

# **GIS, MANAGEMENT SOLUTION FOR SANITARY SECTOR.**

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## **ABSTRACT**

Classically, it is the cadastral component of Geographic Information Systems (GIS) -which by itself- adds value to companies that hold their assets on their operational territory, but fail to get the real benefit of this technology. This work focuses on the elements of GIS that support the management of a company that participates in the sanitary sector, as is the case of Aguas Andinas, emphasizing developed applications to support various business processes and the successful integration with other systems in use. Highlighting the data model developed, describing the main methodological steps to reach the current situation and describing the main applications and results.

**Keywords: GIS, Corporate GIS, Tablet PC, PDA and GPRS  
GIS management solution for the sanitary sector.**

## **1. Introduction**

Geographic Information Systems (GIS), have become a strategic tools for service businesses. To what has been traditional, such as the provision of cadastral information and spatial analysis, now their features are cutting across organizations, allowing to add value from customer service and business processes, to production of a solid information basis in order to negotiate with the regulator along with reliable data.

This is the model adopted by Aguas Andinas since 2000, due to the incorporation of the solution developed by the strategic partner, since then controller of the company, which holds GIS solutions as part of their standard system to assist the operation to more than 1,200 water supplies administered in the world.

The implemented GIS, in its early stages was designed to be the single and updated database for the operational infrastructure, in which the diverse users (commercial, planning, engineering, operations, sanitation, environmental regulation, among others) could access in a friendly and timely way. Currently, the database manages about 12.600 km of drinking water networks, more than 10.200 km of sewage network and more than 1.500.000 customers on top of the respective planimetry and orthophotos of the concession area.

The network implemented, was fundamental to put into operation the GIS. In this sense, the progress achieved toward users who access the system through their computers to consult the networks, to report situations, modeling, design, etc, is enormous.

The state of the art of communications and mobile devices, led to consider their incorporation to expand the use of GIS into the field, therefore avoiding the use and transport of plans, also providing updated information to operators in situations of network emergencies, improving the feedback with update teams and subsequently allowing the interaction with the integrated water shortage management module.

## 2. Objectives

- Improving the management of business processes and customer service.
- Generating the baseline for the Company's infrastructure.

## 3. General methodological stages considered in the project

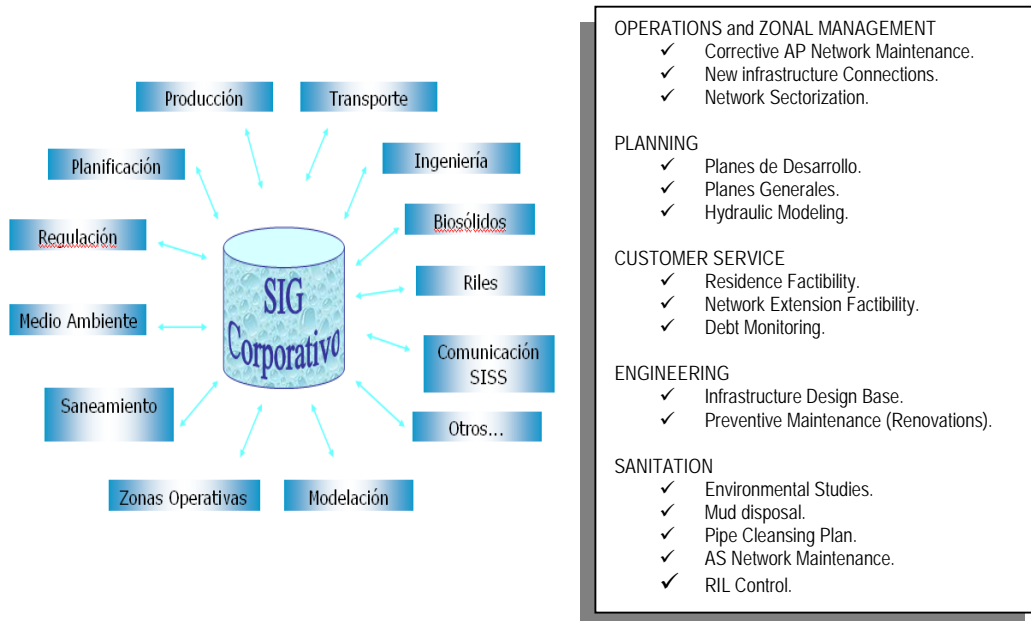
- Definition of objectives and scope of the system.
  - Definition of uses and applications.
  - Definition of scale and accuracy of spatial data.
- Definition of conceptual model of processes and data.
- Identification of users.
- Definition of the platform.
  - Software and hardware.
  - Data model.
- Construction of a database.
  - Migration, collection and data generation.
- System implementation and user training.
- Updating procedures.
- Application development.

