

NEW GENERATION DATA INTEGRATION SOLUTIONS

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Abstract

Data integration and inadequate data management practices are the most critical information issues facing the petroleum industry. Past data integration solutions have been too complex, cumbersome to use and costly. As a result, companies desire Internet driven solutions that combine simple map browsers and meta-data catalogs through which users can view, query and display linked databases. This paper presents a case for a new generation solution based on standard off the shelf Web browsers and simple meta-data file definitions using SDE (Spatial Data Engine) and GIS technologies from ESRI. SDE tables are used to define spatially enabled meta-data tables to facilitate access to proprietary data on company networks. ArcIMS servers and spatial browsers are used to facilitate network access to other commercial or publicly available spatial data via the Internet. This paper illustrates how vendors and major oil companies are using these cost effective new generation spatial data management tools and processes to solve a large part of the petroleum data integration problem. These technologies could be exploited to help resolve many of the long-standing data access issues that have confronted Argentina's petroleum industry.

INTRODUCTION: According to a recent survey, inadequate data management practices and data integration are the most critical information issues facing the petroleum industry. Key issues cited in the survey include:

- As a result of consolidation, many companies no longer have adequate staff to either maintain their corporate data stores or to support commercial databases.
- Companies spend too much time and money cleaning and loading data into project files.
- Stand alone corporate, commercial and project data files that are managed in incompatible formats and systems make it difficult to access and integrate enterprise data.
- Lack of standard enterprise systems and inadequate data/application interfaces limit ability to exchange data and to achieve desired benefits of systems interoperability.

The scope of the data integration problem is illustrated in Figure I.

Cost was cited as the universal corporate driver to restructure data management systems. Users also hope to increase values through restructuring. Users confirmed their desire for capabilities that could be delivered through a network (Internet) services model. Desired capabilities for a network solution include a meta-catalog linking all available data and a simple Internet browser to view and select data. Need for seamless data/application interfaces and eventual linkage of E&P and business processes also were cited as important needs. In spite of tens of million dollars investment, past data integration solutions have been too complex, cumbersome to use and costly.

