

“Managing Authoritative Data Stores”

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Abstract

E&P Enterprises suffer from considerable inefficiencies, errors in decision-making, operational mistakes and financial loss due to duplicated, inaccurate, inconsistent and misclassified data spread across numerous applications. The dangers and costs of this critical business problem are multiplying as data volumes increase, data is shared with partners and regulatory compliance requirements are made more stringent. Well managed Authoritative data stores provide reliability and preserve important technical knowledge for these organizations.

The key to successful management of Authoritative data stores is to address the up front processes of data acquisition and provide a framework for handling the data volumes and complexity of E&P technical information. In addition, success is achieved with a framework to facilitate the storage of interpretation artifacts that constitute the intellectual capital of the organization.

Saudi Aramco faces this challenge and understands that the long life of their assets and the accumulating knowledge demand a solution that was flexible, extensible and robust. The system must be able to adapt to the changes in the data flows, content and technology that are inevitable over the life of their assets.

A system has been developed to successfully address the management of Authoritative data for the seismic data domain. The flexible architecture will be described and show how it accommodates changes in data format, media and content and is extensible to new data types.

Introduction

Managing information associated with extremely large and long lived Oil and Gas assets pose unprecedented challenges and opportunities. These assets offer tremendous return to the owners. Owners may be major integrated oil companies or more commonly the assets of a country.

A large and long lived O&G asset will be producing for many decades. (Figure 1 – Large Assets with Long Production Lives) The owners of these assets hold them in high value as they may be the ‘flagship’ assets of the country or company and success in managing them may determine the fate of the owners. In addition, these assets are typically complex in geology and may reside in hostile environments. Some examples are commercially held such as Prudhoe Bay, the Gulf of Mexico and North Sea assets. Nationally owned fields include Saudi Arabia’s Ghawar Field and China’s Daqing field.



Figure 1 - Large Assets with Long Production Lives

The critical role and the complexity of these assets accentuate the value that can be obtained by effectively managing information during the life of the asset. The overall value

will be extracted during the life of the asset. This may span many years. The challenges these poses are significant.

Challenges to Information Management

A prime challenge is the multi-year timeframe of operation and exploitation that characterizes these assets. It is common that they produce commodity and revenue for many decades. This lengthy period of operation generates huge volumes of data. The sheer size and the scale of activity associated with a key company asset also increase the volume of data. Indeed, the concurrent processes of production, development and exploration for extensions can produce a 'fire hose' of data coming into the organization.

Other than this size challenge, because of the long life, other changes threaten the management of this information. Technical disciplines will advance. New data types are developed. Information technology advances and storage devices and data models evolve. What we assemble for a seismic section in 1970 is significantly different from what we assemble today; for the same data type!

If work is being carried out for decades, the workforce changes so we cannot rely on an individual maintaining the continuity over the life of the asset. And the business environment changes, partners come and go, security concerns increase, the idea of minimum quality advances.

All these conditions pose a challenge to the full life cycle of information management for large long lived assets. To meet this challenge of changes, traditional data management applications had to be rewritten or replaced. This was not only costly, but the knowledge being built up by the organization will be eroded before it can be applied to current problems. We want to preserve the value of this information over the life of the asset.

The Value in Managing Long Lived Field

The significance of the information is magnified by the size of the asset. Even small percentages of improvement or cost savings will be multiplied by the size of the production, operational and capital expenses. Because of the strategic nature of the asset, most organizations are committed to doing the best they can with these assets. There is considerable organizational commitment to act on ideas and opportunities that are discovered. An investment in the information technology that enhances the quality and quantity of these ideas can pay off very well.

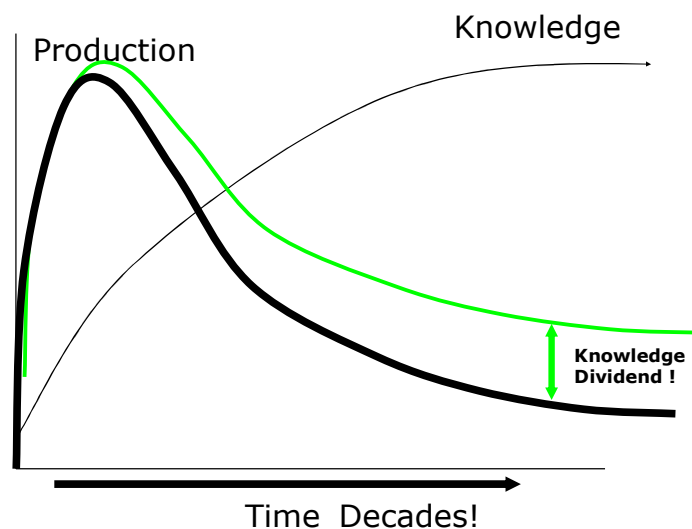


Figure 2 - The Knowledge Dividend

By maintaining this information in an accessible and understandable manner over the life of the asset, a knowledge dividend will accrue during the later phases of the asset's life. (Figure 2 – The Knowledge Dividend) This information can be used to implement operational improvements, make sure that costly data acquisition is not wasted or repeated. As projects are undertaken and turn out well or poor, these "lessons learned" can provide critical guidance to today's projects. Furthermore, since we are projecting workforce changes over the life of the asset, maintaining an ability to pass ideas and data across generations of the workforce also produces value to the organization.

Long Lived Asset Information Initiatives

There are a number of things that we can do today to insure that the information of these assets are managed to achieve maximum value for their owners, commercial or national.

- ▶ We must establish a concept of managing the information life cycle with the long life perspective that can accommodate change without disruption.
- ▶ We must accommodate and streamline the massive flow of information acquired from today's and tomorrow's field-based acquisition technologies, such as real time data from exploration geophysics, drilling and production activities.
- ▶ We must preserve the past insights and interpretations and be able to apply them to new data acquisition and current interpretations.
- ▶ We must preserve the representation of information by standardizing the description of observations to enable communication across generations.
- ▶ Eliminate the requirement to replace legacy systems and to migrate data from the old to the new system.

Enabling Technology

The philosophy of this project was to use a technology architecture that would not necessitate the replacement of existing systems and would allow concentration on problems. By using a service oriented, component-based architecture, solving problems could be the focus of effort and technical limitations related to fixed data models or formats could be eliminated. The inherent loose coupling of services allows extensive use of preexisting capacities that are registered within the service oriented architecture and thereby rejuvenated and enterprise enabled.

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