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Analysis and design of a Geographic Information System for the OGX process Oil Exploration

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Tesis de grado presentada como requisito para la obtención del título de Magister en Sistemas de Información Geográfica

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DEDICATORIA

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RESUMEN

En estos días, la actividad de exploración petrolera se basa principalmente en la integración y el análisis multidisciplinario de datos de diferentes fuentes: Multipropósito, catastro, uso del suelo, fotografías aéreas e imágenes de satélite, separados como topográficos, geomorfológicos, geológicos, geofísicos de la tierra y el aire, y así sucesivamente. Además, las organizaciones garantes para la exploración petrolera deben establecer relaciones con un gran número de otras entidades, de las que toma o comparte la información manejada.

El procesamiento de la información por medio de la recopilación de datos, el almacenamiento y la manipulación a veces no tienen una estructura clara y lógica que permita a los tomadores de decisiones haciendo efectivamente en el negocio del petróleo.

En primer lugar, se tiene la definición y los conceptos teóricos básicos de medio ambiente, en segundo lugar una revisión paso a paso de la filosofía que nace con el sistema de información geográfica, para terminar con los resultados y análisis del visor web.

Dentro de esta investigación, las técnicas y los métodos utilizados pueden ser descritos como: observación básica, la creación de encuestas y cuestionarios, investigación-acción, el análisis y diseño de un sistema de información geográfica en la producción de la exploración petrolífera.

La metodología parte de un proceso heurístico, precedidos de búsqueda y recopilación de fuentes de información, que son características claramente diferentes y de la naturaleza, bibliografías, anuarios, monografías, artículos, trabajos especiales, documentos oficiales o confidenciales.

La fase hermenéutica, donde cada una de las fuentes investigadas fue leída, analizada y hecha su clasificación de acuerdo a la importancia en la investigación, tras la selección de

los puntos principales, se muestra los instrumentos diseñados para sistematizar la información bibliográfica recopilada.

Los resultados se muestran como el análisis y diseño de sistema de información geográfica adaptada a las necesidades de la compañía OGX, detallando en cada uno de sus procesos claramente expuestos, desde la concepción y requisitos. A través del diseño y modelado de base de datos geográficos, y servicios geográficos que figuran, mostrando que después de un buen diseño con la planificación estratégica puede tener éxito, sin dejar de lado las necesidades específicas del usuario final, que determinará en última instancia el éxito del desarrollo.

A lo largo del artículo, se puede ir por dentro del desarrollo de un SIG de la empresa, teniendo en cuenta que el costo de un GIS de la empresa no es sólo el costo del hardware y el software, la planificación inicial, normalización de datos, la comprensión de las aplicaciones básicas, adquisición de datos, sistemas de desarrollo de aplicaciones y despliegue terminará costos involucrados.

ABSTRACT

In these days, the oil exploration activity is mainly based on the integration and multidisciplinary analysis of data from different sources: Multipurpose cadastre, land use, aerial photos and separate satellite images such as topographic, geomorphological, geological, geophysical, land and air, and so on. In addition, organizations guarantors for oil exploration establish relationships with a large number of other entities, from which it takes or have to share the information handled.

All of this process has significant benefits as it puts the information right in the hands of an end user, but it also results in problems like fractured databases, lack of synchronization, data duplication, loss of data and ultimately loss of productivity and accuracy. Unorganized growth also leads to proliferation of systems with attendant interoperability and compatibility problems. Here an enterprise Oil [1]GIS as the answer to that kind of problems. Such a system designed to provide an integrated and interoperable environment in which the different departments and functionaries of an enterprise can make, access, view, and analyze data relevant to their tasks. This information can incorporate spatial as well as non-spatial datasets. Applications could range from complex spatial models to delivery of services encompassing government, business and citizens.

The processing of information by means of data collecting, storage and manipulation does sometimes not have a clear and logical structure that allows decisions makers doing effectively in the oil business.

Firstly, we have the definition and basic theoretical concepts of environment, secondly a review stepper of the philosophy which was conceived with the geographic information system, ending with the results and analysis of the same Web viewer.

[1] Geographic Information System

Within this research, techniques and methods used can be described as: basic observation, creation of surveys and questionnaires, action research, analysis and design of a geographic information system in the oil exploration production.

The methodology starts from a heuristic process; there are preceded to search and collection of information sources, which were distinctly different characteristics and nature, bibliographies, yearbooks, monographs, articles, special works, official or confidential documents.
Hermeneutics Phase; where each of the investigated sources was read, analyzed, and understand its classification according its importance in the research, following the selection of the main points will demonstrate the instruments designed to systematize that bibliographic information collected.

Results are shown as the analysis and design of geographic information system tailored to the needs of the company OGX[2], detailing in each of its processes clearly exposed from conception and requirements. Through modeling and Geodatabase design, creating business SIGEX[3] viewer, and geographic services set out in, showing that after a successful design with strategic planning can be successful, without leaving aside the specific requirements of the end user who will ultimately determine the success development.

Throughout the paper, we can go inside the development of an Enterprise GIS and note that the cost of an Enterprise GIS is not just the cost of the hardware and software, the initial planning, data standardization, understanding of core applications, data acquisition, systems applications development and deployment will end up front costs involved.

[2] Oil and Gas Exploration Company

[3] Geographic Information System for Exploration Viewer

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1. INTRODUCTION

The use of geography in the study and decision making is not new in the industry of oil. A good knowledge of geography is required in many processes of an oil production from locating a place to drilling a well, route a pipeline from the exploration site to the refinery plant, finding an ideal location for a refinery and more (Yeung, 2002). All these procedures rely heavily on geography to achieve business goals. The convergence of GIS and other technologies, particularly relational database management systems (RDBMS)4 with the maintenance of spatial data through spatial cartridges, has opened a new era (IGAC, 1995). These technologies will lead the spatial components of all days "business objects", such as leases, wells, pipelines, environmental concerns, facilities and outlets in the corporate database and implement appropriate geographic analysis efficiently in a desktop application. (Aquilino, 1996).

This includes the process of exploring new locations with oil reserves, the management of crude oil from the earth strata (Barrell, 2003), the management of the pipeline system to transport crude sources to treatment plants and facilities management models various resources connected to a major industry (Aquilino, 1996).

Discovering new sources of oil before competitors is one of the key skills to keep successful in the oil industry. While the application of GIS is relatively new in the oil industry, it surely becomes a high value tool (Alekhya Datta, 2009). An efficient GIS can help evaluate the potential for oil in promising locations (Yeung, 2002). Compared to other pipe network planning tools (e.g. Computer aided design CAD) the value of a GIS program is its ability to analyze. Oil exploration is a hugely complicated process and depends on a multitude of variables (Barrell, 2003). The analysis capabilities of GIS programs are able to reduce the price of oil exploration, by analyzing the potential of oil that is in a potential location and the potential performance of an oil field (Yeung, 2002). GIS is also used to control the conditions and the flow of oil and choose the best locations for the pipelines

[4] Relational DataBase Managment System

used to transport oil fields and refineries (Alekhya Datta, 2009). Exploration requires analysis of a large number of different types of information such as satellite images, digital aerial photography mosaics, seismic surveys, surface geology studies, subsurface location and interpretations and cross-sectional images and the existing information and infrastructure (Yeung, 2002). A GIS can join these data, together with the location in question and allows superimpose, view and manipulate data as a map to analyze in depth the possibilities of finding new or expanding gaming opportunities (Barrell, 2003).

The integration of GIS in the current business model of the oil industry is not an easy process, requires a thorough understanding of the requirements and details of the practices of the oil companies (Aquilino, 1996). Seeing a positive sign of growth and progress of GIS companies in this important sector of the GIS and its partners have begun to take this billion dollar industry (Barrell, 2003). All significant GIS companies have been involved in the development of new solutions for the oil industry over the past three decades (Acharya, 2009). Groups of users, GIS consultants, oilfield service companies, petroleum engineers, suppliers of GIS data, hardware vendors and software vendors make to the growth and development that enable innovative and analytical processes for the industry (Shekhar, 1997). There is a marked increase in the supply of a single application package oil and research component that can be added to the basic result of GIS. Especially the members of all leading GIS companies are offering customized solutions in the base product (Yeung, 2002).

To produce the reserves found, the company must first understand certain geographic infrastructure, business conditions, and environmental factors on the area in question (Acharya, 2009). GIS technology is ideal for this type of analysis of overlap and can be integrated with other business risk, or financial planning firm motors to provide a number of business tools focused solutions (Kumar, 2003).

The global nature of the oil industry results in an infrastructure that is particularly strong and weighty. A large company, integrated oil must keep track of everything from drilling rigs to pipeline networks of refineries (Barrell, 2003).

This inform provides analyses and design showing the commercial, operational and environmental conditions, in which adverse facilities exist that are particularly relevant to make planned, operated and maintained effectively (IGAC, 1995). Often, the search for a financial condition is so dependent on a reasonable and proper application of the structure of the facilities is in the exploration and production itself (Barrell, 2003). We can see through the report that it is true that the profitability of a business enterprise often depends largely of the installation. SIG infrastructure can be used to map the collection and transmission of products to a facility. Once there, integration with more traditional "plant" infrastructure management systems, such as CAD, attribute records and scanned documents, permits actual geographic placement of CAD entities complement the architectural CAD (Yeung, 2002).

2. BACKGROUND AND ADDITIONAL CONSIDERATIONS

2.1 Pipeline Management

The piping system is one of the most powerful and intelligent components of the oil industry. The creation and management of a network of functional pipelines requires a thorough research and study of the geographical locations (Barrell, 2003), business needs and manage the use of resources in major productions and transfer of crude oil and refined petroleum reserves at the refinery and then respectively to the storage units (Aime, 1999). The competitive pressure and regulatory constraints are posing increasing demands for pipeline operators to operate efficiently and responsibly. In response to these demands requires accessibility to information distributed geographically operations (Barrell, 2003). GIS items can be used in the site location process to minimize environmental impacts during construction and accidental release and to reduce costs of permits and liability risks associated with accidental spills (IGAC, 1995). Ecological variables developed from public spatial data sets can be used in this process (Aime, 1999). The themes and variables used as input in this process, mainly against the direct costs of construction and network efficiency once the pipeline has been completed (Aquilino, 1996).

The potential costs of environmental impacts during construction and ecological costs and liability arising from accidental releases after construction also account with the cost factor of the oil company (Aquilino, 1996). Some of these costs can be substantial (potentially millions of dollars).

A growing number of spatial data sets the environment has become available to the general public, offers an excellent opportunity for companies to avoid these environmental risks and responsibility with relatively little effort to incorporate them into their normal GIS procedures. GIS technology facilitates the planning and management of data with a geographic component (Aquilino, 1996). It also facilitates the collection and use of data. GIS provides the pipeline operator with enhanced ability to manage the products, improved efficiency in the operations of the pipeline, and a better response to business development opportunities (Aime, 1999).

2.2 Management and distribution

This includes the distribution of petroleum products to different countries and finally to the retail units as service stations, gas stations and other petroleum products retail store (Barrell, 2003). This is the place where there are plenty of activities for GIS development can take place. Retail businesses can use the power of GIS systems to optimize their business intelligence tools GIS research and planning tools and offer better customer service and outlet (Srinivas 2009).

2.3 Use of GIS in the oil industry

Oil companies have traditionally interested particularly easily in the [5]IT investment, through many parts of their business operations (Acharya, 2009). In the last five years, a significant proportion of that investment has been directed towards the component "spatial data", so now some of the largest independent and national oil companies (NOCs) are the main exponents of management spatial data "and the effective use of GIS (Barrell, 2003). This development is perhaps inevitable, given the relatively high investment by these companies in their IT infrastructures and the highly significant fact that business processes have on spatial data (Acharya, 2009). Virtually all business operations of oil from regional geological exploration through field evaluation, development, product distribution, facilities management and environmental modeling for retail or commercial and domestic supply are based on fundamental components of spatial data, allocated in the context of these systems employed in "business objects in space" (Acharya, 2009). This is true for many other industries, but oil companies have been (relatively) rapid employment of appropriate GIS technologies to manage and use these data to better understand and plan their critical business processes (Barrell, 2003). Starting today, most significant oil organizations involved in various programs of data consolidation, compression and conversion, with more economical and efficient management of their files integrated information (Acharya, 2009).

2.4 Difficulties in process

Incomplete methodologies: Most modeling techniques and systems are designed with requirements specification where spatial attributes are not part of the core of diagrams and

[5] Information Technology

operations, although there are extensions to include georeferenced information, they are not yet sufficiently implemented, (Acharya, 2009). The same happens with the temporal component inherent in many physical processes and the third dimensions as elements, are to handle methodological either requirements related to their capture (Barrell, 2003).

Heterogeneous stakeholders: GIS was part of areas where users belonged to the scientific community, in many cases with no computer experience, so the system requirements gathering was done exceptionally diversified (Acharya, 2009). The popularization of the internet and the increasingly frequent use of GIS as a tool to support decision making by government and individuals aggravated the situation, greatly expanding the use of the system.

Complexity of information: information space has properties that make easy work of data modeling, which is developed in the requirements analysis (Acharya, 2009). The georeferenced information is quite bulky, and cause high costs most organizations that should go to different sources to provide themselves with the necessary data for an application (Barrell, 2003). As a consequence, inhomogeneous available information base, with different quality characteristics, scale and present together. For this reason, it is impossible to establish relationships often between information entities connected but logically inconsistent in practice (Acharya, 2009). Also, as, discussed above, the methodological short comings that do not meet the needs of GIS overlook cause analysis requirements these obstacles to the development of the application, not recorded as attributes of quality, scale etc (Alekhya Datta, 2009).

2.5 Difficulties inherent in product

Must consider regarding the spatial elements that represent geometric primitives (points, lines and polygons) and behavior in time of this representation (Acharya, 2009). This component is used to latter discretize continuous phenomena over time or location in space of mobile elements (a car on a road network) (Barrell, 2003).

Component third dimension: GIS as a legacy of the work of geography with maps, representing two-dimensional phenomena, forgetting the third dimension, which generally represents the altitude.

The use of computer technology makes it possible to consider all the dimensions, but the modeling and specification languages have recently been considered (Alekhya Datta, 2009).

Component quality: this is usually little considered. It involves the concept of metadata which is generally described as the data of the data and attributes enable refers that evaluate the quality of geo-referenced information, such as the year of birth, working scale, applied processes lift refining process (digitizing on, fieldwork, gps[6], remote sensing), reliability and more (Srinivas 2009).

Component level: it should be according to the scale of observation the same entity can be represented by different geometric primitives (Alekhya Datta, 2009). So observed at 1:500,000 reservoirs seen as a point, but to expand the scale is 1:25,000, Transformed into a polygon where we can see the limits of the same (Srinivas 2009).

For many years, scientists in different fields of studies used GIS or geographic information systems successfully to create different kinds of geospatial datasets (Acharya, 2009). In the energy sector, the utilization of GIS contributed significantly in improving the efficiency of exploration and distribution of energy (Barrell, 2003). For example, oil and gas GIS have been used to create structured, and historical maps to pinpoint exact locations of gas basins and oil deposits. Gas pipeline GIS, on the other hand, have been used by energy companies to improve distribution services from the production facilities to the consumers (Alekhya Datta, 2009).

Only in the United States, there are more than 150 gas pipelines for the distribution of crude oil. These pipelines run for several hundred miles underground spanning across the 48 states including the gas pipelines in Canada and Mexico (Barrell, 2003). An energy distribution company, therefore, faces an extreme dilemma in identifying its oil and gas pipelines without the help of geospatial data (Acharya, 2009). Although there are existing cartographic renditions of the structural layout of the North American oil and gas pipeline systems, some pipeline maps maybe out of date or could be unreliable (Alekhya Datta, 2009). With the introduction of the GIS, companies can now utilize oil and gas GIS and

[6] Global Posisioning System

gas pipeline GIS accurately locate the exact positioning of the pipelines. Such datasets can be easily ordered online in digitized or printed formats from those Strategies.

Oil exploration companies on the hand face different problems compared to energy distributors. Oil and gas exploration companies specifically need to accurately map network geometries of different gas basins and oil deposits which are of miles (Barrell, 2003). The need to map large geographical areas that are not contiguous and separated by different terrain levels and territories is essential in order to meet the logistical requirements of oil exploration (Acharya, 2009). Another critical function of oil and gas GIS for exploration is to provide support facilities for long distance designs and engineering projects, as well as for monitoring and maintaining remote locations. Oil and Gas GIS for exploration takes into consideration accessibility issues for existing projects and for projects that are being planned by the energy companies (Alekhya Datta, 2009).

In order to overcome the difficulties of energy exploration and distribution processes, it would be crucial for the company to take advantage of modern oil and gas GIS as well as gas pipeline GIS datasets (Barrell, 2003). These datasets can be used to intelligently built a strategic approach to exploration and distribution in order to ensure the competitiveness of the company. By getting oil and gas, the engineering team will not waste time and effort in conducting costly cartographic activities. Instead of losing time on ground surveying, the remote work teams can directly drill the ground based on oil and gas GIS data (Acharya, 2009).

3. THEORY

3.1 *GIS project phases.*

By its multidisciplinary nature, is difficult to divide a GIS project into phases that following a specific knowledge field. Some approaches combine elements of the method of science and engineering project management together with the classical scheme of development of software applications (IGAC, 1995), but it has been noticed that the phases of obey the GIS project implementation units functional given below. (Aquilino, 1996) (Shekhar, 1997)

3.1.1 *Data Entry*

Geographic information systems are fed by data from remote sensors (radar, satellite images), global positioning systems (GPS) and scans on existing information. Through this process, many times the information manually prepares to feed a specific system is discretize continuous data and validates the information to comply with topological relationships (neighborhood, content, intersection etc.). Also, carried out an assessment of the quality of information and starts the construction of the metadata (Aquilino, 1996).

3.1.2 *Data Modeling*

It builds the conceptual model of information giving logical sense to information collected, information is stored in layers or themes, which have prioritized an attribute territory, establishing partitions on the continuity of phenomena space according to a value or range of values. This organizes information modeling preparing it to be stored in a database (Aquilino, 1996).

3.1.3 *Data Handling*

It is at this stage that all GIS system own-mind comes into action through modeling represented in raster map algebra, generalizations, intersections, junctions, etc. Adjacency analysis required under any methodology to obtain the desired results that favored the project meets its objectives.

Presentation of results

Finally, the results of the project should reach interested users to power and subsequent processes. Here, are located generally related sciences building information technology applications that allow visualization, query and information organization result of a project to characterize a territory (Aquilino, 1996) (Shekhar, 1997).

3.2 Enterprise Geodatabase

Due to the enterprise Geodatabase is one of the foundation elements for seamless, organization-wide use of GIS, management staff need a clear understanding of its role and capabilities (ESRI_2012).

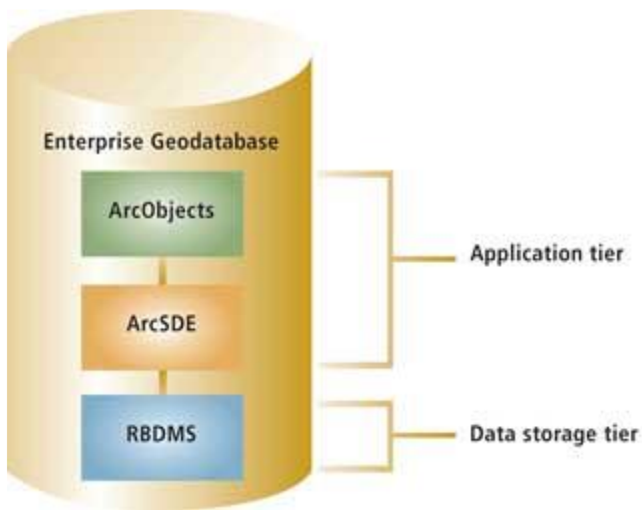

Figure 1. ESRI 2002, Enterprise Geodatabase tiers, esri.com

The Geodatabase is the native data format for ArcGIS. It is a data storage container that defines how data is stored, accessed, and managed by ArcGIS. The term *Geodatabase* combines geo (spatial data) with database (specifically a relational database management system or RDBMS). ArcGIS 9.2 has three types of geodatabases: Microsoft Access-based personal Geodatabase, file Geodatabase, and ArcSDE Geodatabase (ESRI_2012).

Personal and file geodatabases are designed for single users and small projects. ArcSDE geodatabases are scalable and designed for larger-scale use, ranging from medium to enterprise-wide implementations. These geodatabases require ArcSDE technology and are available at three levels (in ascending order of capacity and functionality): personal geodatabase (ArcSDE Personal), workgroup geodatabase (ArcSDE Workgroup), and enterprise geodatabase (ArcSDE Enterprise). This article deals with ArcSDE enterprise geodatabases (ESRI_2012).

3.2.1 *Enterprise Geodatabase Architecture*

At a conceptual level, an enterprise geodatabase consists of a multitier architecture that implements advanced logic and behavior in the application tier (e.g., ArcGIS software) on top of a data storage tier (e.g., RDBMS software). The application tier can be further subdivided into two parts—ArcObjects and ArcSDE technology. The responsibility for managing geographic data in an enterprise geodatabase is shared between ArcGIS and whichever RDBMS is used.

On the data storage tier, RDBMS software provides an easy, formal data model for store and manage information in tables. The schema of an enterprise geodatabase is persisted in the RDBMS as a collection of tables known as the ArcSDE Repository. Aspects related to data storage and retrieval are implemented as ordinary tables and certain aspects of geographic data management, such as disk-based storage, definition of attribute types, query processing, and multiuser transaction processing, are executed by the RDBMS. IBM DB2, IBM Informix, Oracle, and Microsoft SQL Server platforms are currently supported by ArcGIS. At version 9.3, PostgreSQL will be supported.

ArcSDE technology forms the middle tier. Prior to ArcGIS 9.2, ArcSDE was a separate software product. At ArcGIS 9.2, ArcSDE was integrated into both ArcGIS Desktop and ArcGIS Server and is now formally known as ArcSDE technology. As the gateway between GIS clients and an RDBMS, ArcSDE serves spatial data and enables that data to be accessed and managed within an RDBMS. It is implemented as several components—a directory of executables, a set of tables and stored procedures in the database (i.e., The ArcSDE Repository), and an optional service. These components will be discussed in more detail (ESRI_2012).

