

Why Improve? - The Value of Data and Data Management

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The term “business case” was not used in oil industry literature before 1995, however over the last 15 years it has become an essential part of every professional’s vocabulary. When justifying improvements it has become essential to explain how the financial impact of the proposed change can justify the implementation costs.

The ability to effectively handle large and complex sets of data is essential for all Exploration & Production (E&P) companies. The uncertainty of subsurface interpretation and range of different specialist geosciences domains combine to make measuring the total costs and benefits of data management a challenge.

One way to create effective business cases is to focus on increasing the value created, since the budget holders are a key audience it is important to understand how they view data and data management.

This paper uses the results of a study that focused on exactly these questions. It suggests that more than a quarter of all the value generated by a typical E&P company arises directly from the subsurface data it holds. The complex data environment has often discouraged adoption of even quite straightforward data management optimizations, and as a result most companies have opportunities to improve this handling that are extremely cost effective. Data management policies and practices have a direct and significant influence on the value that a typical oil company generates each year improvements in these areas will usually deliver an increase in overall company performance.

Background

The ability to describe convincing business cases is an essential skill for all professionals today. Those involved with data management for Exploration and Production companies have to be able to identify benefits that will justify the implementation of new products and services. They have to describe these benefits in terms that will convince non-specialists that it is worthwhile to invest in improving the handling of subsurface data.

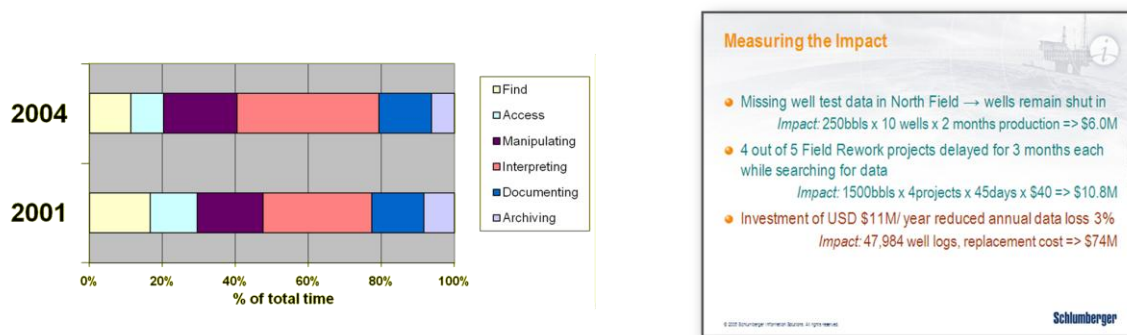


Figure 1: Many different approaches have been used to construct business cases

Over the years these business cases have followed many different patterns. For example, one widely used approach is to measure the proportion of time that data users spend looking for, accessing and using

technical data. The fact that a new system reduces the time taken to find key data can be used to estimate how much more productive the geoscientists will be. However, there are those that are suspicious of this simple model of user's behavior and suspect that not all the search time saved will automatically be added to interpretation time.

Another approach is to create an impact statement that identify the effect that a particular situation delivers and how this would be modified by a proposed change. Typically these statements have to combine the experience of: the data users, who are the ones affected; the data management staff, who understand how to implement the proposed change; and the company executives, who understand the financial implications. Gathering the necessary input from this wide range of stakeholders is often a challenging task.

Reduce costs or increase benefits?

A convincing business case has to demonstrate that the costs of switching to a new way of working are outweighed by the benefits. These benefits come from some kind of combination of reduced costs and increased returns.

In subsurface data management there are only a limited number of activities whose costs can be reduced, and while it is always possible to find new ways to lower these costs, in most oil companies there has already been a considerable effort towards this goal. It is challenging to identify new ways to reduce costs.

What of the other side of the balance? Are there opportunities to improve the value that subsurface data delivers? Improving the benefits from data seems to be the most attractive approach to creating a new business case, however this does require that there is a shared awareness of the value that E&P data is generating at the moment.