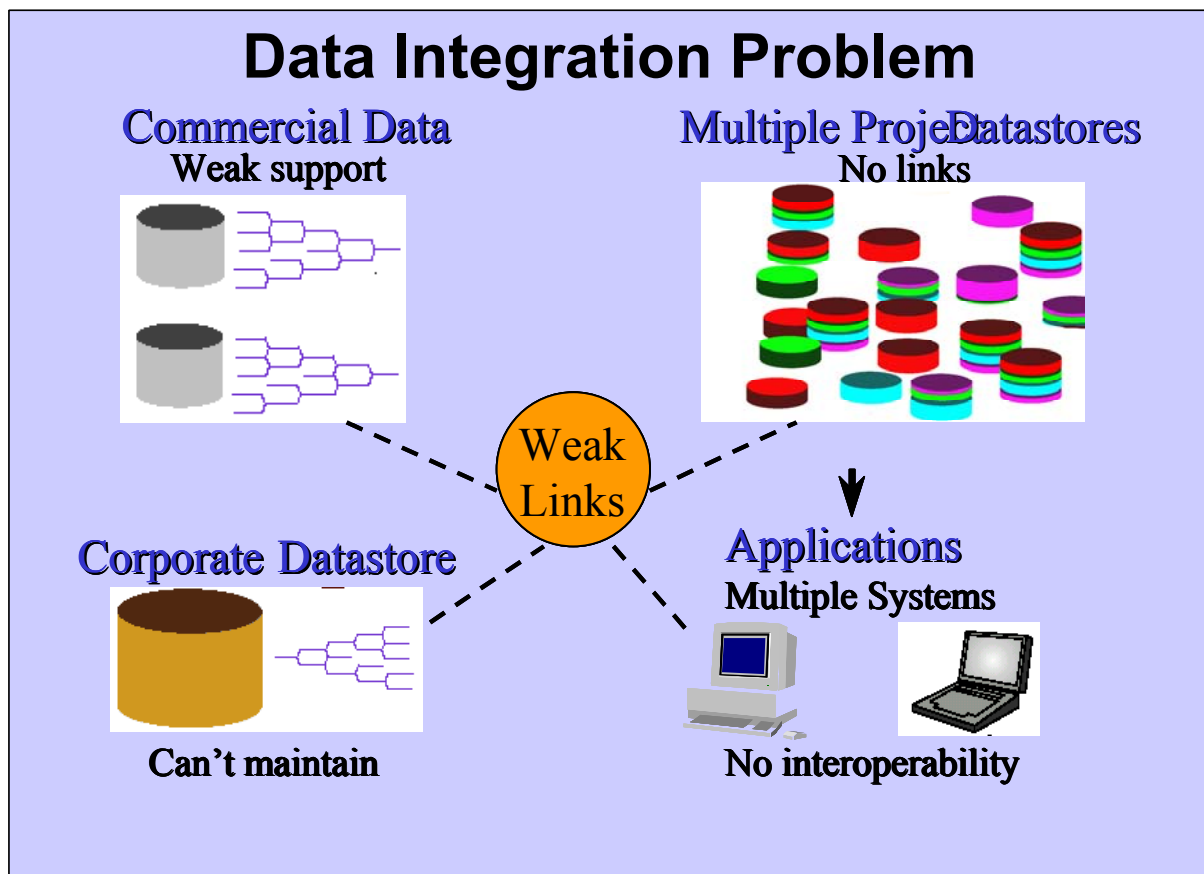


Figure I. Current petroleum systems typically maintain commercial, corporate and project data repositories in different formats and on different servers. As a result, little data integration is provided.

SOLUTION COMPONENTS: This paper presents a case for a new generation solution that combines network and Geographic Information System (GIS) technologies. The solution is based on standard off the shelf Web browsers and simple meta-data file definitions using SDE (Spatial Data Engine) and GIS technologies from ESRI. Key components include:

- SDE tables are used to define spatially enabled meta-data tables, or layers, that facilitate access to multiple databases through a common browser. An SDE layer consists of three tables: a business table which contains unique identifiers and attributes about the data; a feature table that defines spatial attributes and coordinates; and an index table that provides location grid references to speed spatial searches. Experience has shown that standard business tables that employ multiple attributes enhance speed and utility of the SDE layers. Adoption of industry standard unique identification codes, reference values and common business attribute tables also greatly enhance data integration benefits.
- ArcIMS servers and spatial browsers are used to facilitate network access to other spatial data via the Internet. Any public or commercial spatial databases that are available through ArcIMS servers can be accessed and displayed through this technology.
- Tool kit of Web enabled applications. A family of “thin client” tools facilitates easy-to-use but comprehensive queries with a report and graph generator and creation of standard export formats to link data with leading desktop applications. Users also can implement more robust Web enabled applications through an Applications Service. Several such applications are addressing the need for seamless data interface with leading workstation applications.

The solution concept is illustrated in Figure II, which shows how users can realize the benefits of integrated global data through Internet access to spatially enabled SDE layers that are available through ArcIMS servers. This architecture allows users to access global sources of proprietary, public and commercial data.

