CASE STUDY

HEXAGON GEOSPATIAL

Implementing an Imagery Management System at Mexican Navy

> With ERDAS APOLLO in place at the Mexican Navy, end users have seen a significant improvement in image delivery and the ability to easily integrate geospatial information into their applications.

Since 1941, the Mexican Navy has carried out the presidential mandate to oversee and safeguard 11,000 kilometers of Mexican coastlines, inland water bodies suitable for navigation, and the territorial sea and maritime aerial space.

Security tasks at the Mexican Navy are continuous and mission-critical; therefore, reliable and efficient technical systems and solutions are required to support these operations. The response capability of the Navy is of the utmost importance, so modernization programs are constantly underway.

Geospatial management and delivery systems are considered instrumental in decision-making processes at the Mexican Navy. These systems are responsible for delivering geospatial information near real-time to field offices distributed across the country. Therefore, they invest in contemporary solutions to provide the most advanced technological capabilities available. A special division for handling imagery and geospatial information oversees these operations, and all functions are performed by highly trained military personnel.

MISSION

The mission of the Mexican Navy Satellite and Geospatial Information Division is to create accurate geospatial products and guarantee secure, fast access to up-to-date geospatial information for national security tasks for maritime segments. The division manages and administers the Mexican Navy imagery warehouse, which includes hundreds of terabytes and thousands of images. Through geospatial analysis and processing, the division provides secure and accurate responses to geospatial inquiries and delivers high-quality geospatial products to Navy commands. It is also responsible for continuous technological advancements, to ultimately ensure information is disseminated in a reliable and timely manner. The Navy's goal is to remain a top-level, world-class geospatial security and military agency.

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DATA STORIES AND DELIVERY

The Mexican Navy has a large and growing geospatial warehouse of medium-resolution and high-resolution imagery derived from the Mexican SPOT Ground Antenna (ERMEXS) and other satellite sources. The ERMEXS is an advanced terminal for the reception, storage, extraction, and archive of SPOT imagery.

Imagery and derived products are acquired and produced every day, and are an integral part of almost 90 percent of the department's processes. The geographic area of interest covers all of Mexico, or nearly 2,000,000 square kilometers of land. This data supports decision-making activities related to planning, execution, and control of naval operations. The goal is to continue to grow the data store and, in conjunction, expand its geospatial client/ server architecture through a secure web portal.

Some specific operations for which geospatial information is crucial are:

- Monitoring and patrolling border areas north and south of the country
- Recognition and security patrolling
- Rescue operations during natural disasters
- Support assistance relief during natural disasters and fires
- Reforestation efforts and campaigns
- Troop training in military operations and logistics
- 3D topographic modeling for planning military operations

ISSUES WITH GROWING DATA QUANTITY AND DEMANDS

In early 2007, the Mexican Navy's Imagery and Geospatial Information division was struggling to keep its imagery catalog up-to-date, along with performing its other primary duties. The department was under pressure to make sense of the increasing variety and quantity of imagery products being delivered, and simultaneously respond to growing internal and external demands for that data.

For example, a new requirement was the urgent need to deliver up-to-date, large-imagery mosaics for use in a variety of remote sensing and GIS applications across the country. Therefore, department staff required their imagery catalog to be current to easily find information and create mosaics in a timely manner. The main requirements of the Mexican Navy were to:

- Catalog and disseminate massive amounts of raster information
- Respond quickly to imagery queries and requests
- Immediately deliver geospatial information
- Securely share geospatial data and information between users
- Edit vectors in an Oracle® database in real time

THE HEXAGON GEOSPATIAL SOLUTION

Officers of the Mexican Navy worked closely with MAPA, a Hexagon Geospatial Distributor in Mexico. Together, they performed several tests using the Mexican Navy's data and IT infrastructure. Mexican naval officers are long time ERDAS IMAGINE® (remote sensing) and LPS (photogrammetry) users, and also have deep experience in relational databases and GIS. With this level of experience in image processing and cartography, they had a very clear understanding of what was required.

Magdalena Garcia-Rendon, General Manager of Geospatial Solutions for MAPA, says this about the challenge, "We were committed to provide an innovative solution to the customer and help them solve the problem of handling huge volumes of data. ERDAS APOLLO is an extremely suitable solution to support data integration and collaboration in strategic military applications."

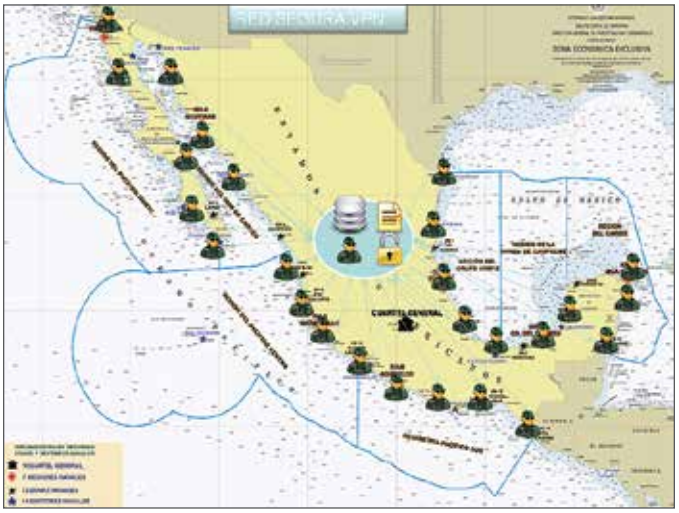
After careful technical evaluation, it was determined that ERDAS APOLLO met the needs and strategic IT requirements the Navy was looking to fulfill for its operational tasks. Available in three tiers,ERDAS APOLLO is an enterprise-class data management and delivery system enabling an organization to describe, catalog, search, discover, and securely disseminate massive volumes of data. ERDAS APOLLO seamlessly integrates with existing GIS environments, leveraging business systems and supporting almost any kind of data input.

