



P-494

Managing Coalbed Methane (CBM) data in a corporate E&P database – to make faster decisions & to cope up with increasing data need

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Summary

With increasing gas demand in the country, most of the India's E&P majors have started exploring CBM blocks. After the third licensing round of CBM acreages, 26 blocks have been awarded to E&P companies so far, covering 13600 km² areas. E&P companies are constantly drilling CBM wells for exploration and development activities; this generates not only gas and profit but valuable data too.

A significant investment was done by E&P companies in drilling CBM wells. Having done that, E&P companies are now facing an issue to store and manage their CBM well specific data in their Corporate Database along with the E&P data related to oil & gas, which is a challenge to them and consequently to SIS as well.

To address the above problem, SIS has taken an initiative to enhance the capabilities of its best in class corporate database 'Seabed' to include CBM data classes to manage CBM data simultaneously with other well data.

Keywords: CBM – Coalbed Methane, SIS – Schlumberger Information Solutions, E&P – Exploration and Production.

Introduction

Coal Bed Methane (CBM) is naturally occurring methane (CH₄) with small amounts of other hydrocarbon and non-hydrocarbon gases contained in coal seams as a result of chemical and physical processes. CBM is often referred by 'Sweet Gas' or 'Green Gas' because of its lack of hydrogen sulfide.

Successes of CBM in US and Australia have prompted other countries to examine their CBM potential. India, having the fourth largest+ proven coal reserves in the world (+ - According to source Fox Davies, Year 2008). E&P companies in India have also started acquiring CBM blocks through CBM rounds.

Exploration and development of CBM blocks and O&G (Oil and Gas) blocks have common operations which results into almost similar output to be stored in corporate database. But during CBM exploration and development many CBM specific well tests and laboratory tests are carried out, which are different from O&G exploration.

Since corporate databases are generally designed to store O&G data; CBM specific data types had no place to fit in company's corporate database, this fact was the main reason for following problems:

- Individuals working on CBM projects were managing their data in non-standard ways
- Data consistency and versioning was not possible
- Finding the right data was very time consuming and many times not possible
- Data security and accountability can't be imposed
- Data loss can't be tracked and Data completeness can't be measured.

SIS have realized above problems must be addressed smartly by understanding the real root cause of the situation. Following result of this root cause analysis are the deliverables of the project.

- Selecting the right technology which can accommodate CBM data types.



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- Identifying most common CBM data types which has no place to fit fully or partially in corporate database.
- Ensuring data security and ease of access is given high priority.
- Moving forward, corporate database should have capabilities and functionalities to accommodate any unaddressed CBM data types.

Project Implementation

The proposed project has been implemented through following different phases:

Feasibility Study carried out to find out optimal approach.

Looking at the various different future aspects during this study, 'Seabed' – the current commercial database offered by SIS was chosen to be extended over any other legacy database. And 'ProSource Enterprise' – the current commercial front-end user interface was chosen to be customized over any other legacy user interface.



Figure 1: Seabed as corporate database and ProSource as front-end user interface.

Identify CBM specific data types.

All possible different CMB data types were gathered from publicly shared content over internet and E&P clients from India and Australia.

Standardize CBM parameters and units for each data type.

Approximately 30 data types given with different Parameters from different mediums; after this standardization exercise they were brought down to 16 different CBM data types.

1. Breakdown Test
2. Injection/Fall-off Test
3. Pre Fracture Test
4. Fracture Test
5. Production Test
6. Phase wise Production Test
7. Salinity Test
8. Geochemical Water Analysis Test
9. Coal Cleat and Fracture Analysis
10. Methane Adsorption Isothermal Analysis
11. Gas content Analysis
12. Maceral Analysis
13. Proximate and Ultimate Analysis
14. Rock mechanical Properties
15. Petro-Physical Properties
16. Molecular Gas Compositional Analysis

Figure 2: CBM data types

Map CBM data types to Seabed* database and Extend the Seabed* data model.

CBM Data types were mapped to Seabed data model and data model was extended using various data modeling concepts of Seabed

Validate data mapping and extensions with SIS Seabed data modelers.*

Configure different views in ProSource.*

Followed by data model extension, front-end user interface is customized to incorporate CBM data management. Ultimate goal of this project, was to make CBM data available to end users simultaneously with other O&G well's data, is going to be achieved through combination of both ProSource and Seabed.



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Figure 3: ProSource showing CBM data types.

Knowledge sharing of the work done

Ideology, concepts and reusable work is shared within internal Schlumberger team worldwide that will help clients in other parts of the world who are facing the similar problems.

Project Values

- Various clients in India and across the globe, who are using Seabed and ProSource as their E&P datastore, will be able to use this solution to manage their CBM data.
- CBM Data kept in unstructured manner, will now have a place to be managed in a structured manner.
- CBM and classic O&G data will be collaborated from the single point of access; making the corporate database as an ultimate place to browse the right information effortlessly.
- Corporate wide accepted data gathering standards
- Clients using Seabed/ProSource as their E&P datastore can get the benefit of

the core investment by extending the data model and the user interface.

Conclusions

CBM Data acquired through millions of dollars spent in various parts of the globe is safeguarded in a corporate database. Inherent capabilities, like data security, data versioning, user management, quality check, view-compare-edit and many others, of SIS new offerings are consistent across all domains (Drilling, Production, Seismic, Logs, O&G Wells, and CBM Wells). Centralized pool for data population and data search across corporate for E&P data is achieved.

References

1. Directorate general of hydrocarbons India, <http://www.dghindia.org/>
2. Fox Davies Capital Limited, <http://www.fox-davies.com/>
3. Seabed*

The Seabed database is totally a new data model that will be integrated into future SIS software products. It is founded on the extensive lessons SIS has learned about what constitutes a model fit for the exploration and production industry.

The Seabed data model is not an update or upgrade, but a completely new approach that is based on technologies from Oracle, Microsoft, Java, and ESRI. It incorporates the best features of the Petrochemical Open Standards Consortium (POSC) and the Public Petroleum Data Model (PPDM) to ensure a usable and functional model that learns from rigorous industry standards. Other information sources used in designing the Seabed data model include:

- Standard Markup Language (WITSML)
- POSC RP66 Standard Format for Digital Well Data
- Schlumberger Oilfield Services Data Dictionary (OSDD)



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- Many years of experience with GeoFrame* integrated reservoir characterization system, Finder* data management system and Input from oil company professionals.

4. ProSource*

ProSource E&P software is a professional data management suite of products to streamline essential workflows of the data management professional. ProSource E&P software is based on the Seabed open data model. This open extensible data model enables complete data storage and the integration of domains. Unique advantages of ProSource suite are:

- Includes the ability to browse, create, edit, delete and quality control data over multiple domains
- Ensures preservation and security of data and corporate knowledge
- All ProSource applications share a common console and a common open data model
- Data integrity constraints and business rules built on corporate standards
- Data audit for regulatory requirements
- Timely access to data of known quality

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