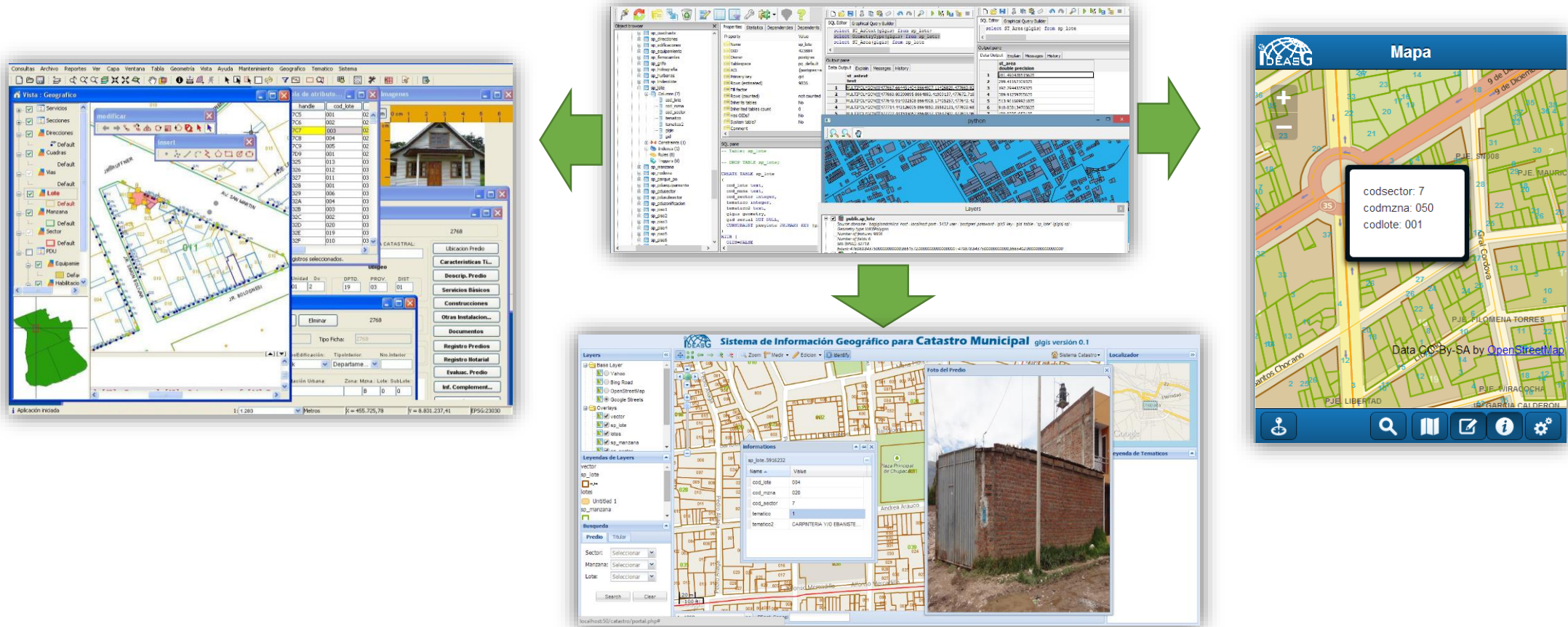


Integration of GIS and spatial DB in management of municipal cadastre



0.- Agenda

1. Goals of Implementation
2. Introduction
3. Why Based in Open Source
4. Server Environment
 1. Spatial Database
 2. Web Map Server
5. Desktop Environment
 1. Spatial Analysis
 2. Integrated Reports

6. Web Environment
 1. Search and Visualization
 2. Update the system via Web
7. Mobile environment
 1. Search and Visualization
 2. Update the system via Mobile
8. Integrate Process
9. Conclusions

1.- Goals of Implementation

- Validate, standardize and migrate all CAD Base and alphanumeric information to the Spatial Database
- To obtain data integrated and centrally
- Designing, Developing and Deploying Desktop application, Web application and mobile application for management of cadaster



2.- Introduction

This project started as an initiative to improve the automation and improved land management in municipalities.

In Peru there is the law of the National Integrated Cadastral Information Property and Tax system (SNCP) ,based on the law is being implemented this geographic information system.

It is being used open source software in all components , because the budget of the municipality is quite limited.

Before the implementation of the solution , the information and data was being handled in CAD and alphanumeric data base formats, now with the implementation process will everything of data integrated into the new system.

3.- Why Based in Open Source

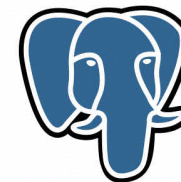
One reason to use open source software is because limited budget for the implementation of the solution

It has been evaluated the development with commercial software alternatives according to the requirements of the solution

For the purposes of local governments , requirements and scope at this stage of the solution , the open source software meets the requirements and have necessary conditions.