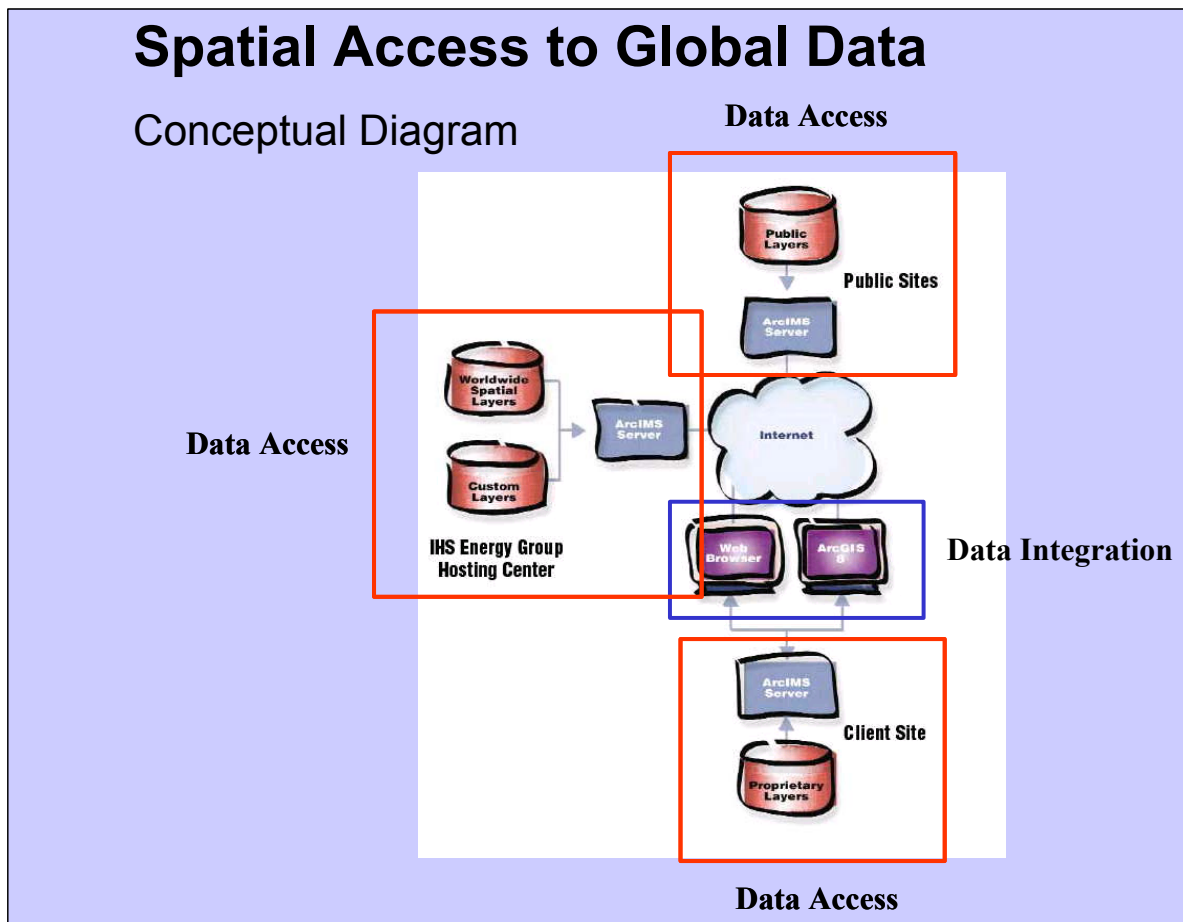


Figure II. Proposed solution architecture providing access to global petroleum data using a Web browser and the Internet to access proprietary, commercial and public data that are defined as spatial SDE layers on ArcIMS servers.

EXAMPLES: IHS Energy Group's implementation shows how these technologies are being used to facilitate global access to multiple sources of petroleum data. Examples illustrate several important capabilities:

- Establishment of hosting centers for commercial data is an important component of the solution architecture that is being employed to reduce costs. Companies that have shifted maintenance of global commercial data from their proprietary processing centers to hosted services report 30 to 50 percent savings. This amounts to tens of thousands of dollars per year. Associated Application Services in this environment also provide software tools to facilitate seamless links to primary workstation applications.
- Using SDE layers to access data from different servers in different formats for adjoining countries and display them together on a single map. Figure III illustrates a map of oil and gas fields that span the Mexico / U.S. border along the Rio Grande River. U.S. data are based on the PIDM data model and are accessed through a server in the U.S. Mexico fields are based on the IRIS21 data model and are accessed through a server in the UK.
- Using ArcIMS to access and integrate spatial layers from multiple sources in multiple projections into a single map.
- Using SDE layers to query and display multiple Argentina data attributes (basins, licenses, fields, reserves, pipelines, wells) with various map layers. Experience with spatial integration of commercial layers for Argentina data indicate that standard commercial unique identifiers and reference values could provide a significant foundation to define meta-data catalogues and SDE layers to launch the indexing of petroleum data that are provided by operators to Argentina's Secretaria de Energia. Moreover, it is believed that the tools and processes described in this paper for the new generation spatial data

integration solution could reduce the time and cost to deliver state of the art Internet access to these valuable national data assets.

