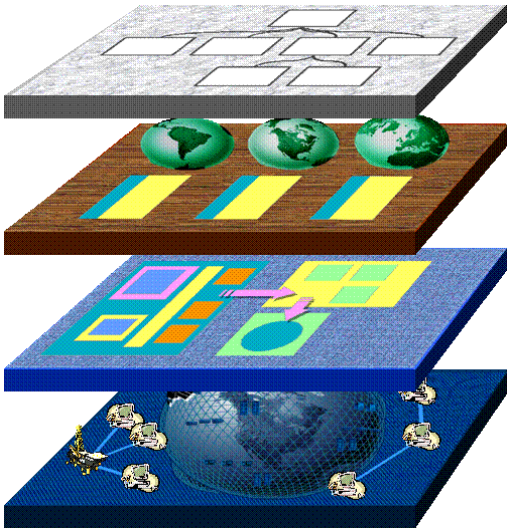
The Main Sequence: Matching Data Management Change to the Organization

Jess Kozman & Steve Hawtin

Oil Exploration & Production (E&P) organizations are complex collections of competing interests that depend on data as an asset. Selecting optimal compromises between end-user access and organizational control to resolve data management issues that arise is a complex task. There are many ways to describe the way information systems function in such an organization. One approach that has achieved enough success to make it a cliché is based on the "Business Architecture".



This isolates the concerns of different key contributors into four distinct layers, each of which relies on the services provided by the layer below and supplies the needs of the layers above:

Infrastructure: The servers, hubs and wiring that provide the computing facilities

Applications: The software that is used to manipulate, interpret and summarize the E&P data

Information: The way information flows, how different systems integrate their results

Business: The value creation focused activities being carried out

There are many resources available to illustrate the way Information is managed within an organization. All require an understanding of:

Streams: how data is organised

Workflows: what needs doing when and by whom

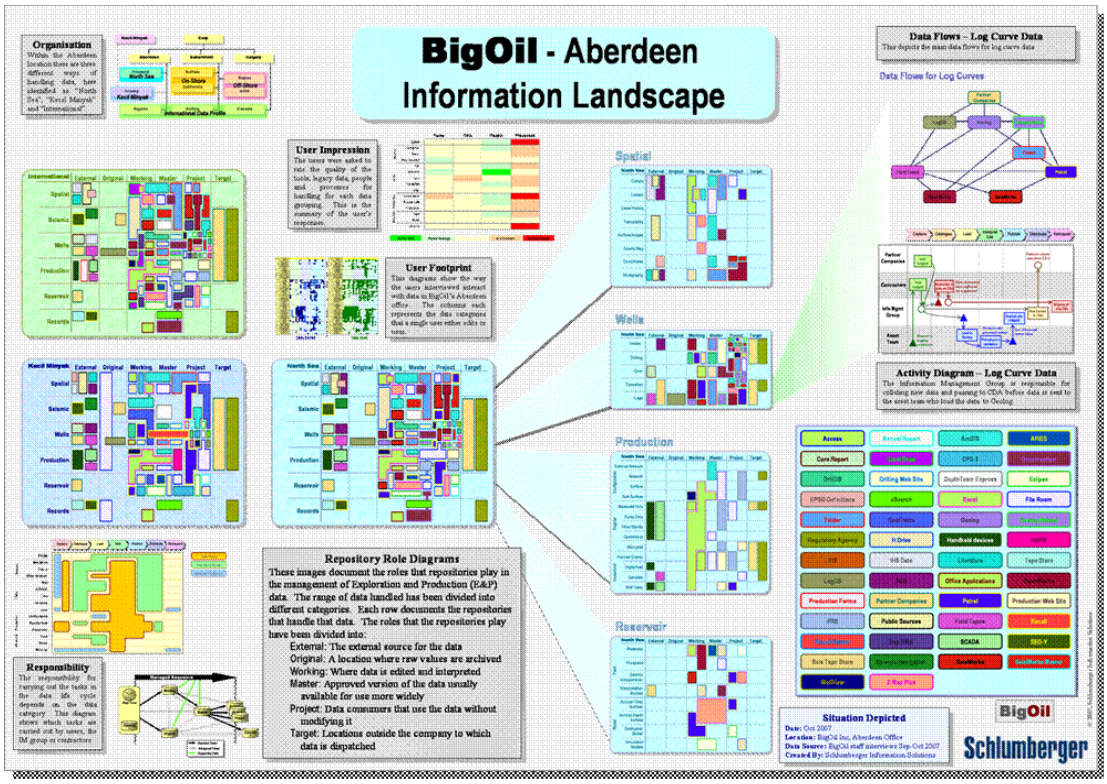
Data flow: how information moves

Roles: which categories of information are held where

Exceptions: how IM varies within the organisation

Organisation: relationships between groups

These elements together form the "Information Management Landscape" which has been more fully described elsewhere[1].



