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**Cadastral GIS**  
**An example from Bolivia**

**Pretoria**  
**November 7, 2002**  
**Christiaan Lemmen**

*Kadaster*





Foto: Edgar Dueri

*Kadaster*

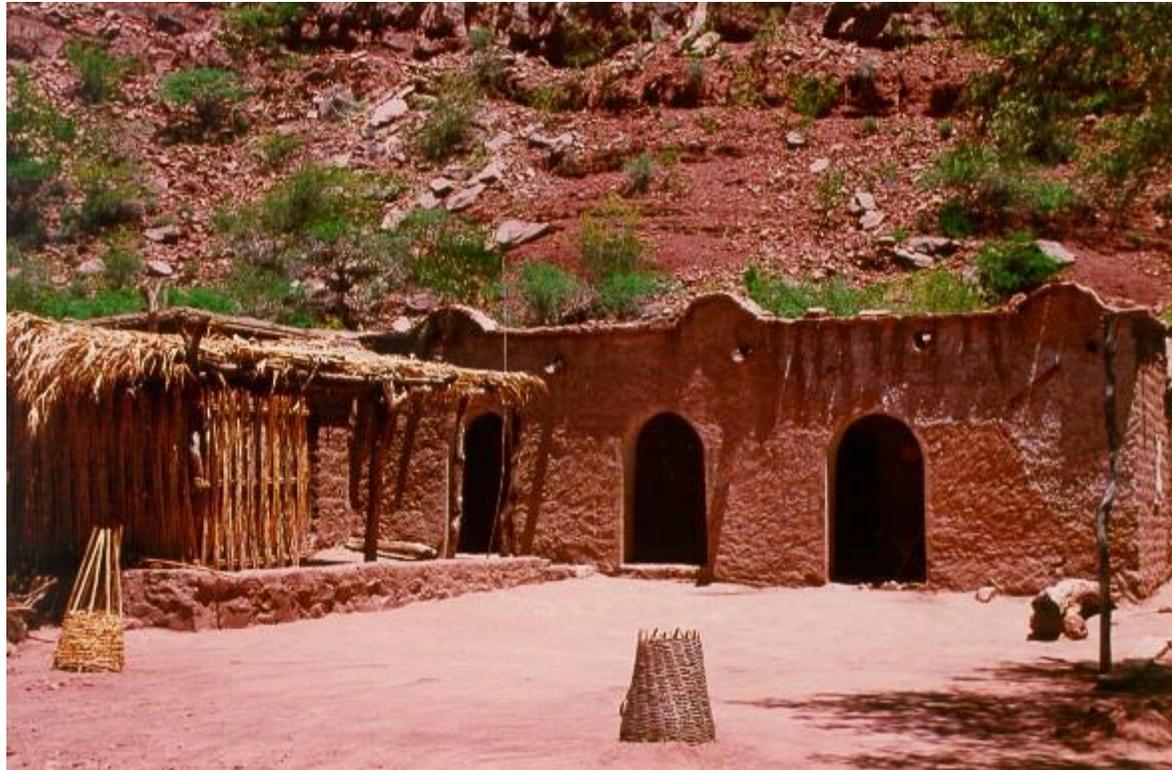


Foto: Ximena Pereira

*Kadaster*



Foto: Eric Lawrie

**Kadaster**

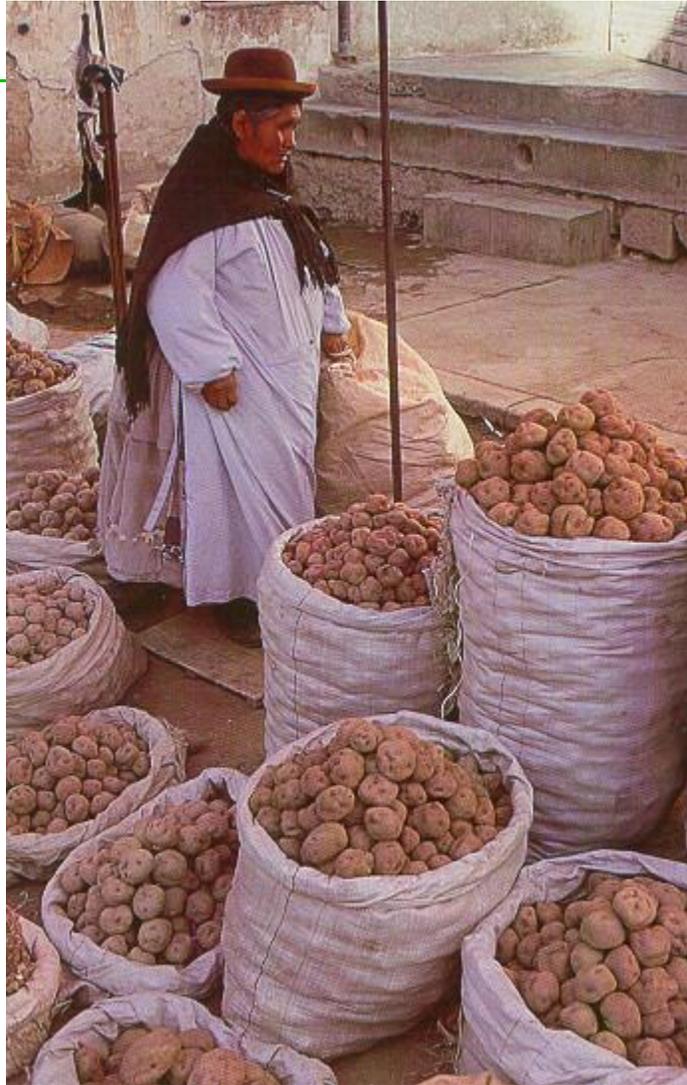


Foto: Eric Lawrie

*Kadaster*

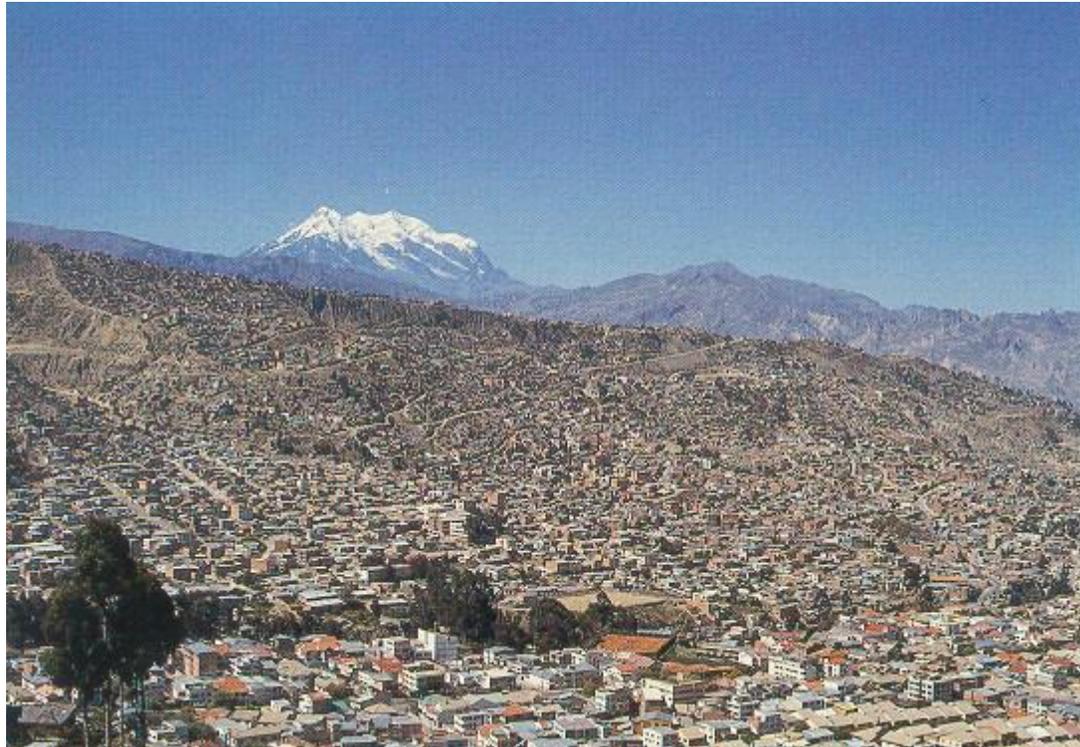


Foto: Raul Guarachi

**Kadaster**

- 
- **If one buys a piece of land from someone else, how can this person be sure the other one is the real owner of all land involved?**

