

# 1. Introduction

Oil companies are information based businesses. Those that are best at interpreting measurements and keeping track of what they know about the hidden underground world will succeed, those that aren't, won't. Oil companies are not unique in how much they rely on information, but exploration and production (E&P) is one of the activities where the financial impact of data is highest. In 2011 half of the ten most valuable companies in the world were oil companies<sup>1</sup>.

In 2009 DAMA (Data Management International) published the “Data Management Body of Knowledge” (DMBoK) a generic description of the best practices for data management across a wide range of different industries. This 600 page reference work provides a detailed review of the best data handling practices distilled out of the experiences of numerous experts. But the E&P business, like every information based industry, faces its own unique combination of challenges. This document supplements the DAMA book, it provides examples that explore how the principles of DMBoK can be applied in practice to oil industry technical data, it also explores the topics where the DAMA approach has been tried for E&P data in the past and failed.

The most successful data managers must coordinate service delivery, project management, infrastructure deployment, document libraries, relational databases, information architectures and physical asset handling. At the same time they must be able to explain to the users why they should continue to follow the company's standards and procedures and communicate to the budget holders how the money they spend on handling data is delivering value to the business.

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<sup>1</sup> Based on the “Financial Times Global 500 2011” market values & prices at 31 March 2011

There is a shortage of qualified personnel that have experience running data management activities for E&P companies. This is for two reasons, firstly because academic training in data management is rare, there are plenty of qualified information technologists and computer scientists but few courses that specialize in the actual management of data. Secondly, those that best understand geoscience data are interested in rocks, geological processes and the history of the planet, they usually want to focus on interpreting the subsurface and leave data handling to others.

Good oil industry data managers have mostly learnt their trade on the job, either as computer staff that have had to piece together the way oil company data works from trying to address real issues in a working company, or as geoscientists that have come to realize that the way the data flows has an enormous impact on their organization's financial success. It is hoped that both these communities will find some value in this material.

## *Acknowledgements*

This book is the result of insights from numerous different people collected over the course of many years. In particular I'd like to thank all those countless people that have put up with my awkward questions. Picking out a few names would just emphasize those left out, so instead I'll highlight three key groups: current and ex-colleagues at both Schlumberger and Oilfield Systems; oil company clients; and discussions at various industry gatherings, such as POSC, the Geoshare User's Group, EAGE, AAPG, ECIM, DAMA SMI, and especially Phil Crouse's annual PNEC meeting in Houston. I also like to thank all those that provided valuable feedback for this text. Finally I would like to thank my wife Angela Beasley and our two daughters, Eleanor and Rosalind for their continued support and constructive sarcasm.

## 2. The value of data to oil companies

The oil industry is an information led business, the market capitalization of companies is mainly dependent on an expectation of the value of future production. This is a number that depends entirely on the interpretation of data about resources that are both hidden far below the earth's surface and are often also in remote and inaccessible locations. The very nature of these resources means that a completely accurate picture is impossible to obtain, the best that can be done is to gather various evidence that informs guesses about future opportunities.

The way these interpretations are handled is one of the main things that differentiate one oil company from another. The company that can anticipate future discoveries and safely develop assets in the most cost effective way will succeed. Organizations that don't do these things will be out-competed and become candidates for future corporate acquisitions.

***“Here, you see, it takes all the running you can do, to keep in the same place”***



**Figure 1: Oil companies have to continually strive to keep relative position<sup>2</sup>**

Oil companies are in constant competition, this means that they must continually improve just to maintain their current relative

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<sup>2</sup> The name Red Queen situation has been applied to this type of dynamic following Matt Ridley popularised of the term in his book “The Red Queen: Sex and the Evolution of Human Nature”

position. The company that relies on doing things the same way will slip further and further behind. New discoveries are uncovered either by innovating new ways to understand the data, or by applying existing techniques in new regions for the first time.

In all these activities, the data and the way the data is handled, is one of the crucial elements. Yet, for whatever reasons, there are no oil companies that recognize their information as an asset in their annual accounts.

## ***Why measure value?***

There are some within oil companies that claim data has no inherent value. Their view is that because the people and infrastructure are required to make sense of any data it has no value in itself. This seems like a perverse view, the fact that a good omelette needs a chef does not mean that the freshness of the eggs is unimportant.

Assigning a value to the data that an oil company holds is important for a number of reasons. For example, all data has a cost to acquire, whether this must be spent with an external contractor to take some measurement or hiring internal experts to interpret a range of inputs. Unless there is some “value” in holding data how can anyone decide how much to spend to obtain it?