A complete description of an "IM Landscape" employs a wide variety of artifacts[2] each of which provides insight into some aspect of the overall situation. This detailed exploration of the current and potential way that Information Management works is invaluable for IM practitioners.

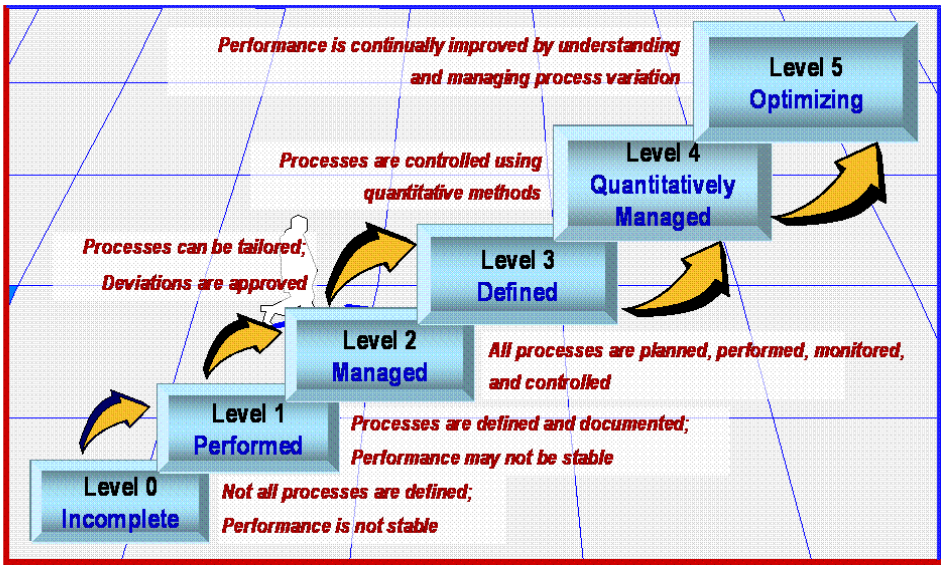
However it is also important to provide simpler metrics, both to convey some of the overall trends to non-specialists such as management and to assist in identifying headline strategies for improvement. Over the years Schlumberger has used a number of metrics

---

[1] See for example "Experience from IM Assessments" from PNEC10 or the whitepaper "Adding Value with IM Assessments: E&P Data Management Today" available at *www.slb.com*.

[2] See for example "Sharing a common view of the Information Landscape" from ECIM2007

to summarize aspects of the complex picture. The less diagnostic measurements have been rejected and the more successful ones have been refined and continue to be used not only to assess the progress of individual organizations but to benchmark and compare between different types of organizations in different parts of the world. Schlumberger now manages the largest such collection of standardized "IM Landscapes" for the oil and gas industry and uses it regularly to collaboratively design and evaluate IM strategies for international clients.

