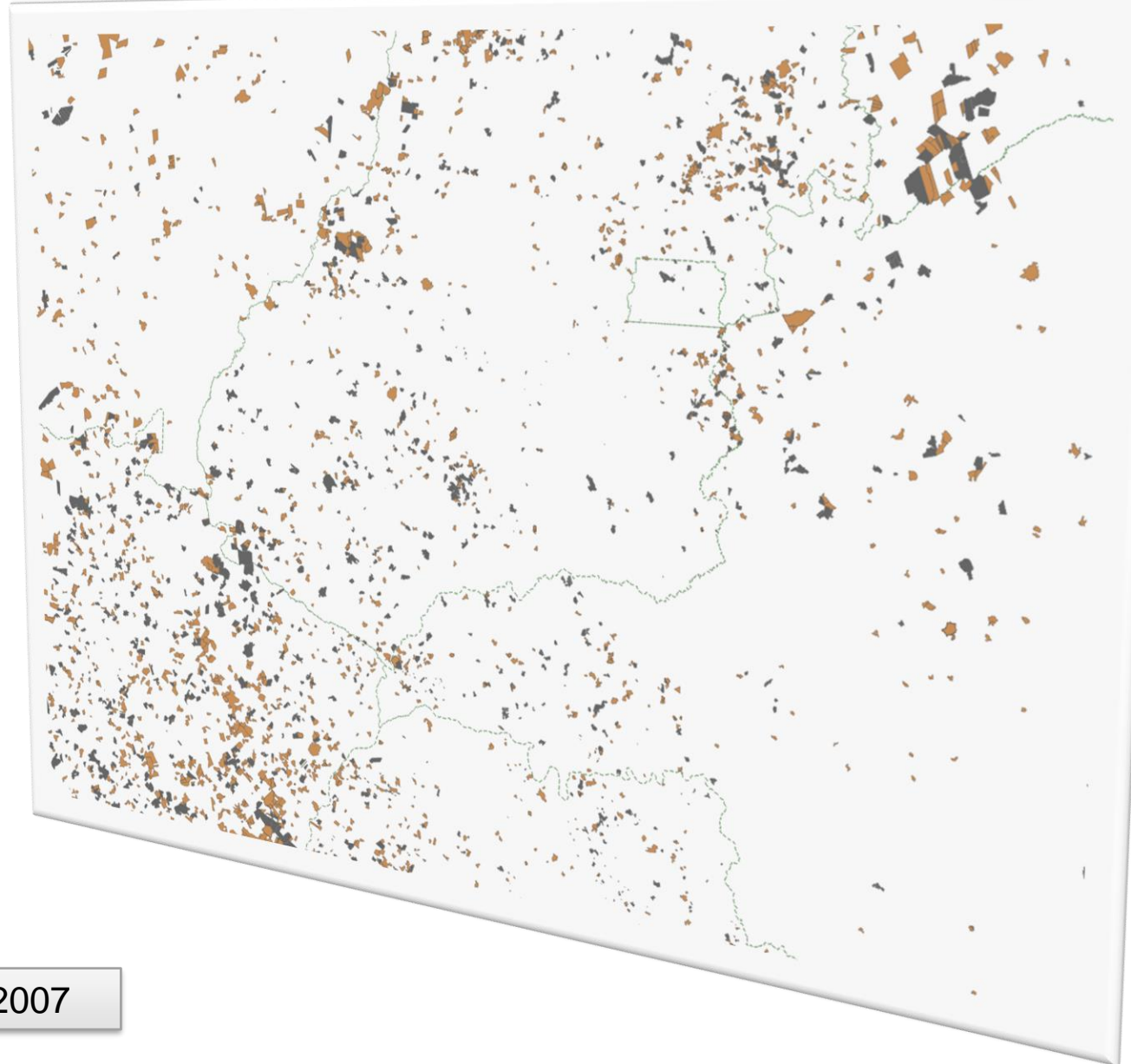
- The Rural "Geospatial Cadastre" is relatively new: by Law in 2001
 - The coverage is now around 1.6 million parcels, above 400 million hectares
 - Growing fast, but still a long way ahead: ~850 million
- The National SDI (INDE) is from 2008
 - Important Observation: it does not cover Cadastre data, like parcels
- Very few official land databases and applications interoperate at some level
 - As the basic cadastral reference was absent, other initiatives filled the gap as possible
 - Example: Rural Environmental Cadastre (CAR) has over 7 million parcels crowdsourced

- Spatial Units surveyed since 2004

Active parcels by year of input

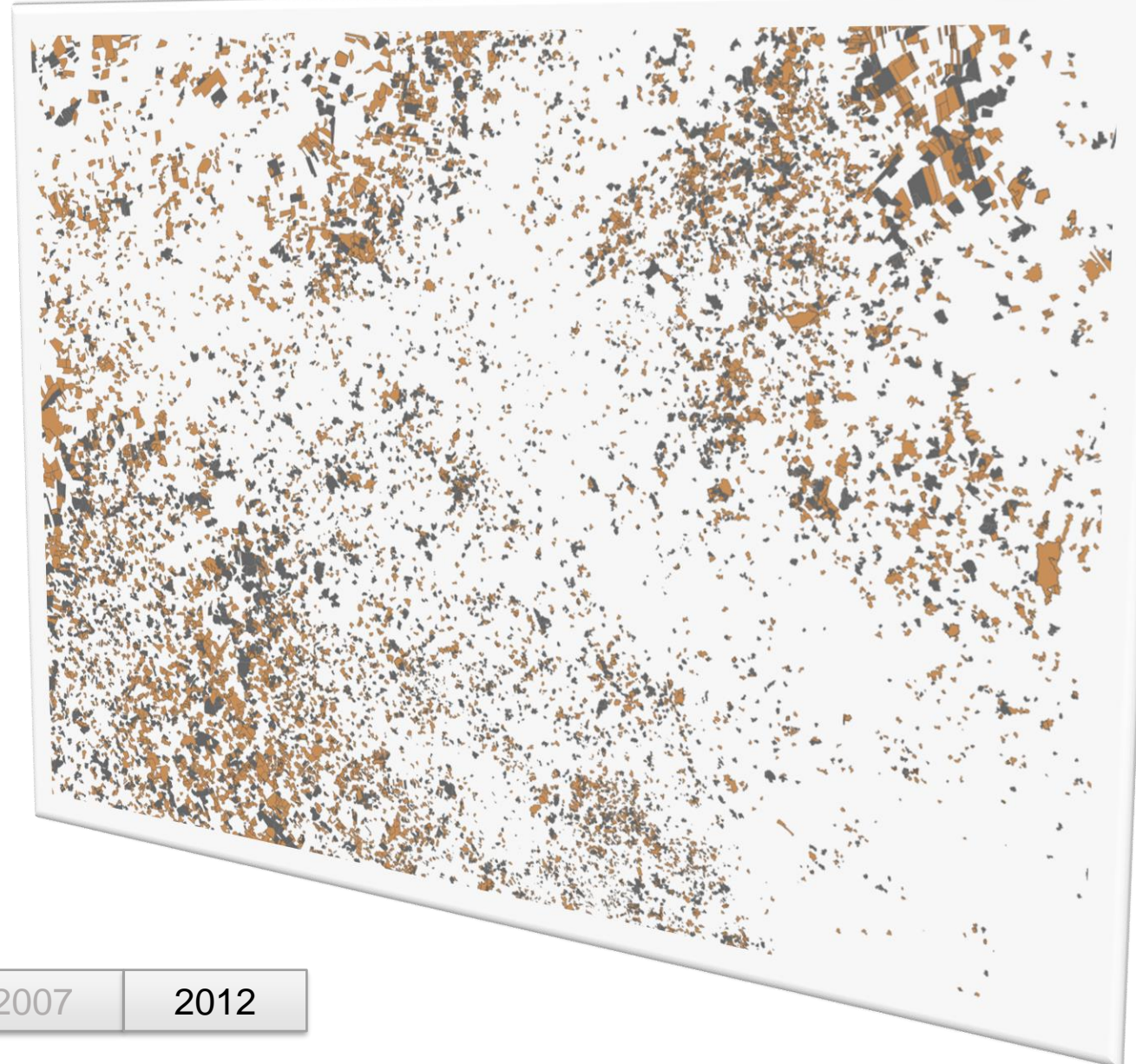


- The sample:
 - About 1.2 million square km
 - High tenure formality region
 - Parcels area above the average
- Today: over 400 million hectares, almost half of the National Territory



