



GIS Integration in Energy

THE CHALLENGE

Geographic Information Systems (GIS) technology is a computer-based data collection, storage, and analysis tool that combines geographic or spatial information into easily understood maps. The oil and gas industry and other related sectors are heavily dependent on geospatial data to make decisions ranging from new exploration to day-to-day operations. When determining where to drill or which wells to repair, geography plays a major role.

How do you integrate Geographic Information Systems with your planning and operations systems so that you can maximize utilization of geospatial data? The business could benefit with:

- **Increased production yield** – combining geographic data with data on business, economic, and risk factors could enhance long-term yield, not just short-term output.
- **Improved facilities management** – combining geographic data with facilities and equipment data, such as availability of repair rigs, greatly reduces operational down time.
- **Efficient pipeline management** – combining geographic data with transportation data can be utilized to monitor the condition and flow of pipelines and determine the best pipeline locations to transport oil and off the fields and to the refineries.

There are a number of challenges to integrating and using GIS data, including:

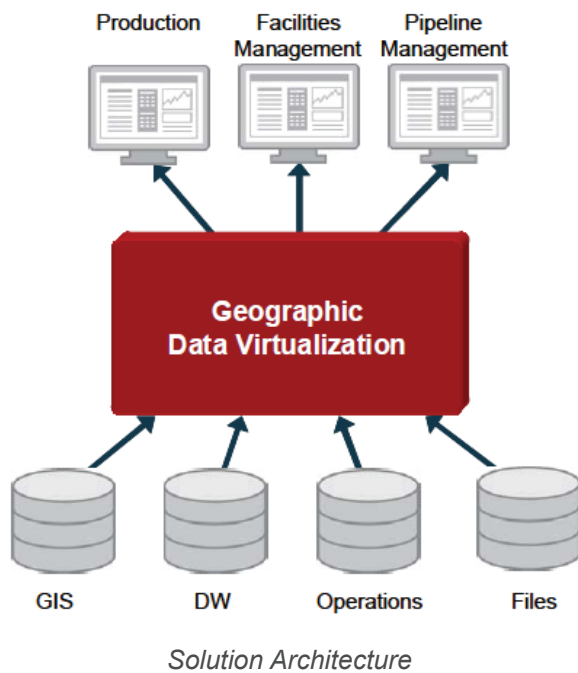
- **Accessing disparate data sources** – GIS data is only part of the equation. Accessing data from other upstream and downstream systems are also required.

- **Combining geographic and operational data** – Once you access the disparate data, you need to integrate, join, or aggregate data to reveal insight.
- **Delivery data to the decision makers** – There are numerous applications that consume data using different methods. How do you ensure the assembled data is delivered to these applications?

SOLUTION ARCHITECTURE

The Composite solution federates and virtualizes GIS and other data to provide a contextual view (see diagram on back). The solution architecture has the following characteristics:

1. **Geographic systems and data sources that require geospatial information overlay**
 - Geographic Information Systems
 - Operational – production, management, monitoring
 - DW – historical data
2. **The Data Virtualization Layer**
 - Access geographic data for disparate sources
 - Aggregate or virtualize data into a contextual view
 - Deliver aggregated view for operation and management
3. **Operation and Management Applications**
 - Production – Oil and gas production
 - Facilities Management – Manage facilities and equipment
 - Pipeline Management – Monitor flow and transportation



THE COMPOSITE SOLUTION

Composite provides an elegant solution for GIS integration. The Composite Data Virtualization Platform leverages best practices principles including abstraction, decoupling, reuse, and more, while also supporting a range of internal and industry data standards to integrate geospatial data with operational systems to improve productivity and efficiency.

- **Access GIS, operational systems, data warehouses, files**
 - **Databases** – Connects to standard databases using ODBC/JDBC.
 - **Web Services** – Consumes SOAP over HTTP and JMS services. Supports XML over HTTP.
 - A message pipeline allows interjection of custom logic during the request/response of the Web service.
 - **Packaged Apps** – Connects to SAP, Oracle EBS, Salesforce.com and other applications using their approved APIs.
 - **Multi-dimensional Data Sources** – Access multi-dimensional data sources such as SAP BW.

- **Integrate GIS data with information systems into a contextual view**
 - **Federation Engine** – Join and aggregate data that is vertically and horizontally partitioned.
 - **Cost-base Optimizer** – Uses statistics to create an optimal query plan that minimizes unnecessary data flow across the network.
 - **Rule-base Optimizer** – Allows users to specify exactly how they want to execute a particular query.
 - **Transformation** – Shape data using XQuery, XSLT, Java and SQL functions.
- **Deliver combined information for planning, analytics, and real-time action**
 - **Database Objects** – Publish data models in the form of views and procedures for consumption via ODBC/JDBC/ADO.NET.
 - **Web Services** – Publish data services in the form of WSDLs for consumption via SOAP or SOAP over JMS. A message pipeline allows interjection of custom logic during the request/response of the Web service.
 - **REST** – Access and retrieve large volumes of data.

BENEFITS AND ADVANTAGES

- **Agile architecture** – integrate GIS with numerous operational systems
- **Easy to add/remove** – various operational systems and data stores
- **Scalable** – to support increasing data sources and data volumes
- **Improved** – analytics and richness of results
- **Short deployment time** – for quick time to solution
- **Reduced custom development** – to minimize complexity