*Kadaster*

- 
- **If one buys a piece of land how can he or she be sure this land is not included in a TCO (Tierras Comunitarias de Origen) area? Or in a comunidad?**

*Kadaster*

- 
- **If one wants to invest in new buildings or in agricultural development and wants to establish mortgage, how can the bank be sure that the person requesting the mortgage holds the ownership on the complete land?**

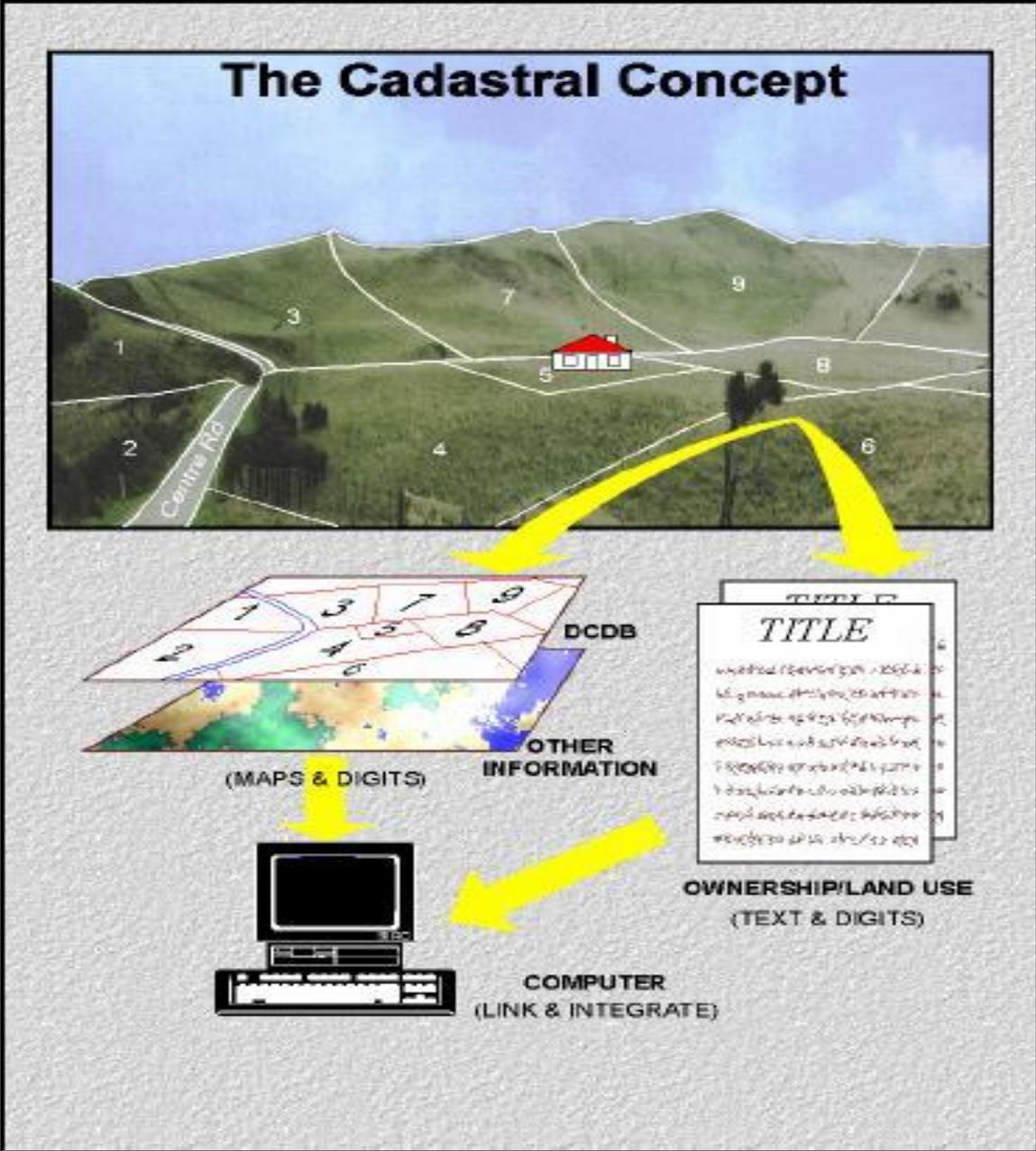
*Kadaster*

- 
- **If one buys a piece of land how can he or she be sure this specific piece of land is ‘free’ of mortgage?**

# Chuquisaca Project, Bolivia

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- **5.1 million ha**
- **Data collection, data ‘cleaning’**
- **Design of a maintenance proces**
- **Database and application**



Kadaster

# Information to the Public

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*Kadaster*

# Aerial Photographs

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# Data Collection: Field Office

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# Data Collection

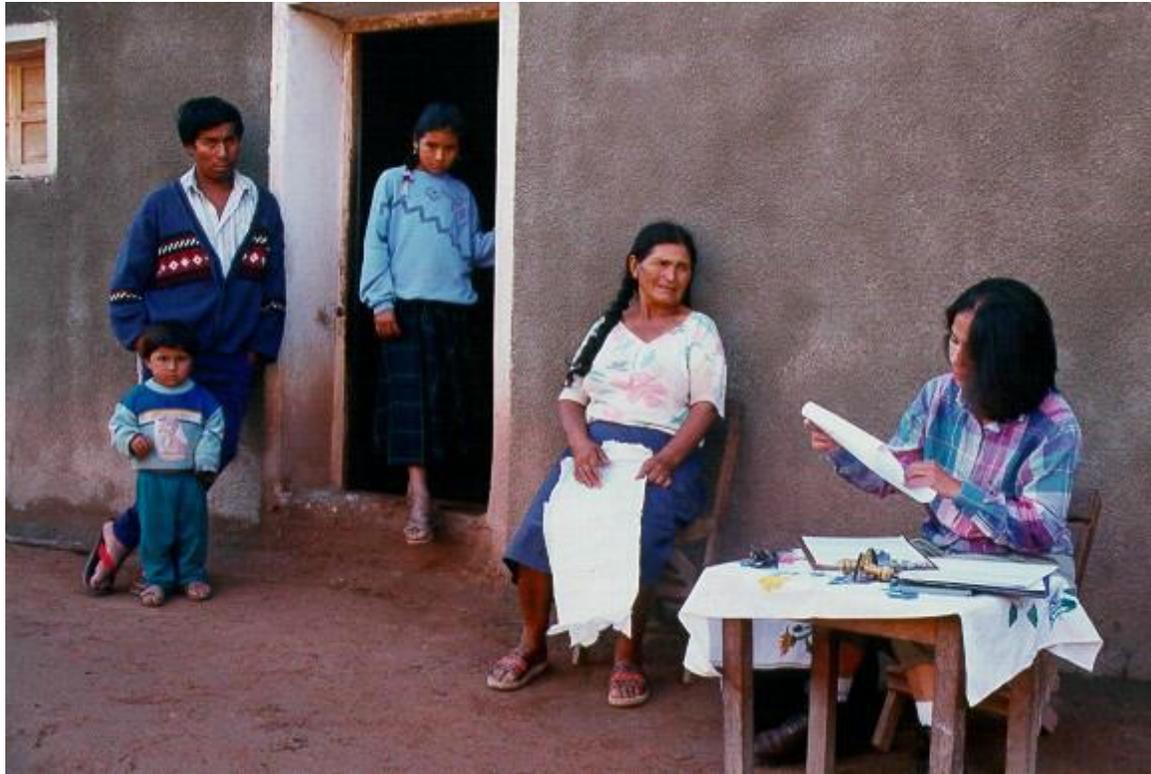
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*Kadaster*