## 4. Results of the implementation of the Corporate GIS

Based on the goals and the implementation of the methodology, it was possible to implement Aguas Group's Geographic Information System, the following describes briefly the most important elements.

**4.1. Platform.** ESRI platform was selected for the development of the corporate GIS. For the Geodatabase it was chosen ArcSDE and for intranet publishing ArcGIS Server with some remnants of ArcIMS. Customers are connected through ArcView for advanced query users and through Intranet to basic consultation users and updaters with ArcEditor. Other users, additionally are connected to the GIS via the applications developed for various business processes that are detailed below.

**4.2. Users.** The following chart details the principal user units and the table shows their main uses:

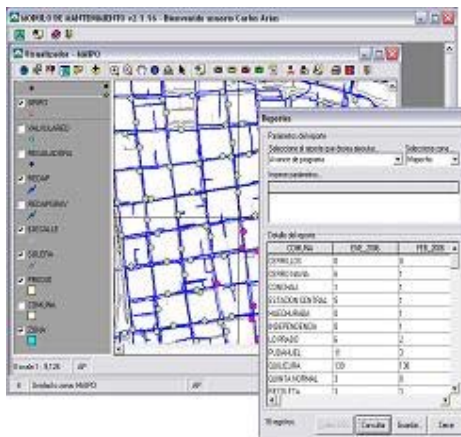


**4.3. Data Model.** The GIS data model is one of the main assets of the system; it was developed by the company strictly following our business model and is composed of a working model to address the recurring consultation and a extended model for the generation of less frequent reporting. It is modeled according to the topological structure of AP-AS networks.

**4.4. Updating procedures.** To ensure the adequate updating of the different levels of GIS information, it was developed rigorous procedures embedded in the processes where the data is generated. In general terms, these procedures consider the data generated by means of the expansion of networks, the corrective maintenance and special projects that contribute data into the system.

**4.5. Applications.** Having the information entered into the system and having the update process established to ensure the best information for the company, the biggest potential of the GIS is in applications that allow automated responses to consultation and analysis for the company. Among the applications developed by Aguas Andinas are:

**4.5.1 Failure and Cut-off Management Module**, this module allows to manage drinking water cut-offs for both scheduled and emergency, following the imposition of continuity applied by the superintendence. This module has a number of means to define cut-offs on the network following its connectivity, identifying those involved clients for warning. It also permits to generate valve upgrade warnings (sketches) to upgrade teams.



**4.5.2 Fireplug Maintenance Management Module**, this module allows to manage the maintenance of the fireplugs according to the instructions given by the superintendence. By means of this module it's possible to make an annual planning through tabular and geographical patterns. It also includes tools that allow carry out regular monitoring and extract reports according to formats required by the regulator.

**4.5.3 TESEO, On-Site Service Management Module**, this module manages, in an optimized way, the “job orders” and “mobiles in field” relationship. It also considers a real time full view of contact center job orders and mobiles located over an-up-to-date cartography database. Through this module, it is possible automatic or assisted job order dispatch and a two way communication channel between dispatch center and in-field mobile using a predefined set of messages.

