

## **A Safe Approach in Implementing a GIS Solution**

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### **Abstract**

When a GIS solution was first considered at Petrobras Gas Business Unit by the beginning of 2003 the scenario we faced was demanding a reliable and efficient system to support the engineering division responsible for the conceptual design of new gas pipeline projects and management of the existing one's.

Many Petrobras gas pipelines are older than 20 years and some do not have yet a complete set of information even in paper format. To face ongoing demands from regulatory and environmental agencies we had started a GIS implementation with a different approach that has been given good results.

Petrobras has some GIS solutions already in place and spread all over the company but most of them lack some fundamental features and approaches that are fundamental for their systematic use as an invaluable tool.

To address internal and external demands for accurate and reliable information we decided on implementing a GIS system with a safe approach comprising some important steps.

This paper will underline the overall benefits that we have gotten from the adoption of the above described approach.

### **Introduction**

Planning is of fundamental importance when making an important decision such as implementing a GIS solution (*Tomlinson, 2003*). This is a normal procedure that applies for any project that would impact a company way of performing its work flow and adopted standards.

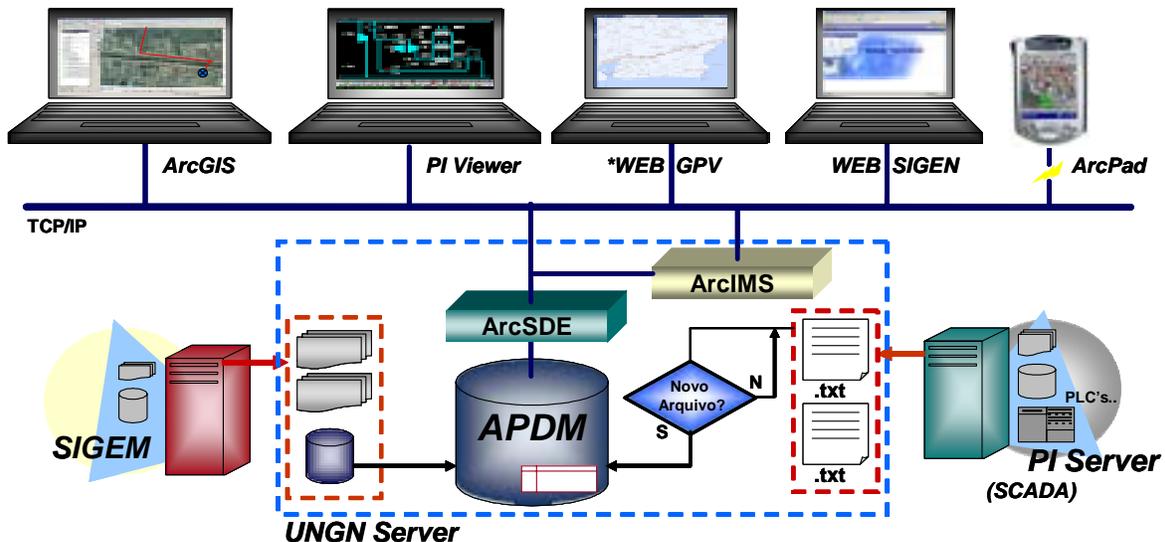
Technical and organizational aspects of the corporation should be taking into account. Some level of partnership with other divisions should be pursued so as to contribute to the success of the implementation. We can hardly succeed in this kind of solution if we do not focus on the company business.

The aforementioned approach was the driving force behind the GIS project for Petrobras Gas Business Unit. The challenge was to make available a reliable and safe GIS solution to support our engineering staff, as a first priority, while providing a system that would scale up progressively incorporating other divisions needs on a step by step approach. Internal and external demands for spatial data from new and existing gas pipelines projects in Brazil also created an urgent need for implementing a GIS system.

## Requirements

Any web based information system to be successful need to have at least three fundamentals attributes that we named SPS – Simple – Practicable and Speedy. As we selected the architecture for the implementation of our GIS solution these attributes were considered as of fundamental importance.

The ESRI ArcGIS technology fulfilled our requirements and was the best cost-effective solution. The adopted architecture is shown below.



One outstanding core component of our GIS solution is the APDM – ArcGIS Pipeline Data Model which is a data model for pipeline transmission.