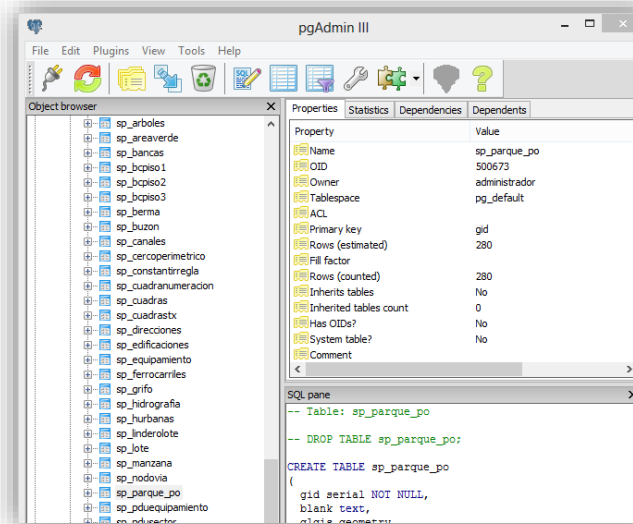
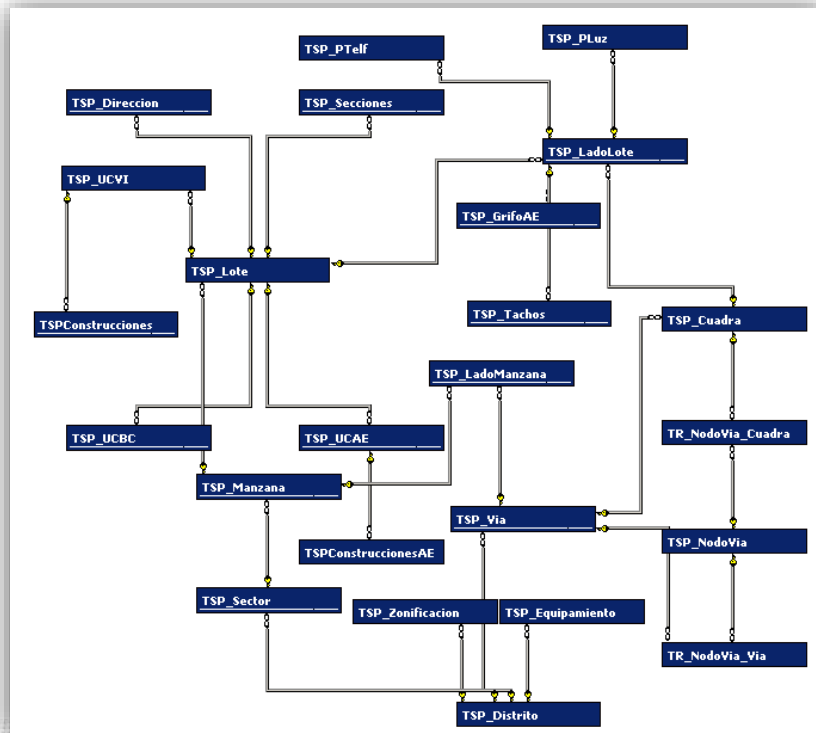
PostgreSQL



4.- Server Environment

The system has been designed from at least according to the data structure of National Integrated Cadastral Information Property and Tax system (SNCP)

However to get to work as a system had to be added and improved the database model, because the system provides multimedia management, audit, handling security, user roles and access, statistics, reports, thematic analysis, among others that were not in the scope of the standard.



The spatial Layers is managed by geoserver as a WMS, and WFS.

4.1.- Spatial Database

Postgres and PostGIS Database is used as a repository for alphanumeric, spatial and multimedia data

The screenshot displays the pgAdmin III interface with three main windows:

- Object browser:** Shows the database structure, including tables like `sp_lote` and `sp_manzana`.
- Properties window:** Displays the properties of the `sp_lote` table, such as Name, OID, Owner, and Primary key.
- Query Editor:** Contains SQL queries for `sp_lote`, including `select ST_AsText(glgis) from sp_lote;` and `select ST_Area(glgis) from sp_lote`.
- Output pane:** Shows the results of the queries, including a table with columns `st_astext` and `st_area`.
- python window:** Displays a map visualization of the spatial data.

To work with the system, we need to migrate all the information in a PostGIS spatial layers, because the base system layers are connected to spatial database, or synchronize by geojason to PostGIS

4.2.- Web Map Server

Identificado como admin. Cerrar sesión

Capas

Gestionar las capas publicadas por GeoServer

Agregar nuevo recurso
Eliminar las capas seleccionadas

Resultados 1 a 25 (de un total de 29 ítems)

Tipo	Espacio de trabajo	Almacén	Nombre de la capa	Habilitada?	SRS nativo
<input type="checkbox"/>	catastro	bdglgismpchupaca	sp_lote	✓	EPSG:32718
<input type="checkbox"/>	catastro	bdglgismpchupaca	sp_manzana	✓	EPSG:32718
<input type="checkbox"/>	catastro	bdglgismpchupaca	sp_piso1		
<input type="checkbox"/>	catastro	bdglgismpchupaca	sp_piso2		
<input type="checkbox"/>	catastro	bdglgismpchupaca	sp_sector		
<input type="checkbox"/>	catastro	bdglgismpchupaca	tematico		
<input type="checkbox"/>	catastro	bdglgismpchupaca	tematico_cd		
<input type="checkbox"/>	catastro	bdglgismpchupaca	tematico_lc		
<input type="checkbox"/>	catastro	bdglgismpchupaca	tematico_lf		

The Styles of base presentation layer is configured in geoserver.

Editar el estilo SLD actual. El editor puede proporcionar realce de sintaxis y ser expandido a pantalla completa.

Nombre: tematico01

Espacio de trabajo: catastro

Copiar de un estilo existente: Seleccione uno Copiar...

```
<?xml version='1.0' encoding='UTF-8'>
<!-- A sample style that draws a polygon -->
<!-- FeatureTypeStyles describe how to render different features -->
<!-- A FeatureTypeStyle for rendering polygons -->
<FeatureTypeStyle>
  <Rule>
    <Title>Con Licencia</Title>
    <ogc:Filter>
      <ogc:PropertyIsEqualTo>
        <ogc:PropertyName>tematico</ogc:PropertyName>
        <ogc:Literal>2</ogc:Literal>
      </ogc:PropertyIsEqualTo>
    </ogc:Filter>
    <PolygonSymbolizer>
      <Fill>
        <CssParameter name="fill">#b39df3</CssParameter>
      </Fill>
    </PolygonSymbolizer>
  </Rule>
  <Rule>
    <Title>Sin Licencia</Title>
    <ogc:Filter>
      <ogc:PropertyIsEqualTo>
        <ogc:PropertyName>tematico</ogc:PropertyName>
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      </ogc:PropertyIsEqualTo>
    </ogc:Filter>
  </Rule>
</FeatureTypeStyle>
```