ArcSDE technology provides fundamental capabilities that include

- Access and storage of basic feature geometry in the RDBMS
- Support for native RDBMS spatial types (if available)

- Spatial data integrity
- Multiuser editing environment (i.e., Versioning)
- Support for complex GIS workflows and long transactions
- Geospatial data integration with other information technologies

The upper level of the application tier, ArcObjects, implements geodatabase application logic. This set of platform-independent software components is written in C++ and provides services to support GIS applications as thick clients on the desktop and thin clients on the server. This technology component is built into GIS clients (e.g., ArcGIS Desktop) and implements more complex object behavior and integrity constraints on basic features, such as points, lines, and polygons, stored in an RDBMS. In other words, ArcObjects implements behavior on the feature geometries. Feature classes, feature datasets, raster catalogs, topologies, networks, and terrains are all examples of geospatial data elements within the geodatabase data model for which ArcObjects provides the application logic that implements GIS behavior on top of basic spatial features stored in an RDBMS (ESRI_2012).

The three enterprise geodatabase architectural tiers are defined at a conceptual level. To most end users, working with the architectural tiers of the enterprise geodatabase is an easy, transparent process. GIS managers or database administrators most likely work directly with these tiers only during the setup and configuration of an enterprise geodatabase or when performing maintenance (ESRI_2012).

3.2.2 *Enterprise geodatabase capabilities*

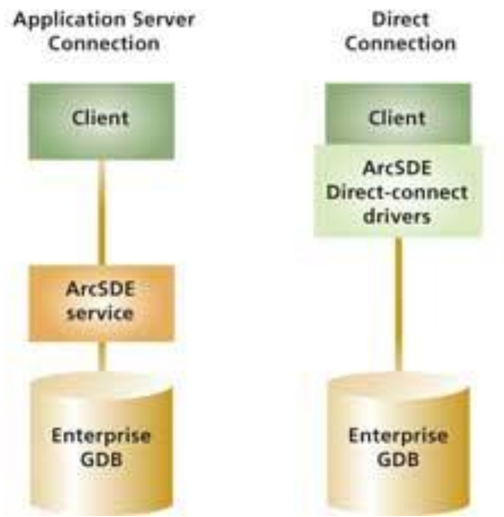

Figure 2. ESRI 2002, Application server connection or a direct connection, esri.com

Designed for large-scale systems, the enterprise geodatabase, can be scaled to any size, support any number of users, and run on computers of any size and configuration. It takes full advantage of the underlying RDBMS architecture to provide high performance and support for extremely large continuous GIS datasets. RDBMS functionality supports GIS data management for scalability, reliability, security, backup, and data integrity. In addition to supporting many users with concurrent access to the same data, an enterprise geodatabase can be integrated with an organization's existing IT systems.

Some of the aspects of ArcSDE technology that contribute to these capabilities include the following (ESRI_2012).

3.2.3 *Versioning*

With versioning, the ArcSDE geodatabase can manage and maintain multiple states while preserving the integrity in the database. Versioning is the default ArcSDE geodatabase editing environment that explicitly records states (i.e., versions) of individual features and objects as they are modified, added, and/or retired. It enables multiple users to access and edit the same data simultaneously and provides long transaction support. Simple queries are used to view and work with any desired state for a particular point in time or see an individual user's current edits (ESRI_2012).

3.2.4 *Nonversioned Editing*

Using nonversioned editing is equivalent to a standard database transaction. The transaction is performed within the scope of an ArcMap edit session and the data source is directly edited. Nonversioned edit sessions do not store changes in other tables as versioned edit sessions do (ESRI_2012).

3.2.5 *Geodatabase Replication*

With geodatabase replication, data is distributed across two or more geodatabases in a manner that allows them to synchronize any data changes that are made. It is built on top of the versioning environment and supports the full geodatabase data model including topologies and geometric networks. In this asynchronous model, the replication is loosely coupled. This means each replicated geodatabase can work independently and still synchronize changes with other replicated geodatabases.

Because geodatabase replication is implemented at the ArcObjects and ArcSDE technology tiers, the RDBMSs involved can be different. Geodatabase replication can be used in connected and disconnected environments and can also work with local geodatabase connections as well as geodata server objects (through ArcGIS Server), which enables access to a geodatabase over the Internet (ESRI_2012).

3.2.6 *Historical Archiving*

When enabled for a dataset, historical archiving captures all data changes in the DEFAULT version of the enterprise geodatabase by preserving the transactional history as an additional archive class. ArcGIS applies transaction time when changes are saved or posted to the DEFAULT version to record the moment of change to the database (ESRI_2012).

3.2.7 *Enterprise Geodatabase Components*

A typical enterprise geodatabase installation has three main components—the ArcSDE home directory, the ArcSDE Repository, and the ArcSDE service.

3.2.8 *The Arcsde Home Directory*

When the ArcSDE component of ArcGIS Server is installed on the server, this directory is created. It is referenced in the server operating system by an environment variable named %SDEHOME%. The directory contains the ArcSDE command line executables, ArcSDE configuration files, geocoding and language support files, log files (for troubleshooting ArcSDE server issues), help documentation, and some sample utilities.

The ArcSDE command line executables are a collection of binary files that can be run at the command prompt by geodatabase administrators to create, configure, manage, and monitor both the enterprise geodatabase and ArcSDE service. ArcSDE command line executables include a set of commands for data import and export at the ArcSDE technology tier of the enterprise geodatabase (ESRI_2012).

3.2.9 *The Arcsde Repository*

The internal system tables and stored procedures that are installed in the RDBMS during the ArcSDE postinstallation are owned and managed by the geodatabase administrative user created in the first step of the ArcSDE postinstallation. They are self-managed internally by both ArcGIS and the RDBMS via stored procedures and should not be edited manually.

ArcSDE Repository tables can be subdivided into ArcSDE system tables and geodatabase system tables (i.e., system tables prefixed with GDB_). ArcSDE system tables work at the ArcSDE technology tier level and contain basic metadata for ArcSDE, store feature geometry and raster data and manage the versioning environment. The geodatabase system tables work at the ArcObjects tier level and store information on geodatabase behavior and functionality for topologies, networks, and domains. These two groups form the schema of the enterprise geodatabase (ESRI_2012).

3.2.10 *The Arcsde Service*

Also, commonly called the giomgr process (an abbreviation for geographic input/output manager), the ArcSDE service is a persistent service on the ArcSDE server that is dependent on the RDBMS instance. The *giomgr* process supports application server connections to the enterprise geodatabase.

The ArcSDE service listens for incoming client connection requests on a dedicated port and helps enable clients to connect to the geodatabase. A typical enterprise geodatabase installation has one associated ArcSDE service; however, the ArcSDE service is not required if only direct connections are made to the enterprise geodatabase (ESRI_2012).

3.2.11 *Client connections types*

Clients typically communicate with an enterprise geodatabase over a network using TCP/IP protocols and can connect to an enterprise geodatabase in two ways—using an application server connection or a direct connection (ESRI_2012).

3.2.12 *Application server connection*

This traditional client-connect method involves the ArcSDE service, which listens for client connection requests. When a client application, such as ArcGIS Desktop, requests a connection to the enterprise geodatabase, a *gsrvr* (an abbreviation for geographic server) process is launched by the ArcSDE service and provides a dedicated link between the client and the geodatabase. The ArcSDE service continues to listen for connection requests.

The connection to the geodatabase is based on the user name and password submitted. Dataset access depends on the permissions established for the user by the geodatabase administrator. The *gsrvr* process remains connected to the geodatabase until the client releases the connection by closing the application. This connection method is commonly called a three-tier connection because it involves the client application, the geodatabase, and the *giomgr* and *gsrvr* processes. In this method, most of the work is performed on the server (ESRI_2012).

3.2.13 *Direct connection*

With this method, clients connect directly to the enterprise geodatabase without using the ArcSDE service. Communication between the clients and geodatabase occurs via ArcSDE direct-connect drivers, located on the client side, not through the ArcSDE service. Client machines must be configured for network access.

ArcSDE direct-connect drivers are automatically installed for the whole ArcGIS product suite, the ArcView 3.x Database Access extension, ArcIMS, ArcInfo Workstation, and MapObjects. For custom applications built from the ArcSDE C API, the ArcSDE direct-connect drivers need to be enabled with application to support this functionality.

Direct connection drivers are built from the same software code used to build the ArcSDE service. The difference is that direct connect drivers are built as dynamic-link library files and execute in the process space of the client application, whereas the ArcSDE service was built as an executable program that runs on the ArcSDE server (ESRI_2012).

With this connection method, commonly called a two-tier connection because it only involves the client application and the geodatabase, some of the work that would have occurred on the server with the application server connection is performed on the client.

To have ArcSDE server handle the majority of the ArcSDE processing load, use application server connections. When the client machines have enough resources to handle some of the ArcSDE processing load, use direct connections, direct connections may cause more network traffic. Both client connection methods can be supported for the same enterprise geodatabase in any combination and configuration (ESRI_2012).

3.3 GIS server

ArcGIS Server is a distributed system consisting of several components that can be distributed across multiple machines. Each component in the ArcGIS Server system plays a specific role in the process of managing, activating, deactivating, and load balancing the resources that are allocated to a given service or set of services.

The components of ArcGIS Server can be summarized as:

- GIS server—Hosts and runs services. The GIS server consists of a server object manager (SOM) and one or more server object containers (SOCs).
- Web server—Hosts Web applications and Web services that use the objects running in the GIS server.
- Clients—Web browsers can be used to connect to Web applications running in the Web server. Desktop applications can connect either through HyperText Transfer

Protocol (HTTP) to ArcGIS Web services running in the Web server, or connect directly to the GIS server over a LAN or WAN.

An ArcGIS Server system also includes a set of services; Web applications, ArcGIS Explorer Maps, and KML network links that have been published on the server, as well as a Manager application for creating and organizing them. This group of services and applications, with its associated Web server and GIS server, is called an ArcGIS Server instance (ESRI_2012).

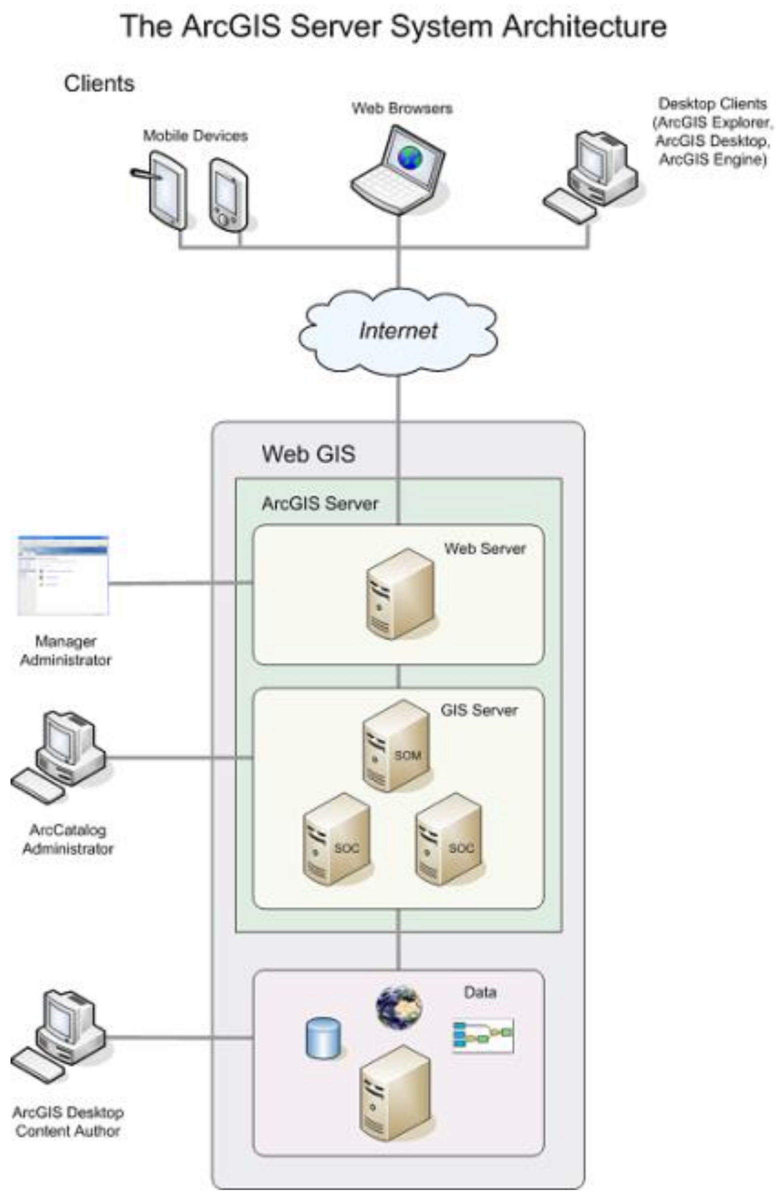

Figure 3. ESRI 2002, The ArcGIS Server system architecture, esri.com

3.3.1 *The GIS Server*

The GIS server is composed of a server object manager (SOM) and server object containers (SOCs). The SOM manages the set of services that are distributed across one or more SOCs. When an application makes a direct connection to a GIS server over a LAN or WAN, it is making a connection to the SOM.

Server object containers (SOCs) host the services that are managed by the SOM. All services run on all container machines, so it is crucial that all container machines have access to the resources and data necessary to run each service. This can set the capacity value of a SOC machine to limit the number of running services it can host at one time.

Each container machine is capable of hosting multiple container processes, which are processes in which one or more services are running. The SOM starts and shuts down the container processes. The objects hosted within the container processes are ArcObjects components that are installed on the container machine as part of the installation of ArcGIS Server.

The SOM and SOC are processes that run on a machine; therefore, a single machine can act as both a SOM and a SOC in an ArcGIS Server configuration. If desired, the Web server and the ADF can coexist with the SOM and the SOC, allowing for a deployment of ArcGIS Server on just one machine (ESRI_2012).

3.3.1.1 Server Directories

The server manages several types of directories, which are used to store files that the server needs for its work.

- *Output directories* are for temporary files needed by the server. Sometimes, these files will be returned to the user as output, such as map images. Some service types, such as geodata services, require output directories. For other services, an output directory is optional or not needed.
- *Cache directories* store caches of pre-rendered map tiles that map services can use for faster display. Can use ArcCatalog to create a cache.

- *The jobs directory* stores files needed by geoprocessing services. Often, geoprocessing tasks require a space to write temporary files and store information about ongoing jobs. These items are stored in the jobs directory (ESRI_2012).

3.3.1.2 *Processes started by the GIS server*

The Windows service "ArcGIS Server Object Manager" represents the GIS server. This service starts the following processes which will always be running on a healthy GIS server, even when all GIS services have been stopped:

ArcSOM.exe - 1 instance

- Server Object Manager process - Acts as a broker for requests to the various services

ArcSOC.exe - 2 instances

- Server Log Process – Records log messages generated from services.
- Server Directory Manager – Cleans ArcGIS Server directories.

The above-mentioned ArcSOC.exe processes can be created on any SOC machine are indistinguishable from other ArcSOC.exe processes except by size. The logging and directory processes are generally smaller than ArcSOC.exe processes that represent GIS services (ESRI_2012).

3.3.2 *The Web Server*

The Web server hosts server applications and Web services written using the ArcGIS Server API. These server applications use the ArcGIS Server API to connect to a SOM, make use of services, and create other ArcObjects for use in their applications. These Web services and Web applications can be written using the ArcGIS Server Web Application Developer Framework (Web ADF). Examples of Web applications include mapping applications, disconnected editing applications, and any other application that makes use of ArcObjects and is appropriate for Web browsers.

Web services can expose, for example, map and geocode services that desktop GIS users can connect to and consume over the Internet. It is possible to create native Web services whose parameters are not ArcObjects types, but do perform a specific GIS function. For example, it could write a Web service called Find Nearest Hospital that accepts x,y coordinates as input and returns an application-defined Hospital object that has properties such as the address, name, and number of beds.

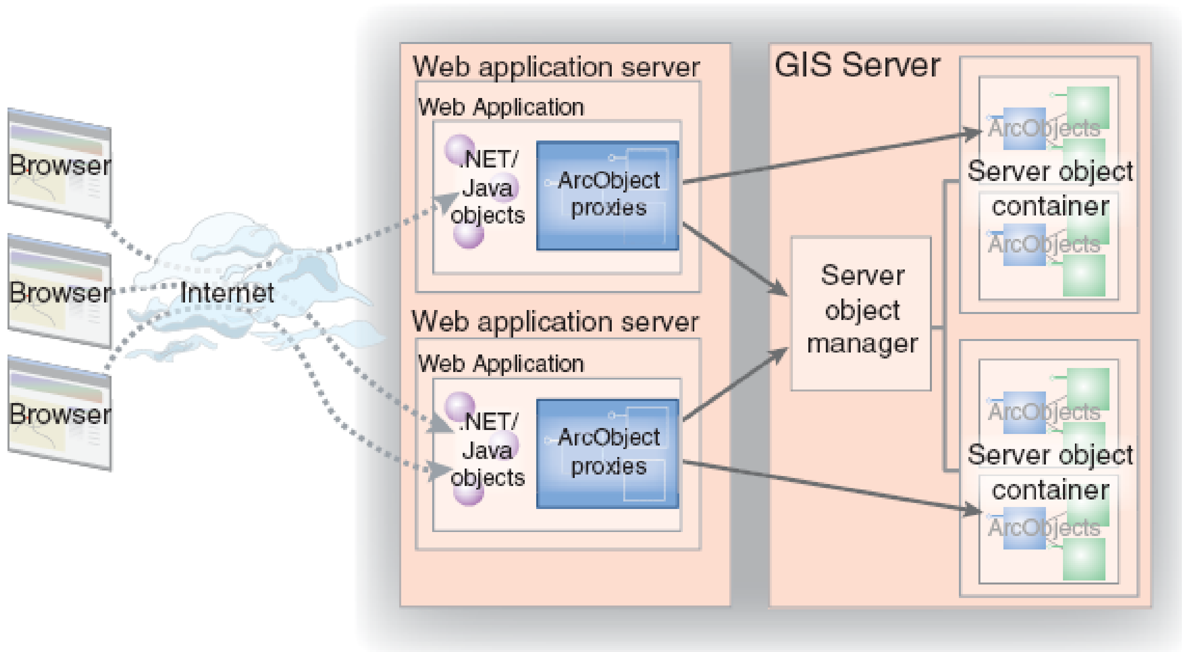

Figure 4. ESRI 2002, Web Server (ESRI_2012), esri.com

3.3.3 *Clients*

Clients of an ArcGIS Server system can include any of the following:

3.3.3.1 Web Browsers

Anyone with a web browser and an Internet connection can perform GIS tasks on services using an appropriately designed web application. The ADF provides tools for creating web applications that make use of services. Since all the work is done on the server, end users of these web applications do not need to have any GIS software or ArcObjects installed on their machines (ESRI_2012).

3.3.3.2 ArcGIS Explorer

ArcGIS Explorer is a free lightweight desktop client for ArcGIS Server that can display data in three dimensions. It can add the ArcGIS Server services as data in ArcGIS Explorer for a rich navigation and viewing experience. For advanced functionality, can use the ArcGIS Explorer SDK to develop custom tasks that work with the services (ESRI_2012).

3.3.3.3 ArcGIS Desktop

Connect to ArcGIS Server using ArcGIS Desktop applications to make use of services running in the server. ArcGIS Desktop applications that can access services include ArcMap, ArcCatalog, ArcGlobe, and ArcReader.

With ArcCatalog, can connect to a GIS server directly on the LAN or WAN. It can also specify the URL of a GIS server or a specific Web service running on that GIS server to indirectly connect to a GIS server over the Internet (ESRI_2012).

3.3.3.4 ArcGIS Engine Applications

ArcGIS Engine applications can utilize the GIS server in a variety of ways. The simplest is by working with services in the form of data inside map or globe documents. An ArcGIS Engine developer could also design an application that sends data off to the GIS server for advanced tasks such as spatial analysis that require extensions only licensed on the server machine. Conversely, the application might request data from the server to edit or analyze within the rich user interface of the ArcGIS Engine application (ESRI_2012).

3.3.3.5 ArcGIS Server Instances

An ArcGIS Server instance is a way of grouping a Web server, an associated GIS server and a set of services and applications. By default, ArcGIS Server installs one instance named ArcGIS, but can add additional instances. In large ArcGIS Server deployments, multiple instances can be useful in organizing resources between different departments in an organization.

An instance consists of the following:

-A Web server

-A GIS server (SOM and SOCs)

-An ArcGIS Server Manager application

-A set of GIS services

-Web applications

-ArcGIS Explorer maps

-KML network links

Instances can share the same Web server and even the same SOCs, but they must use different SOMs. The set of applications and services also differs between instances. Before create a new instance, should ensure that the appropriate software (SOM, SOC, etc.) Is installed on all of the machines that will be included in the instance, and that have run the GIS Server Post Install on all machines, using identical names and passwords for the SOM and SOC Accounts. Each SOC in the instance should have the same edition of ArcGIS Server installed.

To create a new instance with ArcGIS Server for Microsoft.NET Framework, use the Add ArcGIS Instance tool located at <ArcGIS install location>\DotNet\AddInstance.exe. Need to provide the name of the new instance, the SOM machine it will use, and the ArcGIS Web Services account name and password.

Once create the new instance, see an additional link to Manager in the Windows Start menu. Each instance has its own Manager. Use also the new instance's name when connect to its Web services, since the URL for making an ArcGIS Server Internet connection is http://<server name>/<instance name>/services (ESRI_2012).

3.3.4 *Network Environments*

ArcGIS Server can run in Windows Domain or Windows Workgroup environments.