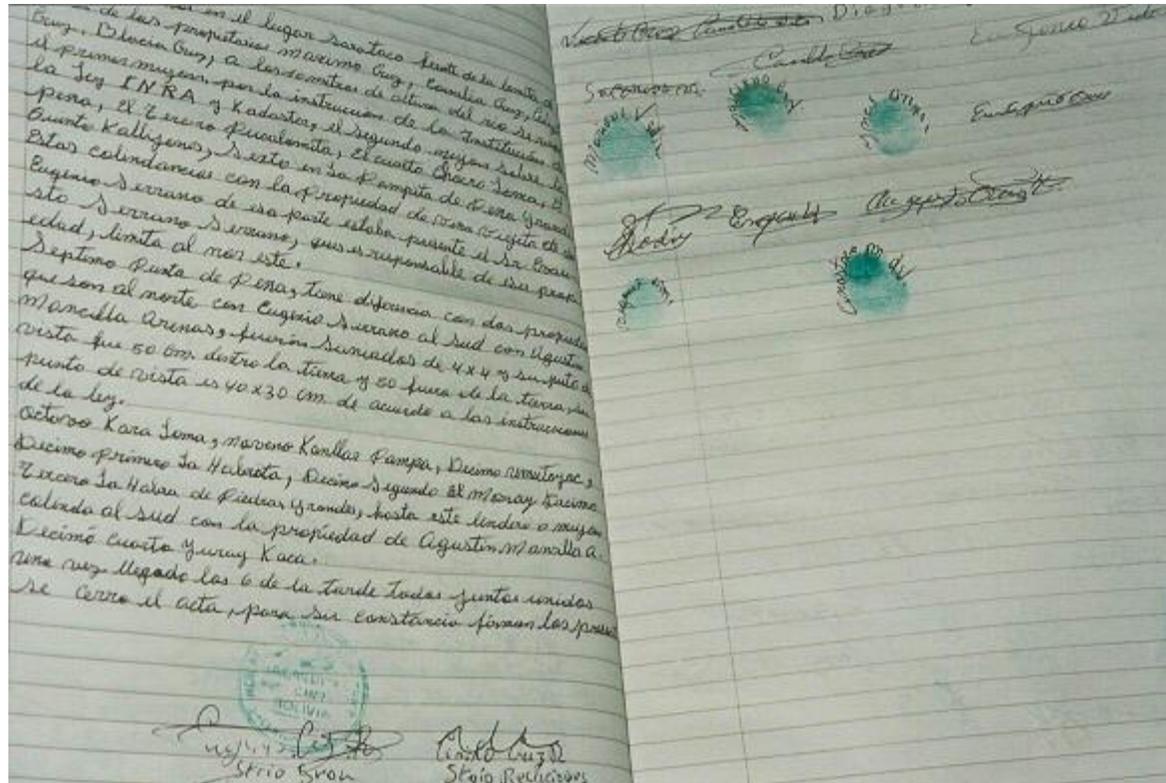
# Data Collection

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# Data Collection



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# Data Collection

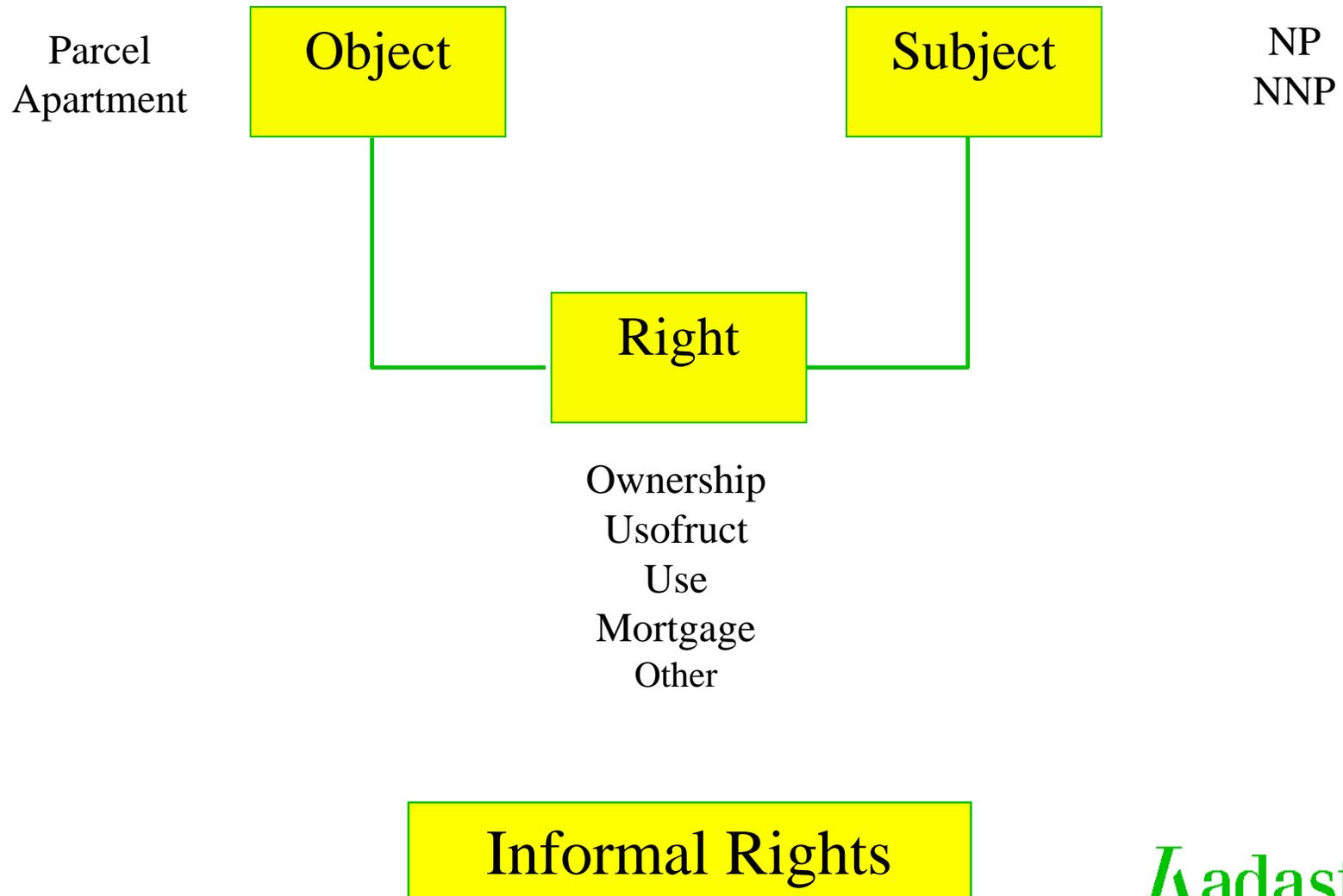
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*Kadaster*

