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FIG Working Week 2012

## 3D Cadastre in the Federal Countries of Latin America

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Rome, Italy  
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## Latin America



- 20 countries
- 15% of the Earth's surface.
- 400 regional governments
- 16,000 local governments

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**EL CATASTRO TERRITORIAL EN  
LOS PAISES LATINOAMERICANOS**  
DIEGO ALFONSO ERBA



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## Latin America

### CADASTRAL ORGANIZATION IN THE LATIN AMERICAN FEDERAL COUNTRIES

Before the conquest, territorial cadastres were organized by the Mayans and Incas.

Geometric-economic-legal cadastral models imported from Spain and Portugal ⇒ most Latin American countries.

In recent years ⇒ the multipurpose cadastral model.

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## Latin America



**Federal countries**

- Argentina, Brazil, Mexico and Venezuela
- 65% of the region's population and a similar percentage of surface area of Latin America

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## Latin America

### CADASTRAL ORGANIZATION IN THE LATIN AMERICAN FEDERAL COUNTRIES

<b>ARGENTINA</b>	
<b>Nacional</b>	Federal Council <sup>1</sup>
<b>Regional</b>	Urban and Rural Cadastre
<b>Local</b>	Urban Cadastre

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## Latin America

### PERSPECTIVES OF A 3D CADASTRE IN LATIN AMERICA

Is it realistic to develop spatial concepts for parcels and legal land objects; and to propose a 3D cadastral model in the federal countries of Latin America?

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## Latin America

### National discussions

**VI Congreso Internacional de Catastro**  
Monterrey, México, 18 a 20 de abril de 2012

**XI Congreso Nacional y VII Latinoamericano de Agrimensura**  
Carlos Paz, Argentina, 2 a 5 de mayo de 2012

**10º Congresso de Cadastro Técnico Multifinalitário e Gestão Territorial**  
Florianopolis, Brasil, 7 a 11 de outubro de 2012

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## Agenda

- Understanding Latin America cities
- Identifying main existing legal land objects
- Drawing a perspective for a 3D Cadastre vision.

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## CITIES IN LATIN AMERICA



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### CITIES IN LATIN AMERICA



Martim Smolka

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### CITIES IN LATIN AMERICA

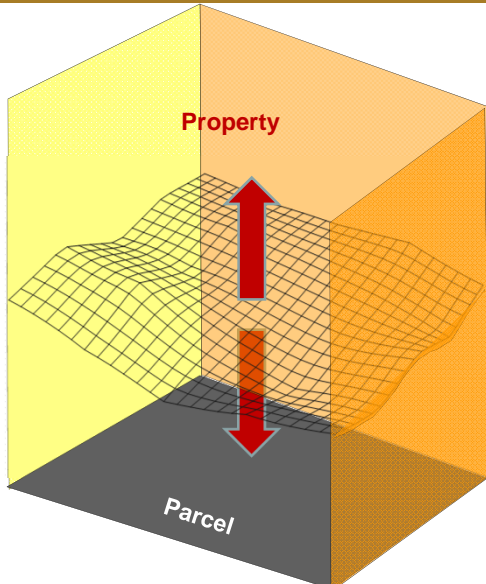


Martim Smolka

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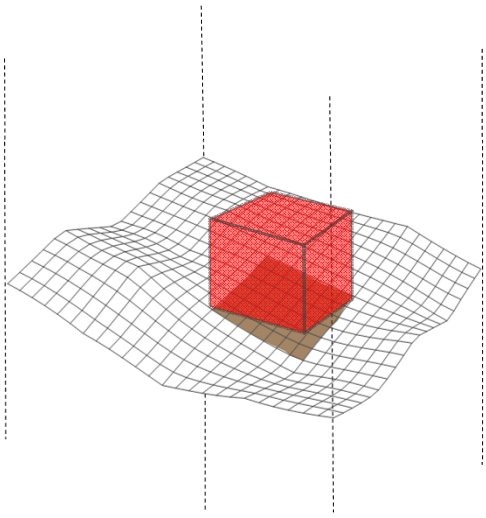
Property

Parcel

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This slide features a 3D bar chart with four bars. The first bar on the left is the tallest, colored brown with a yellow section at its base. The second bar is shorter and solid brown. The third bar is the shortest, also solid brown. The fourth bar is taller than the second but shorter than the first, solid brown. The bars are set on a light brown base with shadows cast to the right.

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This slide features a 3D bar chart with three bars. The first bar on the left is medium height, colored red. The second bar is the tallest, colored red. The third bar is the shortest, colored red. The bars are set on a light brown base with shadows cast to the right.



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## Legal Land Objects in the federal countries of Latin America

The construction of the 3D LLO concept can be based on the 2D definition.

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## Legal Land Objects in the federal countries of Latin America

### Environmental spaces and surroundings

- Right to a forested area: National Law No. 25.509/2001, and Conservation of glaciers and the peri-glacial environment: National Law No. 26.639/2008.
- Forestry Code (Act No. 4771/1965)
- Environmental Equilibrium and Environmental Protection and Sustainable Forest Development.
- Forest and Forestry Management Law (Decree 6070/2008)

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**Legal Land Objects in the federal  
countries of Latin America**  
**Water resources and their surroundings**

- Civil Code
- Water Code
- National Law on Water
- Waterways Law



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**Legal Land Objects in the federal  
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**Underground spaces and concessions**

- Mining Code, established by Decree No. 456 of 1997.
- Federal Constitution
- Mining Law.
- Mining Law (Decree 295/1999)

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**Legal Land Objects in the federal  
countries of Latin America**  
**Aerial space and use restrictions**



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**Legal Land Objects in the federal  
countries of Latin America**  
**Aerial space and use restrictions**

Aeronautic Code, National Law No. 17.285 of 1967.  
Air Code, Law 7,565 of 1986.  
Civil Aviation Law.  
Civil Aeronautic Law.

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### Legal Land Objects in the federal countries of Latin America

#### Aerial space and use restrictions



The diagram shows a top-down view of a land parcel with several numbered sections: 7852, 7452, 6947, 6948, 5122, 106, 7593, 3894, 4392, 1680, and 6135. A runway is located within the 106 section, and an aircraft is shown in flight above it. A green circle highlights the runway area, and a blue shaded area extends from the runway, representing a restricted zone.

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### Legal Land Objects in the federal countries of Latin America

#### Aerial space and use restrictions



The diagram shows a 3D perspective view of the same land parcel and restricted zone. The land is colored yellow, and the restricted zone is shown as a green and blue shaded area. An aircraft is shown in flight above the restricted zone.

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## Final Considerations

### Perspectives for a 3D Cadastre in federal countries

**In favor**

- Appropriated (or adaptable) law framework
- National SDI in construction and local initiatives working well
- Professionals well prepared
- Geodetic networks widely spread
- New topic of discussion: “legal coordinates”

**Against**

- Cadastres and registries are still very “2D oriented”
- Lack of standards between utilities companies and cadastres
- Distance between the public institutions that administrate LLO.

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## Conclusions

- measuring in 3D, representing and describing in 2D.
- there is a long way to go before 3D information is integrated as part of urban legislation and property titles.
- Changing the term “area” to “space” would be a first step in giving urban and environmental legislation a 3D connotation.
- It will be more than one concept of 3D property and 3D parcel in LA.

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**Thank you!**



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