When using ArcGIS Server in a Windows **Workgroup** environment, need to take the following steps to ensure proper authentication against the GIS server:

- All users must be local users. All accounts defined in the GIS Server Post Install (SOC Account, SOM Account, and ArcGIS Web services Account) and any users added to the AGSUSERS or AGSADMIN groups must be local users.

- These local user accounts need to have the exact same username and password (case sensitive) on all machines.
- Local Security Settings must be altered from the default as follows:
  1. Navigate to Control Panel > Administrative Tools > Local Security Policy
  2. In the left menu tree structure, navigate to Security Settings > Local Policies > Security Options
  3. Double-click "Network access: Sharing and security model for local accounts"
  4. Select "Classic – local users authenticate as themselves" and click OK.

4. METHODOLOGY

For the effective GIS Solution implementation for Oil Industry proposes a methodology in which it will work to finalize the proposed objectives.

Phases:

Start:

Inside the boot process generates the documentation required for project implementation, i.e., defining the project charter, identifying stakeholders and conducting a project initiation meeting in which teams participate Prosis defined SA as defined by the customer. At this stage, we are establishing the boundaries of the project objectives and, based on the commercial offer and the contract.

Planning:

Planning processes are aimed at determining the effort required to implement the project or each of the defined stages.

Defining the Project Implementation Plan

In the planning phase establishing a roadmap for achieving the project objectives and activities are required for each phase, human resources and execution times.

Execution:

The execution processes are focused on the generation of the project product through the coordination of the resources involved making the activities defined in the planning. Within this process is performed agreed documentation to ensure the solution from the standpoint of development and implementation of the functions defined. This stage includes activities of requirements analysis, design, implementation, testing and commissioning.

Requirements Analysis:

During the needs analysis is carried out process of requirements gathering, high level of identification and generation of use cases, which are defined and documented detailed requirements for each use case and reviewed separately by the tester to ensure they can be tested once they are implemented. This results in better and more clearly defined requirements, which are documented as a basis for the design of the solution.

Design:

Once the detailed requirements specification is documented, the next step is the design that transforms requirements into a set of functions of GIS software, translating user requirements to detailed design specifications. At this stage, make key decisions on the implementation of the system. We performed a design document based on the requirements specification which defines the tasks of the development process.

Implementation:

Building Geographic Information System is functional adequacy of the ESRI platform oriented to the functional requirements of the system. The goal at this stage is to ensure that the solution: Be safe and reliable to interact with existing production systems and to give an accurate solution that lets view the support for the OGX[7] Organization

Comprehensive Testing:

This phase verifies that the components or modules interact correctly through their interfaces to ensure the proper functioning of the system.

Multiple tests are conducted in the development environment and test environment for the test team. Evidence of quality control equipment seeks to eliminate defects and ensure compliance with the requirements defined by the cases of use.

Deployment:

Once have been willing the production environment, the GIS software and applications are installed in its operational environment and tested to ensure they meet needs.

[7] Oil and Gas Company

Technology transfer:

Transfer the customer knowledge through training so that he can operate the system autonomously.

Technology transfer is a process along the entire development of the system is developed end-user manuals and installation.

Monitoring and Control:

This process keeps track of the activities planned in the project, taking control of the activities defined within planning. The aim is to ensure that activities are being developed within the defined plans and maintaining the project within expected ranges. Regular meetings are held between the project managers of the provider and client which determine the project progress, identify critical points, corrective actions when necessary, decision making and generate documentation of monitoring defined in the planning.

Similarly, tracked the risks and determining the activities aimed at implementing mitigation or contingency plans.

Constant verification of the scope in this process will jointly define the changes needed to ensure the solution with the effects of time and cost involved.

Close:

To the extent that following completion of products that make up the project, these are delivered to the customer with relevant evidence, for which the records will be generated for delivery to be gradually closing the project.

5. ANALYSYS AND DESIGN

The main objective of this implementation is to have basic functional facilitate rapid access, automatic orderly and the information contained in the system to the wide range of end users. This fact determines automating a series of processes, designed according the needs of these users, among which include the various search processes GIS supporting the definition of predefined scales and legends oriented cartographic meet the best fit between the processes and the presentation-visualization. This is defined by a series of custom interfaces and information contained on commonly on demand. These include a first approximation of the process and can be described as follow:

5.1 Needs identified in the technical visit

Below is a summary of the preliminary requirements gathering, in which they identify areas of company requirements and the minimum number of users that interact with the system:

Table 1. *OGX, Needs Identified*

AREA	NEEDS	USERS	
		Desktop	Web
Exploration	-Centralization of information. Definition of Base Map. Well-Edition Info messages and mapping business. -Integration of GIS Exploration with other sources as the Paradigm system, seismic information, information from wells and geology. -View information that may come from other databases or documents (photos, images, reports). Publication Web-mapping information base and thematic exploration. Web tool for publishing geographic information to users of the area.	11	5

5.2 Recommended architecture for the solution

The implementation of a GIS project requires an IT infrastructure that supports the different phases of the project. Specialized programs in spatial information management are mainly used in a step which performs the modeling and presentation of data. It presents system architecture that summarizes the structure that has a project team or working group in GIS today.

Undoubtedly approaches are less complex and equally functional for smaller processes, however, these can be considered subsets taking architectural elements presented.

Storage base level of information: is responsible for responding to requests for access (read / write) spatial and alphanumeric data.
This level is implemented using the most accessible file servers (Information is stored directly as layers in the system structured in folders without any protection other than that provided by the operating system), from the model georrelational (GeodataBase) using spatial extensions are mounted on a handle of relational databases. Implementations have appeared lately mapping services and data that provide information via web Internet.

The proliferation of spatial data and concerns about their quality control make it desirable that this level is implemented obeying standards for storage of information and construction of metadata.

• Intermediate data transmission: This provides the communications platform and network services that connects different parts of the architecture. The rise of the Internet and the large volume of data traffic generated by the transmission of information has led to the development of protocols to structure and ease the data representation of spatial thinking in shipping over long distances, prioritizing text type representations on binary (XML6, GML7).

• Final Application Level: The level at which the majority of GIS professionals or end users has access to the information. It consists of four categories of applications are not necessarily mutually exclusive (there are programs that fulfill functions of more than one category). The programs capture information, and support for scanning lifting geospatial data (GPS support programs, CAD tools, digitization programs raster or vector). Processing programs, analysis and modeling of information (which are most confused with the general concept of GIS) routines provide raster and vector processing, database management and statistical data, taking the input information for the results given by a methodology. The desktop mapping software, including tools designed for cartographic production allowing spatial information to paper and finally, applications access and dissemination of information presented to professionals and the general public, powerful graphical interfaces for viewing information geographic and spatial queries and easy alphanumeric on it.

This architecture is defined for the users identified in the requirements gathering preliminary study of OGX official within the project development phase will be a Sizing Technology Platform, which will adjust the requirements for successful implementation and system access.

5.2.1 *Web service level, service level GIS*

Composed of one server for Web client management system that requires lightweight geographic services and / or heavy. This level would be the viewer GeographicOGX.

On the same server will light mapping services, these will be consumed from a client ArcGIS Server. This architecture allows local customers ArcGIS Desktop (ArcInfo, ArcEditor) to consume any service of this level and / or administrators can manage this component from an ArcGIS Desktop client.

At this level, find geographic OGX Services, these services will be built as part of OGX GIS.

5.2.2 *Level of data*

Composed of one server for managing all data requirements generated from light service, heavy duty and / or requests from ArcGIS Desktop (ArcInfo, ArcView).

Note: The previously set architecture can support up to average

Concurrent users web 50 and about 20 in the above Desktop the initial requirements for the GIS to OGX. However, this architecture would into account the potential growth of the company at the user level and outstanding performance applications.

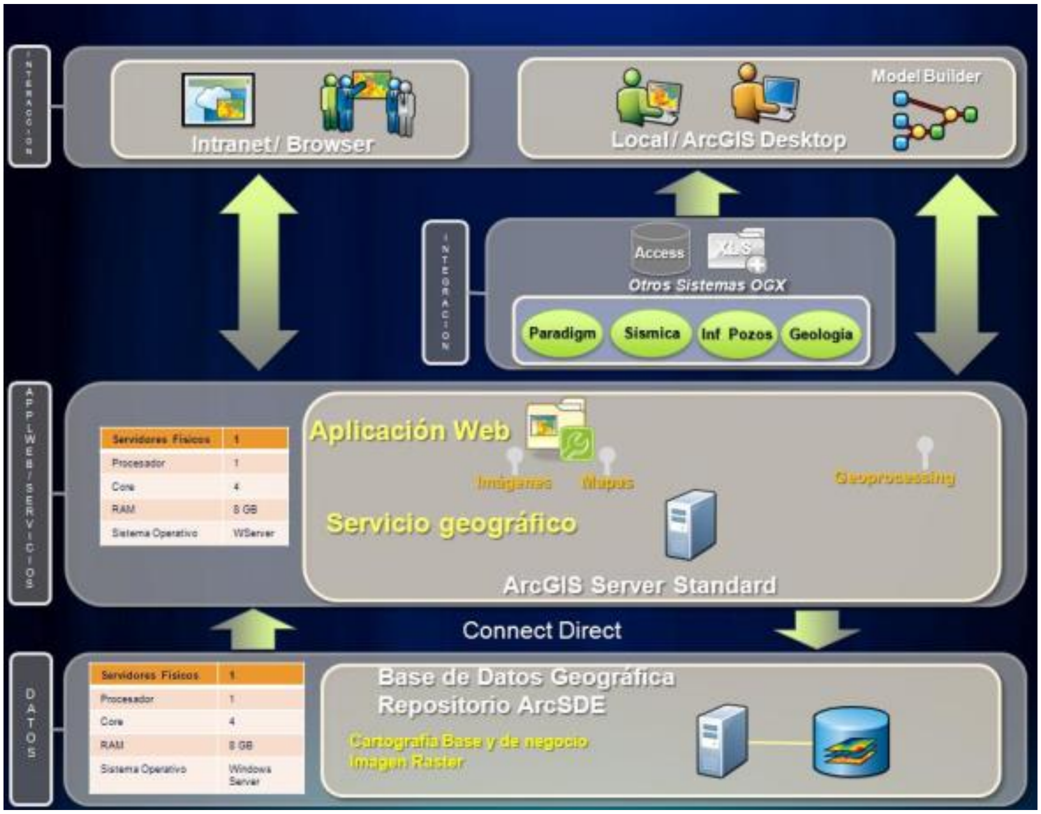

Figure 5. OGX, Solution Architecture, Design Document

5.3 Planning and tactic

In order to centralize information and integrate it with other sources of exploration, as the system paradigm, seismic, well information and geology, as well as see it through Web tools, comes the need for the analysis, design and implementation of a Geographic Information System for oil and gas sector that meets the needs of OGX in the exploration area.

- Tunning requirements.
- Implementation of environments for development and quality assurance
- Design and generation of the GDB.
- Data migration.
- Development of specific functionality for the Web module.
- Testing of the applications in accordance with the collection of use cases.
- Implementation in the production environment OGX.

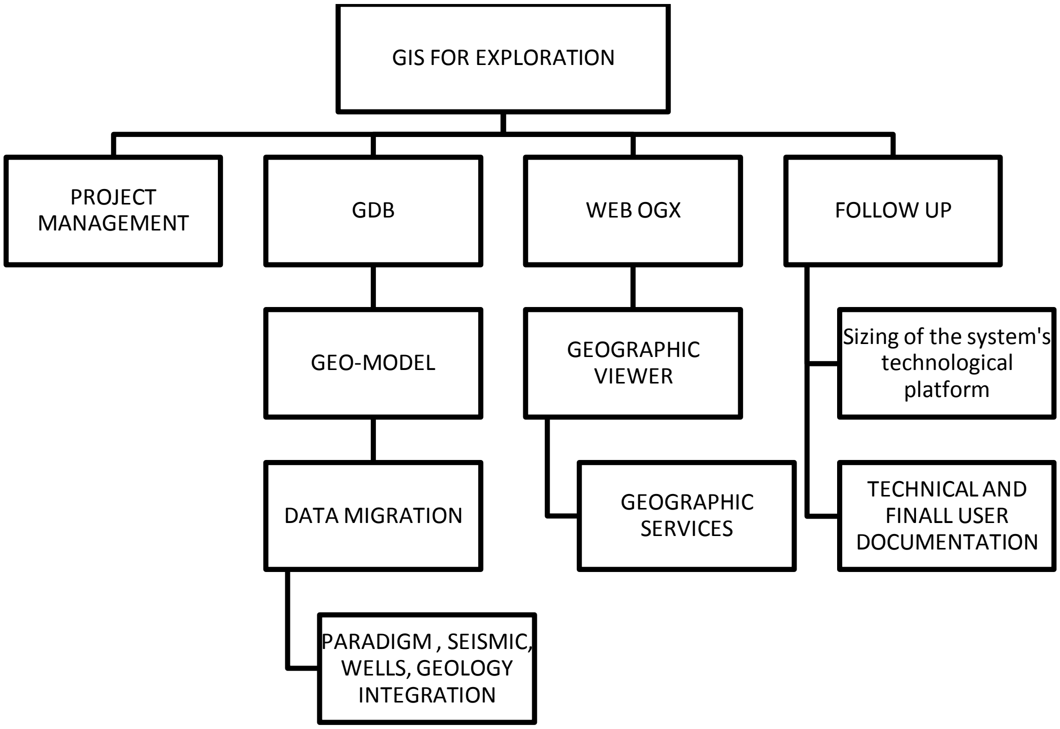

Figure 6. OGX, Tactic, Design Document

5.4 Requirements tanning

Requirements engineering for OGX GIS must face the problems already explained to achieve present an initial vision what they want from an application built by or for a multidisciplinary team or in many cases to a user group much broader. The difficulties mentioned in the previous section mainly affect the functional requirements and the specific domain of GIS. Approaches to address these difficulties consist of system modeling techniques that allow expressing the requirements of a GIS application of a more technical and less ambiguous than natural language. In lists, the characteristics of a good technique must comply Systems modeling for requirements engineering in OGX GIS application.

Took into account the following

- Time dimension: object changes in time.
- Complex spatial elements: multipoint, multiline and multipolygons (individual elements but compounds of multiple instances of the primitive space) which was relegated

The long method inherited from the two-dimensional work of geography: Extended relational elements model for GIS

- Values theme: Attributes that describe properties of objects.
- Diffuse Objects: geographical features that belong to a class with certain degrees.
- Data and entities based on field values: Data can be sorted by or entities that are continuous and do not belong to a specific entity (e.g.| height).
- Generalization: Multiple representations of space objects depending on the scale.
- Restrictions: Impose ranges to the values of the attributes.
- Object Identifier: All objects must be uniquely identified.
- Data quality: Rate the adequacy of the provenance and treatment of the spatial data.

The evaluation of bibliographical sources throws the following categories for requirements engineering processes in GIS:

5.4.1 *Geographic Services*

Map service: Product mapping web accessible for viewing and basic query.
Services as documents born MXD map (built in ArcMap) that are then published via ArcGIS Server. Once published, ARGIS Server exposes interfaces to access various services (or endpoints) as SOAP and REST. Besides these, are available as standard interfaces defined by the OGC, as WFS and WMS.

Service: It is a resource such as a map, an image, a connection to the geodatabase or a geocoder, which is placed on a server and is available to client applications through a communication protocol such as HTTP.

5.4.2 *Paradigm Integration*

The Paradigm software to locate new oil or gas and create dynamic digital models of the subsurface of the earth. Also optimize the production of new or existing deposits.

OGX currently manages information and Geophysics Seismic software with Paradigm for Exploration. Integrating Paradigm Exploration with GIS will be made through GIF image: Maps TWT (Time). Depth Maps, These images are associated with the blocks (Map of Land) for this becomes a Geoprocesing and a manual procedure for georeferencing these images. Well Information Integration.

5.5 Architecture Technology

The aim of the process of Information System Design (ISD) is the definition of the system architecture and the technological environment that will support, together with the detailed specification of the components of the information system.
From this information, it generates all construction specifications related to the system itself and the technical description of the test plan, the requirements definition and design implementation of the migration procedures and initial charge, the latter when appropriate.
As a methodology that covers both structured developments as object oriented activities of both approaches are integrated in a common structure.,
The activities of this process are grouped into two main groups.
In a first set of activities that are carried out in parallel, get the detailed design of the information system. Performing these activities requires continuous feedback. In general, the actual order of their execution depends on the specifics of the information system and, therefore, generation of products.

In the activity Defining System Architecture sets the physical partitioning of the information system and its subsystems organization design, specification of the technological environment, and operating requirements, administration, security and OGX access control. Catalogs are completed requirements and standards, depending on the definition of the technological environment, with those aspects of the design and construction necessary to contemplate. It also creates a list of system exceptions, in which are recorded the secondary operating conditions or abnormal consider it appears proper and, therefore, designing and testing. This catalog of exceptions is used as a reference in the technical specification for system testing.

The physical partitioning of information system to organize a design that provides a system of distributed information, such as client (OGX) / server architecture, being applicable to multilevel architectures in general. Regardless of the technological infrastructure, such partitioning represents the functional and physical levels of the information system. The relationship between elements of the design and physical partitioning, and in turn, between the physical partitioning and technology environment allows a specification of the distribution of the elements of the information system and at the same time, a design oriented mobility other platforms or relocation of subsystems.

The information system is divided into subsystems design. These, in turn, are classified as support or specific, to respond to different purposes.

The subsystems support or services contain elements common to the system and installation, are usually caused by the interaction with the technical infrastructure and reuse of other systems, with a higher level of technical complexity.

Specific subsystems containing the elements of the information system, usually with continuity of the subsystems defined in the process of Information System Analysis.

Also, specify in detail the technological environment of the information system, along with its capacity planning (capacity planning), and operating requirements, administration, security and access control.

The detailed design of the information system, following a structured approach, comprising a set of activities that are carried out in parallel with the definition of the system architecture.

The extents of each of these activities in OGX environment are summarized below:

Architecture Design Support, which includes the detailed design of the subsystems support the establishment of standards and requirements arising from the design and construction as well as the identification and definition of generic mechanisms of design and construction.

Architecture Design System Module, which performs the detailed design of specific subsystems of the information system and the revision of the user interface.

Physical Design Data, which includes the design and optimization of system data structures and their location in the nodes of the proposed architecture.

For Object-Oriented Design, it should be noted that the design of persistent objects is performed on relational databases and that the detailed design of the information system is performed in parallel with the design activity Architecture Support, and corresponds to the following activities:

Use Case Design Royals, with the detailed design of the system behavior information for the use cases, the design of the user interface and validation of the division into subsystems.

Class Design with the detailed design of each of the classes that are part of the system, its attributes, operations, relationships and methods, and the hierarchical structure of the same. In the case where necessary, is performed to define a migration plan data and initial load.

Once we have the class model, begin the physical design activity Physical Design Data common with the structured approach.

Once the detailed design is done in review and validation activity verification and acceptance of the system architecture, in order to analyze the consistency between models and design gain acceptance by those responsible for Operations and Systems areas

The simulation for the design was performed using reference Processors X5670 Intel Xeon technology.

The tech support is defined according to the sizing of two (2) dedicated servers by function:

- Presentation Layer and services: Composed of a server whose function is to provide services and serve the Web application to access information online Geographic
- Data layer: Made up of a server that has the function of managing and locating files that make up the OGX Geographic Geodatabase.

The technical specifications for all servers that support the architecture of GIS technology was calculated by performing a sizing with ESRI Capacity Planning. (Arc11CapacityPlanning0801):

5.6 Design Geodatabase

This part presents the characteristics of the SIGEX system geographic database, as it has to do with software tools and file structure. It presents all the guidelines and considerations to take into account the management of new processes, elements and aspects to include in the geodatabase. Also, this paper supports the management of existing components, determines all guidelines to follow to interact with GDB (alter or modify the structure) without affecting the proper functioning of this, considering the parameters given initially in both the physical layer, and logic. These parameters include the level of data and the geographical level of the geodatabase.

It also describes the internal structure of the database, configuration, user management and storage management

The technological structure is supported on an engine of Oracle 11G database is the tool used to support the storage of alphanumeric and geographic data, then the RDBMS is installed on a product called ESRI ArcSDE technology which is responsible for managing geographic information stored in the database.
ArcSDE manages storage in Oracle and manages concurrent users, and other topology rules and behavior of the Geodatabase.

5.6.1 *Structure of the geographical database*

5.6.1.1 Need for a design

Effective implementation of a GIS is achieved through good design of the database.
To achieve a good design of the database is necessary to ask the right questions:

- How can implement GIS technology to achieve existing features, or change how a goal is achieved?
- What data OGX benefit more?

• What data can be stored?

• Who is or should be responsible for maintaining the database?

The answer to these questions depends on how understand GIS technology, and knowledge of OGX.

The design for the implementation of a GIS is like any other design:

• Beginning in meeting the goals

• Gradually increasing the level of detail as more information is obtained, and implementation approaches.

Need to take the time right design, because failure to do so the impact on all current and future application can be highly negative.

The database and associated applications can not be treated independently.

5.6.1.2 Design objectives

Design is the process that defines the goals, identify, analyze and evaluate design alternatives, and determine an OGX implementation plan.

The design provides a picture of where we are, where we are going, and how to get from one place to another.

The database design provides architecture for the database, provides a view that spans the entire database allowing an overall assessment of it from several aspects.

Good design results in a well-built database, functional and operational efficiently:

• Meets goals and support requirements.

• Contains data required, but not redundant.

• Organizes data for multiple access

• Allows multiple views of data

• Distinguishes applications that keep those data used only

• Represents, codifies and organizes geographic elements appropriately

Design Benefits:

• Access and data analysis increased flexibility.

• Facilitates application deployment

• Lowering the cost of capture, storage and use of data

• Facilitates and maintains data to support different users

- Facilitates future changes
- Minimize data redundancy.

5.6.1.3 OGX feature identification

Working with business functions and units (sections, departments, divisions) of OGX:

• They are more stable in OGX, a unit meets certain functions in future meets another unit.

For each function, determine a general description of activities associated with this function.

Activities may include management approvals of certain activities in the field (patterns), control of land use, development agreements for the construction of infrastructure.