2007

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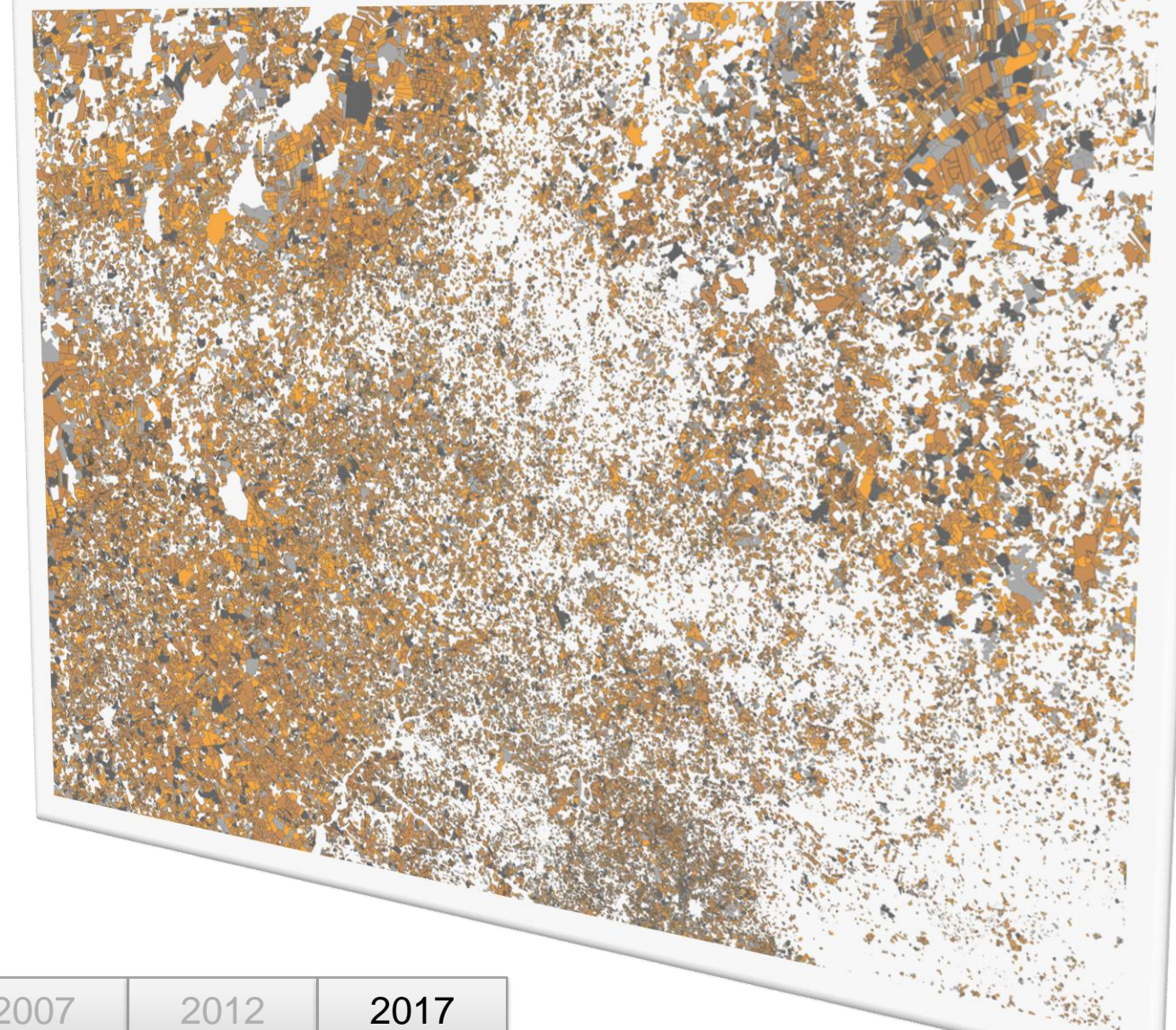


2007

2012

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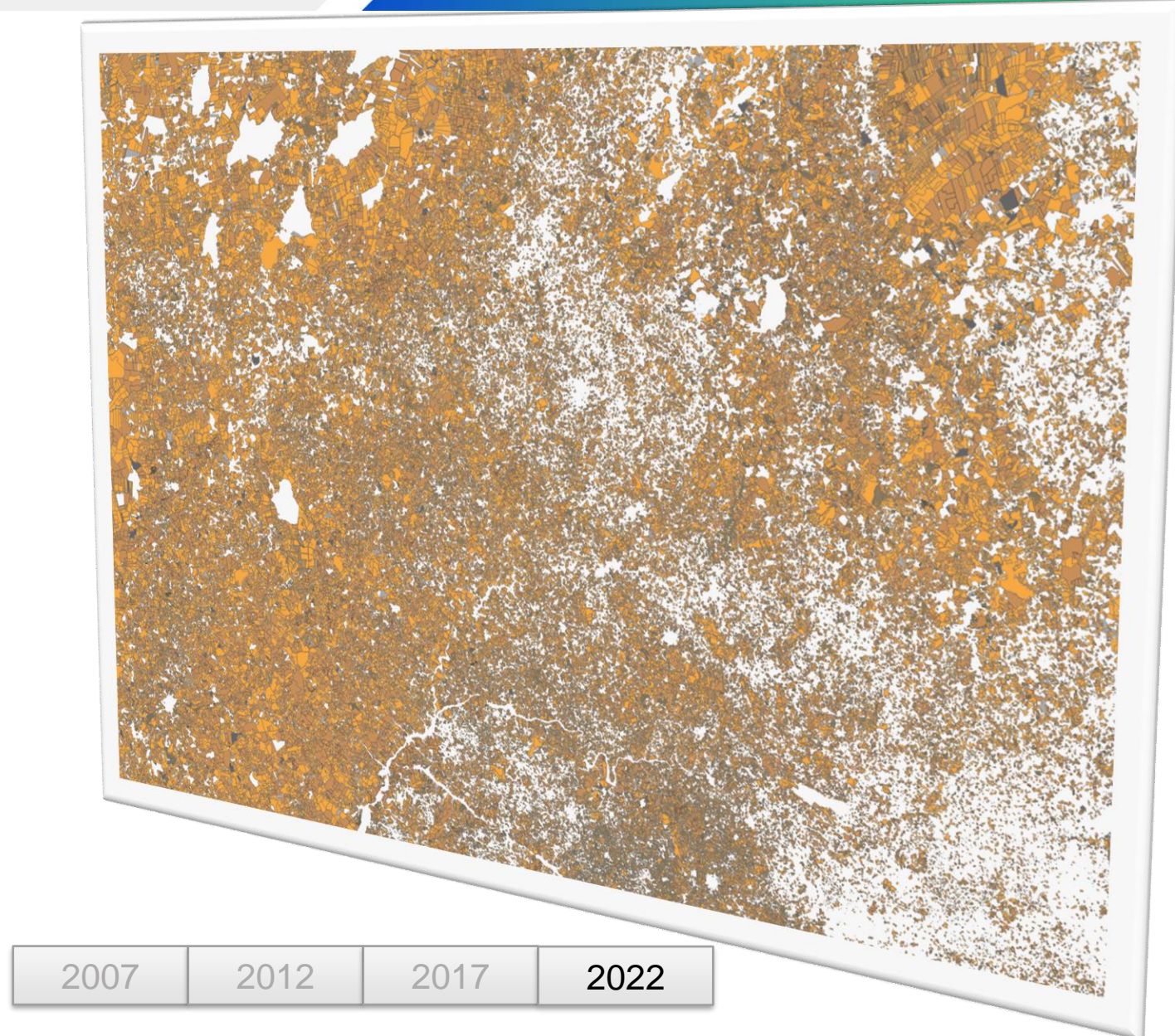
2007