Who is the audience?

This shows the importance of the intended audience. It the beliefs of the audience that will determine the foundation on which the business case has to be constructed.

Who do data managers create business cases for? Clearly anyone implementing a project should fully comprehend its goals, that is why methodologies such as PRINCE2 and PMI emphasize the central role that a business case plays in project management. What about data users, the IT department and data managers themselves? Clearly, all of them need to understand the business justification for the processes they follow, however in most situations the key initial audience are the budget holders.

Unless the budget holder is convinced that a change needs to be made the project will not go ahead. All the other stakeholders won't ever be exposed to the business case.

So, one approach to creating good data management business cases is to focus on convincing budget holders that a project will increase the value they derive from their subsurface data. In order to do that it is obviously necessary to understand what these senior managers believe about the value data and data management currently deliver.

The CDA study

In 2010 Common Data Access Limited (CDA) commissioned Schlumberger to “Collect and publish anecdotal and other evidence supporting the case for the positive impact of good data management practices on the business”. CDA is a not-for-profit subsidiary of Oil & Gas UK, the leading national representative body for the offshore oil and gas industry. CDA was set up in 1994 to provide data management services. The study included input from UK and non-UK companies and from CDA members and non-members.



Figure 2: The CDA Study has been released as four documents

The study interviewed more than 20 senior managers from a range of oil companies to understand their perception of the value of data and data management. The conclusion were presented in the “Results” document, additional supporting material has been published in the “Roundtable”, “Related Literature” and “Process” documents. All four can be downloaded from:

<http://www.oilandgasuk.co.uk/datamanagementvaluestudy/>

CDA has made all of these documents freely available in the hope that they will prove useful.

Roundtable



“You are only as good as the weakest part of your overall chain”

“Nobody is looking to derive more value, everybody is looking to reduce the cost”



“...a kind of a Cinderella function...”

“...the targets are becoming smaller and smaller...”

“...we’re a smaller organisation so it’s easier...”



“...why isn’t my data manager more proactive...”



“...the cost of data management is small compared to other expenditures...”



“Integration with business, that’s key”

“...you cannot outsource the responsibility...”

“You don’t mop the floor until you’ve turned off the tap”



Figure 3: A discussion between managers

The “Roundtable” document records the conversation about data management between six senior oil industry figures held in January 2011. It brought together managers from a range of different companies and covered many of the topics discussed in the report.

Related Literature

The “Related Literature” document lists papers presented in general oil industry conferences and periodicals. It also analyses how the use of various terms has fluctuated over the years from 1980 to 2010.