Identify providers and consumers of geographic information

Identify the data source

Solving (clarify) immediately situations:

- Synonyms
- Functions that duplicate data
    - Interact with those who perform the function as they are the ones who know the data.
    - User must validate documents and diagrams associated with functions and data.

5.6.1.4 Organize ogx data into logical units

Logical units or groups representing such as land registration systems, roads, terrain, and water distribution.

Each defined group is operated by a function that receives and / or transmits information.

Example: Group including surface model with data on rainfall levels connects with another that manages or controls a river network as it provides certain hydrological data, which allows the function to check the network determine the new water flow caused by recent rains for OGX scope areas.

Each of these groups must have a common coordinate system, one type of topology (planar network or none), and generally interact.

Design stages

- Modeling the user perspective (requirements, functions, etc.)
- Define objects and their relationships (UML)
- Identify feature representations
- Adjust it to the geodatabase model (UML objects own base software)
- Organize in "datasets" geographical

Defining objects (entities) and relationships

Entity = objects with common properties.

- Identify and describe entities
- Identify and describe relationships between entities
- Document the entities and relationships using UML diagrams based on.

The identification of entities and relationships can be achieved by analyzing sentences such that a noun commonly identifies an entity, a verb defines a relationship between entities.

5.6.1.5 Defining objects (entities) and relationships

Verbs masquerading as nouns difficult to determine relationships - e.g.| link, description, identification, aggregation)

Document the entities and their relationships using UML diagrams based on identifying feature representations.

To classify entities as how to represent, based on the geometry, or only attributes.

Consider whether:

- The element must be represented on a map
- The shape of the E.g.| is relevant or not for analysis
- The element is data that can be accessed or viewed through a relationship with another element.
- The E.g.| will have different representations at different scales (e.g.| Rio)
- Text will be displayed on screen or map products.
- Type Mapping:

    - Point - illustrates the location of an element of exceptionally small as to look like a pair area.

- Line - illustrates the location of an item as a mighty estimable couple to be seen as an area.
- Area - illustrates location and shape on an item.
- Surface - illustrates the location of an item as an area, but also includes changes in height (including certain TINs and rasters).
- Raster - represents an area using rectangular cells (satellite images, aerial photographs, and continuous data layer) and can be used for various analyzes.
- Images, photos, drawings - each represents a digital picture and can not be used for analysis.

• Object - identifies an item for which do not need any point, line, or area, for which there is no geometric or graphical representation.

The geographic database that supports SIGEX system is mounted on the RDBMS Oracle 11G R2 Standard 64-Bit version 11.2.1.0.

SIGEX is the main instance in which all objects are mounted in standard database and geographic support to SIGEX. The panel is mounted on the server SLC01OGX01 (IP 10.3.1.6) on Red Hat Linux Operating System 5 Update 5 Enterprise

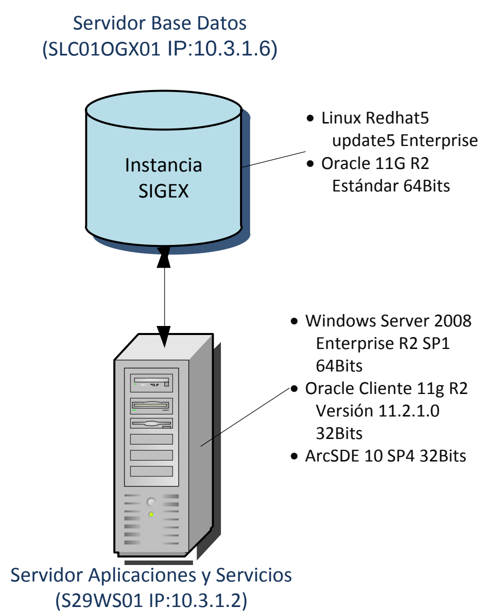

Figure 7. OGX, Servers and Software Distribution, Design Document

5.6.2 *Schemes and users of the geodatabase*

Scheme of a database describing the structure of a database, in a formal language supported by a system administrator database (DBMS). In a relational database, the schema defines its tables, fields in each table and the relationships between each field and each table associated with a user owns objects.

Geodatabase of SIGEX was divided into two additional schemes SDE scheme, depending on the current source and having Geodatbase data.

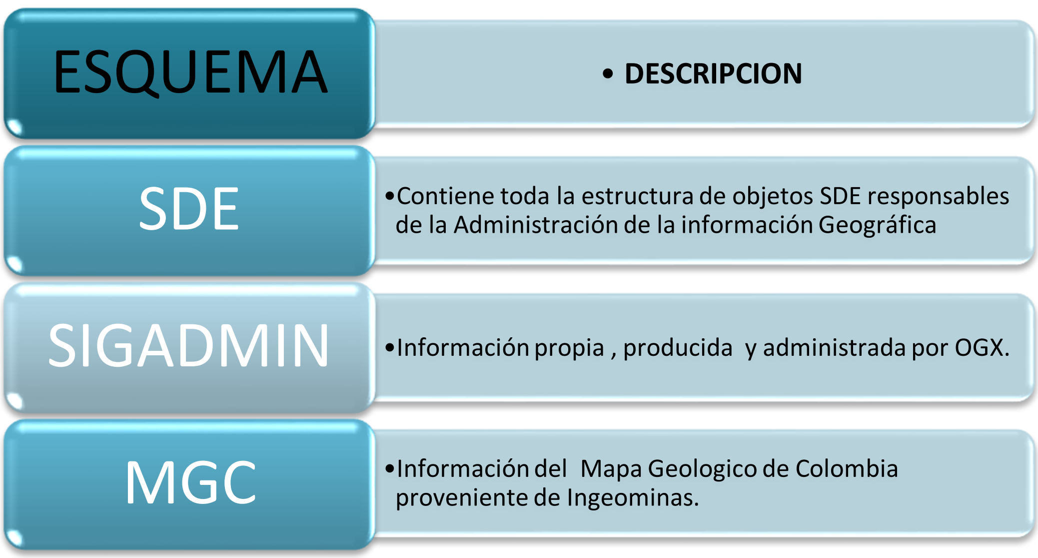

Figure 8. OGX, Relationship diagrams SIGEX GeoDatabase, Design Document

5.7 Sigex Viewer

5.7.1 *Description system / application methodology*

The application seeks SIGEX allow OGX users access a Web tool intuitive and collaborative consultation cartographic and alphanumeric information from different areas of exploration, thematic information base, well integrated with the Paradigm system and have the well information, seismic and geology, among others.

The geographic viewer consists of:

- Toolbar
- Authentication
- Plane Coordinates
- Basic navigation tools
- Scale Control
- Overview (Overview)
- Area map
- Graphic scale and numerical
- About (Help Documents)
- Log Out (Logout)

Figure 9. OGX, SIGEX VIEWER COMPONENTS, Design Document

5.7.2 *System architecture / application*

The system architecture is composed of 2 SIGEX Levels

WEB Service Level, Service Level GIS

Composed of one (1) server for Web client management system that require lightweight geographic services and / or heavy. This level is the Geographic viewer OGX. This server is lightweight mapping services; these can be consumed from clients or from the geographic viewer. This architecture allows local customers ArcGIS Desktop (ArcInfo, ArcEditor) to consume any service of this level and / or administrators can manage this component from an ArcGIS Desktop client.

Level of Data

This level consists of one (1) server for managing all data requirements generated from services lightweight, heavy duty and / or requests from applications Desktop (ArcInfo, ArcView).

5.7.3 *Development tools*

Development tools used were as follows:

- ArcGIS API for Flex version 2.5
- Adobe Flash Builder 4 and integrated development environment (IDE).
- Flex SDK version 4.5.x
- Subclipse 1.6.x
- WTP 3.1.1

5.7.4 *Features*

- Selection tools, search and identification (search)
- Measuring tools (draw and measure)
- Query by coordinates (coordinate locale)
- Use of bookmarks (bookmarks)
- Printing tool
- Service remover tool
- Catalog tool

5.7.5 *Data Model*

The display uses tables SIGEX modeled following data:

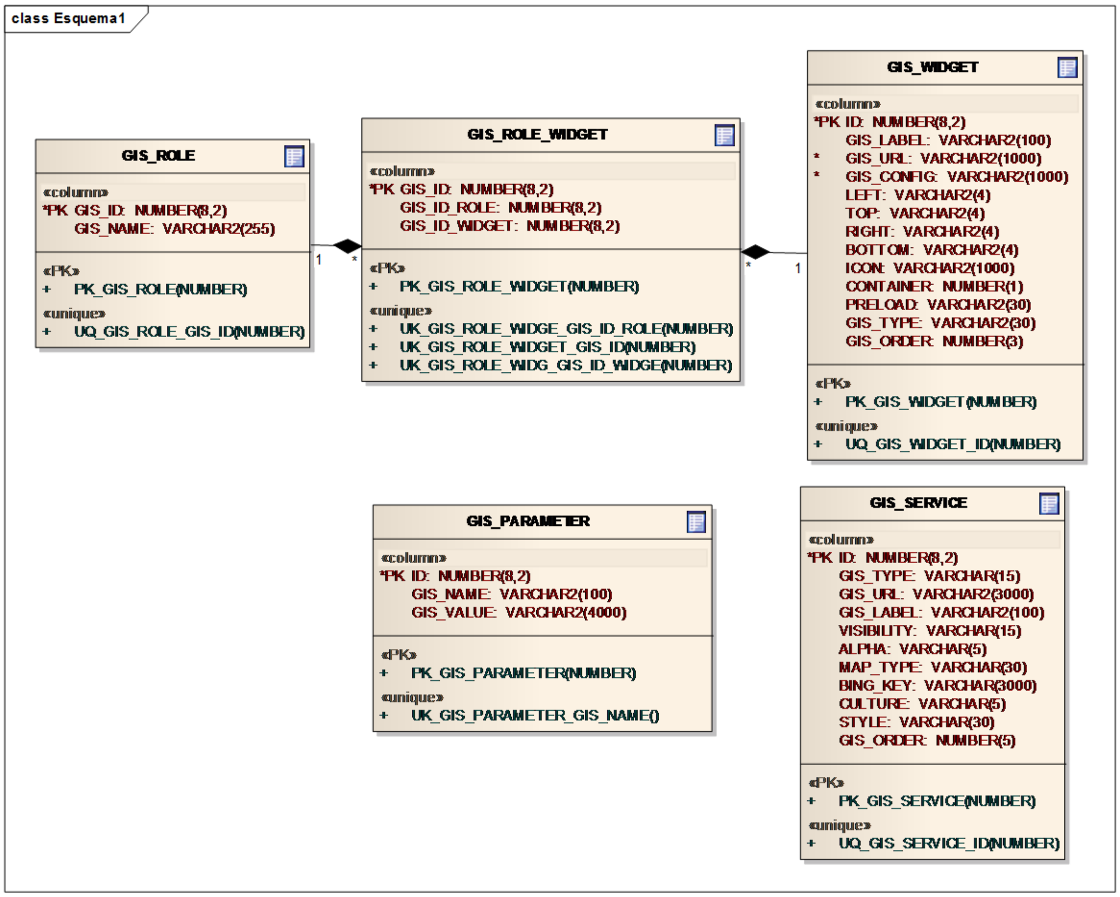

Figure 10. OGX, SIGEX Data Model to display geographic, Design Document

5.8 Geographic Services

For OGX GIS initially presents the installation of ArcGIS Server for the platform Java, second instance has the configuration of workspaces required for the proper functioning of the geographic and connections to the geodatabase with different existing users, mentioned step through the process of installation of services, from creating mxd and msd files, until the publication in ArcGIS Server.

Further recommendations are helpful to have the proper performance of the services as setting permissions and creating backups.

The geographical services are defined as the set of GIS resources built into a company with the aim of centralizing information and make it available to the organization so WEB. ArcGIS Server ® provides a platform for sharing resources.

The fundamental objective is to automate geoprocessing tasks, spatial analysis and modeling. Many of the procedures performed within a GIS require iteration allowing automated workflow, document and share processes.

The geoprocessing developed for OGX used ModelBuilder, which is an application used to create, edit, and manage models. Models are workflows that chain sequences supplied tool and a tool output as input to another tool.

The geoprocessing is responsible of Paradigm georeferencing images using existing spatial data (target data), as a vector feature class, residing in the map coordinate system desired. The process involves the identification of a number of ground control points, known as X, Y, linking locations of the image with locations of spatially related data. Finally, geoprocessing handles projecting the image coordinate system MAGNA_Colombia_Bogota.

The geometry service applications facilitates to OGX stuff to obtaining geometrical calculations for the buffer-related operations, calculation of areas and projected length calculation. Additionally, the ArcGIS APIs for JavaScript, Flex and Silverlight uses this service to modify the characteristics of the elements for Web editions. The geometry service is only visible for AGS server administrators and developers.

For publication of geometry service, access the ArcGIS Server handler. Add a new service type Geometry Service. Set the number of instances according to the needs of the organization and the type of processing and high isolation.

Map services are the way maps are made available to the entire organization through

ArcGIS. Maps should be configured as to ArcMap symbology, scales, labels and other aspects of visualization. Later these will be published through ArcGIS Server and consumed by different customers like Web applications, ArcMap and ArcGIS Explorer and more.

There are two types of map service. Msd services that have a redraw engine optimized elements, particularly useful when trying to display dynamic information quickly. Mxd caching services, especially for the rapid deployment of information with a low exchange rate.

Geographic mapping services are used by the viewer to identify OGX geographic aspects of the business. Below is the services used by the viewer and the publication type to use

6. RESULTS

Results were obtained as the functional requirements of the system, in other words, the features that should be provided to users. These were identified taking into account the various operations that provide SIG, incorporating this specific functionality such as checking, managing oil targets (modify, delete and add) and thematize the map.
From the above result, a strategy was designed to guide the process of customizing and to develop the oil GIS platform. Within this defines the activities to be performed in the steps identified as well as the steps and instructions to follow to pass through each.

SIGEX Viewer is a tool that seeks to provide OGX users access to a Web tool for intuitive and collaborative consultation to cartographic and alphanumeric information from different areas of exploration, thematic information base, well integrated with Paradigm system, and have well information, seismic and geology, among others.

The information set forth below will guide the user who uses the functionalities of the tools deployed in the OGX Geographic viewer, to find generalities that allow to query information in the viewfinder and step by step principal options for navigation, analysis and consultation are explained.

6.1 System Modules

The geographic viewer includes:

- Toolbar
- Authentication
- Plane Coordinates
- Basic tools of navigation
- Control of scale
- Overview (Overview)
- Area Map

- Graphical and numerical scale
- About (Help Documents)
- LogOut(logout)

Figure 11. OGX, Viewer SIGEX, User Manual

6.1.1 *Authentication*

By default, the display starts with a popup that prompts the user credentials to log in OGX Exploration GIS must enter a user name and password. The system validates against the group of domain users that can access the OGX GIS Exploration.

After receiving the authentication and accept it as valid, the system displays the primary view of the viewer

.

6.1.2 *About Documentation (Help)*

The Help menu is contained in the User Manual, and a video tutorial guiding the tool, links to the pages of the National Hydrocarbons Agency and paragraph Colombian www.anh.gov.co of Exploration and Production Information Service www.epis.com.co.

6.1.3 *Toolbar*

Figure 12. OGX, TOOLBAR, User Manual

6.1.4 *Table Of Contents*

Displays the corresponding widget, which lists all the services loaded, there is the ability to interact with them according to requirements display. By default the viewer initially loads the Base Map Service.

This Widget turn allows interaction deploy some options for each service:

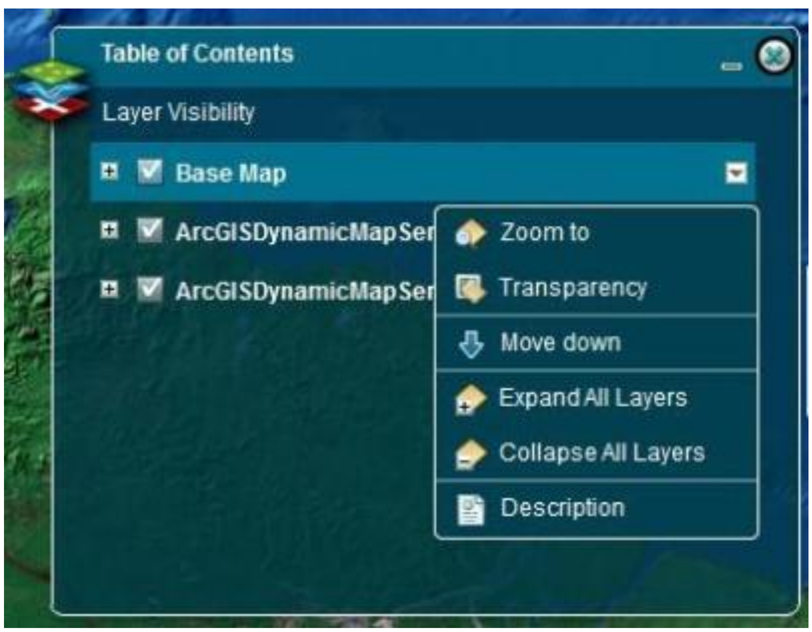

Figure 13. OGX, Services options, User Manual

6.1.5 *Locate Coordinates*

Allows the user to enter in the system plane coordinates MAGNA_Colombia_Bogota to locate a point on the map according to the coordinates consulted.

The user clicks on the "Find Coordinates", the system displays the corresponding widget where query by coordinates to query.

The user enters the flat coordinates that want to locate.

Figure 14. OGX, Coordinate Join, User Manual

After receiving the coordinates, the user clicks locate and leads to a system option widget that displays the result obtained and shown in the map area. An extent where it is located geographically in that point.

6.1.6 *Bookmarks*

Allows the user to navigate to locations on the map preset by the system administrator. The user can create their own locations during its work session, but the system will not store these locations for the next session.

Doing so displays the associated Widget, which has two possibilities:

The Bookmarks button: Displays a list of predefined geographic extents by the system administrator.

Figure 15. OGX, Zoom to selected Bookmark, User Manual

6.1.7 *Add Bookmarks Button*

This option allows the user to add new "Bookmark" approach to an area of interest, it should be noted that these locations will only be retained for the current work session and will not be stored in the system for future sessions.

After giving click "Add Bookmark, where the brand is created, the system adds the list along with the other administrator-defined bookmarks System.

6.1.8 *Draw And Measure*

This functionality allows the user to measure distances and areas, as well as allows drawing shapes on the map. This widget shows the measurement tools, in the case of obtaining coordinates active tool is clicked point on the map and draw that point.

There is a window opens with the drawing options:

In the case of distance the tool is activated online or free online, draw the line with the pointer to measure and double clicking ends the process of drawing showing the distance, with the possibility to change the units of measurement (meters, miles, feet, miles).

In the case of measuring areas activates the polygon tool, free polygon, rectangle, circle or ellipse is drawn on the map with the pointer and the successive clicks to measure area polygon or end double-clicking, as a result, shows the area and perimeter with the option to change the units of measurement for both the perimeter and for areas (m2, Km2, Ft, Mi2, ... etc).

Figure 16. OGX, Drawing polygon with area measurement, User Manual

When the element is of type point, besides being able to delete the item, the user can right-clicking in the drawing, to get the location on the same plane coordinates.

6.1.9 *Search*

This functionality allows the user to select, search and view the information defined for the geographic object.

The user accesses by clicking the search icon and the system displays the corresponding widget.

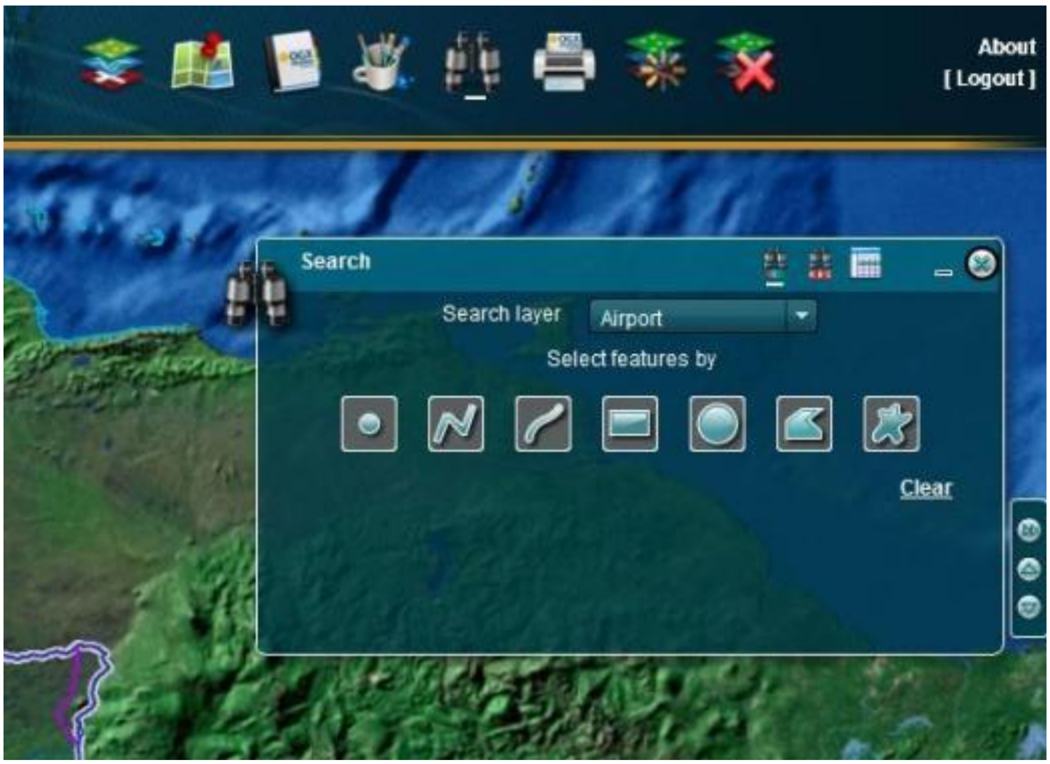

Figure 17. OGX, Search Widget, User Manual

The user can select a specific item geographically loaded into the viewer, or through a search on attributes defined in each layer or reference layer.