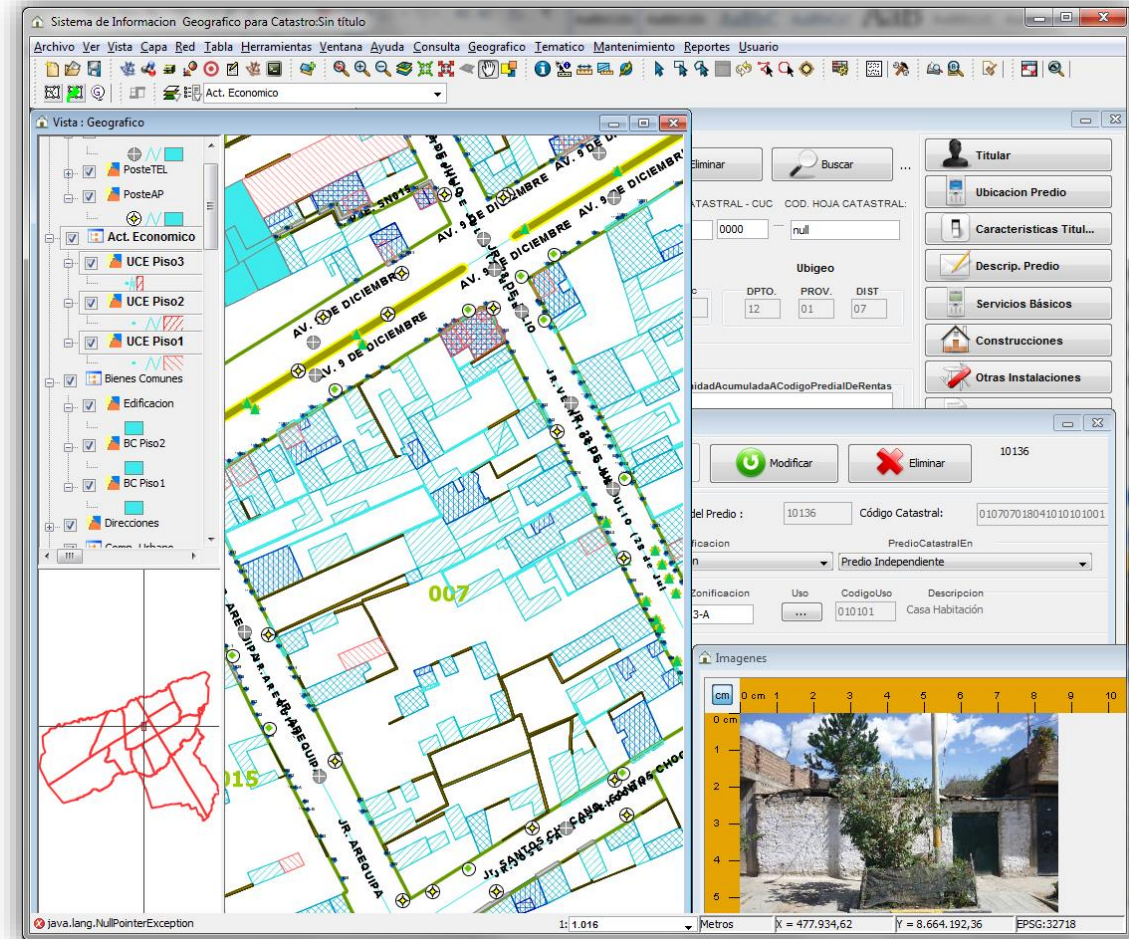
Geoserver is used as base map server , in geoserver is configured the layers of information services like WMS, WFS for web applications and mobile applications

5.- Desktop Environment

The desktop environment is where most advanced GIS operations, geo processes, spatial analysis and reporting is done, among others.

It has been personalized in gvSIG application so you can make the processes of cadastre.

Functionality has been added according to need, this is possible since we could run gvSIG from source code .