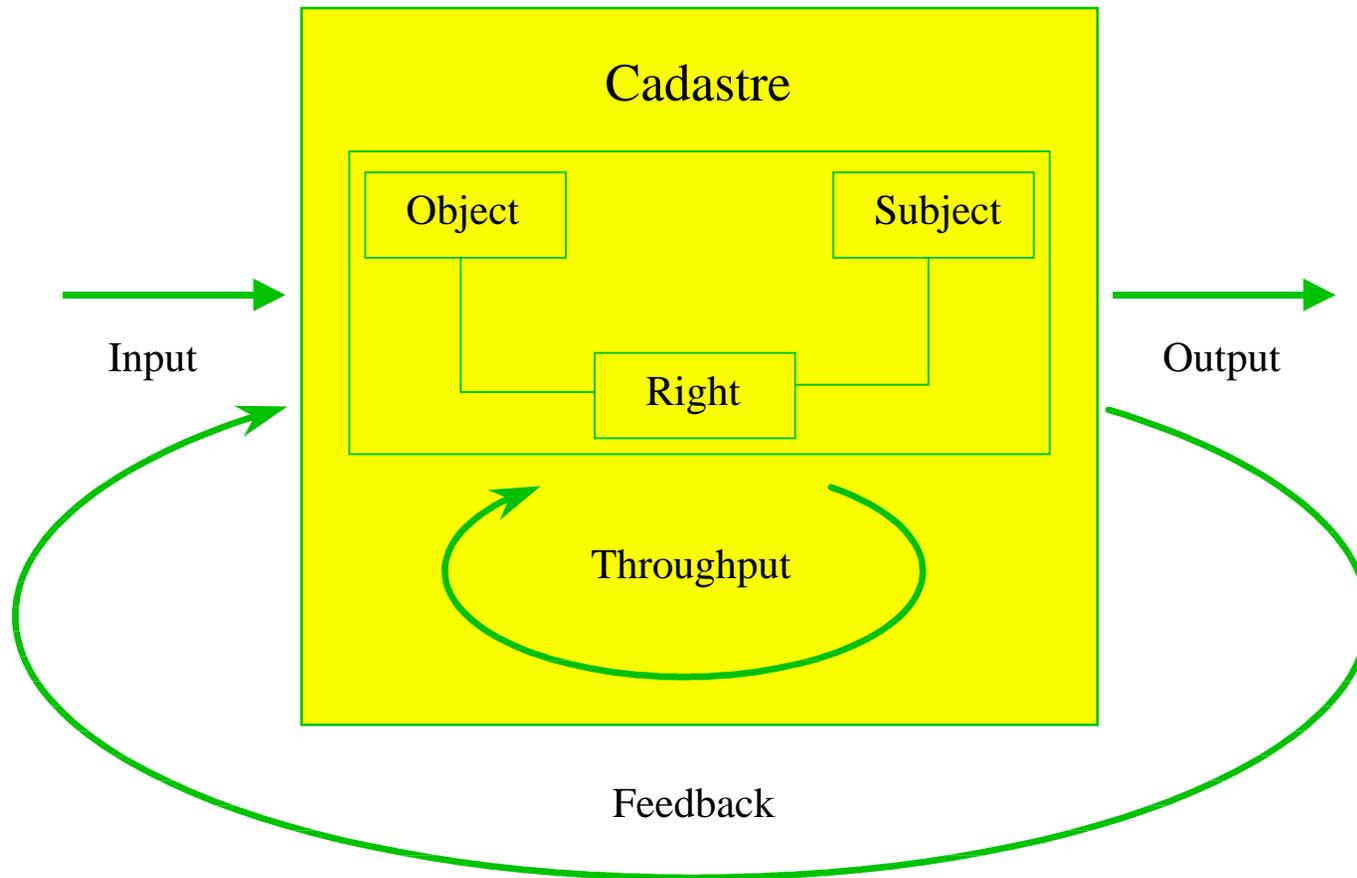
# Data Model

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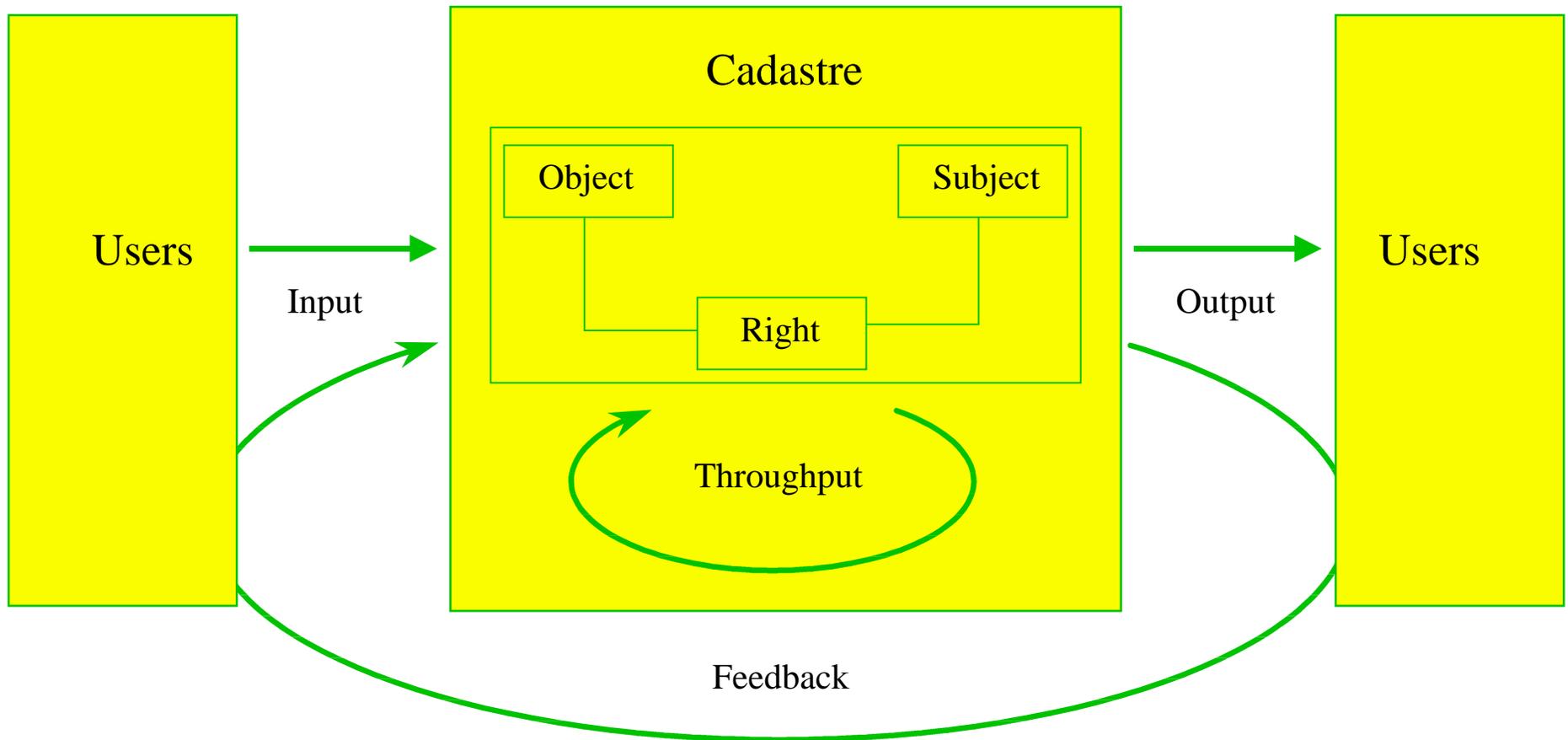
*Kadaster*