6.1.10 *Select Entities*

When looking to the "Select entities", the system loads the dropdown list the name of the component layers (the) service (s) loaded in the viewer:

After the user draws the stroke, the system displays the total number of selected features, when mouse over any of the results the system displays an information box of the feature:

Figure 18. OGX, Results Selection, User Manual

Useful to selects one of the results of the selection, so, the system closer to the element of interest:

6.1.11 *Select by Attributes*

The system loads the dropdown list the name of the component layers (the) service (OS) loaded in the display shows the fields that comprise:

The user can select the layer and the field on which to search:

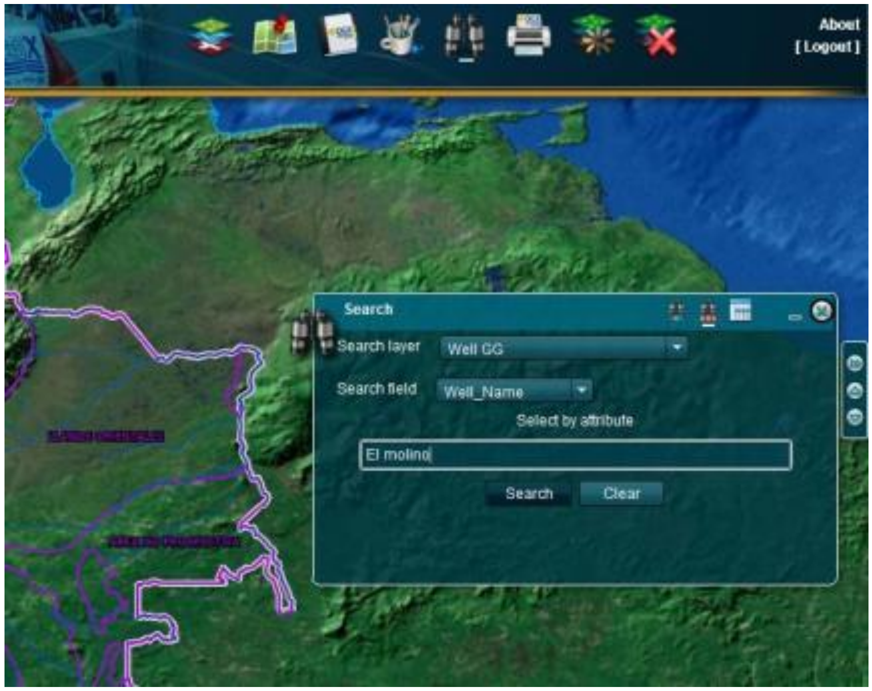

Figure 19. OGX, Select by attributes "El Molino", User Manual

When enter the search criteria and click on the "Search" button, in case find (the) result (s) the system displays the results tab:

By selecting the result of the list, the system will place on the map:

6.1.12 *Attachments*

Once the geographic object query, the user can view attachments (attachments) using the corresponding button.

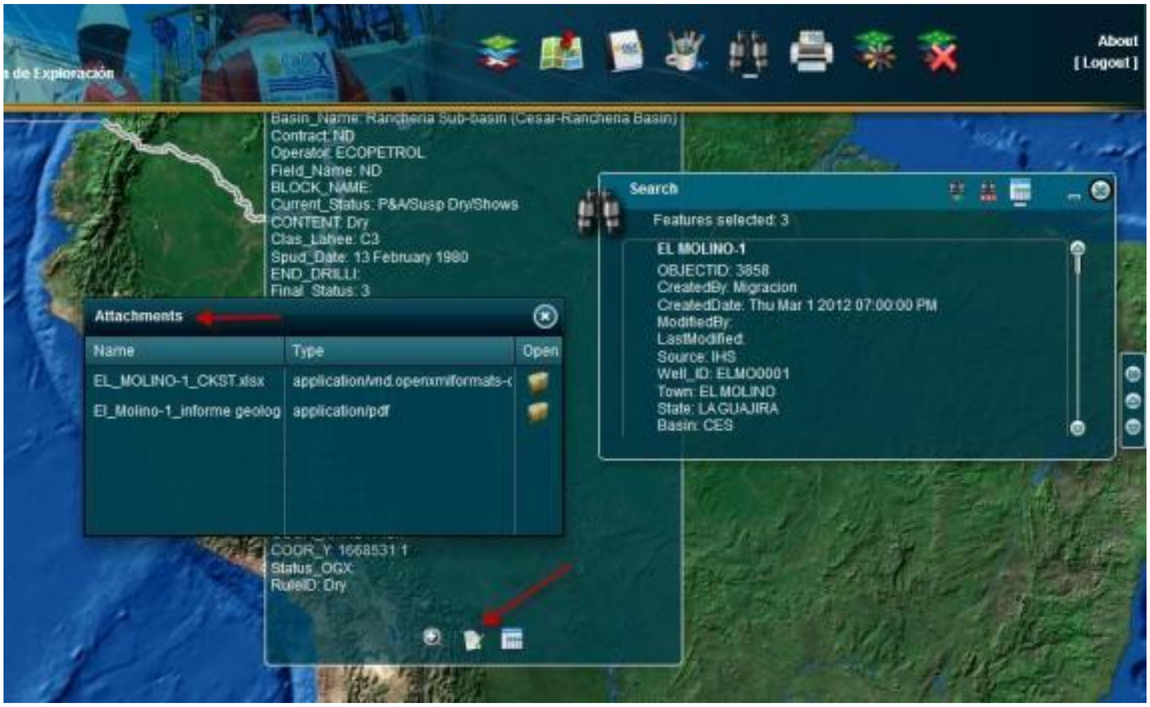

Figure 20. OGX, Expand the selection attachments, User Manual

It is pertinent to note that to open the selected attachment, the machine that carries out the application, we must have the corresponding application. E.g.| to open a file
. Dwg - Autocad must have.

6.1.13 *Related Tables*

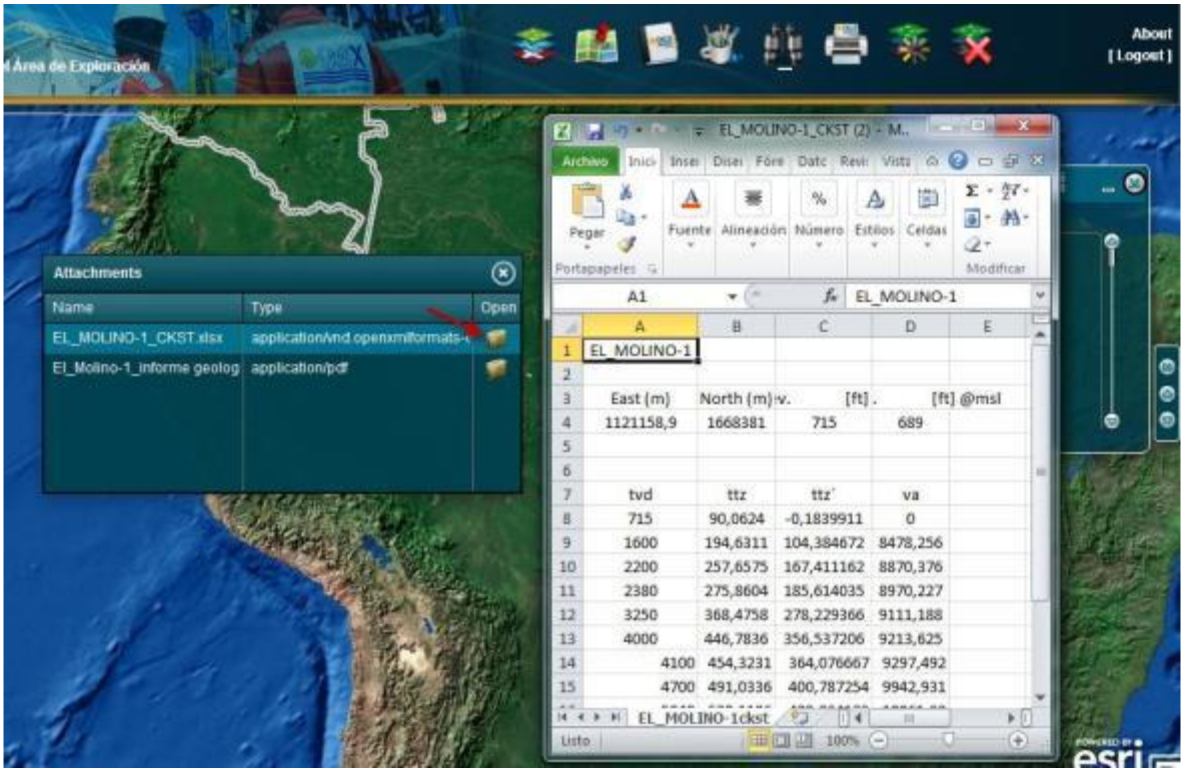

Figure 21. OGX, Example Attachment, User Manual

In addition, the user can query the tables that are related to the item searched by clicking the button. (E.g.| for a well), the user can view the information tables Tabletop, electric logs, tests, Geochemistry.

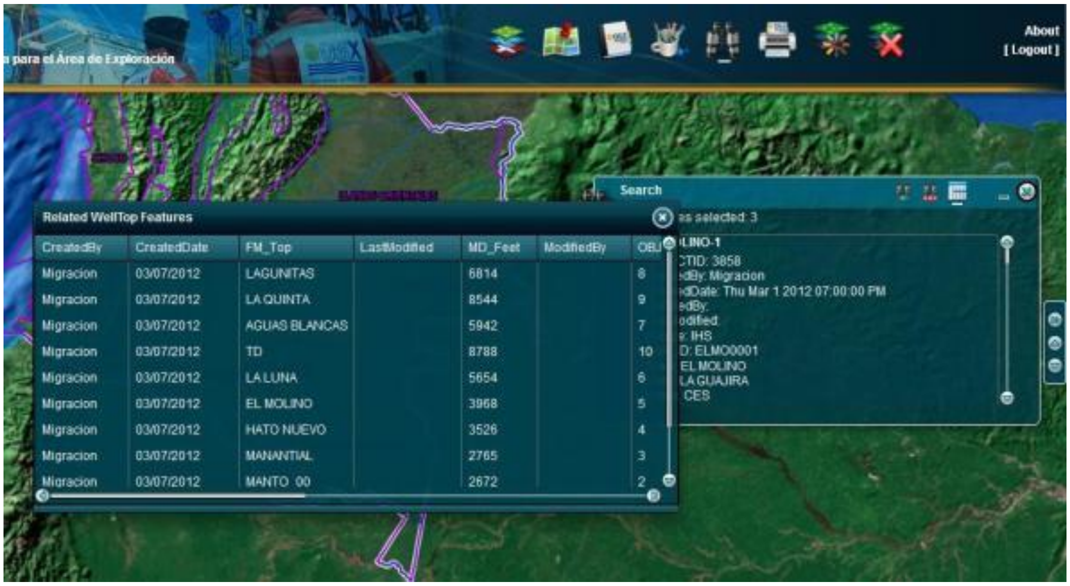

Figure 22. OGX, Related Table, User Manual

6.1.14 *Print*

Print the map in portrait and landscape orientation to print on letter size.
By selecting the "Print" button displays a window where we can enter the name of the map the direction of printing:

Can also select the layers we want, legend to be loaded into the map to print.
The user can select any of the buttons Portrait "house printing vertical" or Landscape "horizontal print", the system displays a preview window in the default format for printing.

The printing system obtains the legend of the map services selected at print time. The user can select the portion we want to display the legend on the printed document from the area of print preview.

- Company logo,
- Scale Text,
- Scale bar,
- North Arrow,
- Date of preparation,
- Coordinate System and Projection

• Overview

The user clicks on the "print"

Unfold print options native operating system, there the user has the option to choose their preferred output for the map, either creating a. Physical print or pdf format letter.

6.1.15 *Service Catalog*

By clicking on the "Catalog" This allows to view a list of available services, which allows a preview of geographical services preconfigured ArcGIS Server and are available to the user query, showing details of services such as the title, a brief description of subject and author.

If the service is already loaded in the current session, the system gives a warning.

By clicking on the refresh option, loaded services are updated.

6.1.16 *Remove Service*

"Remove Service", the system displays a window with the list of loaded services:

It gives the user the ability to remove one or more services.

Selects the service and click the Remove button. Press Shift or Ctrl to select multiple services ":

Figure 23. OGX, Selecting Services to remove, User Manual

7. CONCLUSIONS

The applied strategy devised significant advantages to ordinary software construction processes. It decreases the time of system development by 30%, thus achieving compliance with the time set for the development of the application number of human resources involved in the customization is minimal. This achieves optimization in the effort of each of those involved, since the strategy works as a guide to develop an specific job. Based on the above it can be stated that the work would be appropriate to develop, direct, concise and focused on the real needs of consumers.

Performed a validation of the research for which was used in the methods of expert preference method. Different validation criteria and a committee of experts selected taking into account the role of work performed by each, in addition to know their prior experience in the topic. Was given to each expert investigation and a form to know the valuation given to each criteria.

The calculation of the degree of competence of the experts, showed that most of these have a high level of knowledge and competence in the subject.

Importantly, the level of agreement that exists between the opinions of the experts, obtaining, as a result, that there is substantial agreement or marked between the scores given.

Considering the results obtained during the validation process is concluded that the proposed strategy has a high quality scientific technique. Besides the methodologies and tools used in its development have a high level today. It largely meets the needs of customers and developers who will be working on customizing the GIS Viewer OGX and is considered to be easily understood by the personnel working on the project. The necessity of employing this strategy is high, due to the advantages offered to achieve system customization, so it is considered feasible to conduct applied GIS development tanker.

With the development, of the proposed strategy does have direct guidance of the work to be undertaken by project members.

With the proper application of the strategy is achieved adjustment of the final product to the customer's real needs, and to achieve the reduction of development time and effort and consistency and ease in the work of each of the members of the project.

Research provides the knowledge necessary support on oil exploration stage must know the system developers.
Assessment of the strategy by the expert committee has determined that this selected scientific quality required for subsequent application.

8. FUTURE PROSPECTS

The Geographic Information Systems (GIS) are becoming more influential in computer science by its multidisciplinary nature and diversity of technological concepts (databases, computer graphics, high performance computing) involving, especially considering that today more than 80% of the existing data in the world are georeferenced or are associated some kind of spatialization. Specifically software engineering and requirements phase are critical to the dissemination of such systems, which are necessary for the democratization of information and to participate in the community by increasing their level of knowledge about the space around them.

However, the lack of technological equipment, not only users, but of the same design ordinators of these systems and the fact that the existing methodologies to support engineering requirements were not designed originally, given geo-referenced information have resulted arises the need to extend existing models or applying concepts initially alien requirements engineering to meet the specification requirements of GIS support including space time dimension, granularity (scale) of information, interoperability, quality, and behavior that affect operators. Although currently there are several modeling languages, specification languages and other techniques have facilitated the development of GIS applications focusing on the spatiotemporal modeling or the integration of heterogeneous applications. There is a comprehensive methodology to address requirements in engineering
GIS, which are proposed by the features, that should make up such a methodology based on the description of the domain, identification of actors and geographical standards to follow.

GIS design has been suggested as a novel approach in the analysis of requirements of software applications. Using its techniques can be iteratively refining the object of study. In this particular case, have been making observations, interviews consultations and documentaries as a way to infer from the fieldwork methodology guidelines that should lead to design. GIS Design provides powerful tools for qualitative research outweigh the purely quantitative items based on surveys that actors feel disconnected, highlighting the researcher in the same field where the events take place, making an actor. However, and for obvious reasons, the enterprise GIS study requires a series of negotiations with the community under study for the acceptance within their dynamic work an external agent such as the researcher. Upon completion of this step can be applied ethnographic tools for gradually to decant the nature of the GIS working group. Initially it has been possible to identify the roles involved in GIS project and observation spaces to consider. It has also been possible to articulate some categories of analysis that allow the classification of the collected material emphasizing the elements that can help build requirements engineering methodology for GIS. Once this stage is passed to the actual design of the methodology proposed extensions covering spatiotemporal aspects to languages like UML and Language specific domain main of GIS.

Although GIS technology brings many benefits to the oil industry, it can still be improved. If Requested enhancements can affirm and apply a generic way, can benefit all users of GIS. Things about the "oil industry".

A truly comprehensive paradigm in places of the earth, including "metadata" geodetic reference, Cartesian projection / spheroid parameters, etc. ..

Improvement "condensing" tools. "Condensing" is the process of merging two or more GIS data sets, so the output data accuracy. That has Greater entries. As measuring instruments and GIS data and images, ortho photography continues to Improve, maps and GIS databases should be "of" highly rated, i.e.| adjusted for consistency with the more recent data. Managing this process may well be the biggest challenge.

At this time, the use of GIS stops at the surface of the Earth. To visualize subsurface deposits, and switch to entirely different systems, who rarely have a "seamless" interface for GIS.
Advanced analytical tools for managing outlets, Integration of mobile GIS solutions help business optimized etc.

GIS technology and other hardware and software have Reached the stage at Which Technical and Economic offer tangible benefits for the oil industry. Not only the current Improve Business Processes by furthering better data exchange and more accurate mapping, But Also support efforts "reorganization process models" where technical professionals redefines Their Activities As They Are Able to access data new ways. Several critical GIS Initiatives on track to become integrated production systems in the Business Processes, support groups and a growing number of users who still late to benefit from discovering new ways technology This Way. The stiff competition ahead promises, technical advances in software and hardware utilization and integration, adaptation to the Requirements of multi-discipline, the improvement of the system architecture from discrete model to a universal model, advanced data acquisition methods and so on. The component of "Where" can have a darned good impact on the oil industry in the way we do business and serve customers in the future.

9. ANNEX

9.1 Annex Geographic Services, Application Example

This part is intended for officials of the entity requiring OGX know the process of creating, publishing and managing geographic Services ArcGIS Server.

The technical paper presents initially Services installation process ArcGIS Server for the Java platform. As a second instance is the configuration of workspaces necessary for the proper functioning of the geographic and connections to the geodatabase with the different existing users, is mentioned step by step process of installation of services, from creating the mxd files and msd, until the publication in ArcGIS Server.

Additionally recommendations are useful to count with the proper performance of services as setting permissions and creating backups.

9.1.1 *Installation Geographic Services*

Geographic services are defined primarily as a set of GIS resources built into a company to centralize information and make it available to the organization so WEB. ArcGIS Server ® provides a platform for sharing resources. It then presents a picture of the different types of resources that can be published (For more information, see the website http://resources.arcGIS.com/).

Figure 24. Services provided by ArcGIS Server ® platform.

Additionally, specific information is presented in terms of configuration of each geographical services used by the application developed for OGX.

9.1.2 *Creation Of The Connection To The Database*

To provide geographic information services, we must create a connection that allows querying the database. The following describes the sequence of events for this configuration.

Previously, a customer must have Oracle 11G installed on the server ARCGIS.

In the folder of the Oracle client installation, navigate to find the path <NETWORK\ADMIN>. Within this, tnsnames.ora file is hosted. External click and select Open With ... and in the displayed window, select a text editor program, followed by the OK option.

9.1.3 *Service St Geometry*

The geometry service provides applications to obtain geometric calculations for buffer related operations, calculation of areas, lengths and calculating projections. Additionally, the ArcGIS API for JavaScript, Flex and Silverlight uses this service to modify the characteristics of the elements for Web editions. The geometry service is visible only to server administrators and developers AGS.
For publication geometry service, enter the handler ArcGIS Server. Add a new service of type Geometry Service. Set the number of instances according to the needs of the organization and the type of processing and high isolation.

9.1.4 *Configuration Geoprocessing (Modelbuilder) Paradigm*

The main objective is the automation of geoprocessing tasks, spatial analysis and modeling. Many of the procedures performed within a GIS require iteration possible to automate workflows, document and share processes.

The Geoprocessing ModelBuilder developed for OGX used, which is an application used to create, edit and manage models. The models are workflow tool that chain sequences and provide the output of one tool to another tool as input.

The geoprocessing is responsible for the georeferencing of images Paradigm using existing spatial data (target data) as a vector feature class, residing in the coordinate system desired map. The process involves the identification of a number of ground control points, known as the coordinates X, Y, linking locations of the image locations spatially related data. Finally, geoprocessing is responsible for projecting the image coordinate system MAGNA_Colombia_Bogota.

The georeferencing for three blocks arises concerning the region CES Cesar Rancheria RAN is highlighted in cyan.