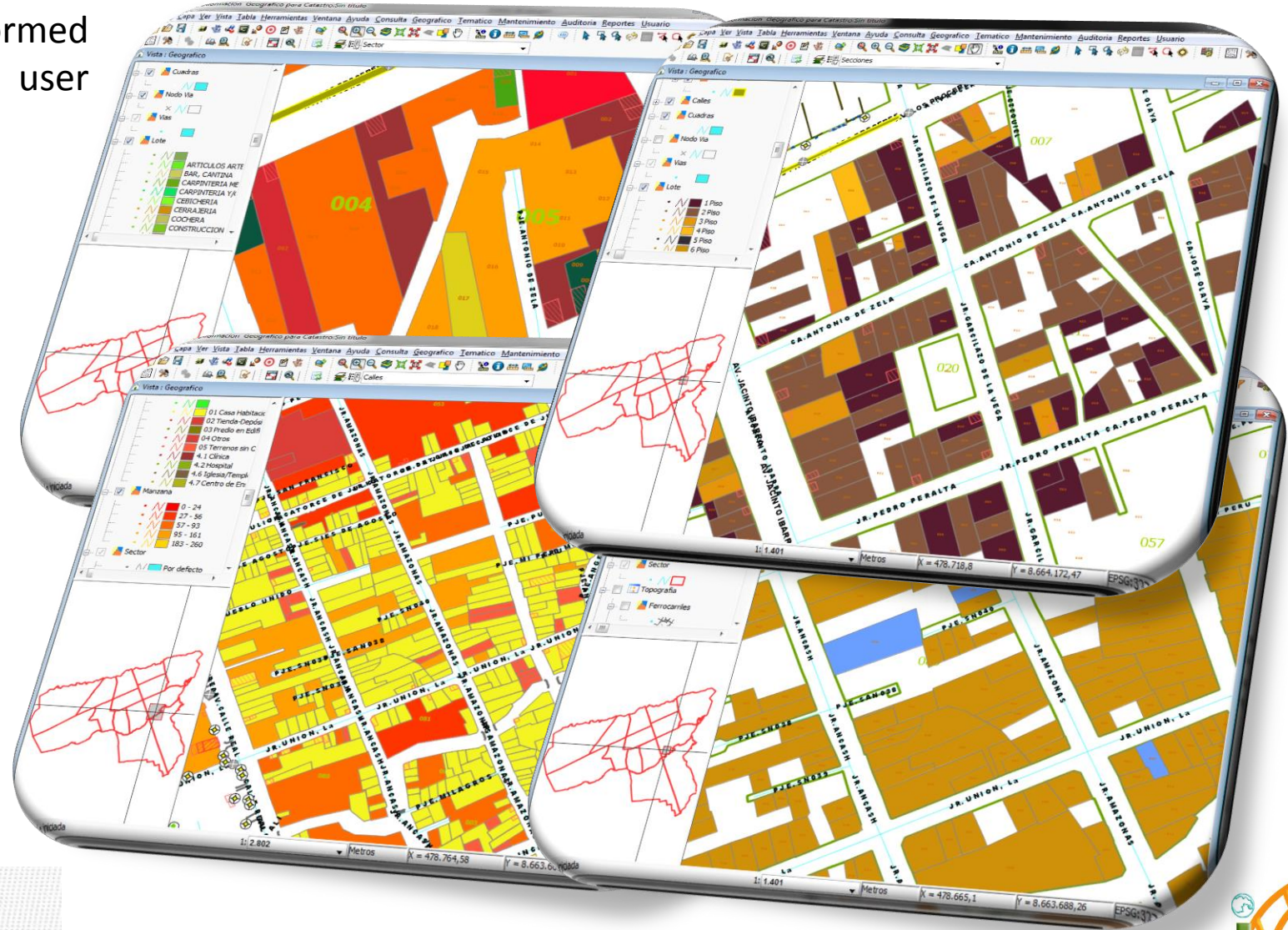


5.1 Spatial Analysis

Spatial analysis is performed automatically, with simple user interaction

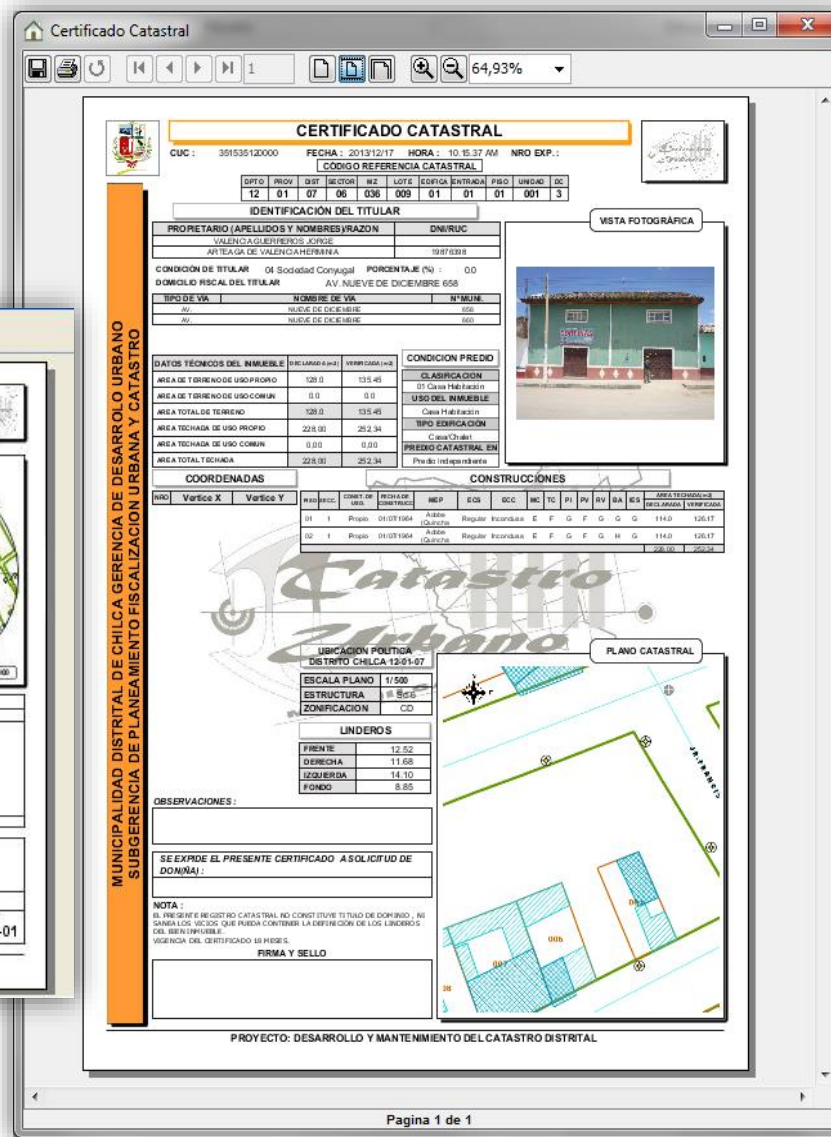
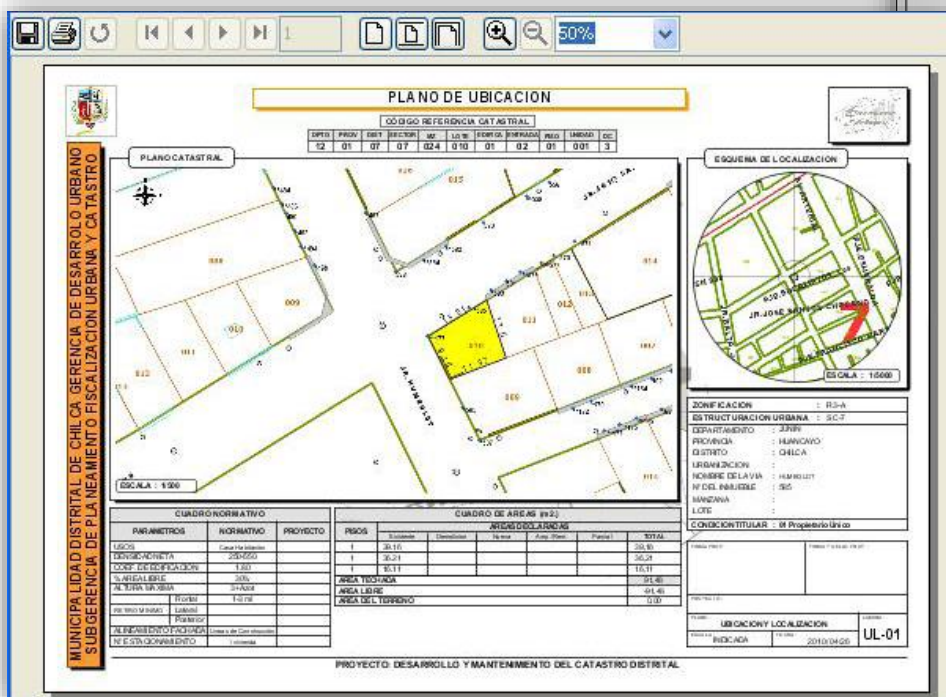
Spatial analysis processes usually performed manually by GIS software, have been programmed to run it automatically.