# Model of Maintenance



*Kadaster*

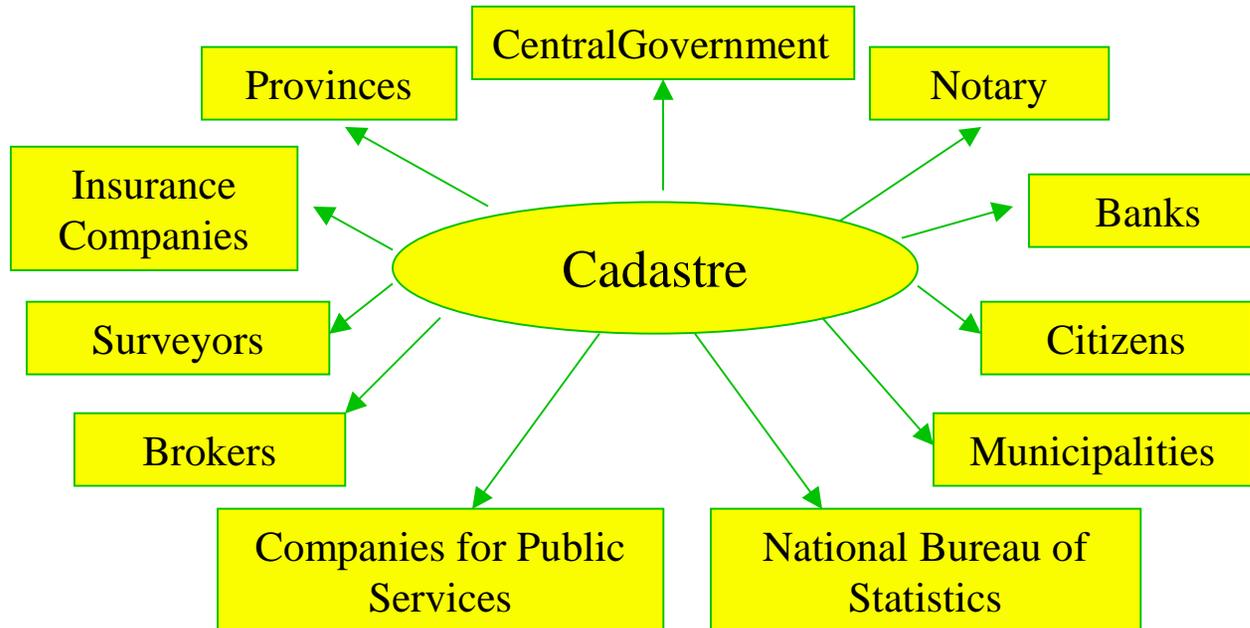
# Model of Maintenance



*Kadaster*

# Users

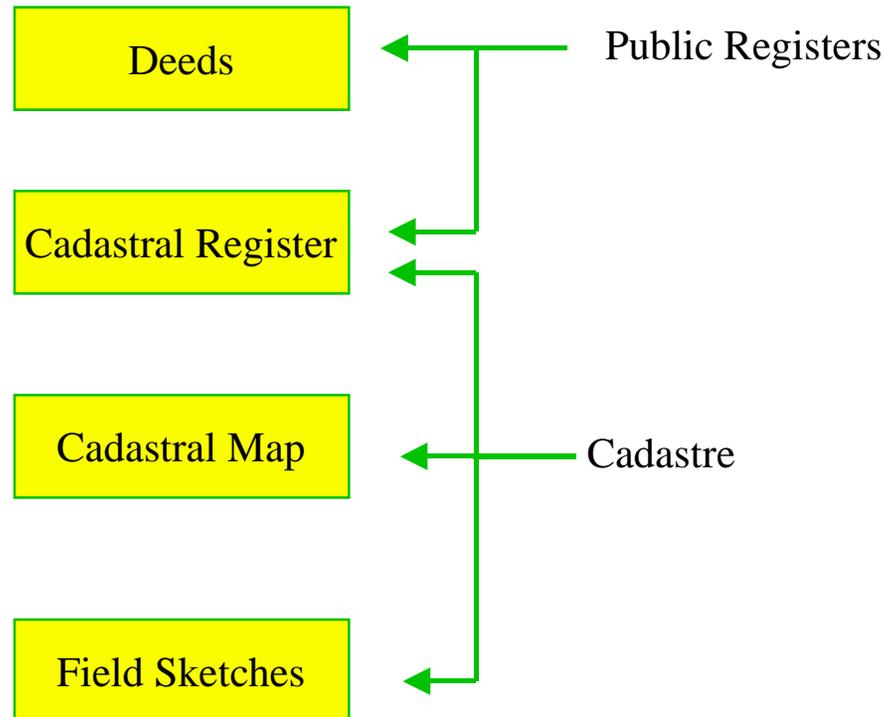
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# Basic Components