2012

2017

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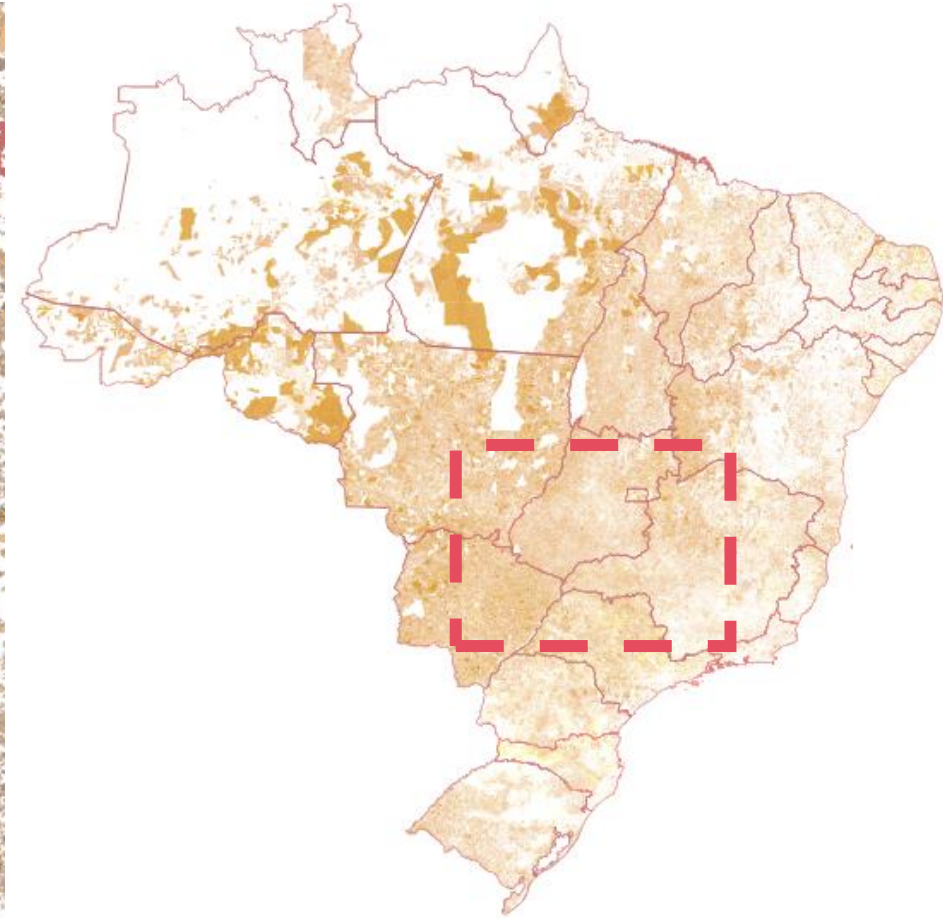
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Our current situation



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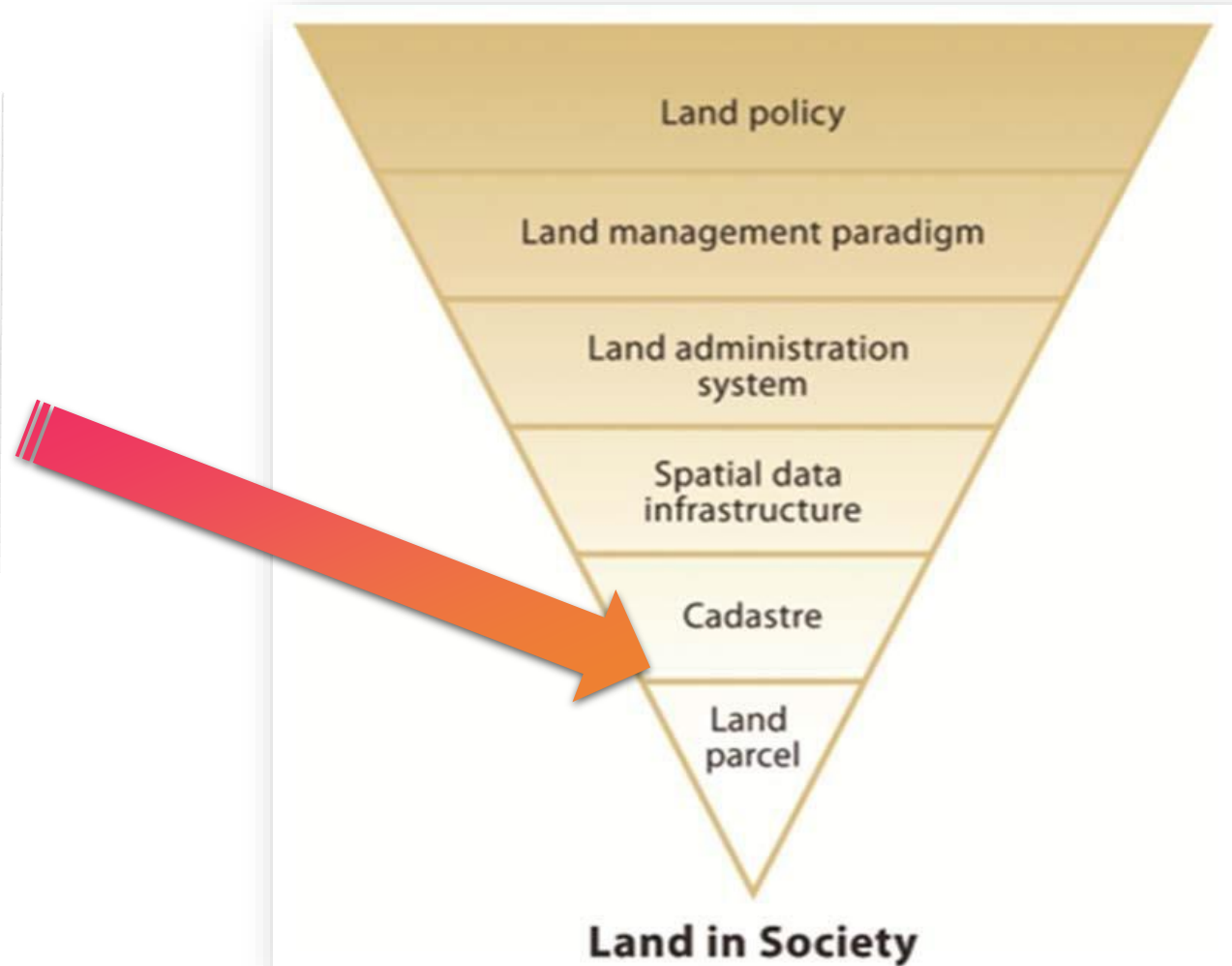
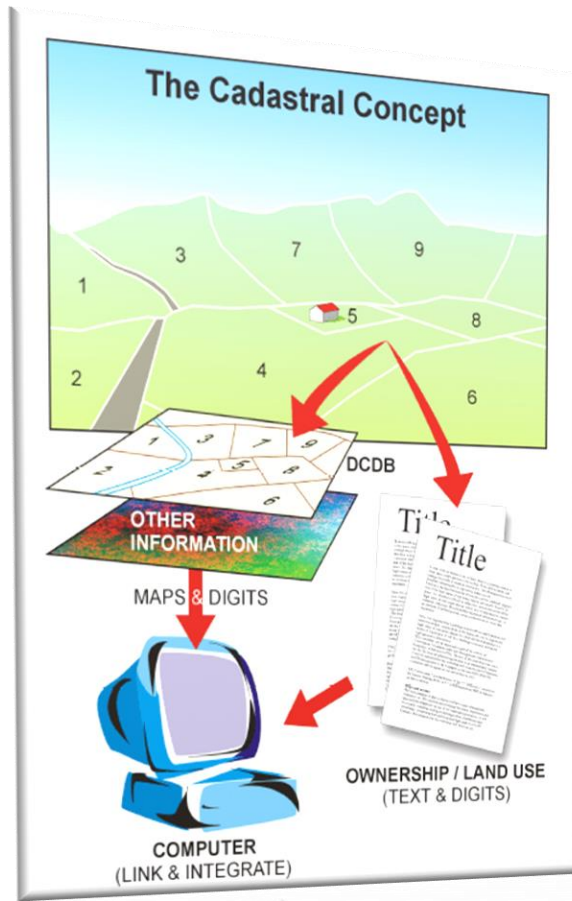
**Gaps... Still a long way to go!
What now?**

2007	2012	2017	2022	Just Yesterday
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What's the idea?