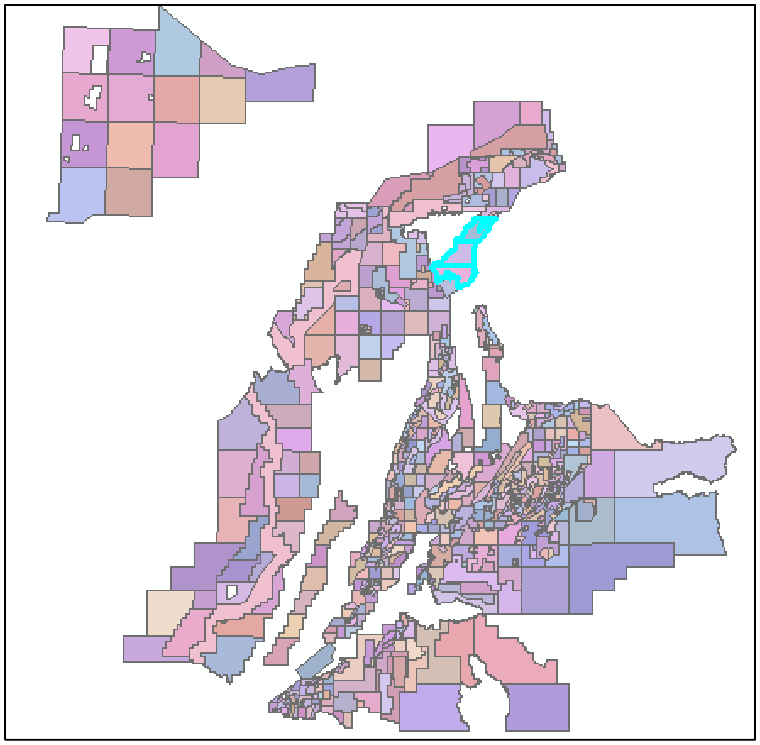

Figure 25. OGX, General location of oil blocks, Services Manual

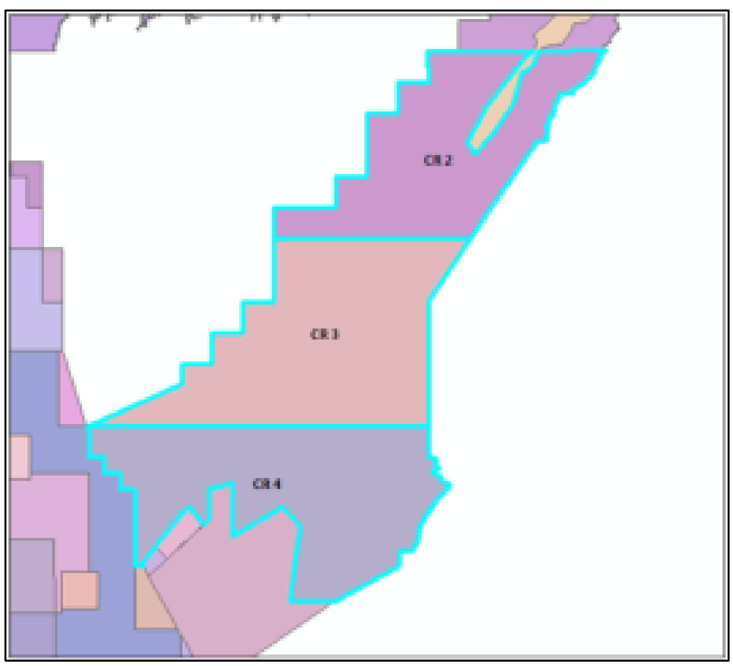

Figure 26. OGX, Blocks Cesar Rancheria region, Services Manual

The canvas of the model should look like this:

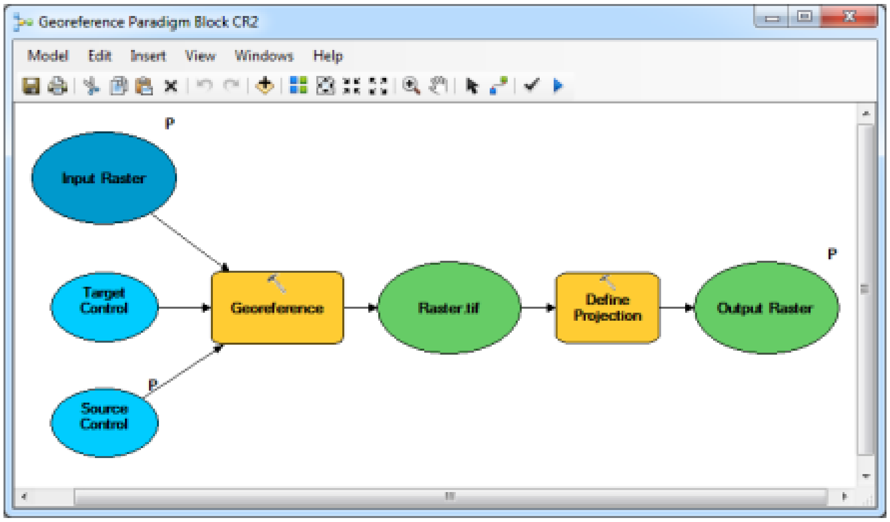

Figure 27. OGX, Final structure of ModelBuilder, Services Manual

Checkpoints Block CR2

It recommends a number of significant control points to provide greater accuracy for georeferencing.

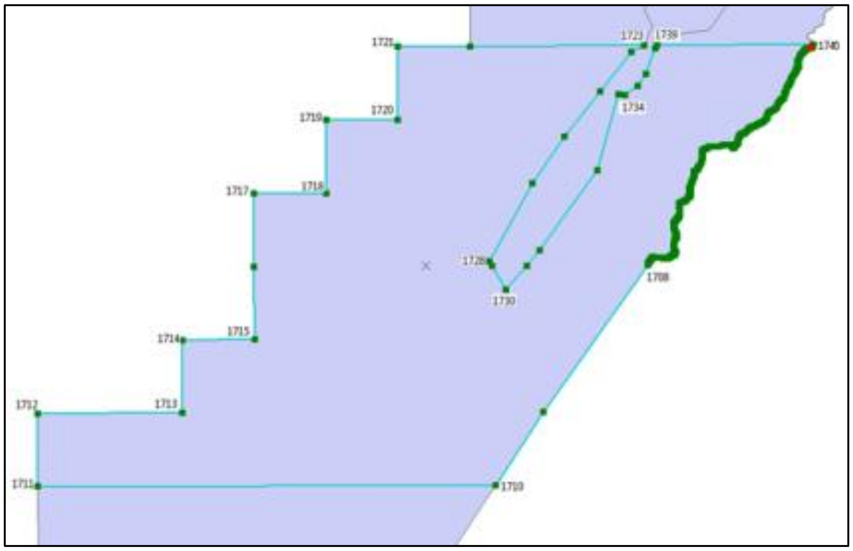

Figure 28. OGX, Control Points CR2 destination block, Services Manual

Table 2. *Listed Block destination control points CR2.*

No	Vértice	X	Y
1	1708	1149381,59	1680910,19
2	1710	1130110,28	1653168,54
3	1711	1072342,14	1653001,16
4	1712	1072322,76	1662221,32
5	1713	1090563,82	1662264,84
6	1714	1090539,36	1671483,41
7	1715	1099657,72	1671509,01
8	1717	1099603,04	1689946,68
9	1718	1108716,6	1689975,16
10	1719	1108686,41	1699194,28
11	1720	1117797,65	1699225,47
12	1721	1117764,69	1708444,86
13	1723	1148909,52	1708578,51
14	1728	1129296,08	1681371,88
15	1730	1131384,02	1677843,92
16	1734	1145656,61	1702441,59
17	1739	1150519,16	1708572,86
18	1740	1170279,14	1708675,43

For block 3 are considered CR 13 numbered source control points in the following table and image:

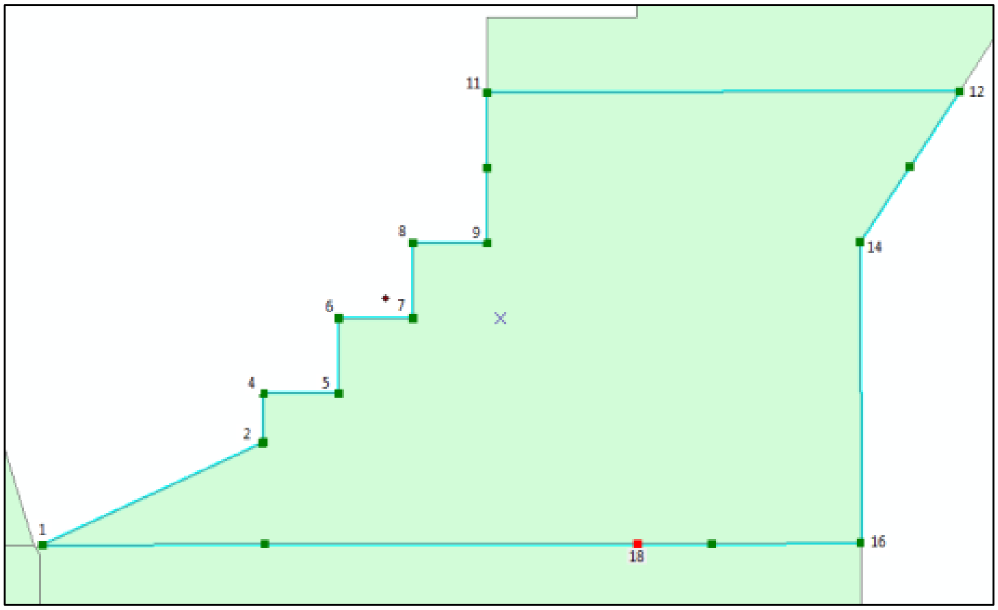

Figure 29. OGX, Destination Check points block CR3, Services Manual

Table 3. *List checkpoints block CR3 destination.*

No	Vértice	X	Y
1	1	1017901,92	1597621,01
2	2	1044860	1610108
3	4	1045021,59	1616085,58
4	5	1054153,78	1616098,31
5	6	1054139,69	1625316,06
6	7	1063269,61	1625331,26
7	8	1063253,01	1634549,18
8	9	1072380,67	1634566,87
9	11	1072342,14	1653001,16
10	12	1130110,28	1653168,54
11	14	1118021,48	1634685,19

12	16	1118143,87	1597815,29
13	18	1090725,85	1597736,02

CR 4 for the block 26 are considered numbered source control points in the following table and image:

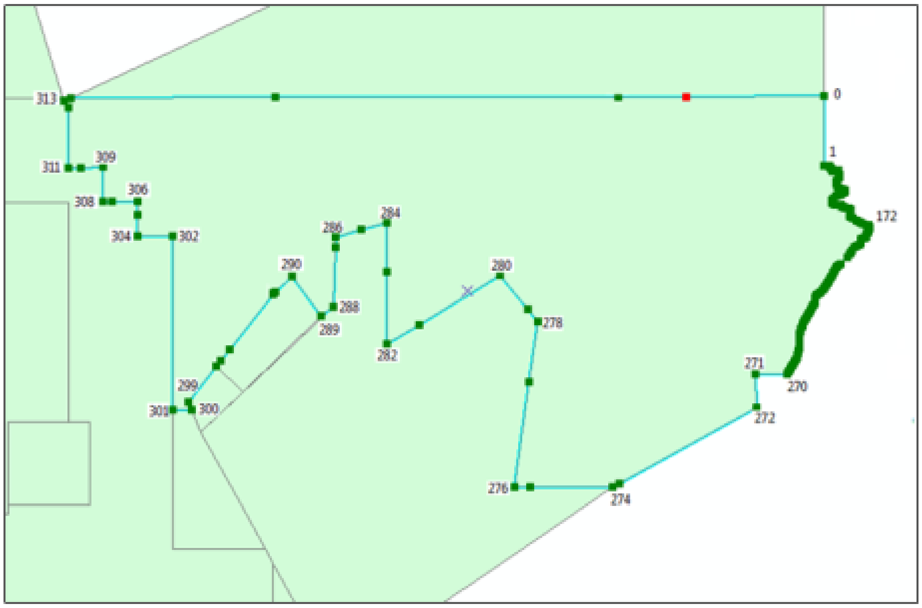

Figure 30. OGX, Control Points CR4 destination block, Services Manual

Table 4. *Listed Block destination control points CR4.*

No	Vértice	X	Y
1	0	1118143,87	1597815,29
2	1	1118173,88	1588590,57
3	172	1124252,66	1580437,81
4	270	1113172,9	1560924,76
5	271	1109115,15	1560906,56
6	272	1109128,1	1556442,34
7	274	1089997,19	1545993,59
8	276	1076997,6	1545993,6
9	278	1079997,52	1567993,33

No	Vértice	X	Y
10	280	1074997,68	1573993,26
11	282	1059998,14	1564993,37
12	284	1059998,15	1580993,18
13	286	1053108,37	1579143,2
14	288	1052901,37	1569876,32
15	289	1051233,68	1568652,73
16	290	1047343	1573868,77
17	299	1033438,97	1557185,48
18	300	1033902,81	1556154,31
19	301	1031374,7	1556152,11
20	302	1031355,45	1579189,04
21	304	1026784,78	1579191,69
22	306	1026781,42	1583800,35
23	308	1022211,34	1583797,29
24	309	1022208,54	1588405,95
25	311	1017639,06	1588403,45
26	313	1016993	1597200

Obtaining the source control points for the variable Target Model Control is acquired from the images. Original png.
Original images provided by OGX for later georeferencing are:

- Mapa_Discordancia_CR2_FA.png
- Mapa_La_Luna_CR2_FA.png
- Mapa_Discordancia_CR-3-4_FA.png
- Mapa_Lagunitas_CR3-4_FA.png

 Control points for the image source Mapa_Discordancia_CR2_FA.png

In ArcMap Mapa_Discordancia_CR2_FA.png attach the image located in the folder C: \ OGXSIG \ Imagenes_Paradigm \ Imagenes_originales.
With the mouse pointer on each of the vertices of the block as indicated below.,

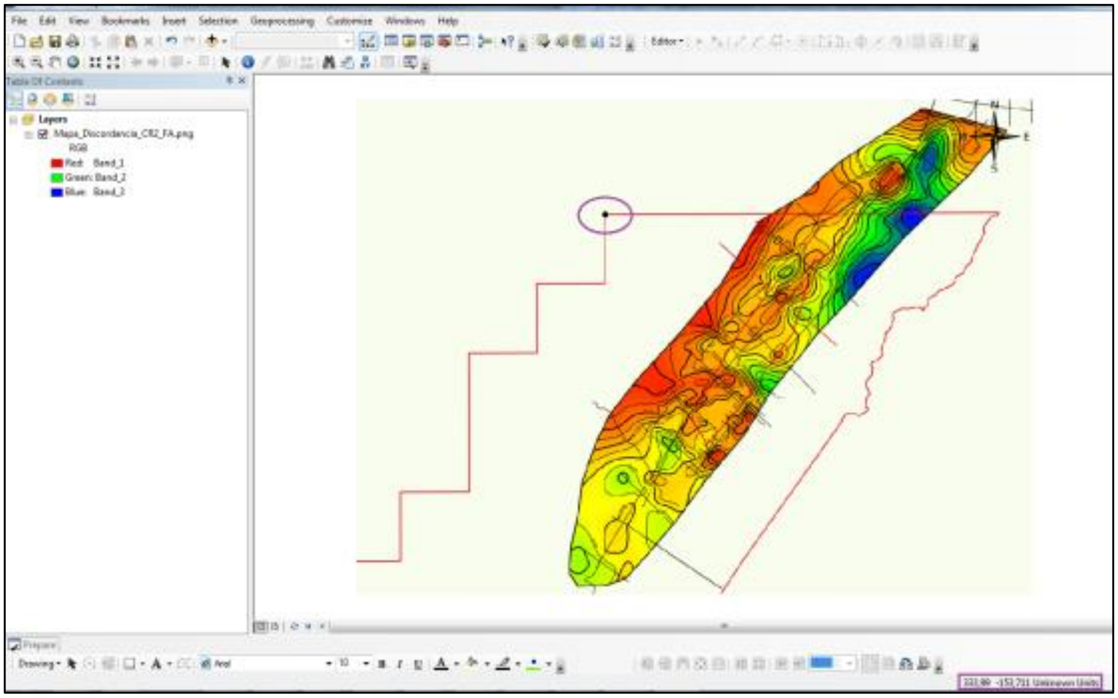

Figure 31. OGX, Taking home Mapa_Discordancia_CR2_FA.png checkpoints, Services Manual

In the bottom view are located ArcMap X and Y coordinates of each point where the mouse is positioned.

This will take all the control points corresponding to the variable source Source Control Model.

Table 5. *List of the main source for the image Mapa_Discordancia_CR2_FA.png.*

PTO_CONTROL	VÉRTICE CORRESPONDIENTE DEL BLOQUE	X	Y
1	1708	652,867	-423,796
2	1713	59,291	-619,698
3	1714	59,291	-526,422
4	1715	150,959	-525,885

PTO_CONTROL	VÉRTICE CORRESPONDIENTE DEL BLOQUE	X	Y
5	1717	150,423	-340,405
6	1718	242,628	-339,869
7	1719	242,628	-247,128
8	1720	334,296	-246,056
9	1721	333,445	-152,621
10	1723	647,897	-152,244
11	1728	450,623	-427,248
12	1730	471,53	-462,093
13	1734	615,733	-213,892
14	1739	665,588	-152,244
15	1740	863,272	-150,44

It is essential to note that for this case, the vertices (1712, 1711 and 1710) of the bottom of the block CR2, not used in the process of georeferencing because the image does not cover this Mapa_Discordancia_CR2_FA.png map section.

Repeat the process of acquisition points to other pictures Paradigm, considering that the selected points correspond to the destination point of each block since the process requires georeferencing common point location and the map image blocks (representing the actual coordinates of ground).

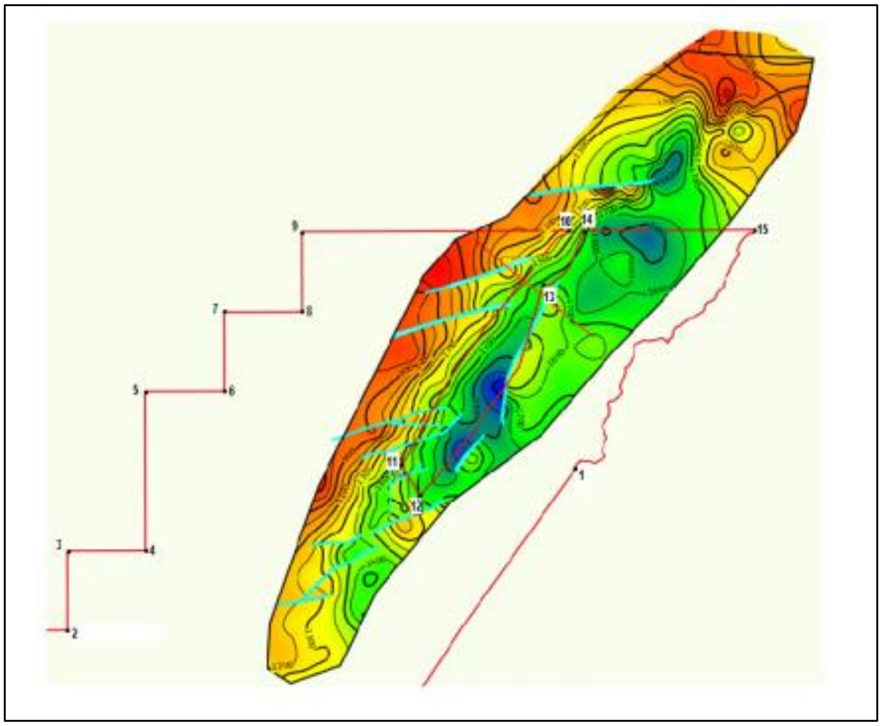

Figure 32. OGX, Taking home Mapa_La_Luna_CR2_FA.png checkpoints, Services Manual

Table 6. *List of the main source for the image Mapa_La_Luna_CR2_FA.png.*

PTO_CONTROL	VÉRTICE CORRESPONDIENTE DEL BLOQUE	X	Y
1	1708	494,211	-428,891
2	1713	19,218	-578,327
3	1714	19,218	-504,054
4	1715	93,047	-504,054
5	1717	92,602	-355,507
6	1718	165,986	-355,063
7	1719	165,986	-280,345
8	1720	239,369	-279,9
9	1721	238,925	-206,072
10	1723	490,208	-204,293
11	1728	331,877	-424,444

Table 7. *List of the main source for the image-3-4_FA.png Mapa_Discordancia_CR.*

PTO_CONTROL	CORRESPONDIENTE VÉRTICE DE BLOQUE	X	Y
1	0	674,03	-228,871
2	1	674,03	-286,911
3	172	713,453	-338,38
4	270	642,272	-462,125
5	271	617,085	-463,221
6	272	615,99	-491,693
7	274	494,435	-558,493
8	276	411,208	-556,303
9	278	430,92	-416,132
10	280	339,163	-379,994
11	282	303,89	-434,748
12	284	302,795	-334
13	286	260,086	-346,046
14	288	258,991	-405,181
15	289	248,04	-412,846
16	290	222,853	-379,994
17	299	134,151	-486,217
18	300	137,436	-492,788
19	301	121,01	-491,693
20	302	121,01	-346,046
21	304	91,442	-346,046
22	306	91,442	-317,574
23	308	62,97	-315,383

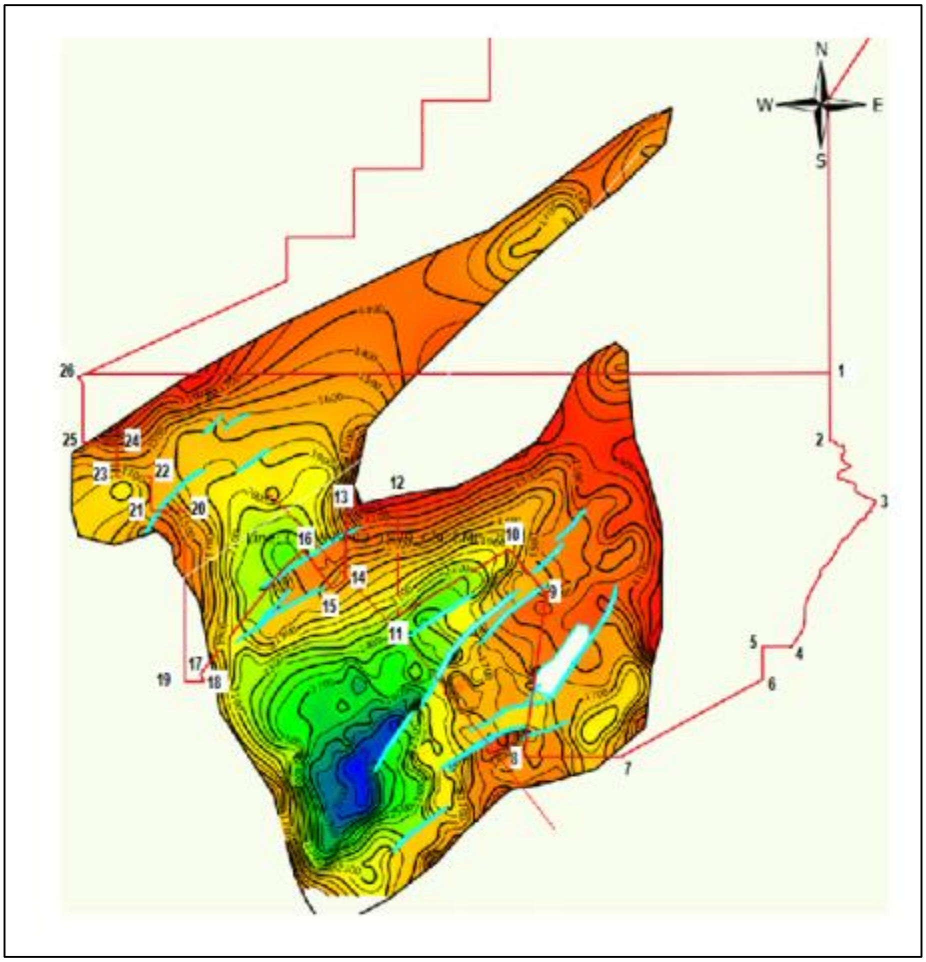

Figure 33. OGX, Take control point-source Mapa_Lagunitas_CR3 4_FA.png, User Manual

Table 8. *List of the main source for the image-4_FA.png*

PTO_CONTROL	CORRESPONDIENTE VÉRTICE DE BLOQUE	X	Y
1	0	731,847	-320,118
2	1	731,847	-383,293
3	172	775,795	-440,974
4	270	696,14	-581,057
5	271	667,299	-581,057
6	272	667,299	-611,271
7	274	532,71	-685,432
8	276	440,694	-685,432
9	278	461,295	-528,869

PTO_CONTROL	CORRESPONDIENTE VÉRTICE DE BLOQUE	X	Y
10	280	424,214	-487,668
11	282	319,838	-550,843
12	284	318,465	-439,6
13	286	270,397	-450,587
14	288	269,024	-516,509
15	289	258,037	-526,122
16	290	229,196	-490,415
17	299	131,688	-607,151
18	300	134,434	-614,018
19	301	116,581	-612,644
20	302	117,954	-450,587
21	304	83,62	-449,214
22	306	83,62	-419
23	308	52,033	-417,627
24	309	52,033	-386,039
25	311	19,072	-384,666
26	313	14,952	-322,865

By having variable data Source Control and Target Control proceeds to transcribe this information to the developing ModelBuider.