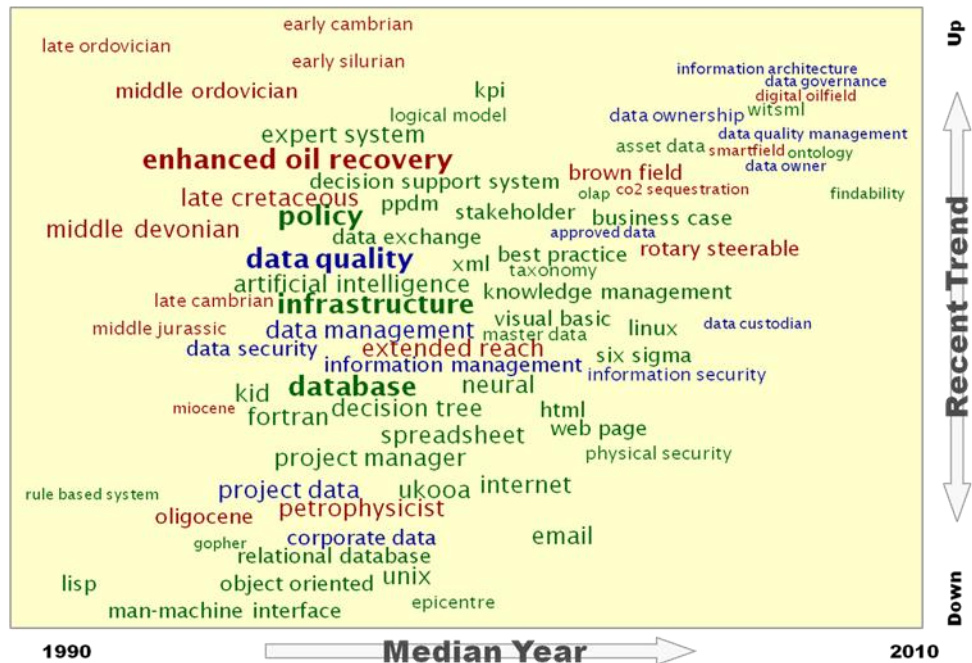


Figure 4: Trends in search terms

The value of subsurface data

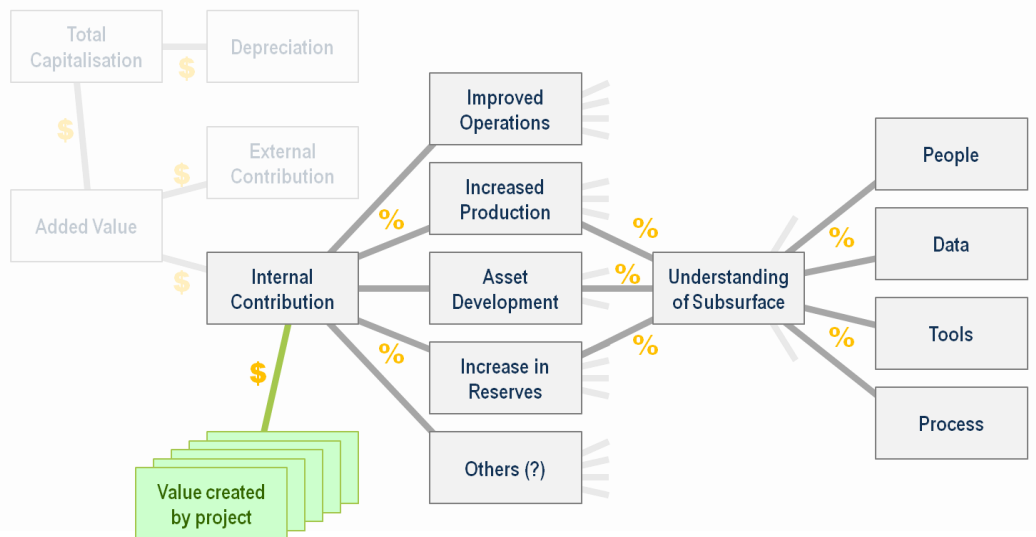


Figure 5: A model of the value an E&P company creates

The impact that data management has depends on the value that the data delivers. If the data has only a marginal impact on the overall performance of an E&P company then managing it more efficiently won't have much effect. If, however, data is responsible for a large proportion of an E&P company's success then quite modest improvements have the potential to deliver significant benefits.

The model above was used to explore the impact that data has on the overall value generated. This suggests that the value a company generates each year comes from external factors, such as an increase in the price of oil, and internal ones, associated with the projects undertaken. The impact of subsurface data depends on:

- The company’s balance between exploration, production and development
- The contribution that knowledge of the subsurface delivers to these activities
- The extent to which interpretation of the subsurface is dependent on the data

Each of these factors will be explored in turn.

Value generated by projects

The financial value delivered annually by the participants in the study varied from company to company and role to role. The values ranged from tens to hundreds of millions of dollars total value per year. Two example cases will help to show how these values were calculated:

Purchasing a 50% interest in a prospect cost £5M
 In total £20M was spent to prove the prospect over a 2 year period (50% of these costs was £10M)
 Turned down offer of £100M for our stake
 Total value created £85M
 Annual value created £42½M per year

20 year drilling program to 2030
 Anticipate 400M barrels additional from 20 wells (20M barrels each)
 £20M to drill each well (\$34M)
 Plus FPSO - £2B (\$170M / well)
 20M barrels @ \$40/barrel => \$800M
 Value created: \$696M per year

Corporate balance

Oil companies adopt a range of different business strategies. One may focus on exploring for new discoveries, another may specialise in optimising production and a third may invest in developing assets to bring them closer to creating revenue. This diagram shows how the study participants each balanced between these goals.