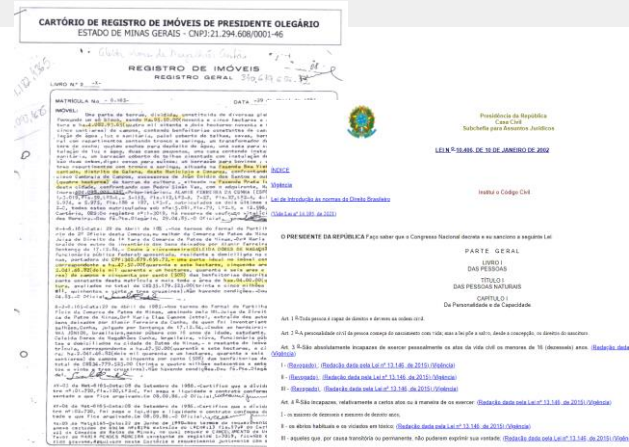


- We need to consolidate an effective Cadastre

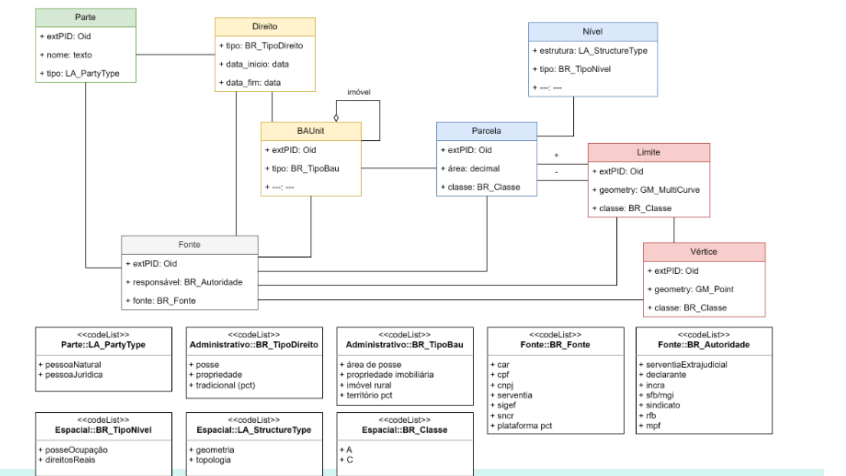
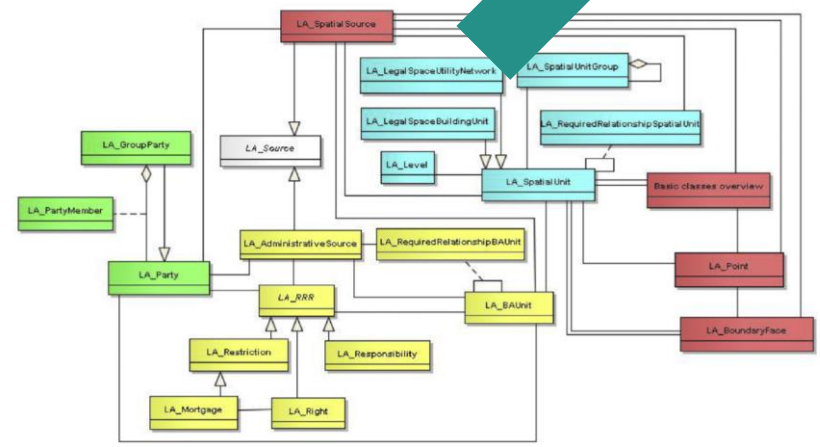
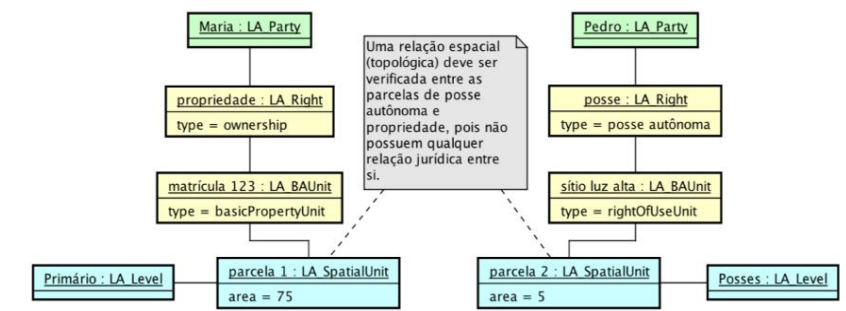
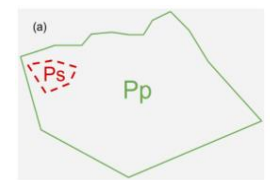




- **Implement the Cadastre concept** starting with a Core Data Management Application
 - **Data modeling** based on Land Administration Domain Model (LADM), ISO19152
 - Representation of **rights that are invisible** today, mostly **informal**
 - Support for a **broad range of Fit For Purpose methods**, grouped in classes (A, B, C...)
 - Mash up authoritative **official with crowdsourcing** data
 - **Parcel data widely available** via APIs, webservices and downloads
 - Interoperability and broad use by Land Administration agencies and society in general
 - **Data migration** from legacy applications
- **Intensive cooperation**
 - Cadastral **data model harmonization** among stakeholders
 - **Adjustments** in current data management applications and **processes**
 - **Fill the Cadastral gap in National SDI**: increment and update data models and standards



2) Brazilian legal framework



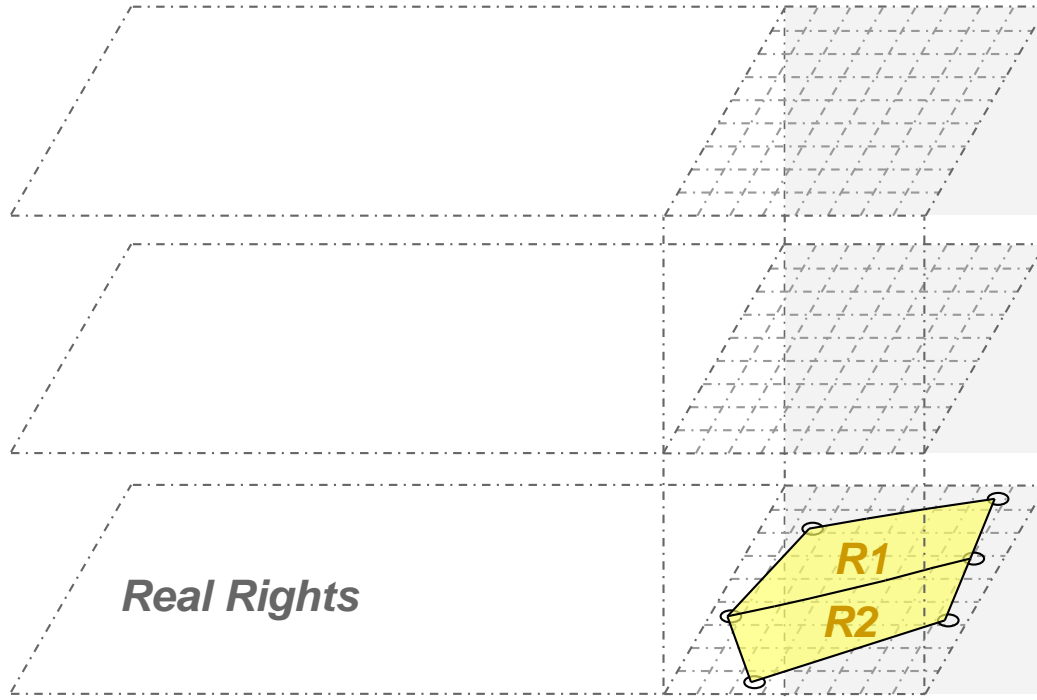
1) Concepts and Standards

3) Modeling and applying LADM_BR



Class	Who	Methods	Applications	Levels
A	Professional with specific creditation for Registry, technical responsibility	Surveying Norm for Land Registration (INCRA)	All, including Registry update	All
B	Professional without credentials for Registry	GNSS, remote sensing, topography...	All except Registry update	All
C	Citizen with familiarity with geospatial tools	Sketch on webmap, smartphone GNSS, Crowdsourcing	Possession rights, areas of interest,	All

Parcel Levels (LA_Level)

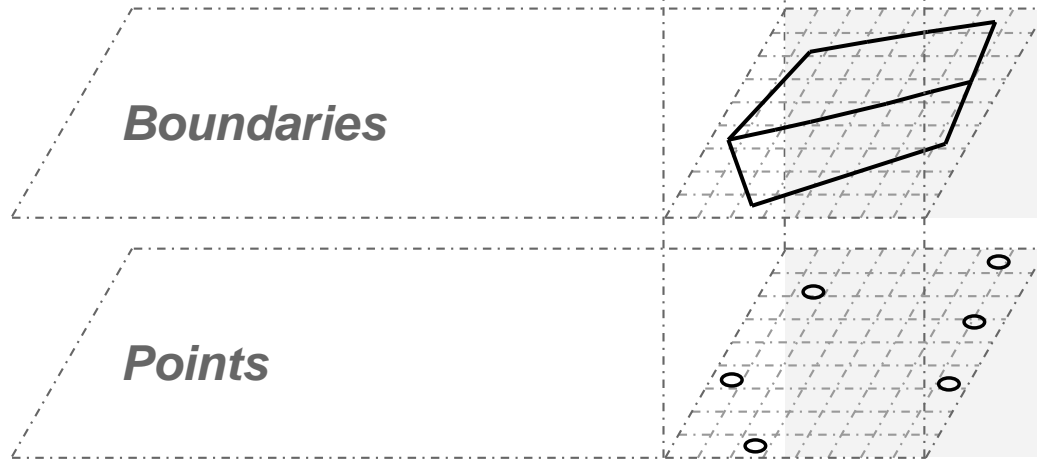


We can use them on Real Rights Parcels Level

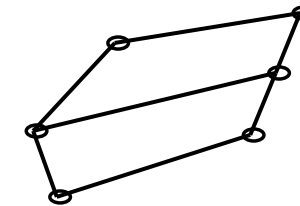
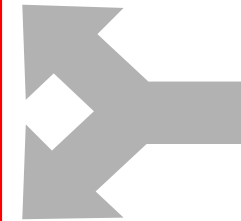
Spatial Components