Target Contol Points look like this:

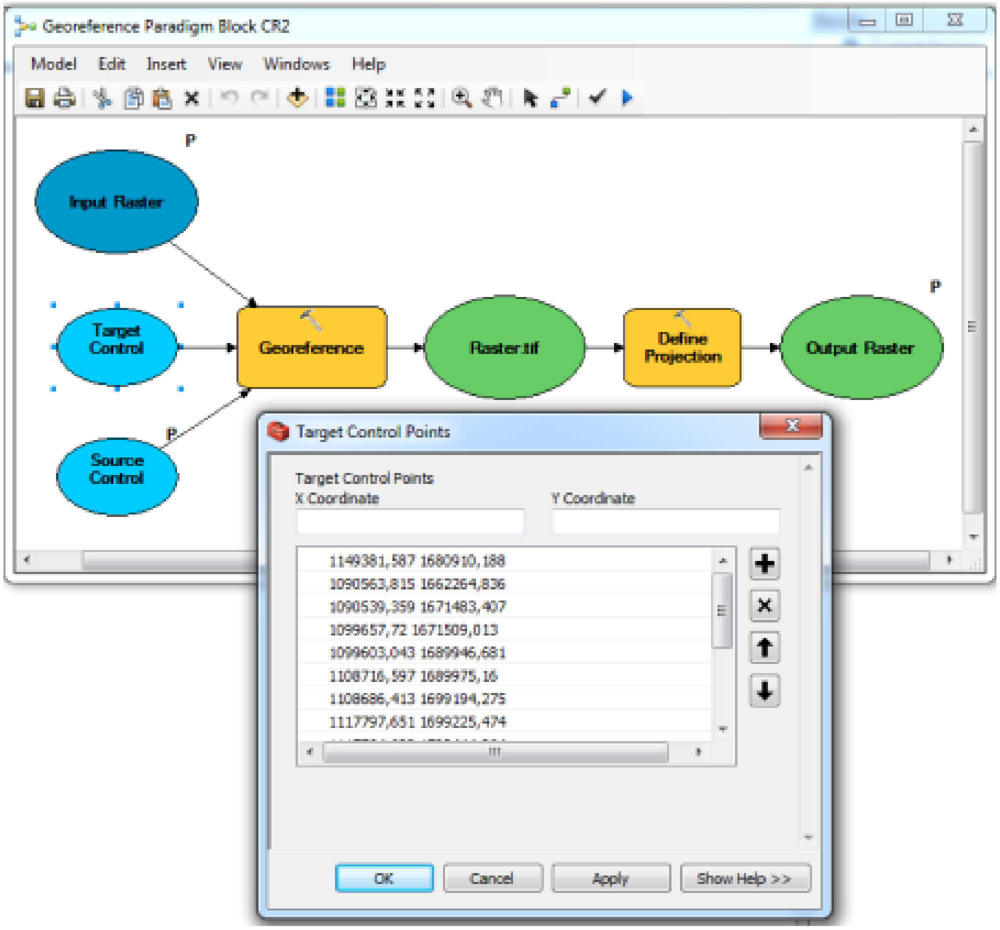

Figure 34. OGX, Information check points destination field, User Manual

It needs to set the order of the model parameters, which will be reflected at runtime. To do so, Model Builder properties, go to the Parameters tab, in this view are seen all the parameters defined for the model. When using dates can arrange the parameters in any order. Similarly, we can add or remove parameters:

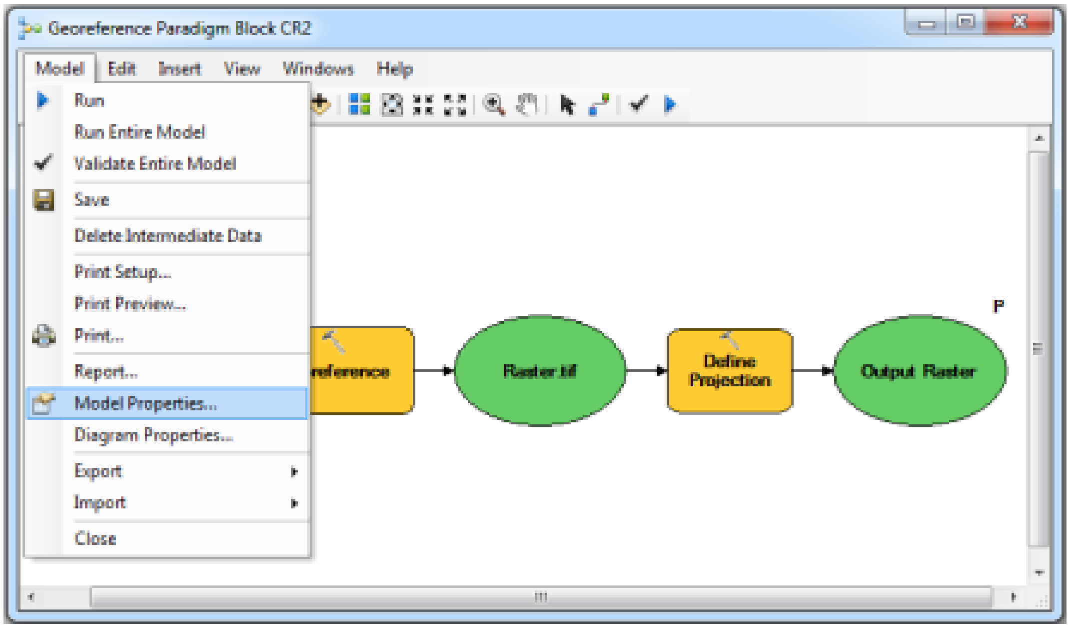

Figure 35. OGX, Properties of the model, User Manual

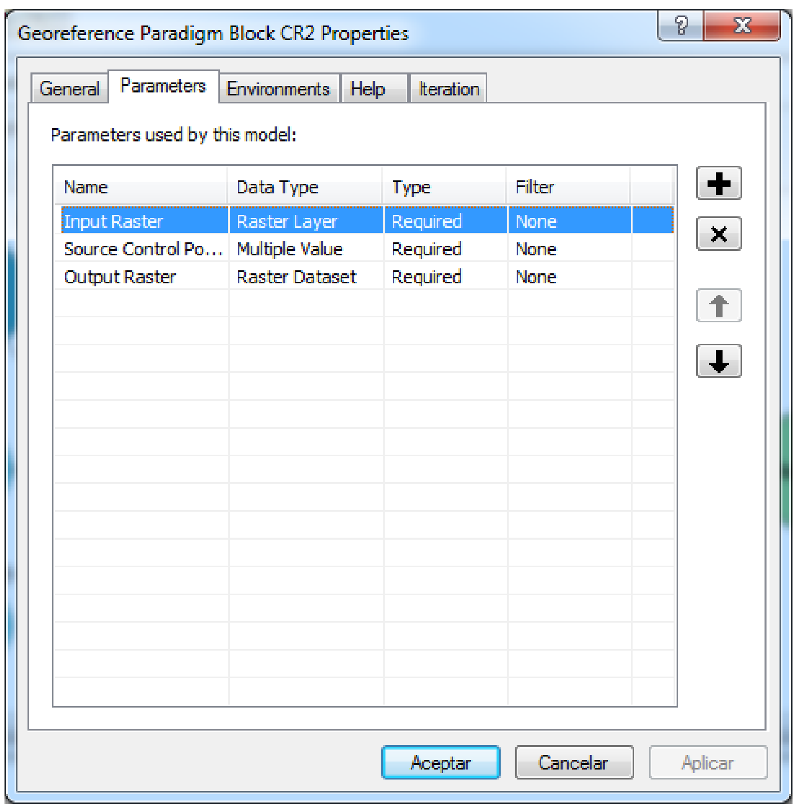

Figure 36. OGX, Order of parameters, User Manual

9.1.5 *Mosaic dataset alternative creation*

For the service that has 56 geographic Mosaic_ElPorrorasters and in general for services that have raster images (Mosaic_RadarSat_CR, Mosaic_LandSat_CR, Mosaic_ImageTIFF) is recommended for customers using Mosaic Dataset and the publication of the image as a service.

OGX to the project was not implemented the Mosaic Dataset data model because this tool requires the Image Server license for publication. However, this document includes the steps for creating a Mosaic Dataset and the publication of this image as a Service

It is pertinent to mention some advantages of using Mosaic Dataset and publish as a service image:

A Mosaic Dataset can store, manage, view and collections of raster and image data, small to unusually large. It is a data model in the geodatabase used to manage a collection of raster datasets (images) that are stored as a catalog, and it looks like a tiled image.
The Mosaic Dataset have advanced processing functions and query raster, and can also be used as the source for imaging services.
The Mosaic Dataset is ideal for distributing data because they allow direct access by users and served easily. A server administrator can change many of the properties of a Mosaic Dataset, such as the maximum image size, level of metadata, the compression method or the maximum number of downloads for maximum server performance and meet the needs the user.
When clients connect to a server to view image in mosaic, the application can handle the same methods of mosaic and other properties connected directly to a user, along with the ability to select raster datasets and download them to the local disk.
A Mosaic Dataset manages and displays not only data but also a tool for the dissemination of images.

Here are the steps for creating a Mosaic Dataset, just in case that requires it or decide to implement it. Remember that it is necessary to have the Image Server License.

To create and configure Mosaic Dataset consider the following:

- The raster data are aggregated are managed, therefore, if the raster data are deleted or moved, the mosaic dataset will be affected.
- Can add a Mosaic Dataset rasters that are within a geodatabase. Those that are created out of a geodatabase can only have the contents of a raster catalog or a previously created mosaic dataset.

The Mosaic Dataset is created from the User SIG_ADMIN, because it is the user who has privileges to create and edit layers.

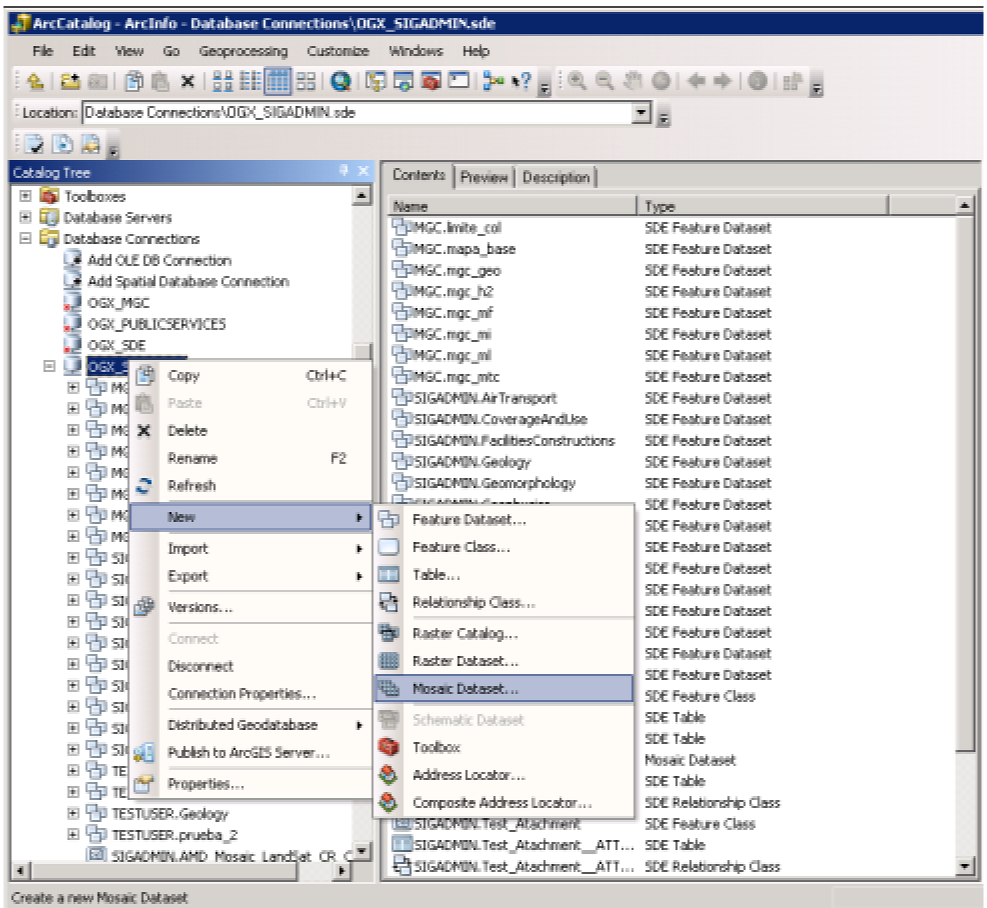

Figure 37. OGX, Creating the Mosaic Dataset, User Manual

9.1.6 *Configuration services maps*

The mapping services are the way maps are made available to the entire organization through ArcGIS. The maps must be configured as to ArcMapsymbology, scales, labels and other aspects of visualization. Later these will be published through ArcGIS Server and consumed by different clients such as Web applications, ArcMap and ArcGIS Explorer and others.
There are 2 types of map service. Msd services that have an engine optimized redrawing of elements, very useful when trying to display dynamic information quickly. Mxd caching services, especially for rapid deployment of information with a low exchange rate.

Geographic mapping services are used by the viewer to identify OGX geographical aspects of the business. Below is the services used by the display and the type of publication to use.

9.1.6.1 Creation and configuration file cr_structural_maps MXD

This service is for Paradigm georeferenced images in subsection 2.7, and as already indicated, is a kind service. Mxd.

Aesthetic deployment of Paradigm images was necessary to apply a clip that acts by cutting the Data Frame in the area of interest. This option is checked the clip To Shape from the properties window of the Data Frame in ArcMap and add the Feature Class Area_Clip_Block located at address C: \ OGXSIG \ Servicios_SIG \ FeaturesClass_Servicios.gdb.

.

9.1.6.2 Creation and configuration file mosaic_elporro mxd

For the customer environment creates a map service containing raster Cesar Rancheria area located in the C: \ SIG_OGX_Raster \ Orthophotos \ El_Porro, these rasters are named with the term mos_corte followed by a number indicating its location with respect to the other raster as shown below:

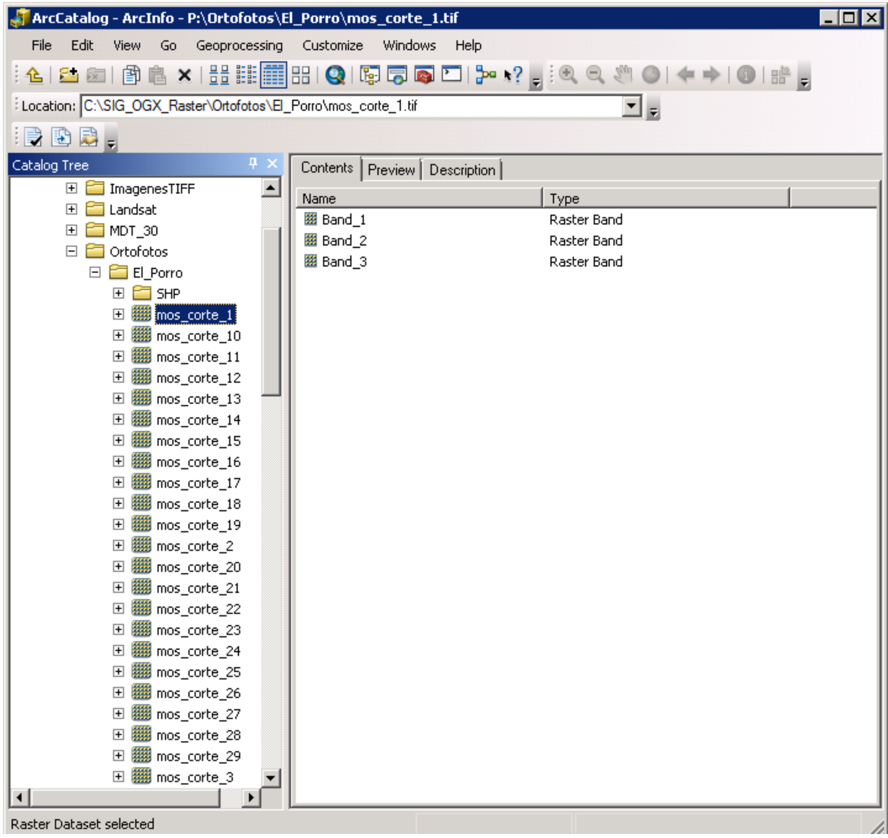

Figure 38. OGX, Location and names of the raster, User Manual

The statistics are needed for raster carry out some tasks such as application of contrast enhancement or classification of data. The calculation of the statistics allows extending ArcGIS applications and adequately symbolize raster data for display.
The creation of pyramids improves display performance raster datasets.

In paragraph 2.8 is explained how to create a Mosaic Dataset recommended as an alternative to improve the display of raster images and other advantages mentioned above. Then in this paragraph 2.9.2 will explain step by step process of publishing an Image Service.

Important: An image service provides access to raster data (and images) through a Web service. The raster data source can be a raster dataset (from a geodatabase or a file on disk), a Mosaic Dataset or a layer file that references a raster dataset or Mosaic Dataset. Post a Mosaic Dataset as an image service extension requires ArcGIS Image Server. After publishing raster data on the server, we can use the resulting image service in ArcGIS

Desktop in the same way we would add any other GIS service layer.

9.1.6.3 Installing the map cache

Go to the installation directory of ArcGIS Server and enter the folder arcGIScache and deposit the contents of the folder on the cd. Verify that content is shown in the figure below:

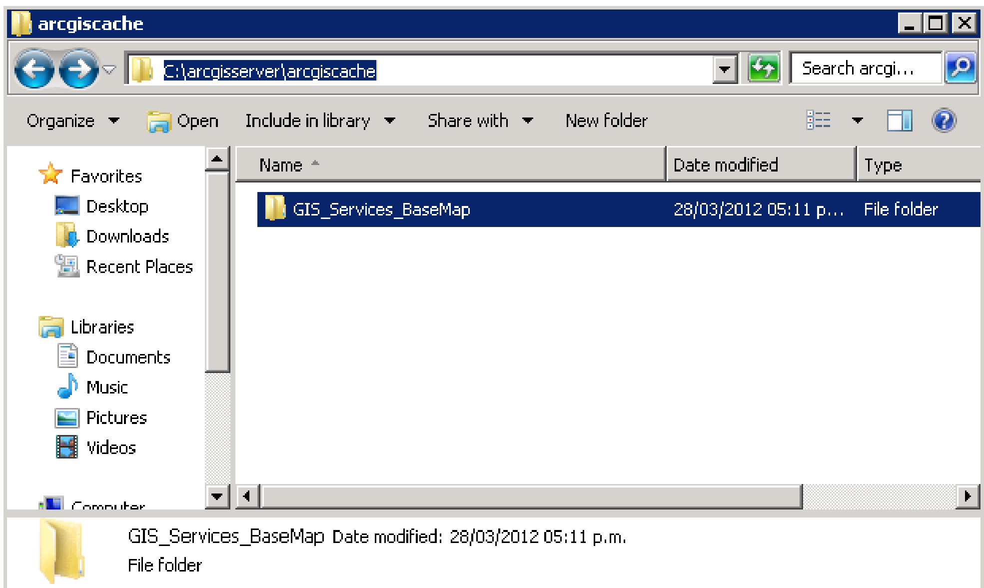

Figure 39. OGX, Folder contains ArcGIS cache, Services Manual

9.1.7 *MSD publication of services*

ArcMap includes a toolbar and workflow for analyzing and publishing optimized map services using a Map Service Definition (MSD). Using ArcGIS Server, the OGX users can use the MSDs to publish high performance ArcGIS map services. This optimized map services are new at ArcGIS Server Version 9.3.1 and can support both real-time, dynamic map services as well as cached map services.

To support optimized map services using MSDs, ArcGIS includes a high performance, scalable mapping engine, which can generate dynamic, high performance maps on-the-fly (as well as cached map services) using the advanced cartography that we design and create in ArcMap. This work is accomplished through a simple workflow - generate a map in ArcMap, analyze and optimize it for performance, save it as an MSD, and publish the MSD as a map service to ArcGIS Server.