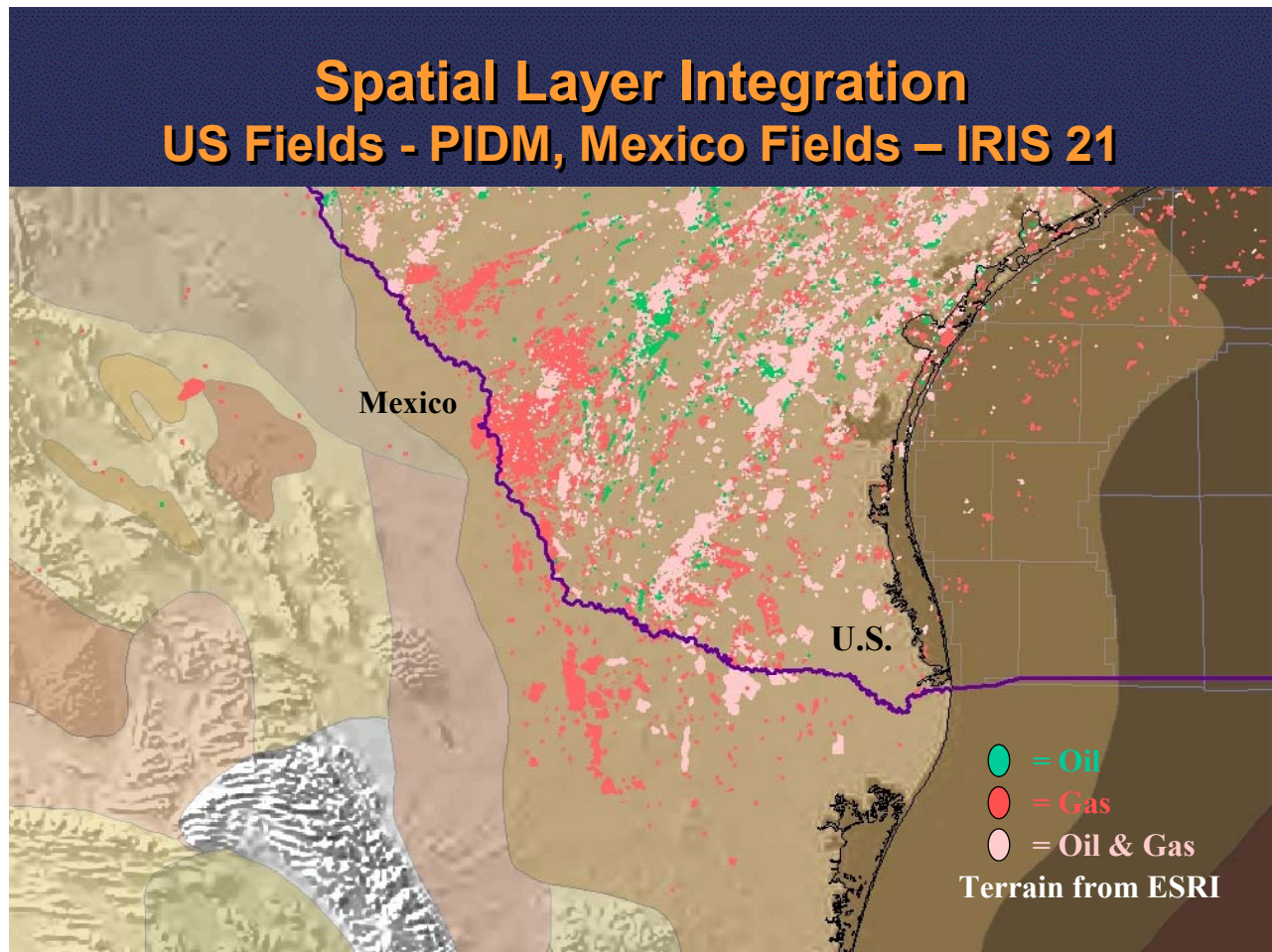


Figure III. Using SDE layers to access data from different servers in different formats for adjoining countries and display them together on a single map is illustrated. Terrain data are imported from ESRI.

CONCLUSIONS: Creative use of these new generation spatial data management tools and processes promise to deliver viable, cost effective solutions to a large part of the petroleum data integration problem. Consequently, many companies are implementing SDE to facilitate access to disparate internal databases. This paper also shows how the functionality can be extended to link company proprietary data with vendor supplied commercial data and public data that are accessible via the Web. These technologies could be exploited to help resolve many of the long-standing data access issues that have confronted Argentina's petroleum industry.