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# Relations

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**Object**

**Right**

**Subject**

Parcel 1

20 ha



Ownership

1/1



NP

Juan

*Kadaster*

# Relations

**Object**

**Right**

**Subject**

Parcel 2 0.2 ha

Ownership

1/2

NP

Carlos

Ownership

1/2

NP

Juanita

*Kadaster*

# Relations

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**Object**

**Right**

**Subject**

Parcel 3 4500 ha



Ownership

1/1



NNP

TCO

*Kadaster*

# Relations

**Object**

**Right**

**Subject**

Parcel 4 70 ha



Ownership

1/1

Parcel 5 10 ha



Ownership

1/1

NNP  
Municipality

*K*adaster

# Relations

Object

Right

Subject

Parcel 6 50 ha

Ownership

1/2

NP

Javier

Ownership

1/2

NP

Johanna

Usufruct

NNP

TCO

Kadaster

# Relations

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**Object**

**Right**

**Subject**

Parcel 7    20 ha

↔ Informal

↔ NP

Peter

*Kadaster*

# Relations

**Object**

**Right**

**Subject**

Parcel 8    1 ha

Ownership    1/2

Ownership    1/2

Parcel 8 => Part 1

Apartment

Parcel 8 => Part 2

Apartment

NP    Leo

NP    Jan

*Kadaster*



Foto: Raul Guarachi

*Kadaster*



Foto: Eric Lawrie

Kadaster

# Transaction: Establishment of Mortgage

**Object**

**Right**

**Subject**

Parcel 9    1 ha



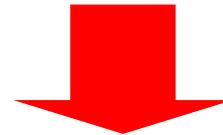
Ownership

1/1



NP

Jan



Parcel 9    1 ha



Ownership

1/1



NP

Jan



Mortgage \$ 10.000

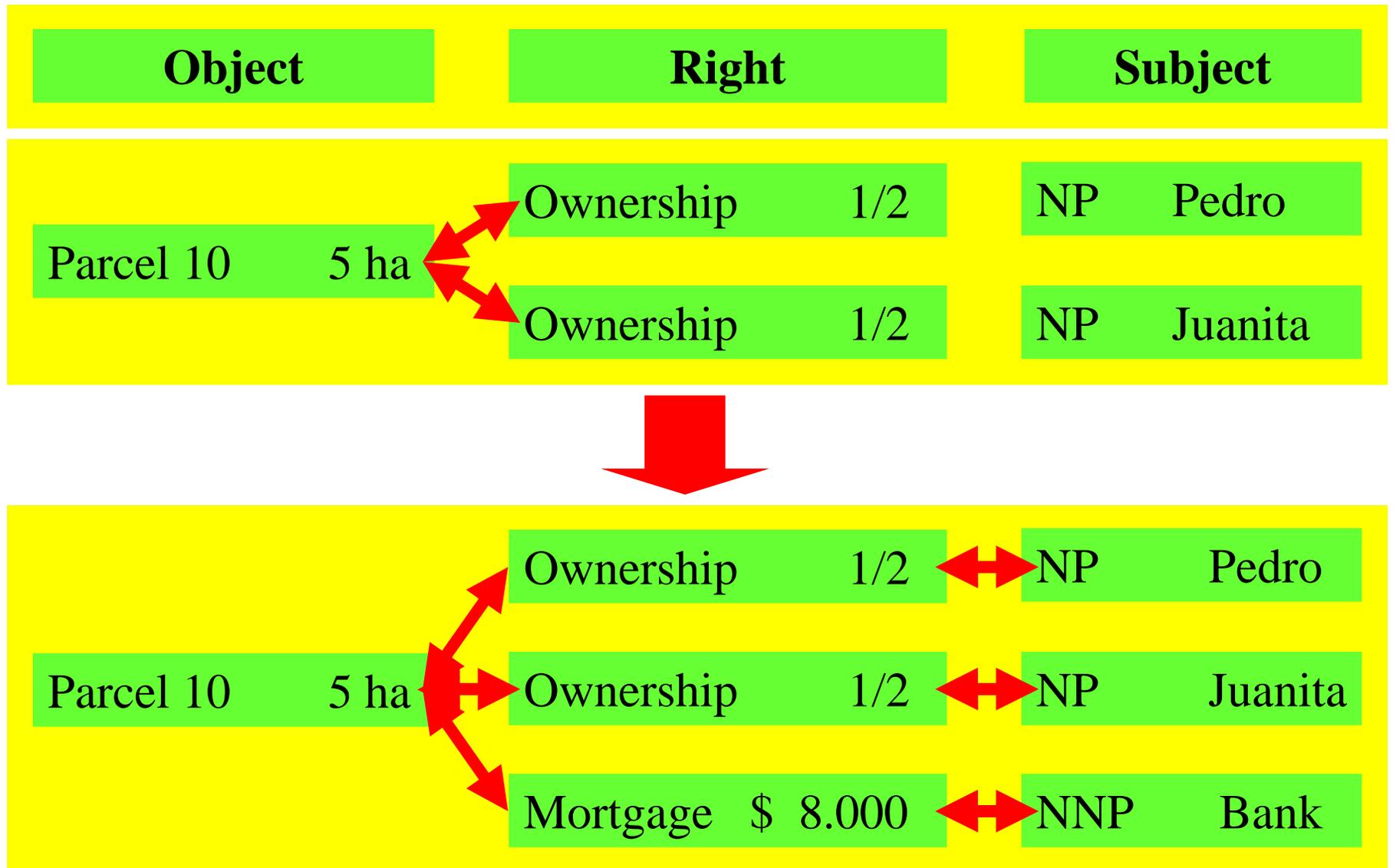


NNP

Bank

*Kadaster*

# Transacción: Constitución de Hipoteca



# Transaction: Division

**Object**

**Right**

**Subject**

Parcel 11 5 ha

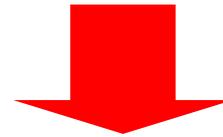


Ownership

1/1



NP Maria



Parcel 12 3 ha



Ownership

1/1



NP Maria

Parcel 13 2 ha



Ownership

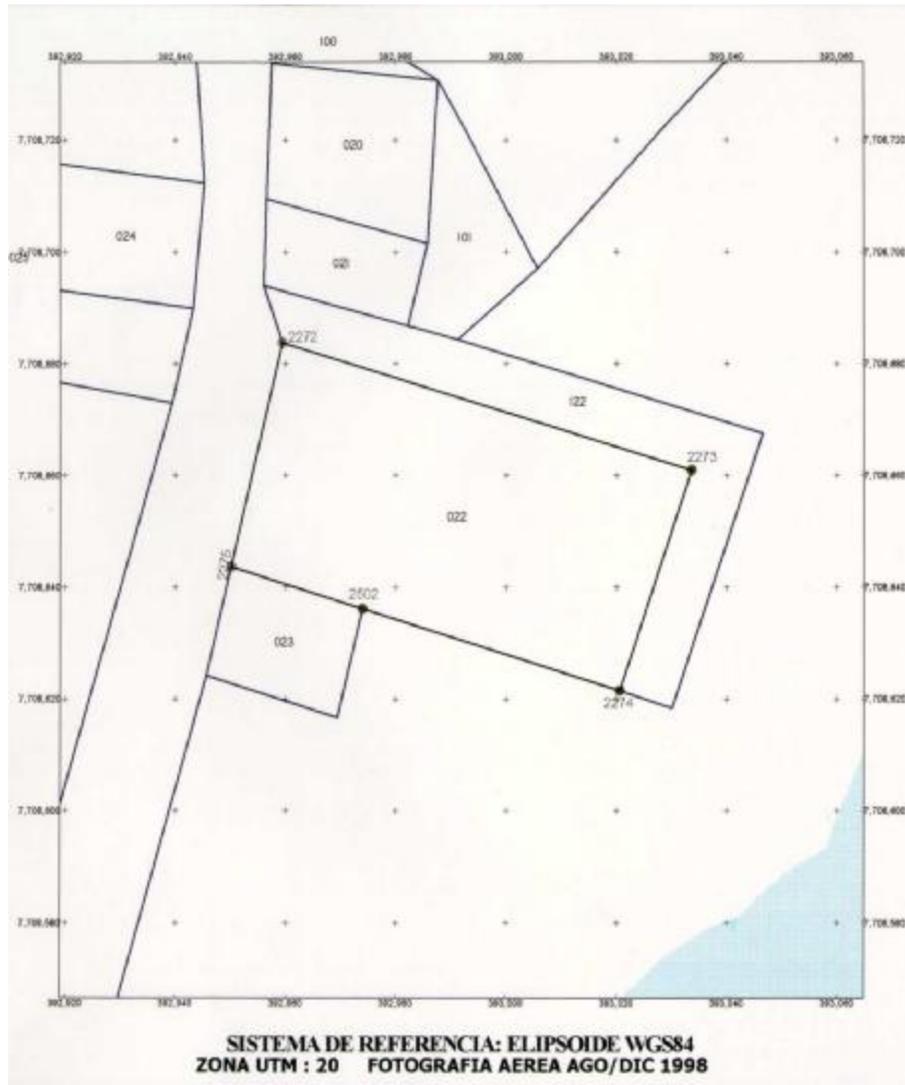
1/1



NNP Municip

*Kadaster*

# Cadastral Map





**INRA**

**Plano  
Catastral Individual**

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**Kadaster**



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**Zona:** HUACARETA

**Departamento:** 01 CHUQUISACA

**Provincia:** 05 HERNANDO SILES

**Sección:** 02 SEGUNDA HUACARETA

**Cantón:** 00 HUACARETA ROSARIO DEL INGRE

**Polygono:** 544

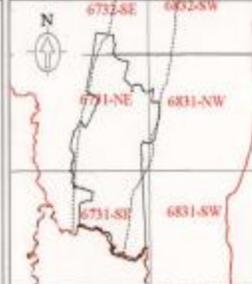
**Parcela Nro:** 22

**Nombre del Predio:** ESCUELA MIGUEL JASTER

**Cod. de Lev.:** 1-07-1589-0012-1

**Cod. Catastral:** 01-08-02-00-544-022

**Superficie:** 0.3133Has.



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**Escala: 1: 1000**



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**Propietarios de la Parcela**  
AREA ESCOLAR ESCUELA

Propietarios de parcelas colindantes		Vertices			
Nro	Nombre	Edo	Surte	Dist(m)	Áreas
001	FARRAGA MENDIETA FELIX	2272	382953.44	739663.88	
001	LAZO MENDIETA (e) HENDON MEJANDRA	2273	381821.66	739668.97	77.65 107'45"2"
001	FARRAGA MENDIETA FRANCISCA	2274	383828.83	739662.47	41.58 190'13"2"
001	LAZO MENDIETA NILO	2502	382971.96	739658.15	48.82 207'47"3"
001	LAZO MENDIETA LUISA	2275	382958.11	739664.65	35.06 207'47"2"
002	DUESAS ARANCHEA FAUSTO	2272	382953.44	739663.88	41.22 13'44'55"
0107	CALLE				
0108	CAMINO				

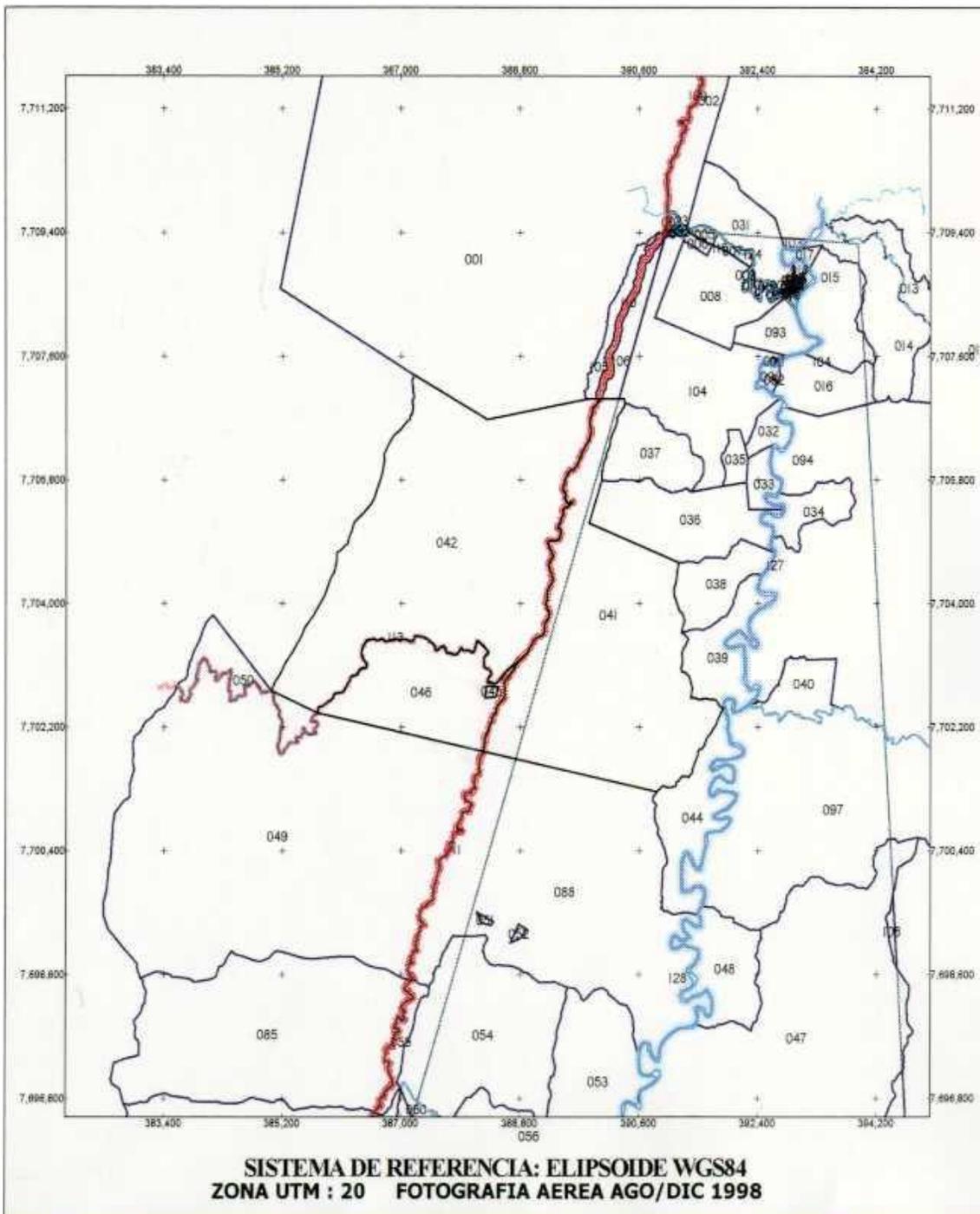
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**Elaborado:**  
06/09/2020