9.1.8 *Service publication with cache mxd*

A cached map service is a collection of tiles (tiles) of map art that can be used for displaying a map service. Thus, a mapping service maps can display quickly because the map image does not have to generate on the fly ("on the fly"). Each map image is calculated only once, when creating the map cache.

Thus, each time the user requests a map of ArcGIS Server, map tiles are retrieved from the cache map to the map extent and resolution requested.

9.1.9 *Cache and updates scales*

Below are the scales used for the service cache Base Map. The tiles of this service are set to PNG32 format, creating local cache tiles and customers.

For the update cache, please go to the properties of the service in ArcCatalog session and select Update Tiles. On the window displayed, select the scale we want to update in the Update Tiles, select Recreate Empty Tiles, and finally Update Feature Class Extends surf the Browse window and select the layer in the geodatabase stored in the directory hosted Guia_Cache.gdb MXDMAPAS previously installed. Click OK and wait until the end of the procedure ArcCatalog.

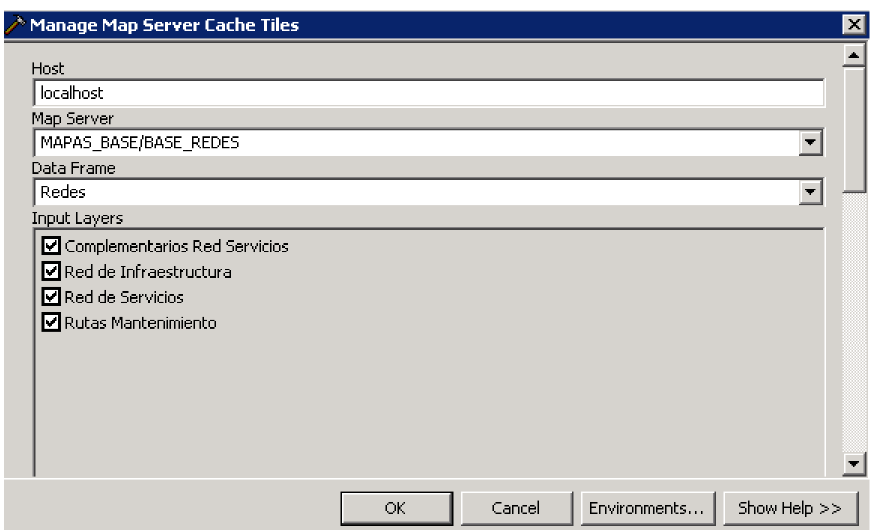

Figure 40. OGX, Update Cache, Services Manual

10. REFERENCES

Acharya, A. (2009). *gisdevelopment.net*. Retrieved 10 18, 2012, from http://www.gisdevelopment.net/application/miscellaneous/misc029pf.htm

Aime, F. B. (1999). Making gis closer to end users of urban environment data. *GIS '99: Proceedings of the 7th ACM international* (pp. pp. 122–127). New York, NY, USA: ACM Press.

Alekhya Datta, S. V. (2009). *GIS APPLICATION IN POWER TRANSMISSION LINE SITING.* PUNE: SYMBIOSIS INSTITUTE OF GEOINFORMATICS.

Aquilino, C. R. (1996). Towards declarative gis analysis. *GIS '96: Proceedings of the 4th ACM international workshop on Advances in geographic information systems* (pp. pp. 98–104). New York, NY USA: ACM Press.

Barrell, K. A. (2003). *ENTERPRISE WIDE GIS: Technologies, Strategies, and Lessons Learned.* Houton Texas: Geodynamics Inc.

esri.com. (n.d.). *http:/esri.com.* Retrieved 08 27, 2012, from esri.com: http://www.esri.com/news/arcuser/0408/entergdb_101.html

IGAC. (1995). *Conceptos basicos sobre Sistemas de Información y aplicaciones en Latinoamérica.* Instituto Geográfico Agustin Codazzi IGAC.

Kumar, D. N. (2003). Remote Sensing and GIS Applications for Water Resorces. Bangalore, India.

Quinlivan, W. F. (2000). *Integration issues in E&P spatial data processing.* The Leading Edge.
Shekhar, M. C.-R. (1997). *Data models in geographic information systems.* Communications of the ACM.

Yeung, C. P. (2002). *Concepts and techniques of Geographic Information Systems.* Prentice-Hall.

11. GLOSSARY

ANH

National Hydrocarbons Agency.

BUSINESS INTELLIGENCE

Business Intelligence (BI) is a category of applications and technologies to capture, store, analyze and provide access to data to help users make better business decisions.

GEODATABASE

Database for storing geographic objects, their attributes, relationships and behavior of each of its elements. It is designed to provide storage and controlled access, intelligent and sustainable OGX geographic information.

GIS

Geographic Information System

ACTOR

It is a system user, "user" can mean a human user, machine, or even another system. Anything that interact with the system from outside the system boundary is considered an actor. The actors are typically associated with Use Cases

ACCESS TO GEOGRAPHICAL DATA

Geographic data are accessed directly at the data level. This medium can be applied if there is a reasonable basis to apply.

UPDATES

Means any improvement, correction, new version held in ESRI technology platform.

FITNESS

Ease with which a system or component can be modified to correct errors, improve performance or other attributes, or adapt to changing environments.

ADM (Architecture Development METHOD)

TOGAF defined method for developing an enterprise architecture that meets the needs of business and information technology in an organization. It can be adjusted and customized to the needs of OGX and once defined is used to manage the implementation of development activities of architecture.

DATA WAREHOUSE

Element used to define data that is stored permanently. A portion of incoming data in a data warehouse is stored permanently, updating portions of the data that already exist. One piece of data that comes out of a data warehouse is a copy of the original data.

HIGH AVAILABILITY

It is possible in this architecture GIS schemes result in duplicate or active - active or active - passive because some components are mission critical to ensure operational availability of 99%. It is necessary to consider the legal aspects of licensing and maintenance because they impact.

APDM (ArcGIS PETROLEUM DATA MODEL)

Template design and implementation of a geodatabase developed by ESRI led to the persistence of spatial information related to the transportation and distribution of fuel products through a network of pipes.

API (Application Programming Interface)

An application programming interface, or API is the set of functions and procedures (or methods in object-oriented programming) that offers some library to be used by other software as an abstraction layer. Usually used in libraries.

APPLICATION (S)

Software programs that support specific information needs.

CORPORATE APPLICATIONS

These are applications that support administrative and management processes.

ARCGIS It is a family of software products for building a complete GIS. It is integrated with other technologies (not necessarily geographical in nature: database, business applications, etc.) As a whole is constructed following standards. ArcGIS is a suite of products for easy installation and management, which combined, are responsive to the needs of any organization.

The ArcGIS architecture meets the current and future needs of all users in the field of Geographic Information Systems.

ARCGIS DATA INTEROPERABILITY

ArcGIS extension that allows direct reading of numerous spatial formats or not, the ability to export / import to and from a large number of formats, generate custom data formats and transformation tools available formats.

ARCGIS DESKTOP

ArcGIS assembly complete solutions to suit any user's needs. Different customers are a scalable set of products that allow users to create, import, edit, query, map, analyze, and publish geographic information.

ArcGIS Desktop Products:

All ArcGIS Desktop products share the same basic applications (ArcMap and ArcCatalog), user interface and development environment, so that users can share their work with each other. Can share maps, data, symbols, layers, geoprocessing models (ModelBuilder), custom tools and interfaces, reports and metadata.

• ARCMAP

It is an application of ArcGIS Desktop (ArcView, ArcEditor and ArcInfo) to create maps. It is the central application for all tasks that have to do with maps, including cartography, map analysis and editing.

• ARCCATALOG

It is a shared application of ArcGIS to organize and access all the information in a GIS, such as maps, globes, datasets, models, metadata and services.

Users employ ArcCatalog to organize, search, and use geographic data using standards-based metadata. A database administrator can use ArcCatalog to define and build geodatabases. A GIS server administrator can use ArcCatalog to manage the server environment.

ARCGIS IMAGE SERVER

It is a platform for managing, processing and distribution of geographic images. Provides quick access to images and open allowing organizations to maximize their investment in raster information.

ARCGIS SERVER

Complete platform capable of creating professional GIS applications and services, thanks to its server technology are able to manage, visualize and analyze geographic information centrally.

This platform makes it easy for organizations to share mapping services and applications on the Web. With ArcGIS Server, we can connect more people with the information they need to make better decisions. Publish fast, intuitive Web mapping applications and services tailored to the audience. Simplifying access to their services, data and images. ArcGIS Server supports desktop, Web-based, and mobile workflows. It helps to protect and manage their information allocation and provides a scalable platform that satisfies everything from the simplest to the most complex requirements of web maps.

ARCHIVING

It is the internal structure of the geodatabase to manage historical information, consists of taking control of any change on spatial and alphanumeric data that are stored in the versions and reconciled on the default version (Default) of the Geodatabase.

RASTER FILE

Represents any data source that uses a grid structure (regular grid of cells) to store geographic information. Type spatial data structure in which the storage unit Basic information is the cell or grid.

VECTOR FILE

Is the same feature.

ARCIMS

Application server is integrated into ArcGIS architecture that has been designed for the distribution and dissemination of geographical information, maps and GIS services in dynamic environments Internet / intranet.

Whether operating in a sandbox, as an organization's intranet, as if done through universal Internet environment, it is possible to use ArcIMS for distributing data and GIS functionality to multiple users.

It is a very powerful, scalable, standards-based enabling, quickly and easily design and manage Internet mapping services.

ArcSDE

Server that provides advanced data storage, management and access to spatial data in different databases from any ArcGIS application.

ARC USER

Magazine that focuses on users of ESRI software.

ARTIFACTS

An artifact is a work product that provides a description and definition for tangible work products.

Artifacts are tangible work products and well-defined tasks that consume, produce or modified. The devices may consist of other appliances.

ASSOCIATION

A partnership involves two model elements have a relationship, usually implemented as an instance variable in a class.

ATTRIBUTE

Characteristic elements of a map, which is usually stored in tabular form.

Descriptive information of an item (point, polygon, line).

The common attribute describes an entity in a relational data model, equivalent to a column in a table and stored in a database

LOAD BALANCING

It is possible in this architecture GIS schemes result in duplicate or active - active in some parts because they are mission critical to ensure a higher transaction volumes geographical. It is vital to consider the legal aspects of licensing and maintenance because they impact.

DATA BUS

The bus is a digital system that transfers data between components of a computer or between computers.

GIS QUALITY

Geographic Information gathering and introducing it into the system requires a high quality of design and work, intensive training and frequent monitoring to monitor the quality. In other words, in addition to hardware and software suitable for the job, the effective use of GIS requires having adequately trained personnel, as well as planning, organization and supervision, which can maintain the quality of the data and the integrity of the final products.

The architecture was designed recitals OGX GIS concepts:

- Adaptability
- High Availability
- Load Balancing
- Scalability
- Extensibility
- Multi-reference
- Multiscale
- Multiaccess
- Multiuser
- Backup and Recovery Policies

These concepts will be defined in this document in alphabetical order.

USE CASES

Technique for capturing potential requirements of a new system or a software update. Each use case provides one or more scenarios that indicate how the system should interact with the user or another system to achieve a specific objective.

EDITING CACHE

ArcMap settings that makes visible entities in the current map extent remain in the memory of the local machine. Being designed for use in working with large amounts of data, a cache makes editing faster because ArcMap editions do not have to retrieve data from the server.

MAP CACHE

It is a format supported in Tiled and Scale in which the services are generated and sent to PGN formats from there are shipped to customers ArcGIS.

CAD. (Computer Aided Design)

The computer aided design abbreviated as CAD (Computer Aided Design), is the use of a wide range of software applications that assist engineers, architects and other design professionals in their respective activities. Also, we get to find CADD denoted by the acronym, drawing and computer-aided design (Computer Aided Drafting and Design).

COVERAGE

Storage format data file based vector for storing the location, shape and attributes of geographic features.

GEOGRAPHIC DATA CONSUMERS

An entity that uses the service offered by the producer of geographic data.

QUALITY CONTROL

Verify compliance with functional requirements, and other cargo. They include: system testing (functional and technical) and acceptance testing.

CONTROL FILE

A control file is a small binary file that is part of an Oracle database. The control file is used to track the state of the database and the physical structure.

CLASS

Collection of sets (or sometimes mathematical objects, etc.) that can be clearly defined by a property that all its members share.

DATA FILE

File that is part of an Oracle database. The data file used to store data - including user data and undo data. The data files are grouped into tablespaces.

DATA SET

Set of numbers, relationships among numbers, and the metadata associated with numbers. For example, a table of density measurements, the times they were collected, and the location of each measurement

DATUM

Benchmarks set in the earth's surface based on which measures are taken a position, and an associated model of the shape of the earth (reference ellipsoid) to define the geographic coordinate system.

DBMS (Data Base Management System)

Acronym of Data Base Management System, which is a collection of data and programs. Users interact with the DBMS by invoking programs, which allow access to data through transactions or operations such as read, write, start, accept, cancel, which are executed sequentially or concurrently. In Spanish: handler System Relational Databases - SMBDR.

DEPENDENCY

(1) Dependency relationships are used to model a wide range of dependent relationships between model elements, and even among the same models-..

DOMAIN

(1) How to limit entries (data) of a field. They must meet certain rules. They can be: a range or list of values.

DOCUMENT MAP

In ArcMap, is the representation of a map disc. The map documents can be printed or included in other documents.

DPM

Display or Maps by Minute, deployability reference maps ArcGIS tool.

E00

Exchange file format software ARC / INFO

ENTERPRISE Architect Version 7.5

Modeling tool that supports the methodologies TOGAF V9, ADM (Architecture Development Method) and ArchiMate standard version 1.0, all supported by the UML version 2.0.

SCALABILITY

System capacity or configuration resized to fit changing circumstances.

All components of the architecture could be scaled vertically and / or horizontally. It is crucial to consider the legal aspects of licensing and maintenance because they impact.

SCHEME

Collection of database objects. A schema is owned by a database user and has the same name as the user. Schema objects are logical structures created by users who have, or reference data. Schema objects include structures such as tables, views and indexes.

ESRI

ESRI: Environmental System Research Institute, INC., COMPANY ESTABLISHED UNDER CALIFORNIA LAW WITH SOCIAL DOMAIN 380 New York Street, Redlands, California, 92373-8100, UNITED STATES.

ESRI GEOPORTAL SERVER

Open source product that enables discovery and use of geospatial resources including datasets, rasters, and web services. This allows organizations to manage and publish metadata for their geospatial resources.

TY EXTENSIBIL

All components of the Framework includes architecture, APIs, interfaces that allow to extend its functionality using programming languages like Java,. Net, C + +, Python, VB.

FEATURE OR ENTITY:

- Each of the elements of the objects from a spatial database of which it is possible to distinguish its characteristics
- Object class in a geodatabase with a field of type geometry. The entities are stored in an entity class.
- Representing a real world object.
- Graphic element that represents a point, line, or polygon in a coverage or shapefile.

FEATURE TABLE ATRIBBUTE

Attribute table of the elements: Defines generically those tables containing the primary tax items.

FEATURE CLASS

It is a collection of features with the same geometry type: point, line or polygon.

FEATURE DATASET

It is a collection of feature classes that share a common coordinate system.

ARCHITECTURE FRAMEWORK

Set of tools that can be used to develop a wide range of different architectures.

FLEX VIEWER

Web-based application that consists of a template provided by ESRI Flex. The display consists of geographical features as provided by the template as OGX specific functionality. This web application is integrated with the portal.

GEOREFERENCING

Is defined as the location of a mobile or stationary space objects (represented by point, vector, area, volume) in a coordinate system and datum determined. This process is often used in Geographic Information Systems.

GEOPROCESING

Process that applies geographic analysis and data modeling to produce new information. The ArcInfo geoprocessing environment contains hundreds of tools to process all types of data. ArcGIS extensions add more geoprocessing tools for specific geographic features.

GIS. (Geographic Information Systems) Geographic Information System

GI. GEOGRAPHIC INFORMATION

Information describing the location and attributes of things, including its forms and representation. Geographic data is the combination of spatial data and attribute data.

SATELLITE IMAGE Visual representation of the information captured by a sensor mounted on an artificial satellite. These sensors collect information reflected by the surface of the earth which is then sent to Earth and processed conveniently provides valuable information on the characteristics of the area depicted.

DATABASE INSTANCE

An Oracle instance is an Oracle database running memory composite structures (SGA) and background processes (SMON, PMON, LGWR, DBWR, etc..). An instance only exists while it is running.

INTERFACE

Specification of behavior that implementers agreed. It is a contract. Implementing an interface classes withstand guarantee required behavior, which allows the system to treat unrelated elements the same way, through a common interface.

GRAPHICAL USER INTERFACE

The graphical user interface, also known as GUI (graphical user interface in English) is a computer program that acts as a user interface using a set of images and graphic objects to represent the information and actions available in the interface. Its main use is to provide a single visual environment to allow communication with the operating system of a machine or computer.

ISCDEF (COMPILED SERVICE DEFINITION IMAGE)

Defining compiled image service: File image service. An ISCDef is created by ArcMap Image Service and defines a raster data collection, processing parameters and metadata for each map.

KML (Keyhole Markup Language)

Google Earth KML Services is the XML that describes the geographic features and rasters in three dimensions, by which these services provide access to vector features and raster information that is in KML.

MAGNA - SIRGAS

(National Geocentric Reference Frame, densification Geocentric Reference System for the Americas) geometric reference system for defining geographic coordinates (latitude and longitude), which replaced, in 2004, the old datum BOGOTA.

MAINTENANCE

Process of modifying a software system or component after their operation to correct faults, improve performance or other attributes, or adapt to environmental changes.

CORRECTIVE MAINTENANCE

Modification of a software system or component after their operation to fix bugs in the code and / or components.

MAINTENANCE EVOLUTIONARY

Maintenance involving new features or improvements to the code and / or components thereof to existing functionality of the applications.

MAP

ArcGIS is a tool that sends information from a database to the map that is displayed in the application.

MAP SERVICES

Services allowing access to files or MXD map document.

PHYSICAL MODEL

Represents the lowest level in data modeling. Define the storage structure and specific paths to databases. Specifies how the data will be stored and how will flow within the process. Therefore, this model is dependent on the hardware and software to be used.

MOSAIC DATASET:

Can store, manage, view and COLLECTIONS raster and image data, small to BIG. Is a model of data within the geodatabase that is used to manage a collection of raster datasets (images) stored as a catalog and that looks like a mosaic image.

MULTISCALE

The geodatabase data level in the Feature Class, geographic data at different scales.

MULTIACCES

The GIS is a Frame for Intranet, Internet, Extranet, LAN, online and offline clients ESRI ArcGIS exists for each environment. (QUALITY GIS).

IO MULTIUSER

Any user at any time, any client can access different OGX GIS.

MXD (MAP EXCHANGE DOCUMENT)

A map file format, used in ArcGIS. A. Mxd save the description, design and objects stored in the map and organized into units called documents.

NETWORK

Network, usually used to connect services, servers and workstations can be covering these Local, Intranet, Internet and Extranet.

NODE

It is a physical piece of equipment to be deployed on the system-for example, a workgroup server or a workstation.

OGC - Open Geospatial Consortium

Define open and interoperable standards within GIS pursues agreements between different companies that enable the interoperation of geoprocessing systems and facilitate the exchange of geographic information for the benefit of users.

ORACLE

Oracle is a management system relational database (RDBMS or by the acronym for Relational Data Base Management System), manufactured by Oracle Corporation. ORACLE DBMS is the standard for OGX for critical databases.

ORTOPHOTOGRAPHY

It is a digital aerial photograph transformed orthogonal projection showing a scene.

MVC (Model View Controller)

It is a design pattern that helps give some structure to the application logic. Its main objective is to separate the business logic from presentation logic or interface.

PATTERNS

They are parameterized collaborations that means they are a group of objects / classes working together that can be abstracted from a set of scenarios general.

PROFILE

A profile is a database object - a named set of resources to limit or allow actions in the database. A profile is defined as a set or extension of metadata.

RE-TESTING

Tests running test cases that failed the last time of his execution, to verify the success of corrective actions.

POINT TO POINT

The geographical services are accessed directly from the Web service interfaces service according to their profile. This medium can be applied if there is a reasonable basis to apply.

RASTER

Any type of digital image represented in grids. The raster pattern or grid GIS focuses on the properties of the space in the location accuracy. Divide the space into regular cells where each represents a single value.

RASTER DATASET

They can be simple or compound dataset with multiple bands for different spectra or categorical values

RDBMS (Relational Database Management System)

(1) Management System database, are an awful specific type of software dedicated to providing an interface between the database, the user and the applications that use it. (2) motor is a type of database in which the database is organized and accessed according to the relationships between data values.

REDO LOG FILE

A file that is part of an Oracle database. When a transaction is committed, the details of the transaction in the redo log buffer is written to a redo log file.

RELATIONSHIP CLASS

Relational rule that defines the cardinality between two elements of the Geodatabase (Feature Class and / or Table), maintains the integrity of information from the relational perspective. Relational Integrity OGX information is critical and is presented as a requirement for this design.

REPLICATION

Process to create copies of data across two or more Geodatabase, where changes in data can be synchronized.

REST (Representational State Transfer)

Defines a set of architectural principles for web services, with emphasis on system resources.

ROL

Roles are an effective method for managing privileges in the Oracle database.

RND

OGX National Data Network.

RUP

In English: Rational Unified Process, is a software development process and with the Unified Modeling Language UML is the most widely used standard methodology for analysis, implementation and documentation of object-oriented systems.

SAN (Storage Area Network)

Network designed to connect servers, disk arrays and supporting libraries. Its function is to connect quickly, securely and reliably the various elements that comprise it.

SCRIPT

A set of instructions that allow automation of tasks by creating small utilities, which are executed by a command line interpreter usually are text files.

SGA (System Global Area)

It is a memory region that contains data and control the Oracle Server. This SGA memory is located on the server, it resides in the Oracle Server.

SHAPEFILE

A data storage format for storing the location vector, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains an entity class.