As can be seen the participants covered the complete range of potential strategies

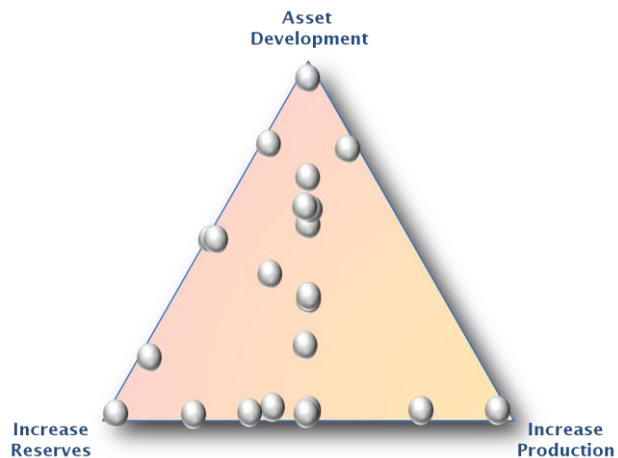


Figure 6: How participants balanced between exploration and production

Influence of subsurface understanding

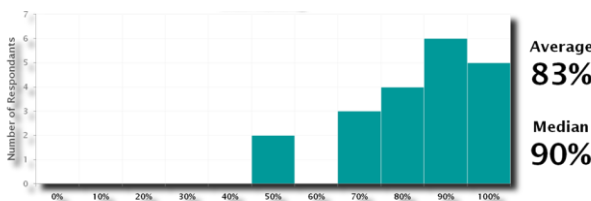


Figure 7: The impact of subsurface understanding on reserves

Those that described reserves replacement as one of their key goals were asked to estimate the impact that understanding of the subsurface had on that activity. The results are shown above. All participants estimated that its influence was at least 50%. The majority of

participants suggested that at least 90% of the value of increased reserves came from understanding the subsurface.

In contrast the value that subsurface understanding brought to increased production was generally held to be somewhat lower. Many interviewees mentioned the fact that technical innovation and business factors, such as the business relationships with partners, were also major factors. Even in this case, however, most participants felt that the contribution of data was more than half the total.

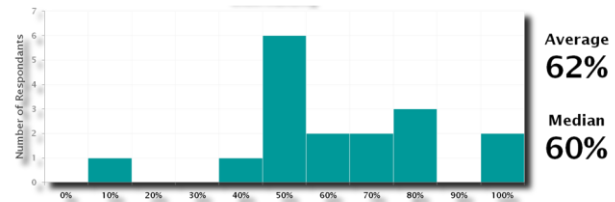


Figure 8: The impact on production improvements

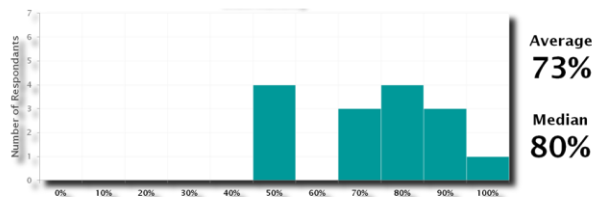


Figure 9: The impact on asset development

Somewhat predictably the contribution of subsurface understanding to asset development was felt to lie between the two other activities.

Combining the various corporate strategies with the estimates of value the participants in the study on average felt that more than 70% of the value their teams generated came directly from their group’s understanding of the subsurface. Given

that the study specifically focused on talking to senior managers in charge of exploiting subsurface resources this should not be a surprising finding.