Through the implementation of ERDAS APOLLO, the Mexican Navy has been able to build and maintain an integrated geospatialinformation workflow with centralized and secure administration.

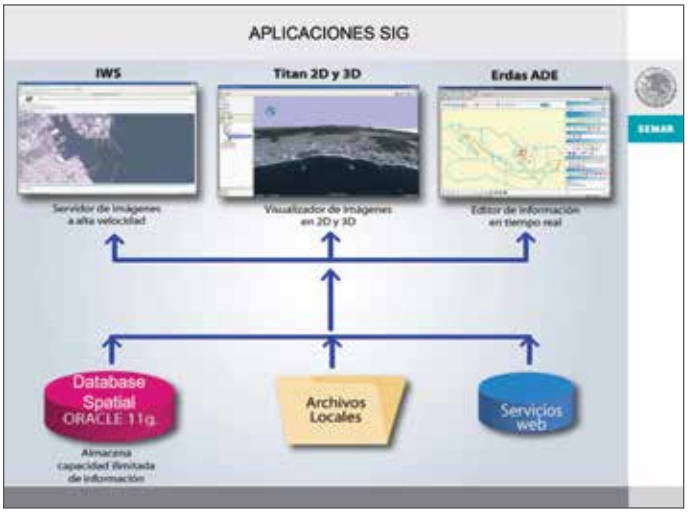
One of the key reasons for selecting ERDAS APOLLO was the level of integration the system enabled, and the ability for end-users to discover and access secure web services in existing applications. ERDAS APOLLO enables seamless data delivery into the various desktop applications in use across the Mexican Navy, including ERDAS IMAGINE, LPS, ArcGIS®, MapInfo®, AutoCAD®, Gaia, and a variety of web clients, to name a few.

The solution also facilitates geospatial collaboration schemas in real time through the Mexican Navy offices across the country, as well as collaboration with other agencies in the Mexican Federal Government.

ERDAS APOLLO was customized according to the specific needs of the Mexican Navy, in conjunction with MAPA. During project implementation, the officers of the Mexican Navy received all necessary training to proficiently manage and operate ERDAS APOLLO by themselves.



Geospatial management and delivery systems are responsible for delivering geospatial information near real-time to field offices distributed across the country.



The solution at the Mexican Navy

POSITIVE RESULTS

With thousands of images to access and distribute, ERDAS APOLLO also enables the Mexican Navy to serve a huge image mosaic in a compressed format. This imagery can then be accessed by a variety of applications in use at the Mexican Navy. Efficient algorithms in the software already reduce mosaic production time. In addition, delivery via a compressed mosaic saves the department's valued storage resources.

For the Mexican Navy, ERDAS APOLLO catalogs continuously updated data stores and simultaneously delivers hundreds of image mosaics and derivative products via secure web services to various levels of government. For the first time, a huge mosaic of several gigabytes is easily accessible for rapid display, using nothing more than a web client.

Navy personnel create sharable data and content mashups in the TITAN Viewer 3D globe and visualize both local and shared data, along with centralized raster and vector web services.

The Mexican Navy is responsible for operation of the Mexican SPOT Ground Antenna (ERMEXS), which is an advanced terminal for the reception, storage, extraction, and archiving of SPOT imagery.

The Chief of the Department for the Imagery and Geospatial Information Division, said, "For the Mexican Navy, Hexagon Geospatial has provided a technological tool to improve, modernize, and facilitate the current competence regarding the handling of enterprise geographic information used for planning operations. The Hexagon Geospatial solution is a complete workflow. Satellite imagery processing and analysis is performed, including geometric corrections, advanced processing, and multispectral analysis both in 2D and 3D environments. Then the solution enables the administration, management, and dissemination of massive volumes of information. Through all of this, we are now well-equipped to provide Navy Commands with accurate and reliable geospatial information for operation development and decision-making support."

With ERDAS APOLLO in place at the Mexican Navy, end users have seen a significant improvement in image delivery and the ability to easily integrate geospatial information into their applications. They also now have the means to engage in higher levels of geospatial collaboration.

One user said about the system, "The end users are very pleased with the geospatial information integration in their daily work, as it supports their decision-making processes."

Using light Web applications in a browser, Navy personnel are able to create, edit, and update vector information from the field and directly into the Oracle database. All edits occur near real-time, so others may query and visualize easily through the same Web browser.

FUTURE

In the future, the Mexican Navy expects to continue growing the ERDAS APOLLO system. Currently, the integrated solution is fully implemented and operational at the Mexican Navy. Phase II integrates more cataloging, serving, and geoprocessing functionality from ERDAS APOLLO. This implementation will enable spatial analysis experts at the Mexican Navy to share their knowledge by publishing spatial models via Open Geospatial Consortium (OGC®)-compliant WPS. End-users can then execute and create value-added data products, and simultaneously increase the use of geographic information via web services at the Mexican Navy.

Photo Credits
Cover: US Navy 050909-N-8154G-045 A Mexican Navy Mi-8 helicopter stands by for passengers on the flight deck aboard the amphibious assault ship USS Bataan (LHD 5), off the coast of Mississippi.

Page 2: US Navy 090423-N-2821G-389 The Mexican navy Knox-class frigate ARM Mina (F-214) sails in formation with maritime forces from Argentina, Brazil, Canada, Chile, Colombia, Ecuador, Germany, Mexico, Peru, U.S. and Uruguay off the coast of Florida during the UNITAS Gold

Page 6: US Navy 100620-N-5319A-030 Mexican marines board the amphibious transport dock ship USS New Orleans (LPD-18) for exercises in Manzanilla, Mexico

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