These automated spatial analysis is used for making day to day decisions of municipal officials



5.2.- Integrated Reports

The desktop environment reports are rich in design and functionality .



Are integrated and shows geographic information, statistics, cadastral unit pictures and alphanumeric , which become documents of communication between municipal different areas.

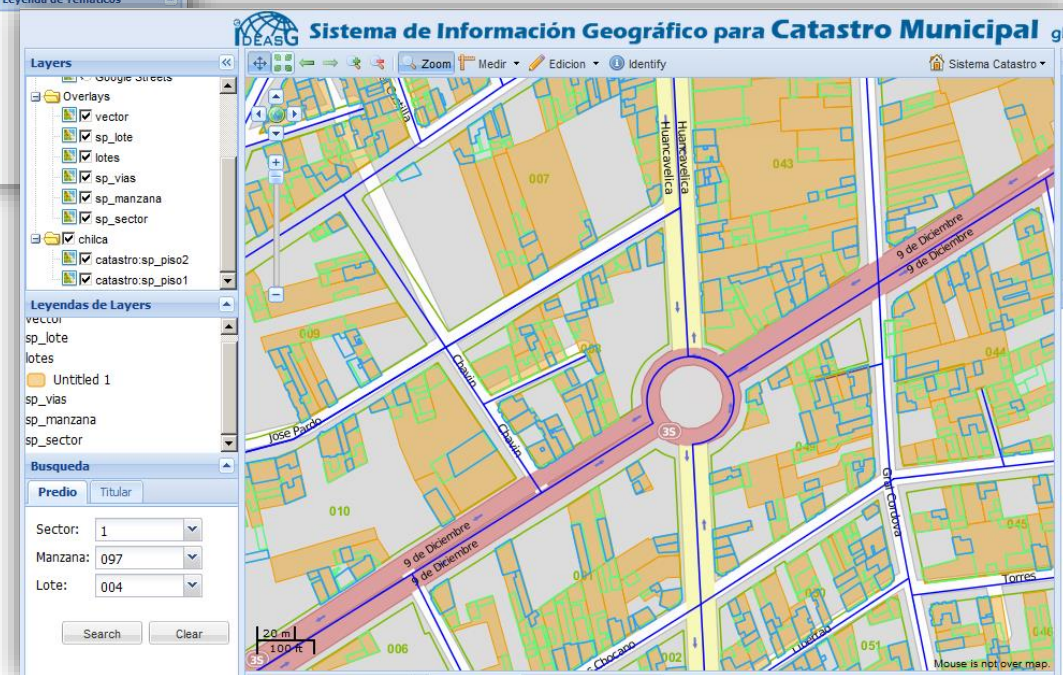
6.- Web Environment

In this presentation we show some results of the system

Also say that the system is still in development process



Users anywhere can do basic GIS operations as query, viewing, browsing, hide and show layers, print, measure areas and perimeters, export image, update information to the central database.

