Maturation of GIS Environment in Mid-size Oil Company

BHP Billiton Case Study

February 2004
BHP Billiton Company Information

• BHP Billiton (BHP B)
• BHP Billiton is a global leader in the resources industry.
• Our organisation is designed around Customer Sector Groups (CSGs), which are focused on customers, rather than operations.
• Our CSGs are Aluminium, Base Metals, Carbon Steel Materials, Energy Coal, Stainless Steel Materials, Petroleum and Diamonds and Specialty Products (including titanium minerals, Integris and exploration & technology).
• In addition to our headquarters in Melbourne and our presence in London, BHP Billiton also has corporate centers in Johannesburg, South Africa and Houston, USA.
Today we will talk about GIS in Petroleum division
Our Principals

• GIS is an integral mapping strategy
• Share GIS expertise company wide
• Value is in the data and knowledge about it
Typical Mapping Problems in Petroleum Division

- Culture data duplicated in all mapping applications
- Mapping professionals do not use up to date functionality of available applications
- Multiple overlapping queries produce redundant data in variety of formats for use in the same application
- Graphics department and Data Management team produce data files for mapping applications with inconsistent content due to poor update procedures
- Layers from digitized sources do not reach data bases
- Value of the project data and interpretation does not reach other teams
History of GIS in Petroleum Division

**Spring 2000**
- No GIS in Place
- Underutilized OpenExplorer on Unix
- No GIS support in the office

**Disadvantage:**
- Lack of knowledge

**Spring 2002 (Houston only)**
- Over 20 users of ArcView 3.2
- GIS used by regional GOM and NV teams
- GIS projects in Geohazards team
- GIS facility planning projects
- SDE implemented as data warehouse

**Spring 2003 Petroleum division**
- ArcGIS 8.3 in all Petroleum offices
- ArcSDE implemented in Perth, Au, and Houston, USA
- Metadata collection is recognized
- Over 50 GIS users and support
- BHP B Houston accepted as ArcGIS 9.x beta tester

**Advantage:**
- Did not have legacy GIS

**Disadvantage:**
- Lack of knowledge
Common Questions Related to Mapping Data for Petroleum Companies

- **Data Integration/ Management**
  - Data synchronization/uploads
  - Where do we store the data?
  - Data formats

- **Knowledge Preservation**
  - What information do we need on our data
  - How does it get preserved
  - How do we retrieve the information

- **What do we put on the desktop?**
  - How do we put the application on the desktop?
Foundation of our Mapping

GIS – ArcSDE on Oracle
Foundation of GIS- ArcSDE

SDE stores vector and raster data. All these data can be added to ArcMap with data retrieval for the area of interest only. Grids and images stored with scale dependent resolution (pyramids). All these make mapping of large datasets very fast and efficient.

Why SDE:
Use the same data without duplication in ArcGIS, Web Maps, Petrosys, OpenSpirit

Data recycling: use of corporate knowledge from previous studies and contribution to the corporate memory

Building compiled layers: we need them not on the fly but in SDE to share with different applications
Dealing with Imagery and Grids

Images stored in SDE are accessible corporately.

Multi-image of ERMapper alg can not be imported.

SDE serves only part of image being displayed.

Need lots of tablespace.
Easier Searches for the Map Layers - Metadata Collection at BHP B

Metadata collection is a first step in knowledge preservation and smart searches. Map layers from SDE or on the disk could be searched using Metadata.
Searching for Map Layers Using Metadata

This search was governed by theme key word and geographical selection. It could be saved and recalled later from Search Results selection. Just remember to give it a name.
Business Rules of ArcSDE Data Management

• Management of SDE layers
• Process design with graphics department
  – Graphics department is a part of data production hence management
  – GIS data to be created by GIS systems if possible
• Dealing with vendors
  – Educate the vendor about metadata collection
  – Make it a part of the deliverables
  – Maintain common deliverables requirements from project to project
Future Plans for ArcSDE in BHP Billiton

- Distributed SDE?
- Replication of data?
- Sharing data across enterprise
- More Metadata server
GIS as Part of Mapping Strategy

ArcGIS + Petrosys + OpenSpirit + ERMapper + Portal = GIS
BHP B Petroleum GIS – Mapping Framework

- **Principals:**
  - Keep value in data
  - Educate users
  - Oracle SDE data storage for vector and raster data
  - Build metadata on all ArcSDE layers
  - Influence data vendors on metadata collection and service
  - Educate and influence software vendors on their possible interactions with GIS systems

- **Agreed items**
  - Serve out layer files not connections to ArcSDE if possible
  - Use personal geodatabases not shapefiles for projects
  - Use UNC not drive letters
GIS as an Integral Part of Petroleum Mapping Framework

**Advanced Mapping**
- Petrel
- ArcMap
- Petrosys

**Portal**
- ArcIMS

**Web Mapping**
- ArcIMS

**Common Mapping Middle Layer**
- Documentum (Document repository)
- OpenSpirit (With CopySync)
- Direct Connect
- ArcSDE: Local Tellus, IHS, other vendor data, geographical layers, geopolitical layers
- BHP B Geography Network - global layers and images

**Data Stores**
- OW
- GF
- Finder
- Early stage of application development
- Data bases
- Applications producing data/Vendor data
- Spatial DB/ Direct connectivity

**Real-time data access**
- ErMapper
- Probe
- CAD & Graphics
- Other IHS
Reduction in Data Duplication and Maintenance - Map Layers from SDE Data Base on ArcMap and/or Petyrosys

• ArcSDE stores vector and raster data. Vector data can be added to the ArcMap/Petrosys with data retrieval for the area of interest only.
• Petrosys is working on display of raster data from ArcSDE

• Issues: ArcGIS can’t display Petrosys information without export
OpenSpirit GIS Middle Ware

Scan Utility can turn OpenWorks data into shapes. Currently limited to shapefiles only for GIS. Can be run as cron job. Requires knowledge of source data/application.
Web Maps With Scale Dependent Legends
Selecting the Object from the Layer and Applying Geofilter
Looking for Mapping Data Available in BHP B-
Participate in BHP B GIS Network

These four catalogs of data are available from BHP B
Minerals. Petroleum can participate in catalog by
contributing to b.net
Enterprise GIS

• Principals:
  • Agree on common building blocks: Oracle, ArcSDE, ArcIMS
  • Desktop solutions depend on business requirements
  • Metadata is an integrator of CSG efforts in providing the data for the corporation
  • The data has a value if there is a metadata on it – knowledge capture
Challenges and Benefits of Enterprise GIS Implementation

Challenges in GIS Implementation

• Large scale implementation, which requires perfect coordination
• Large variety of GIS solutions to choose from
• Different state of GIS awareness in CSGs
• Adequate and proactive support for the growth of the GIS Petroleum community

Benefits of GIS Implementation to the Business

• Faster more efficient services
• Facilitates and accelerates understanding
• Acceleration of knowledge recycling
• Better internal/external communication
• Coordination between CSGs
• Timely utilization of the data by all CSGs – reduction of multiple purchases of the same data
• Easy submittals of the data to government organizations (such as MMS)
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- Share GIS expertise company wide
- Value is in the data and knowledge and not in the application

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