## **Measuring costs**

Information is such an important element within the modern oil company that one would have thought the costs of handling it would be precisely documented. This is, however, almost never the case.

It is, of course, difficult to measure the costs of such a pervasive activity. In addition, there is some experience that illustrates how apparently rational decisions can make this even more challenging. A few years ago a major oil company decided that data management should be cheaper so, rather than buying expensive

services from a specialized provider, they decided to put the task out for bids from off-shore companies. Of course they did this through their procurement department, who didn't fully understand all the activities being carried out and so specified a list of services that didn't completely match what was required. The procurement process focused on locating the lowest cost bidder, who obviously had to aggressively cut costs in order to out-compete their rivals. When the service was rolled out the users quickly identified things that needed to be done which had not been included. The low cost bidder could not just extend the service, their margins had been shaved thin enough already. The users found that they had to hire additional staff to perform these now "extra" tasks. But now they had a problem, if these new resources were called "data management" then it would be obvious that the exercise of off-shoring had actually increased total costs, which would be bad for the senior executive who had sponsored the whole project. So these new people were labeled as "secretarial staff", or "junior geophysicists", or indeed as anything other than "data managers".

This type of perverse incentive to obscure the real activities is encountered in many organizations.

## *Measuring value*

The "International Valuation Standards Council"<sup>3</sup> suggests that there are three ways to set a value for an intangible asset:

- **Direct market comparison:** identify a "market" where an equivalent is available and use it to estimate a fair price
- **Profit:** Identify the current and future benefit that the company derives from the asset, and use that to estimate a level of investment that would deliver an equivalent yield

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<sup>3</sup>"International Valuation Standards Council" is a body set up to ensure that consistent standards are applied for inclusion in financial statements, whether for regulatory compliance or to support secured lending and transactional activity. Their standard IVS 301.02 describes how to estimate the value of intangible assets.

- **Cost:** Identify the complete cost to acquire, maintain and if necessary replace the asset

The most reliable estimates of the value of intangible assets would come from the price paid in an open market to obtain it. However, while petrotechnical data may be included as part of a company acquisition or a farm-in, this almost inevitably combines the data with other more tangible assets and makes isolating the component that covers the data portion almost impossible.

For many categories of oil company data there is no way to replace it, if the past production profile of a well is mislaid there is no way to travel back in time to re-acquire the data. Once a well is completed the original log values cannot be measured again.

So, given that data is not widely traded and the cost to reacquire it is prohibitive, the best remaining way to estimate the value is to look at the benefit it delivers to the organization. So how much value does data deliver to the average oil company? Even this apparently simple question is challenging to address.

## ***Estimates from senior executives***

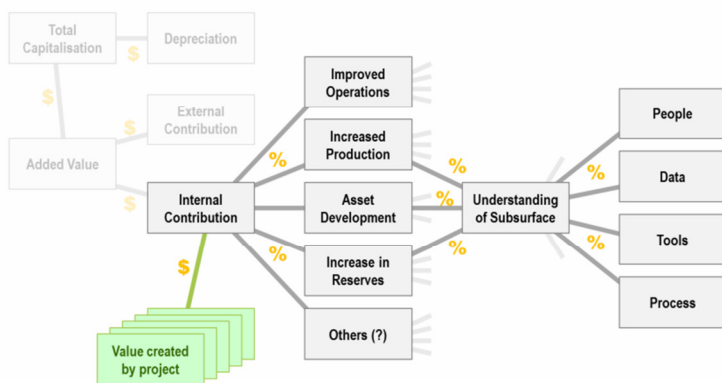
It is important to understand the beliefs that senior executives within oil companies have about the value data brings to their organizations. The normal reason for estimating the value that data delivers is in order to define and present a business case, and the first audience for the business case will be the budget holders, that is, the senior executives. If the proposed intervention does not get approval because the case is not credible the project probably won't go ahead.

There is some evidence for the views of senior managers that is freely available from Common Data Access Limited (CDA) in the UK. They are a membership organization that coordinates the exchange of data between UK oil companies, with participation from the majority of active E&P organizations active in Great Britain.



**Figure 2: CDA have published a study of data value in the oil industry<sup>4</sup>**

In 2011, they conducted a study in which senior managers were asked to estimate the value that data delivered. The study included input from Norwegian and UK companies active in the North Sea with a few oil companies from other regions such as the Middle East.



**Figure 3: The simplified model used by the CDA study**

The study started with a simplified model of how an oil company derives value. It assumes that all value is created by projects

<sup>4</sup> “The business value case for data management - a study” written by CDA & Schlumberger was published as a four part report and can be downloaded from the web address shown