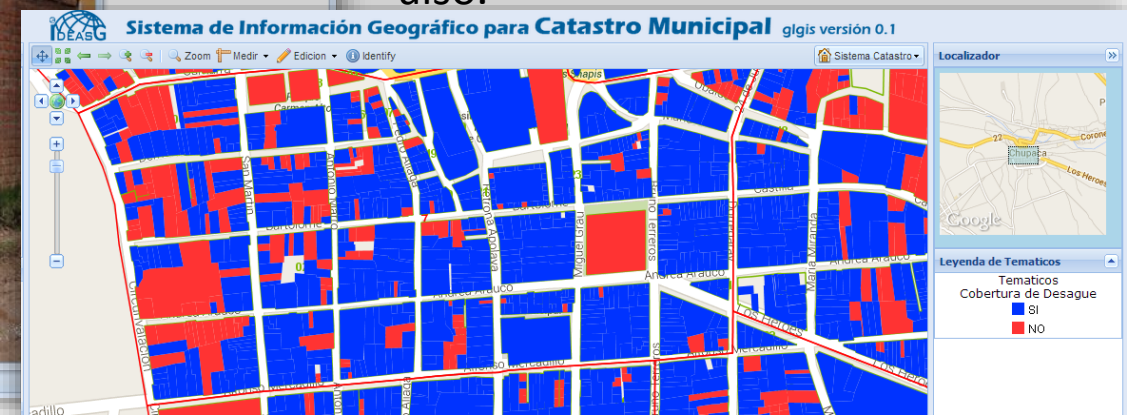


6.1.- Search and Visualization

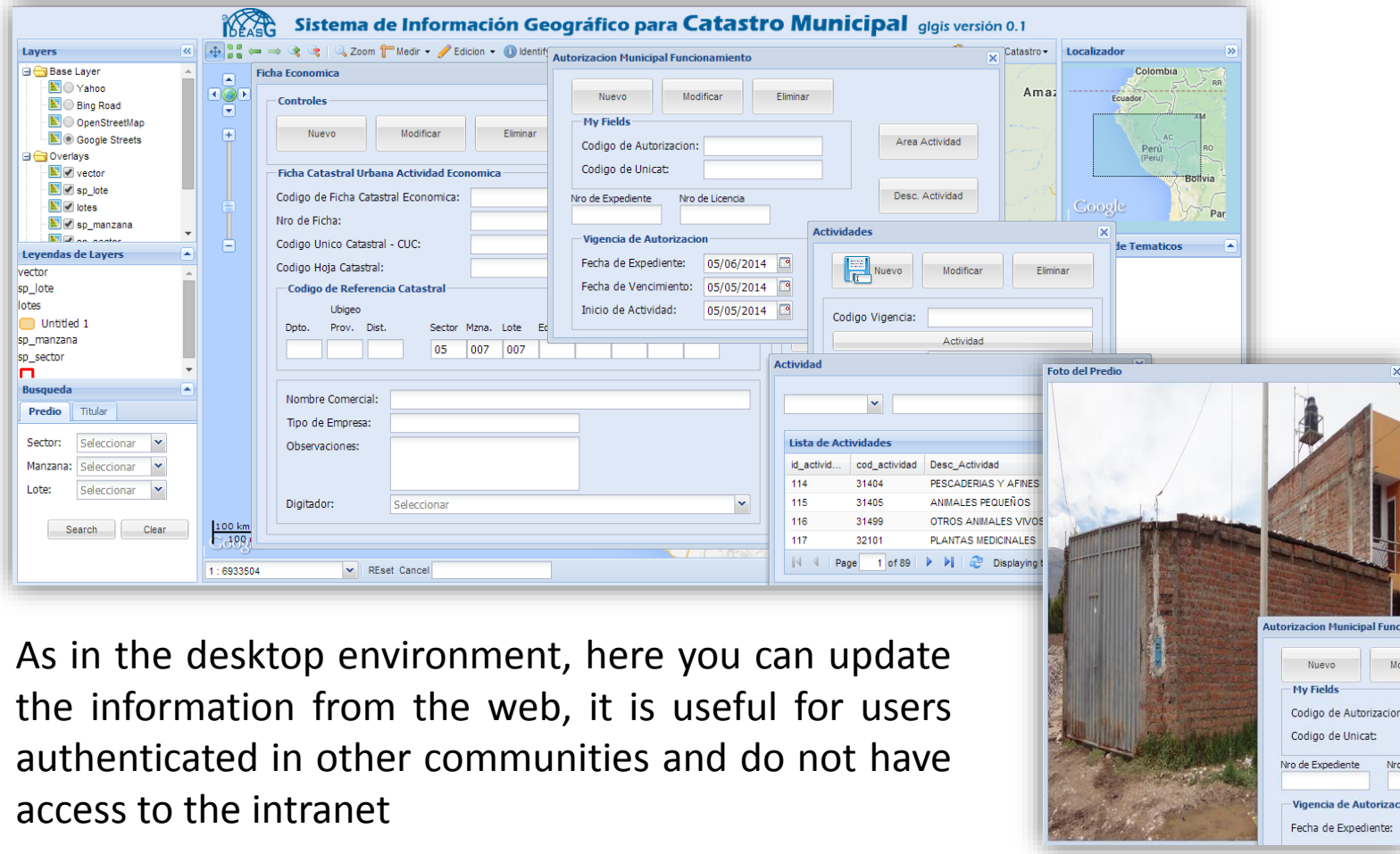
In the web environment system can do searches by lots, blocks, sectors, by owner, and by cadastral code. we can also consult each parcel individually using spatial navigation

The system is capable of displaying multimedia information for each cadastral unit.

We can review some thematic maps inside web environment also.