Classes

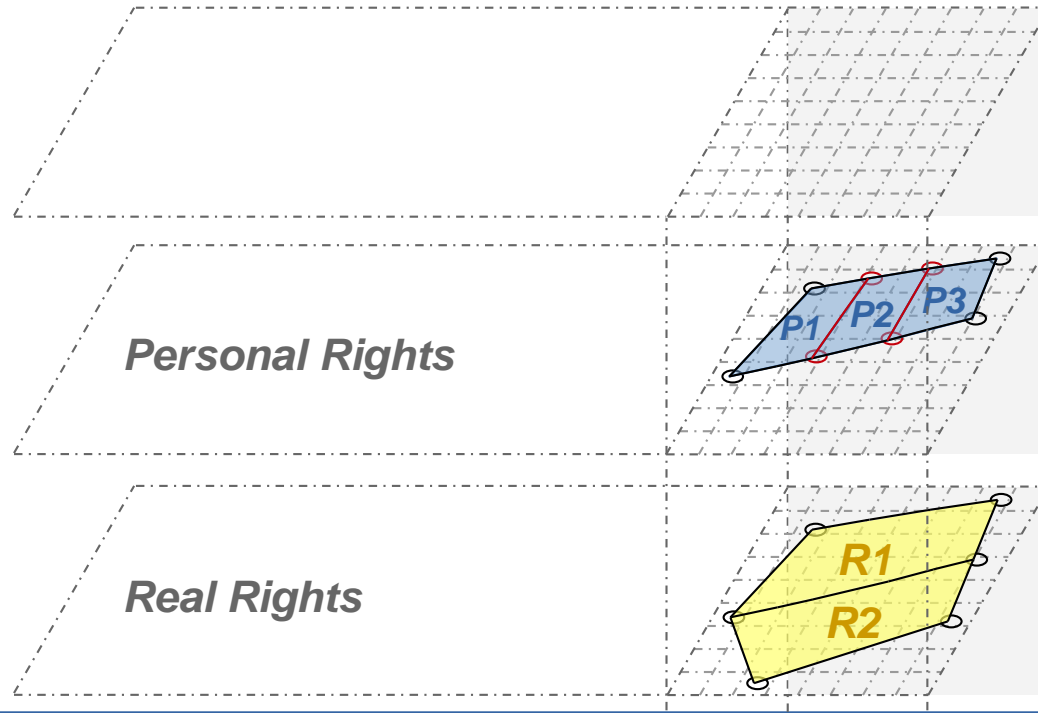
A



Let's take a couple of parcels and represent them using Class A spatial elements



Parcel Levels



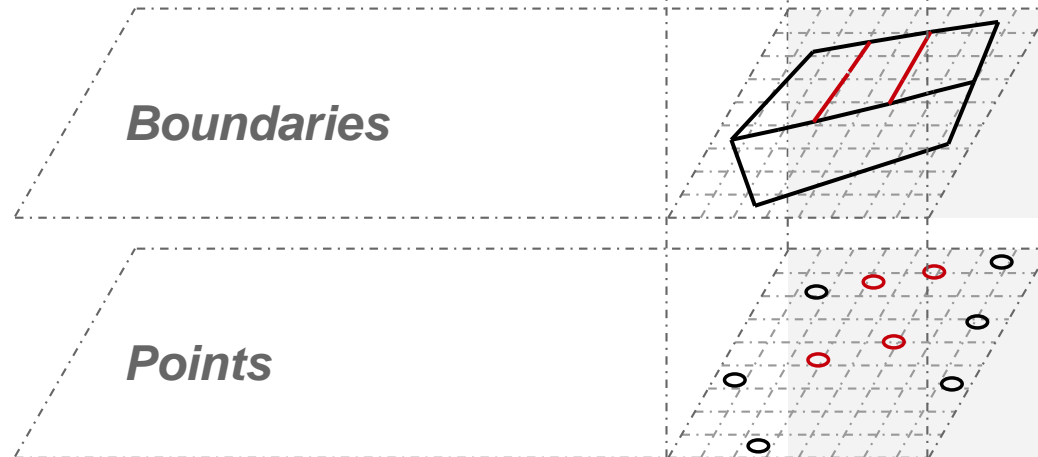
Then we can use them
on Personal Rights
(contracts) Level

Spatial Components

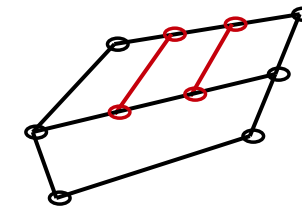
Classes

A

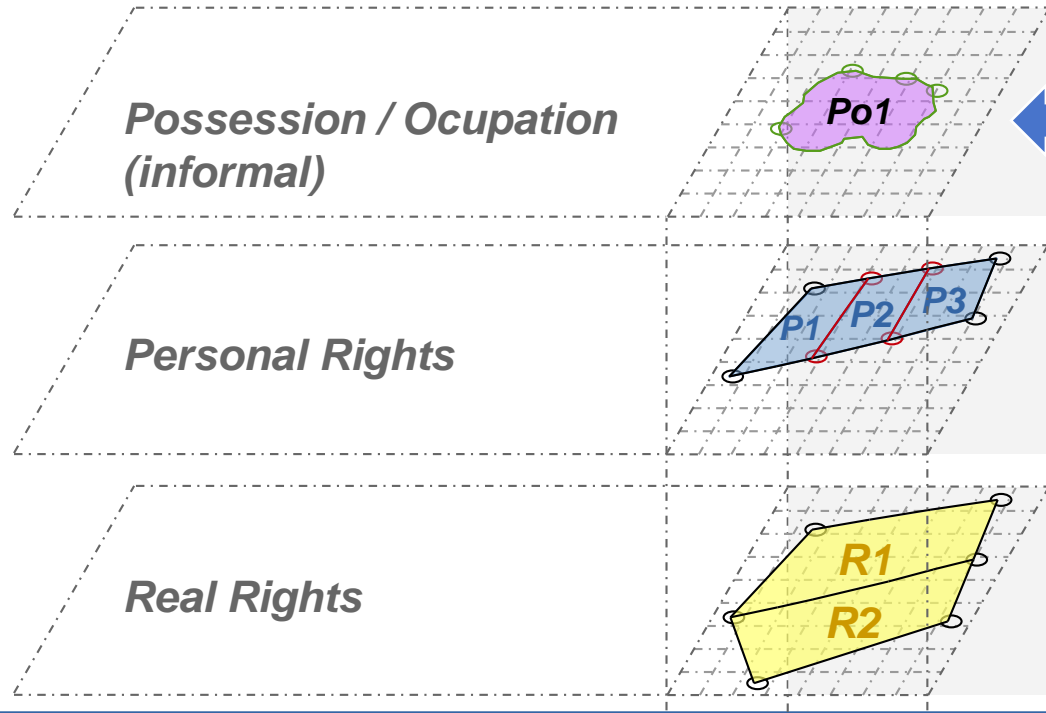
B



Now we add some
boundaries and points
using class B (in red)



Parcel Levels

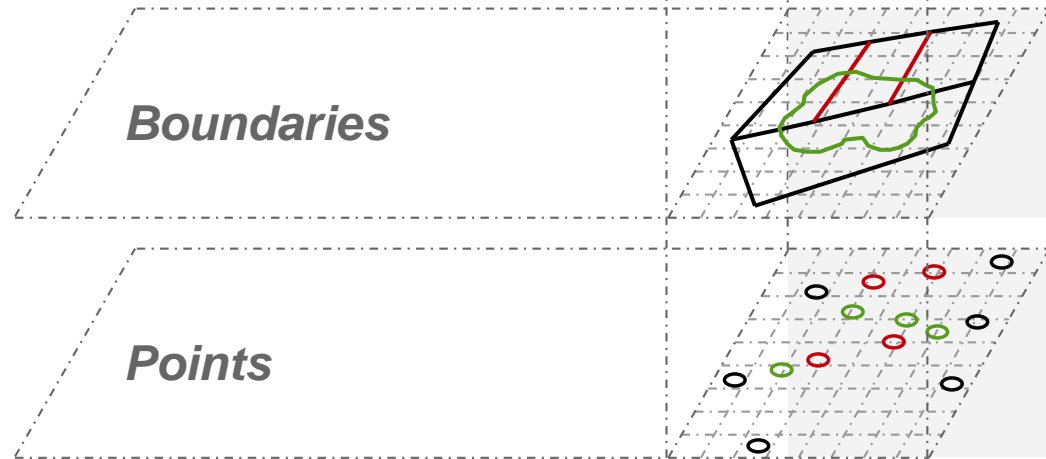


And use them
on Possession Rights
(*de facto*) Level

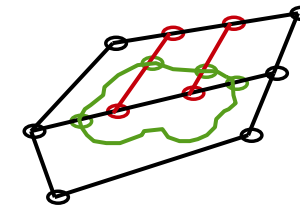
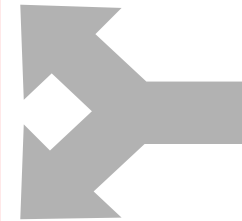
Spatial Components