**Elaborador:**  
Marina Albornoz  
Firma

**Verificado:**  
*[Signature]*  
Firma

**Aprobado:**  
*[Signature]*  
Firma



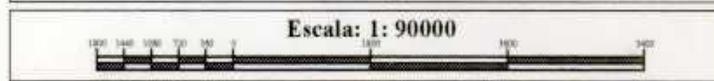
**INRA**

**Plano  
General de Predio**

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**Kadaster**

<p>Zona: HUACARETA</p> <p>Departamento: 01 CHUQUISACA          Provincia: 05 HERNANDO SILES          Sección: 02 SEGUNDA-HUACARETA          Cantón: 00 ROSARIO DEL INGRE</p> <p>Poligono: 544</p> <p>Nombre del Predio: YAPUCAITY          Cod. de Lev.: 1 07 1555 0014</p> <p>Superficie: 2456.4256Has.</p>	
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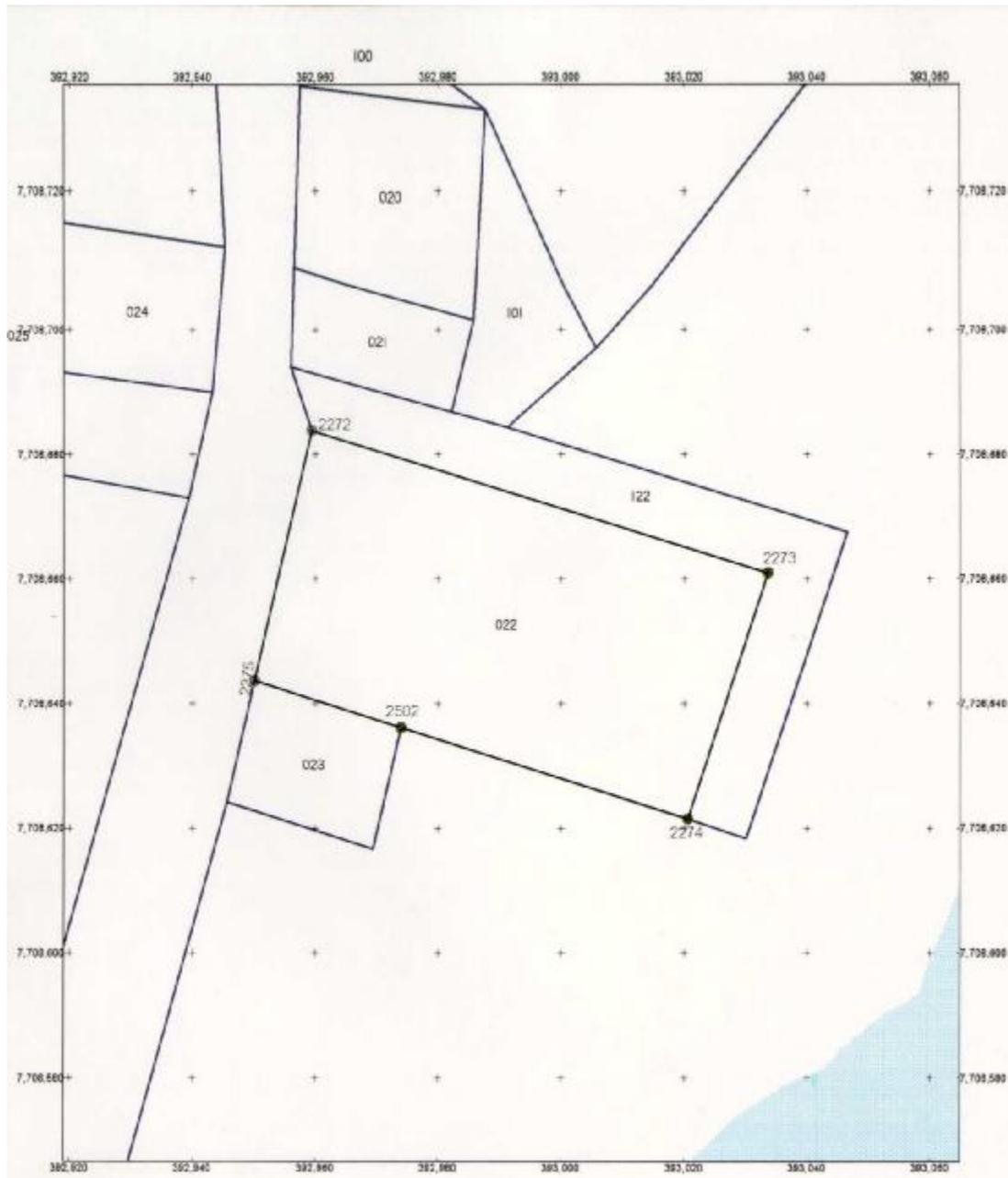
Propietarios de la Parcela	Uso de Suelo	Sup(Ha)
FERRUFINO APARCIO JHONY RONALD	Agrícola	71
GUERRERO QUINTANILLA de FERRUFINO JAQUELIN BETTY	Ganadera	1000

**Códigos Catastrales**

- 01-05-02-00-544-041
- 01-05-02-00-544-042
- 01-05-02-00-544-045

Elaborado 09/09/2000:	Verificado / /	Aprobado / /
Marina Albornoz: Firma	Firma	Firma



**SISTEMA DE REFERENCIA: ELIPSOIDE WGS84**  
**ZONA UTM : 20 FOTOGRAFIA AEREA AGO/DIC 1998**

**INRA**

**Plano  
Catastral Individual**

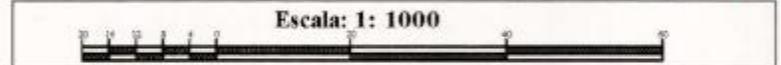
**Kadaster**

**Zona: HUACARETA**

Departamento: **01 CIBUQUISACA**  
 Provincia: **05 HERNANDO SILES**  
 Sección: **02 SEGUNDA-HUACARETA**  
 Cantón: **00 HUACARETA**  
**ROSARIO DEL INGRE**