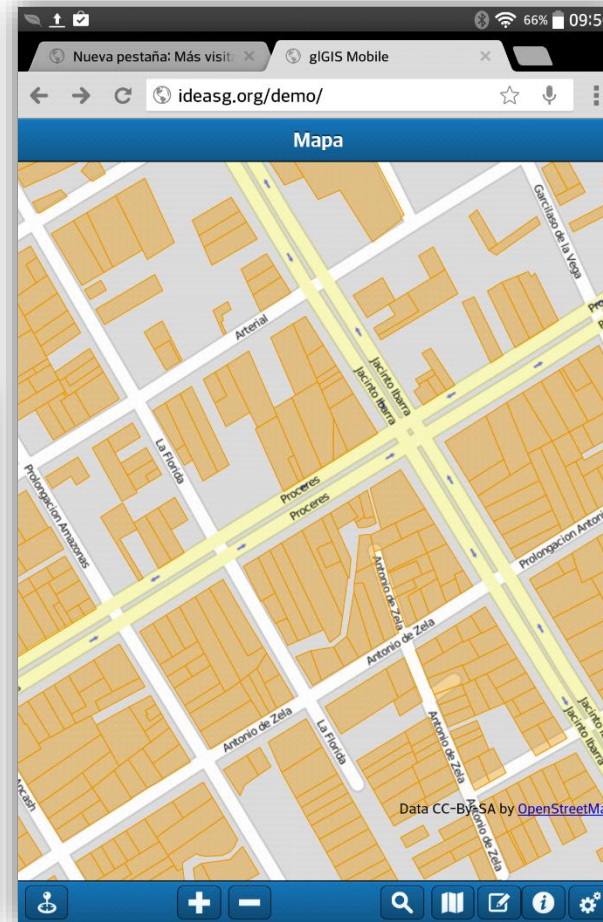
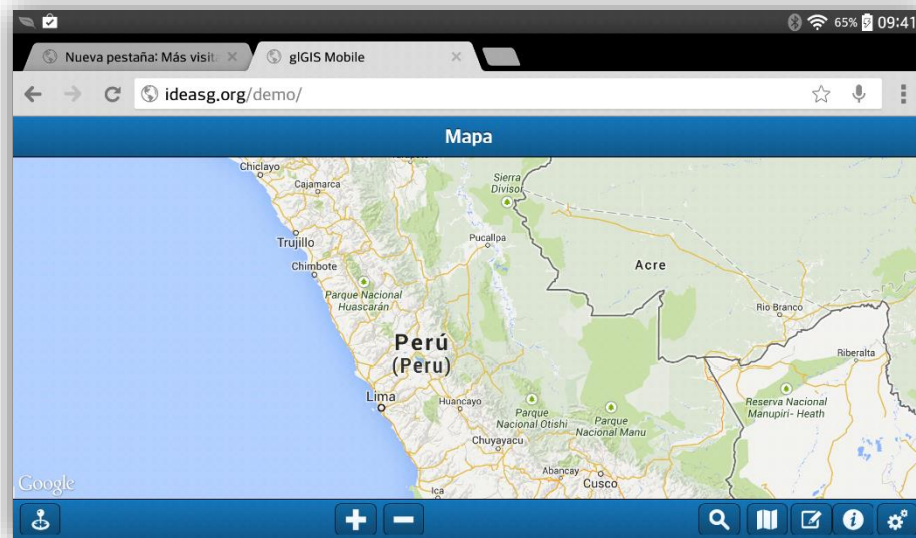


6.2.- Update the System in Web Environment



7.- Mobile environment

Since mobile users can also interact with the integrated system, can view, search, geo locate, update basic information system.

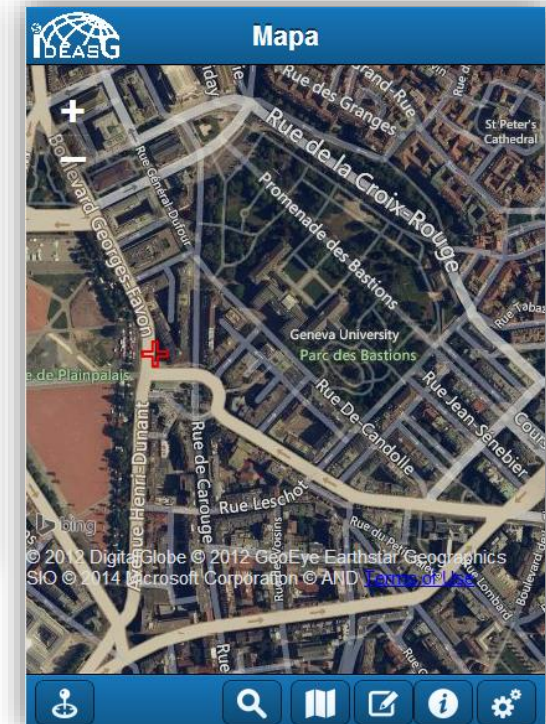
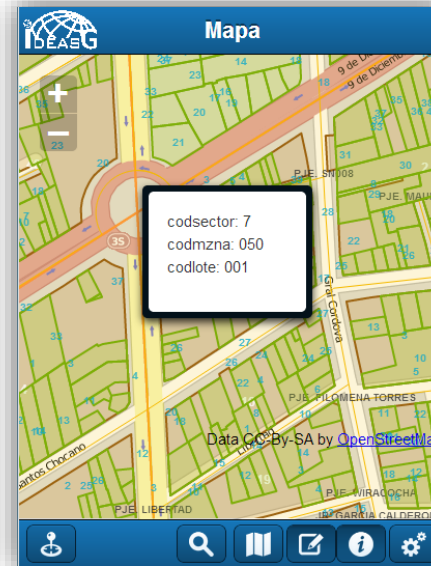
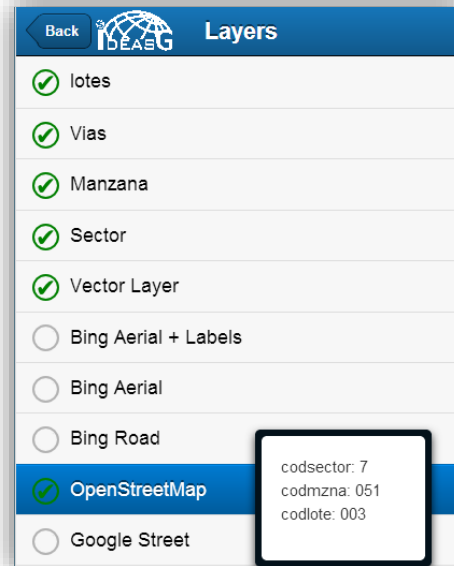


The mobile system environment is still under development, however we can display results according to project scope.

At this moment the system is in test however the functionality according to scope is fully integrated.

7.1.- Search and Visualization

In the mobile environment we can make the search for cadastral codes based in blocks and parcels.