Classes

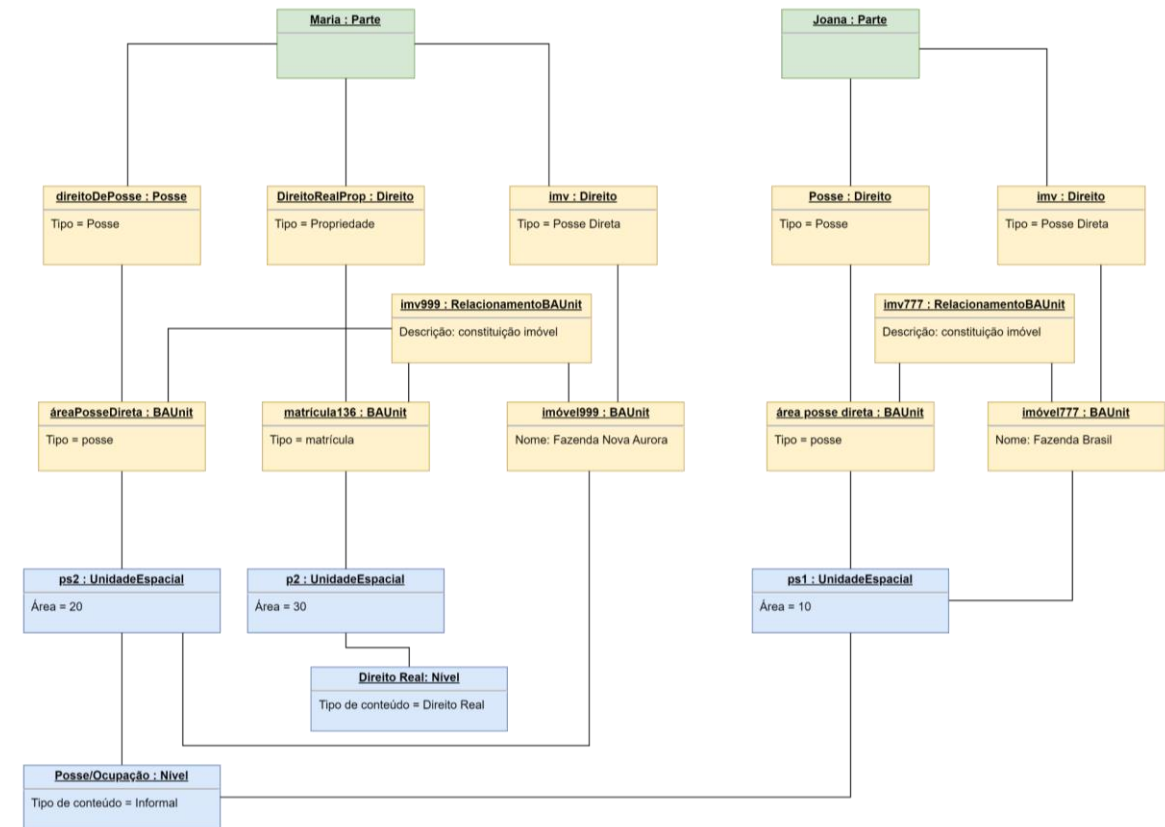
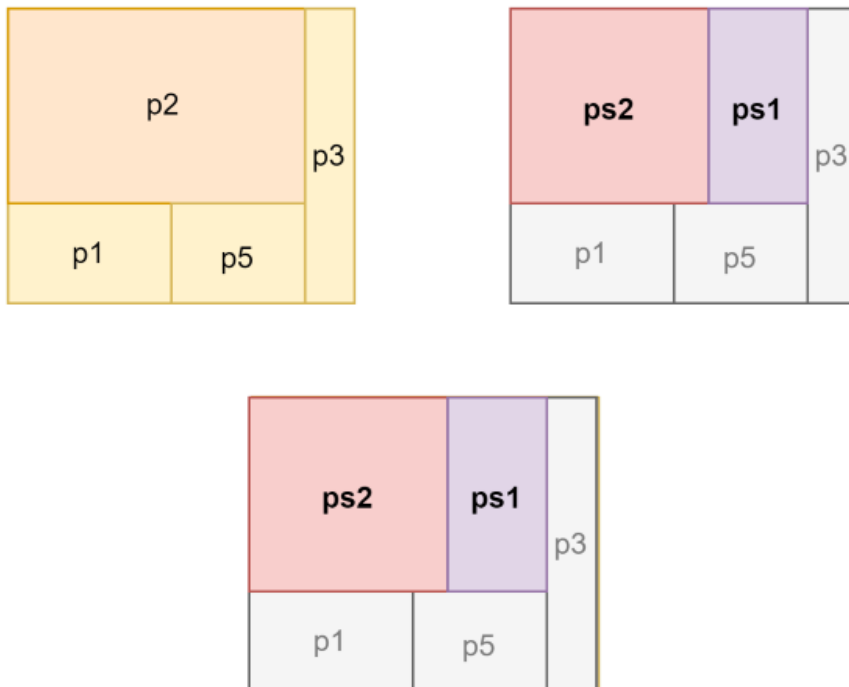
A
B
C



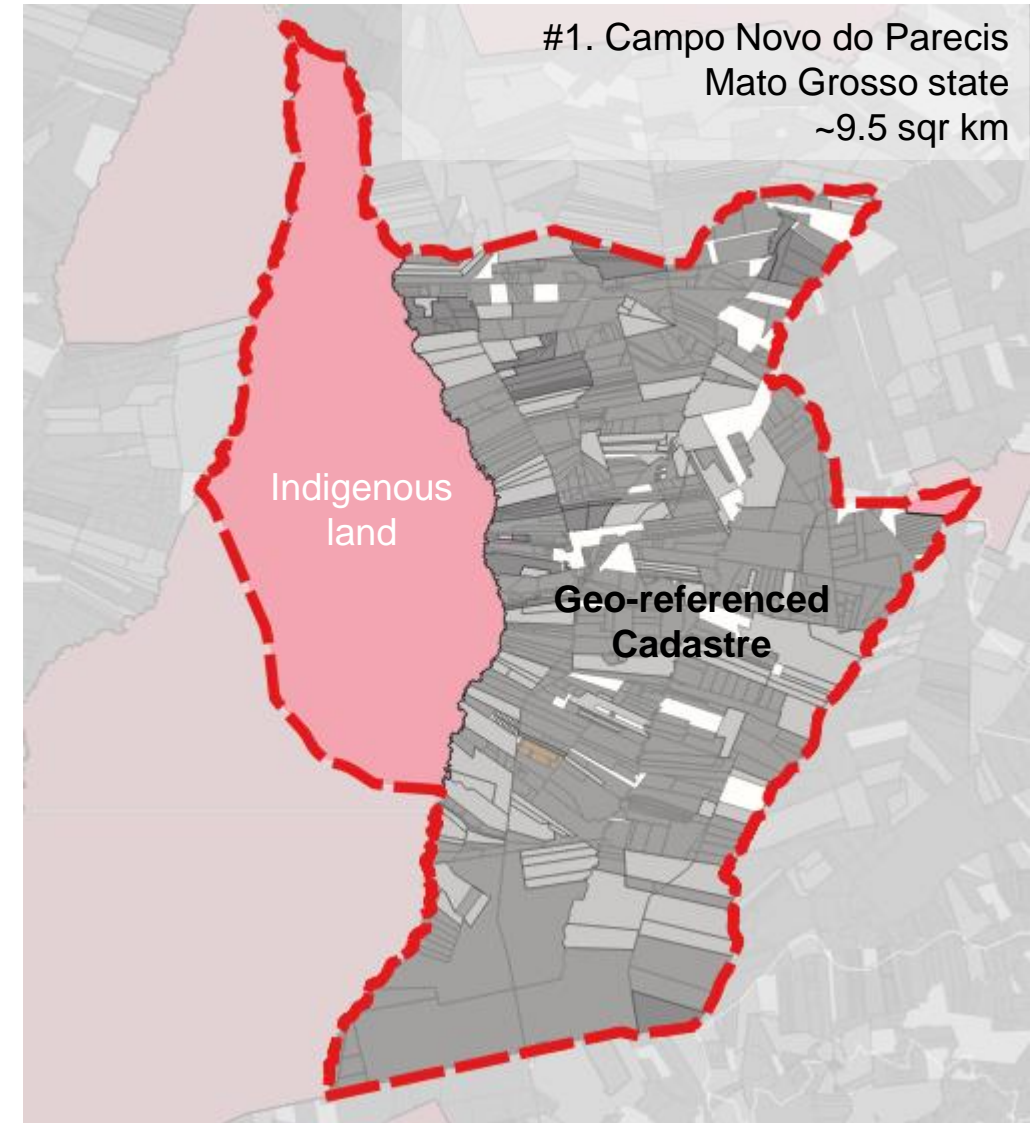
Finally we add some
boundaries and points
using class C (in green)