Subsurface data’s contribution

In order to explore the contribution that structured data makes to appreciating geological uncertainty it was suggested that four factors are crucial: the tools used; the processes being followed; the subsurface data; and the people doing the interpreting.

All of the executives interviewed felt that splitting the interpretation process into these four components provided a reasonable overview. This figure shows that, of the four elements, the majority opinion was that data was the most important.

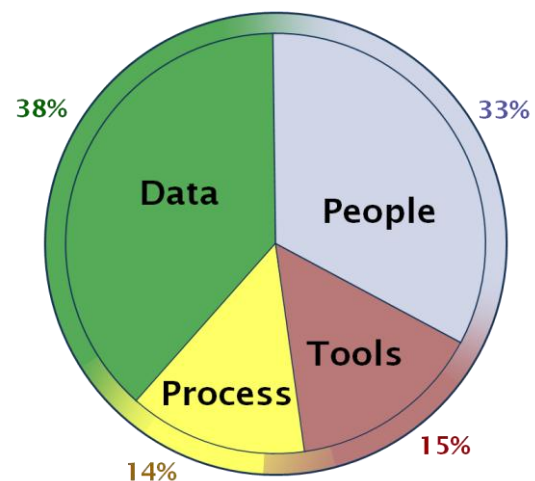


Figure 10: Elements that contribute to subsurface understanding

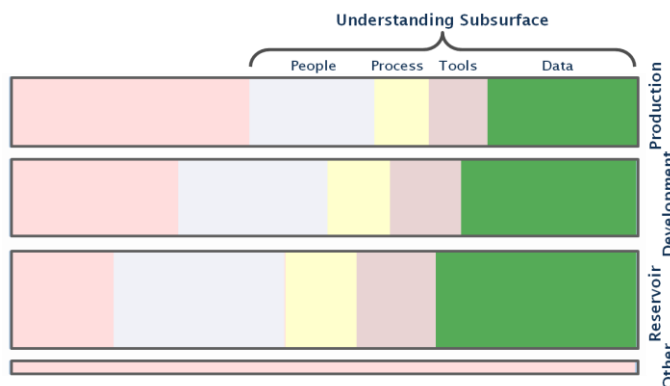


Figure 11: Data delivers a substantial proportion of overall corporate value

Summary

In this figure the average balance between corporate activities, the proportion of those that is derived from the subsurface understanding and the

share that data contributes have been combined. As this illustrates data is a major contributor to the overall total value.

The conclusion from the senior oil company staff interviewed is that data contributes between a quarter and a third of the total value generated each year by all the activities of a typical E&P company. So in an asset team that is generating \$100M of value a year, for example by arresting the production decline of a field, a value of \$25M-\$33M a year is derived from the petrotechnical data it holds.

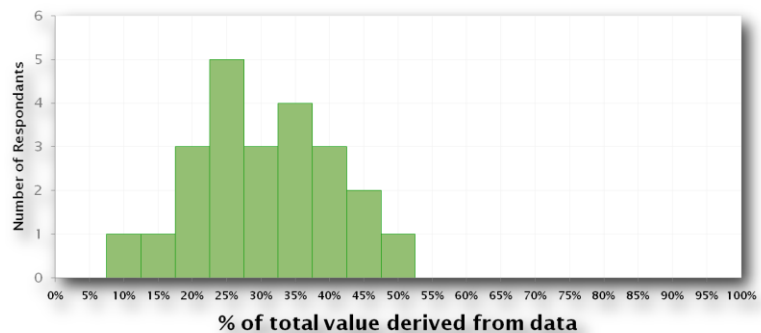


Figure 12: Data's contribution to overall value, a range of estimates

The value of data management

Data brings a significant value, often more value than one might have initially guessed. This value can be increased by effectively managing the data, or conversely, the potential of data can be eroded significantly if it is not available when needed or it is of a quality that is unacceptable. But, these two factors together don't necessarily prove that data management improvements are amongst the most attractive investment opportunities in the majority of oil companies.