## ArcGIS Pipeline Data Model – APDM

The ArcGIS Pipeline Data Model (APDM) is a data model. The APDM is designed for storing information pertaining to features found in gathering and transmission pipelines, particularly gas and liquids systems. The APDM model was expressly designed for implementation as an ESRI Geodatabase for use with ESRI's ArcGIS and ArcSDE products (*APDM White Paper, 2003*)

## Initial Focus on Natural Gas Logistics

One important decision we have made that proved to be of fundamental importance on the GIS implementation success was to keep the focus on the natural gas business and having a step by step approach as follows:

- Evaluation of the APDM capability.
- Identification of compatibility between our requirements and APDM
- Development of a user interface – Web Application

- Development of built in tools using VBA and ArcObjects for the Web Application
- Seamless integration between GIS Solution and the Company Information System
- Definition of a information workflow
- Pilot project implementation
- Incorporation of other Company departments into the GIS Solution

### **Development Team**

The GIS implementation was planned so as not to interfere with the on going activities of the engineering group. The GIS development team was composed of:

- 1 Senior Consultant
- 1 GIS Consultant Analyst
- 1 GIS Analysts
- 1 Web Designer
- 1 GIS Technician

### **Implementation Tasks:**

- Simultaneous users quantity definition
- Survey of existing data
- Hardware selection
- Information workflow definition
- APDM implementation
- Development of SQL scripts
- Implementation of the GIS architecture (ArcSDE – ArcIMS)
- APDM customization to interact with Company information system
- Landbase data loading
- Web application development
- Development of tools using VBA and ArcObjects

### **GIS Architecture**

#### Hardware

- Intel Xeon 2/2.2Ghz Server
- Web Pentium 3 /550Mhz Server
- Intel Pentium 4 2.4Ghz Server (Development Environment);
- Desktop Clients.

#### Software

- ArcInfo 8.3
- ArcEditor 8.3
- ArcView 8.3
- ArcPAD

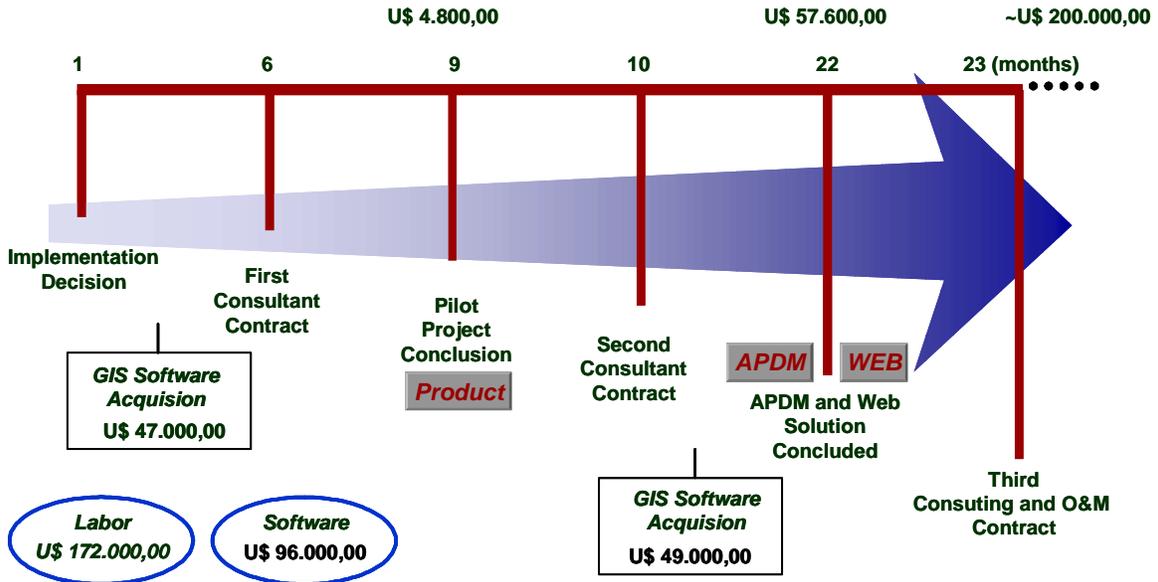
- ArcGIS Extensions
- ArcSDE 8.3
- ArcIMS 4.01
- Oracle 9i
- Microsoft® SQL Server

#### Simultaneous Users

- 10 Desktop clients;
- 100 Web clients;

### Implementation Costs and Schedule

The implementation cost of the above described scope was about US\$ 268.000,00 and the schedule is shown below.



### Benefits

High satisfaction level based on the following items:

- Support for new gas pipeline design
- Management of all gas pipeline data
- High information quality – reliability and integrity
- Support for quick and effective decision making
- Information tracking from different Project phases (Conceptual, Basic, Executive Design and Operation) by using Web application and APDM
- Cost and time savings in sharing information
- Support of different specialties of the Company

## **Final Considerations**

The challenge faced by the implementation team was rewarding. We could implement and test our GIS solution at a very low cost and without interfering with the ongoing tasks of our engineering department but taking advantage of each benefit the GIS Solution could provided as soon as the applications were implemented on the Pilot Project.

The decision on the scope and size of the GIS Solution to be implemented should take into account each Company particular needs and will be reflected on the schedule and implementation cost as well as the Company coverage.

We hope that our experience may contribute with useful information to anyone who will enter into a project of implementing a GIS Solution in your Company.

## **References:**

1. TOMLINSON, ROGER F. - Thinking About GIS, first edition: ESRI Press, 2003.
2. ESRI PIPELINE INTEREST GROUP APDM TECHNICAL COMMITTEE - APDM White Paper, Version 1.0, 2003.

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