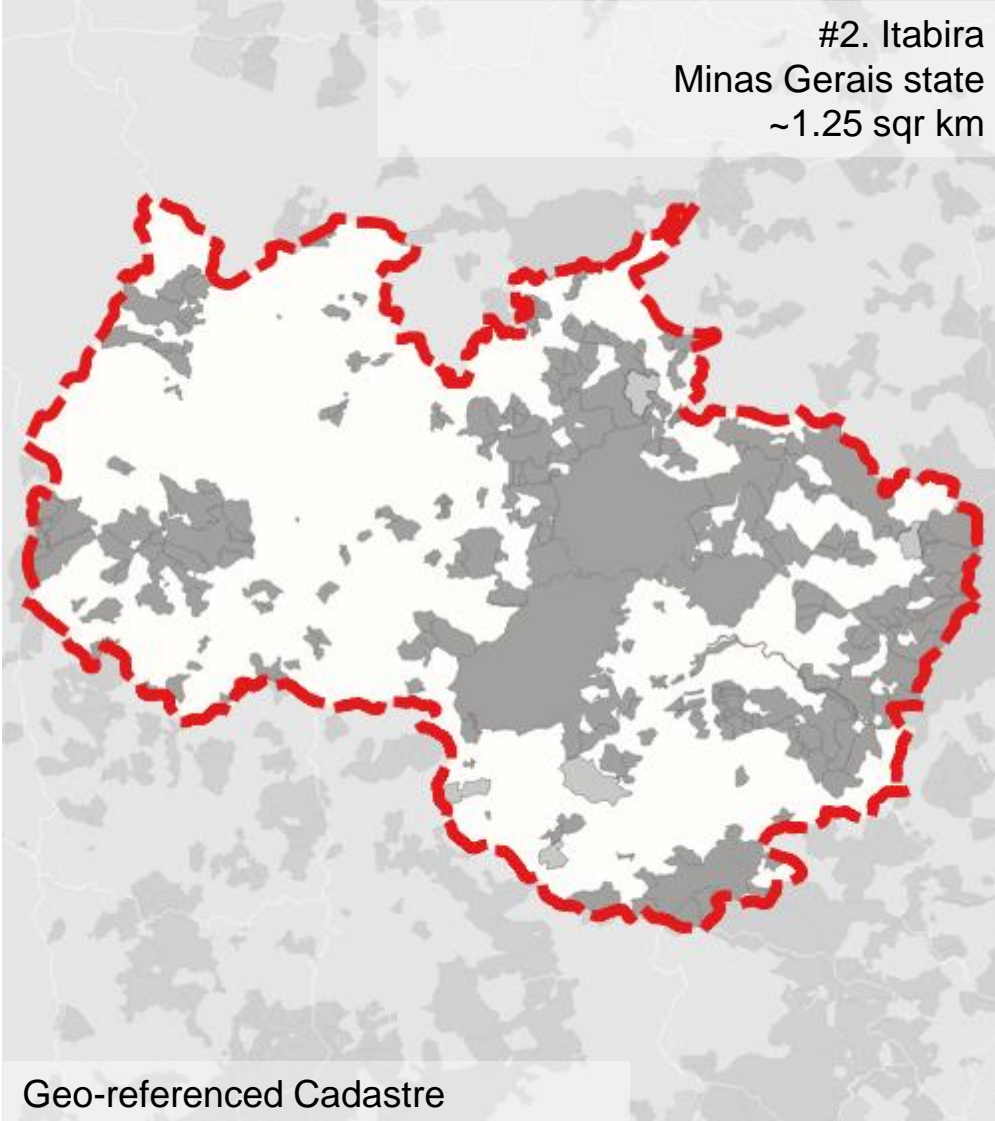
- The Rural Immovable ("Imóvel Rural")
 - Agrarian and Civil Law: different concepts for the same term
 - Agrarian: focused on land use, based on Roman Law possession right
 - Civil: property, object of real right



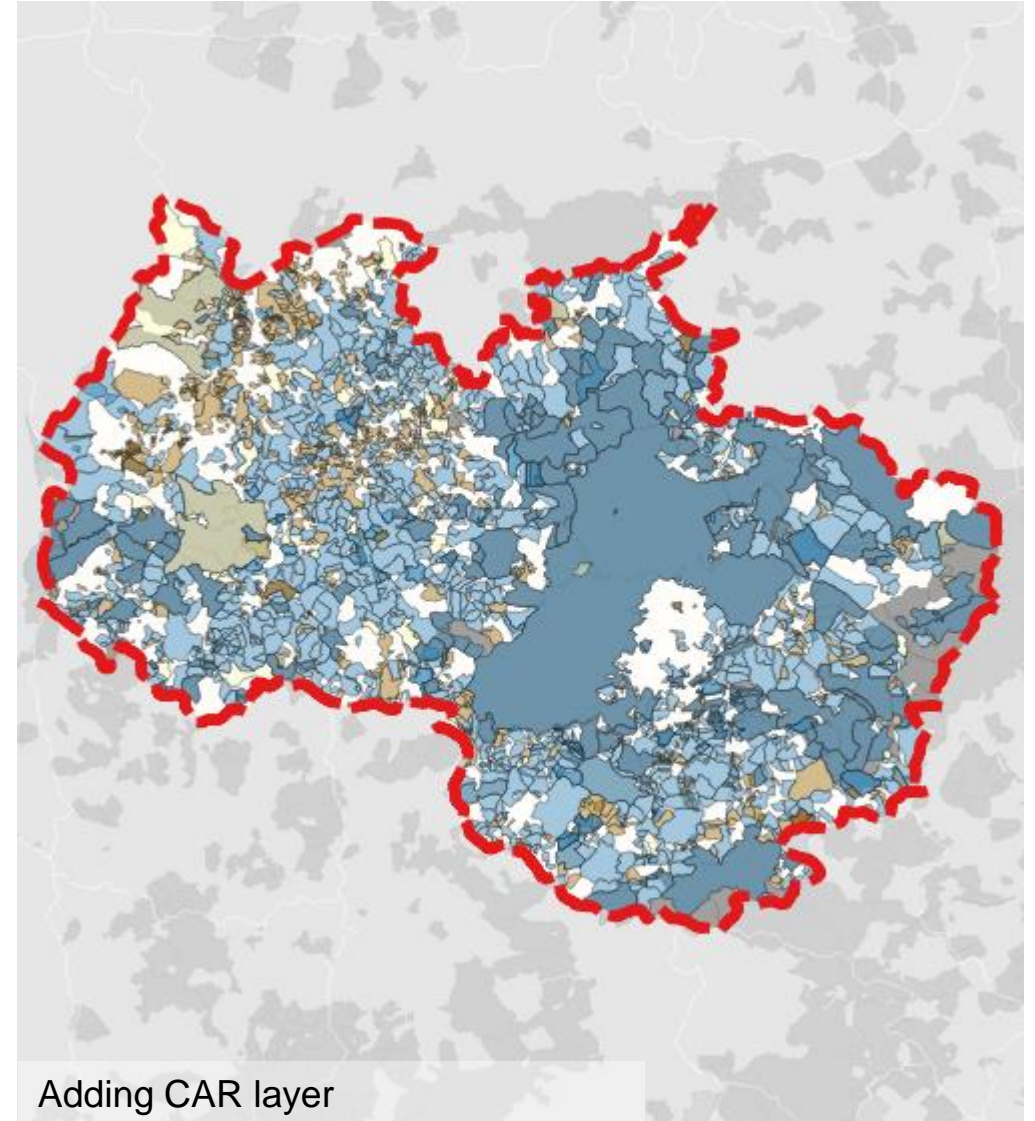
- About to begin the development of a functional prototype
 - Data subset is prepared
 - four municipalities
 - three regions
 - Data from 3 cadastral sources:
 - Sigef, the Georeferenced Cadastre, INCRA (the one that couples with Registry)
 - SNCR, about rural immovables, INCRA
 - CAR, the Environmental Rural Cadastre, Ministry of Management