Using Mobile, GPS and GPRS technologies, TESEO can achieve on-site customer service improve, resolving more job orders per mobile per time unit without loss of quality service.

This improvements leads to develop an open platform standard based that can connect with other GIS, CRM and mobile solutions.

The TESEO's configuration core will allow interoperability with different platforms, AVL technologies and a set of predefined business scenarios where fleet management problem are present.

This new technology is called TESEO PAK and will be available in 2010.



**4.5.4 Sketch module**, this module allows the production of sketches quickly and systematically. With this module the corrective maintenance teams report the location of the modified infrastructure, either for new installations, modifications or removals. Drawings generated are stored in a repository that are lessened by the update team.

**4.5.5 SAR Reclamations locator Module**, this module allows to georeference the incoming complaints or incidents incorporated to the Claims Care System. It has the same interface for the SAR consultations generation, which can be displayed afterwards, and transform into a Shapefile (local graphic GIS file) and/or a Excel spreadsheets.

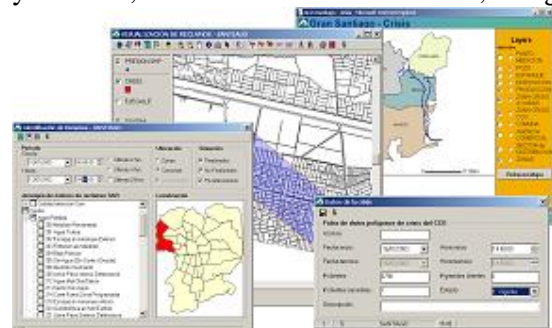
Corporate GIS – Documental System Relationship, with this application is possible to display the scanned maps and plans stored in the digital technical database.

**4.5.6 Corrective Maintenance Management Module for sewage networks**; the module permit to run the company’s “sewer cleaning program”. The trucks carry a PDA that allows to view the cleaning sector networks, and over the developed interface the operators enter the standard data of the completed cleaning. This application is based on PDA and GPS technology.

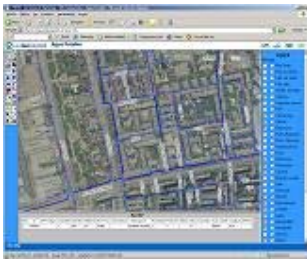


**4.5.7 Tablet PC for Larger pipes operations**, developed for pipe field operation using GIS. Its main features are: visualization of the network in field, display of scheduled and emergency cut-offs, creation of sketches in field, using of GPS technology

to identify pipes and distinguish network closures and sectorizations.



**4.5.8 Emergency Module;** georeference complaints from SAR, enabling operators from operational control center to generate influence polygons in areas of emergency and publish into intranet GIS for consultation and follow-up of the massive crisis.



**4.5.9 Intranet Module;** basic queries of drinking water networks, with this application you can display the location of the concession's area networks, look for associated descriptive data, search addresses, measure of distances and structured consultations. Also it has another version to display the drinking water cut-offs.

**4.5.10 SAP Reports SISS / BW Module;** with this module, you can create requested reports by the SISS (regulator) for basic infrastructure. It permits to generate and store the reports in time. In a narrow sense it is a Data Warehouse.

## 5. Conclusions

- With the development of Corporate GIS, the Company has improved its efficiency in business processes and effectiveness in customer service timing, both face and non-face.
- The level of development achieved in this field, allows the Company to be recognized as a market leader in the sanitary business and a reference among service companies.
- With the implementation of this system, it has been gradually consolidating a massive database for the company's assets, which permits reliable information to internal processes as well as to inform the regulator.
- The following challenges seek to integrate GIS with ERP to manage the maintenance of the assets benefiting from the advantages of using the spatial component in these processes and, on the other hand, the integration with CRM technology to generate a tool to participate in unregulated businesses.