Value based management

In "value based management" the goal is to balance how much is spent on various activities. In a perfect world this would mean that budgets would be allocated to different functions based on their "expected rate of return". When additional budget becomes available it should be given to the department that would have the most positive impact on overall company performance.

However estimating how changes in spend on data management would impact the overall value a company creates is not a simple task. Most budget holders don't have a background in data management, so they underestimate the potential benefit from performing data management better. It is up to experts in the field to articulate the benefits that an improved data environment will bring and to present this to the senior management.

What is "Data Management"?

Before the value of "data management" can be assessed it is crucial that the meaning of the term is agreed. It was clear that most of the senior oil company executives interviewed for this study had a similar view of "data management" and what it entails. They perceived that the main goal of the activity is to hold and make available the raw or unprocessed data in a form that can be used by geoscientists. They include categories such as seismic and well log data that are obtained from outside the organization, and exclude interpreted data such as simulation models and static geological models. In addition while production data has been incorporated in recent years it is still rare for the drilling information to be.

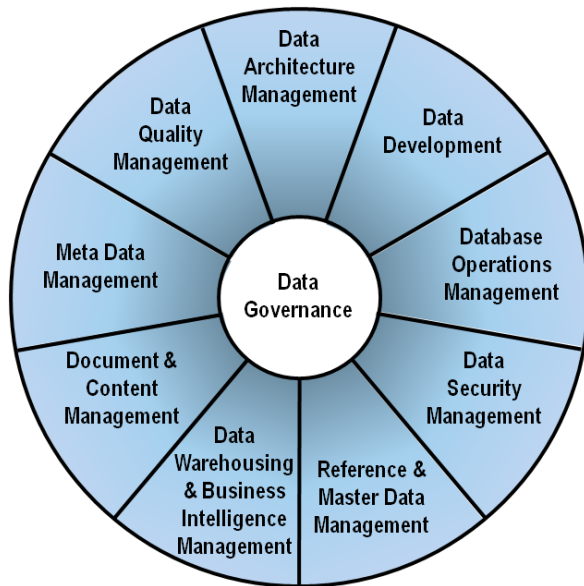


Figure 13: DAMA's 10 DMBOK Functions

In our experience the best data managers don't usually share this restricted view. They perceive that the goal of data management is to enable *all* the data flows required to support the business. They believe that keeping track of the interpreted information is at least as important as the initial measurements, especially since it is the more refined data items that directly influence the key business decisions.

The most widely accepted description of "Data Management" is probably that provided by the "Data Management Body of Knowledge" (DMBoK) published by DAMA, a cross industry international association. In this the subject is defined in relation to the 10 functions shown. Any complete review of data management would need to touch on all ten of the functions.

The goal of data management is to ensure that the right data is available when required. The value that data delivers can be enhanced or destroyed by a wide range of issues, these can often be related to the DMBOK functions:

- **Data Governance:** Lack of agreement about data ownership leads to confusion
- **Data Architecture Management:** Data stored in inaccessible locations, data not archived, data duplicated without awareness of modifications
- **Data Security Management:** Data loss, data corruption
- **Data Quality Management:** Uncertainty over data quality leads to lack of trust, inappropriate processing systematically destroys quality

Data lifetime

Many organizations have a "Value of Information" process that they must complete in order to justify acquiring data. This process identifies an issue that the new data would address and compares the impact of this against the cost of obtaining the data. This process ignores the fact that most data continues to deliver valuable insight long after the original question has been answered, well curve data acquired in the 1970s is still continuing to deliver insights almost forty years later into some fields in the North Sea.

If an asset has the potential to deliver value for a long period it becomes even more important to manage it carefully. Mislaying a key piece of data can reduce the value generated for decades to come.

Conclusion

The business benefits available to E&P companies from the management of subsurface of data are rarely quantified and are therefore widely unappreciated. The CDA study shows that effective data management policies and practices have a direct and significant influence on the value that a typical oil company generates each year and that improvements in these areas will usually deliver an increase in overall company performance.