#2. Itabira
Minas Gerais state
~1.25 sqr km

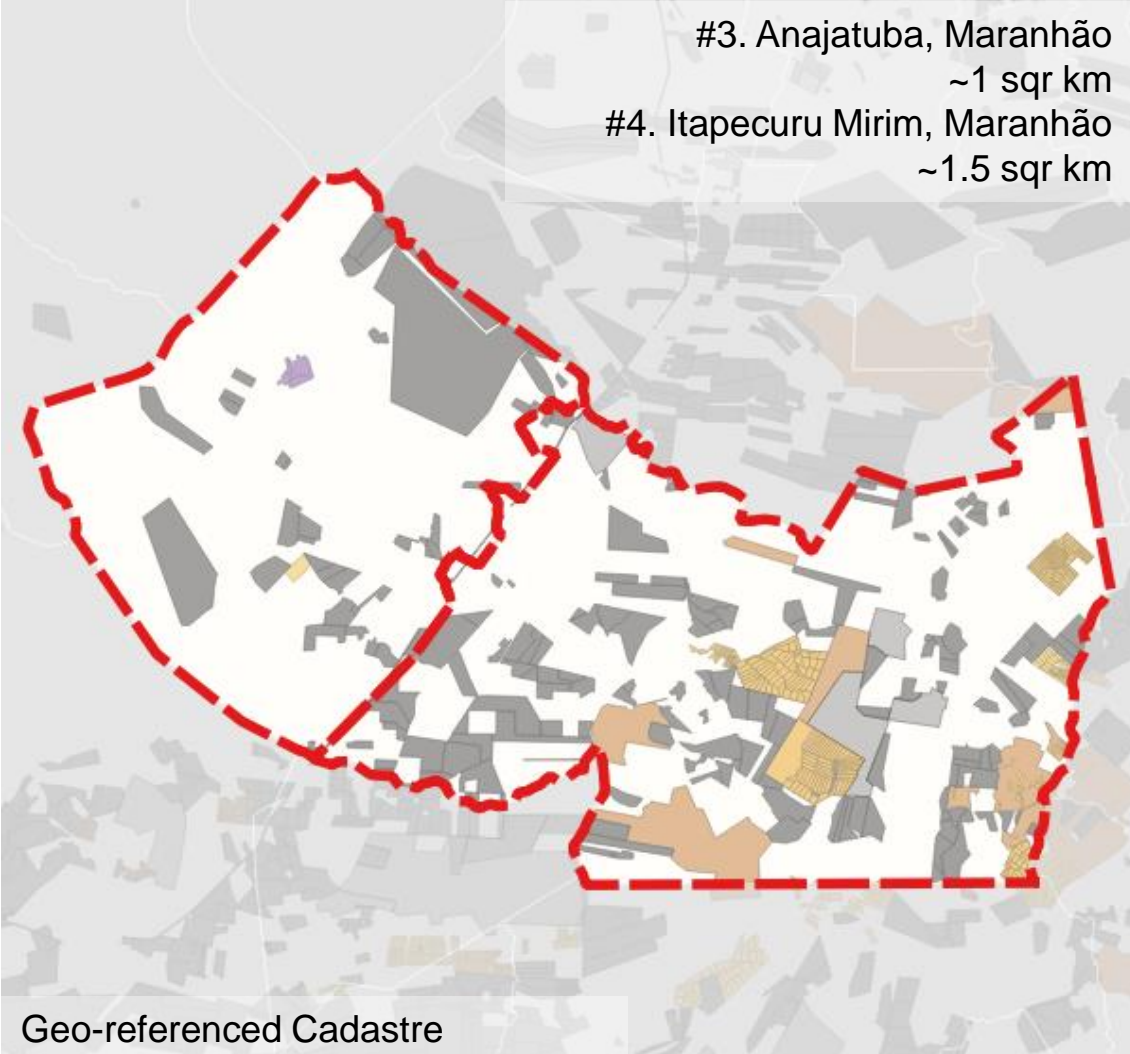


Geo-referenced Cadastre

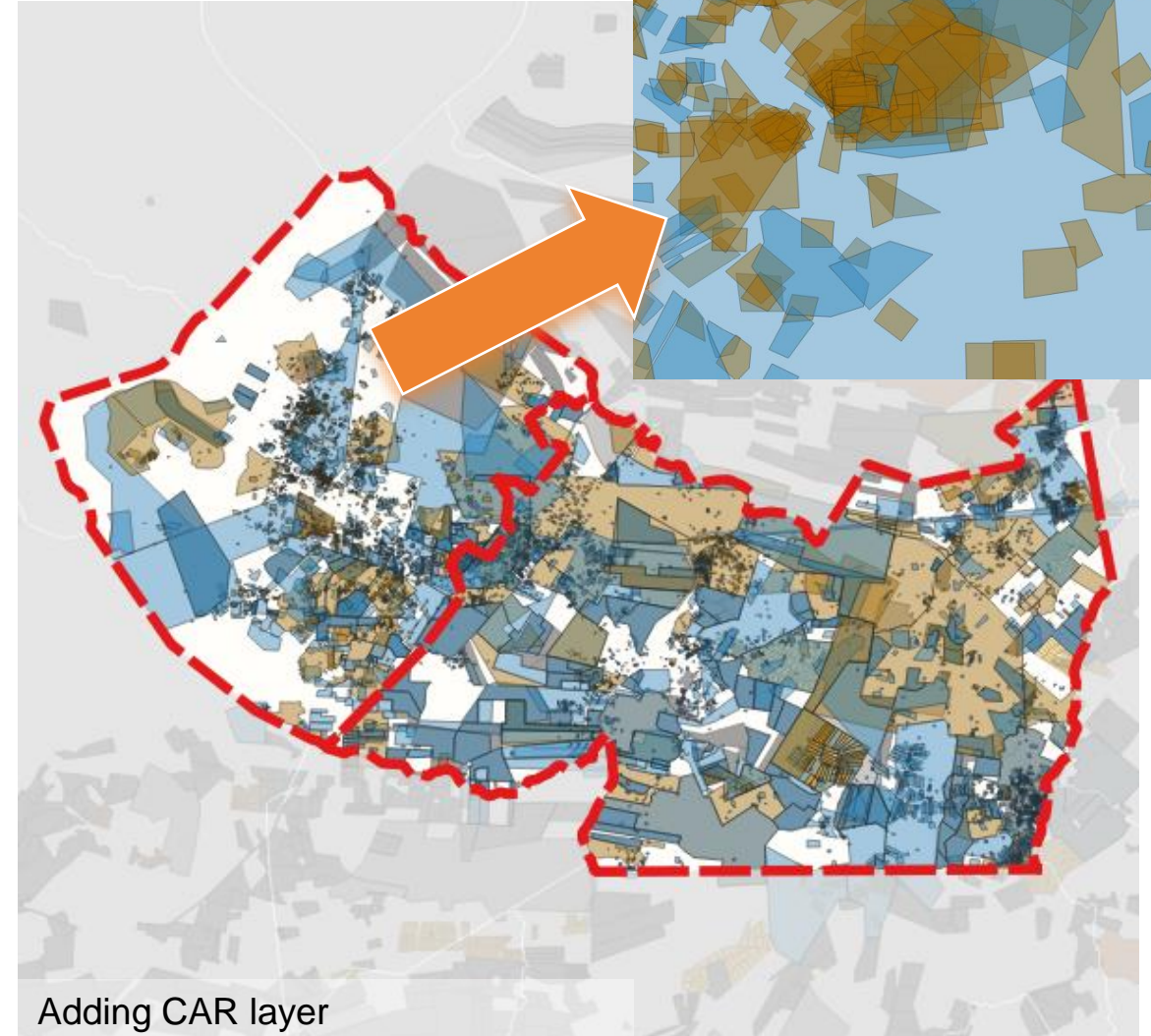


Adding CAR layer

#3. Anajatuba, Maranhão
~1 sqr km
#4. Itapecuru Mirim, Maranhão
~1.5 sqr km



Geo-referenced Cadastre



Adding CAR layer

- Innovation... for the Brazilian context
 - Most likely: do the basics well done, a proper cadastre
 - More coverage and more rights of the spectrum: more people linked to land
 - Use Representation Quality Classes
 - Make formal and informal tenure visible, supported by LADM
 - Consolidate a multipurpose Cadastre
 - Interoperability = efficiency!
 - Everyone using the same data
- Otherwise:
 - How can we get an effective Land Administration without a reliable link between land (parcels) and people?
 - How can we manage our resources towards the SDGs?





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THANK YOU

Special thanks to:

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GeoNow organization: Ms. Zhiling and Ms. Pan