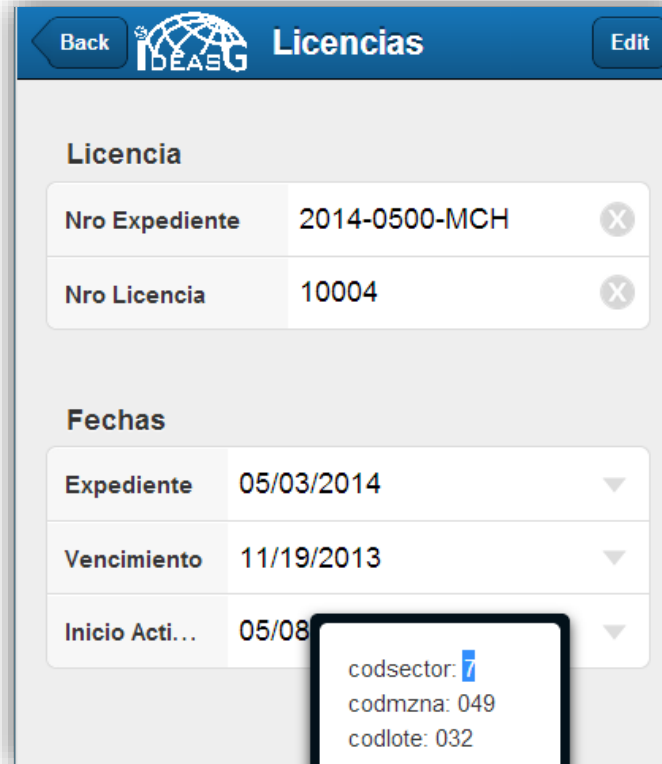


We can on and off layers , review quick information for each parcel, and Geolocate, in this case near to Geneva University.
Of course we can navigate using zoom+, zoom- , move.

7.2.- Update the System via Mobile

The mobile component is designed to make timely updates as the case of the municipality of inspectors in the field, in this example inspector update the municipal license and annotate some incidents to test.

Also it is possible to update spatial incidents in the city and save with basic attributes like category.



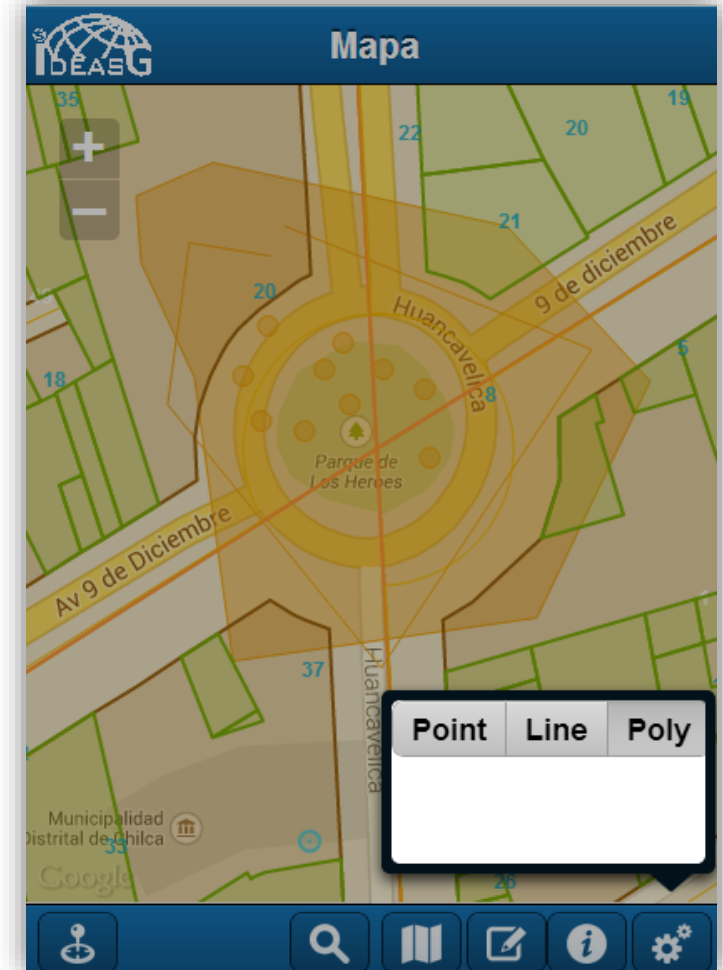
Licencia	
Nro Expediente	2014-0500-MCH
Nro Licencia	10004

Fechas	
Expediente	05/03/2014
Vencimiento	11/19/2013
Inicio Acti...	05/08

codsector: 7

codmzna: 049

codlote: 032



All the updates the geographic or alphanumeric is synchronized to the central database.

8.- Integrated Process Explain Demo

The system is integrated from the server, clients as desktop, web and mobile, we show a comprehensive process with a step by step example.

- We can import, digitize or migrate information related to the system and for local government purposes
- In the centralized database we have in this case an layer about a parcel with business with attribute as the municipal licenses status, multimedia, owner, and others.
- We can do advanced desktop changes spatially , join with each other, split into two parts and other necessary processes.
- From desktop, web or Mobile we can update alphanumeric, spatial or multimedia information.
- On the desktop and web environment we can see spatial analysis of city areas , with patterns of areas, with density , parcels with operating licenses or not and all of the spatial analysis available.
- After updating the information from any environment to the central database , can we view, query or refresh. The query or analysis have changes instantly.
- Finally we can make decisions with the integrated system

9.- Conclusions

- If you do not know your territory you can not manage it
- To get to know the territory we should have the city at our fingertips in one laptop , one tablet or smartphone.
- The decisions do not make the computer or the system , decisions are made by a person who knows the worldview of citizens, laws, and system reporting interpretation.



Thank You
Merci
Gracias

Further information:

**Marino Carhuapoma
IdeasG SAC
Peru**

mcarhuapoma@ideasg.org
www.ideasg.org