Polígono: **544**  
 Parcela Nro: **22**

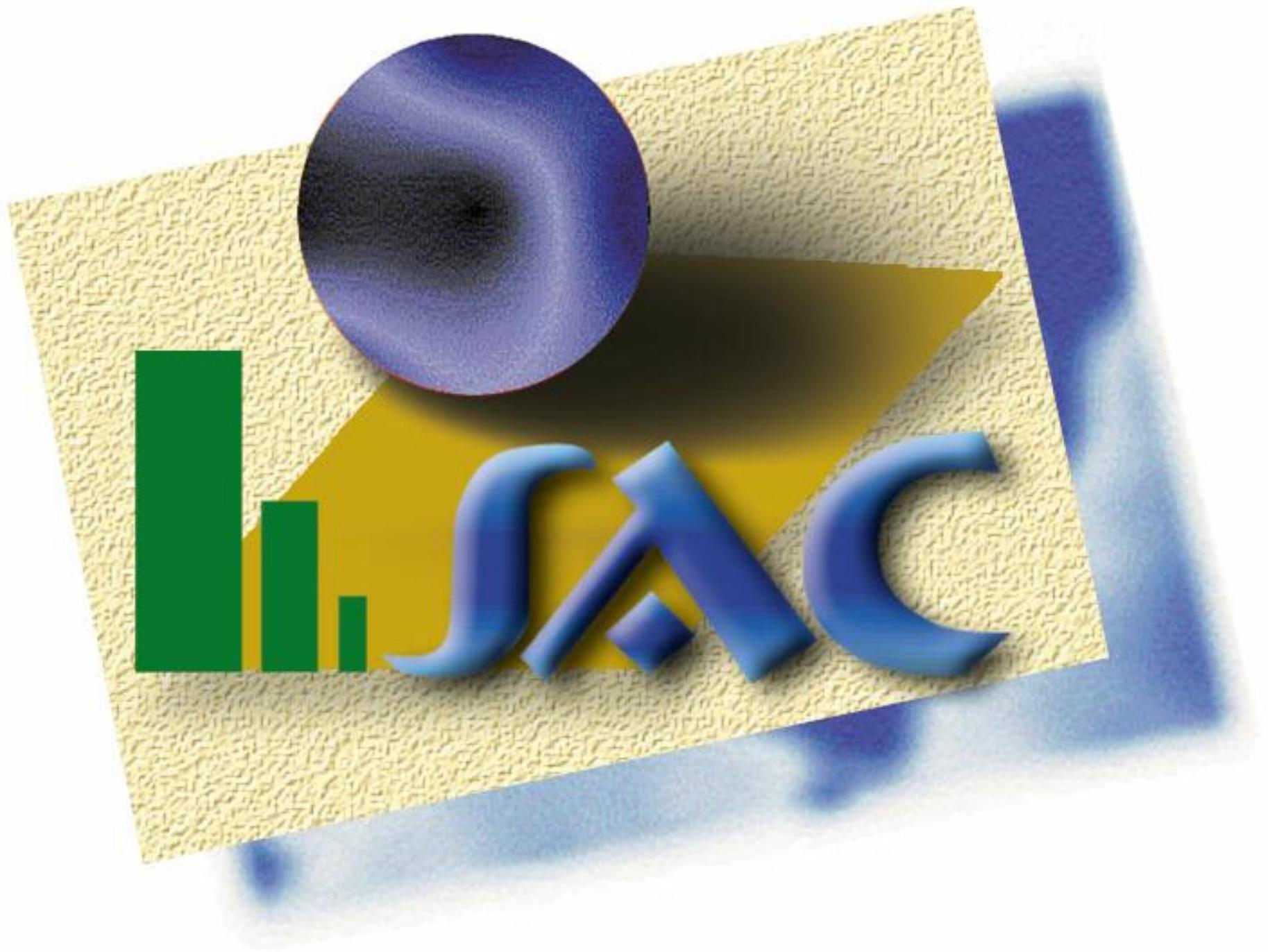
Nombre del Predio: **ESCUELA MIGUEL JASTER**  
 Cod. de Lev: **1 07 1550 0012-1**  
 Cod. Catastral: **01-05-02-00-544-022**  
 Superficie: **0.3153Has.**



**Propietarios de la Parcela**  
**AREA ESCOLAR ESCUELA**

<b>Propietarios de parcelas colindantes</b>		<b>Vértices</b>			
		Este	Norte	Dist(m)	Azimut
0019	TARRAGA MENDIETA FELIX	2272	392959.44	7708683.80	
0019	LAZO MENDIETA de RENDON ALEJANDRA	2273	393033.86	7708660.97	77.65 107-06'52"
0019	TARRAGA MENDIETA FRANCISCA	2274	393020.83	7708621.47	41.59 198-15'22"
0019	LAZO MENDIETA NILO	2502	392973.98	7708636.15	48.92 287-27'39"
0019	LAZO MENDIETA LUISA	2275	392950.11	7708643.85	25.00 287-27'23"
0023	DUEÑAS ARANCHA FAUSTO	2272	392959.44	7708683.80	41.22 13-04'55"
0:07	CALLE				
0:05	CAMINO				

Elaborado: 08/09/2000	Verificado: <i>[Signature]</i>	Aprobado: <i>[Signature]</i>
Marina Albornoz Firma	Firma	Firma



# Platform

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**Oracle 8i  
(Oracle)**

GeoMedia  
Professional  
(Intergraph)

**Visual Basic  
(Microsoft)**

**Windows 2000  
(Microsoft)**

**Industrial Standards**

*Kadaster*

# **SAC (Automated Cadastral System)**

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- Urban and rural cadastre**
- Transparent**
- Simple structure**
- First System to maintain cadastral data in Bolivia**

# Funcionality of the SAC

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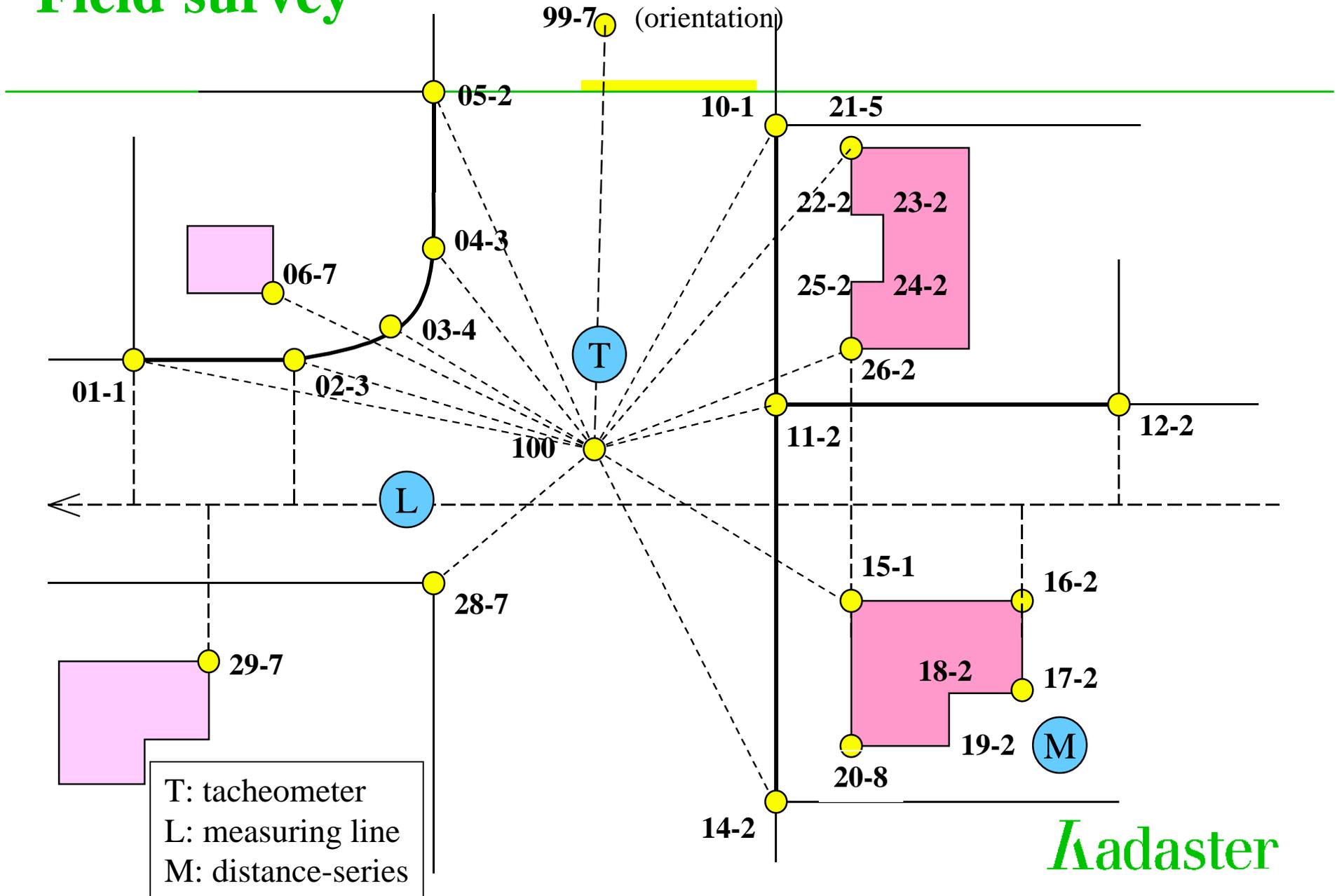
- Cadastral maintenance (object, subject, right)
- Information supply
- Geometric data and topology
- Parcel identifiers + area calculation
- Cadastral certificate
- Application at national level
- Data security, authorisation
- Data conversion from other projects

# Processes

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- **Alfa-numerical maintenance**
- **Graphical maintenance, surveying**
- **Information supply**
- **Quality improvement**
- **Management analyses**
- **Notification**

# Field survey



## Remarks

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- **It's very easy to make a cadastral infrastructure very complex, it's very complex to make it easy**
- **Cadastral is there for its users - not the other way around...**

**Thank you**

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*Kadaster*