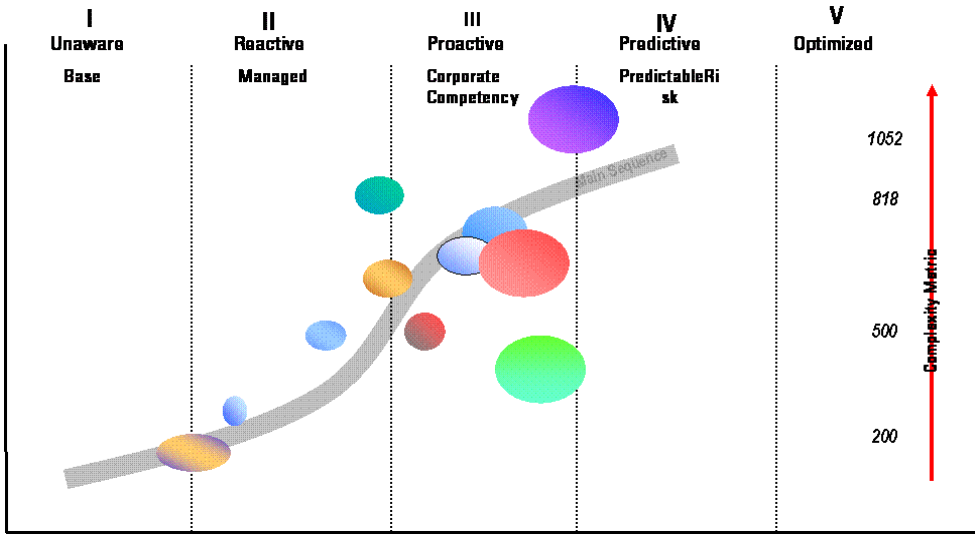


The Data Management Maturity metric[3] is the prime example of a measurement that has proved to be a stable and valuable simple measurements of a company's Information Management. It was originally based on a methodology from the Software Engineering Institute (SEI) that has been tuned to meet the needs of the E&P industry. Years of experience in using this metric have resulted in a large amount of material that recommends positive actions tailored to improve a client's current situation. However, this is just a single numerical description, even if it is a critical one.

One key aspect of a corporate profile that the maturity measure does not address is the "complexity" of the client's IM Landscape. This is calculated partially on the number of crucial data categories that are managed and the documentation of the company's data management policies, however the largest contributor to this measurement is the number of different ways that the same data is handled, for example in different asset teams and locations. For the last few years quantitative measurements of complexity have been made by using specialised internal Schlumberger tools in a consistent manner across multiple international organizations to allow benchmarking and comparison.

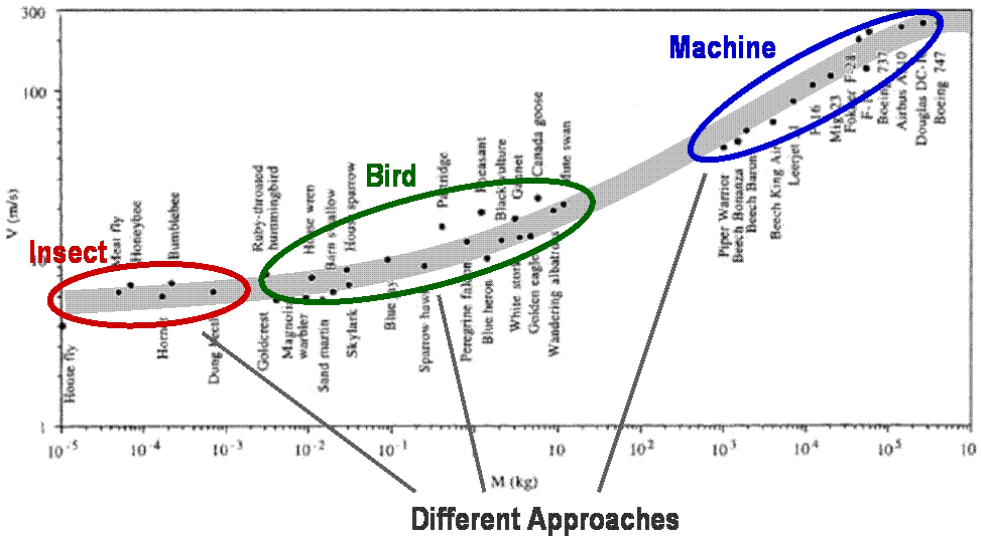
---

[3] The DMMM has been described in many previous papers for example "Maturity Models for E&P Information Management" ADIPEC 2004 (SPE 88666)



When the maturity and complexity measure for a subset of the various E&P companies for which site assessments have been performed are combined the result is as shown above. In this diagram each oval represents a single E&P company. The size of the oval provides an indication of the size of the organization. Note that there is not a linear relationship between the size of an organization (measured by either reserves under management, staff size, or global footprint) and the complexity of its IM Landscape. A detailed study of the collected site assessments show small organizations can have large complexity metrics if growth has been through mergers and acquisitions and adoption of multiple legacy systems and processes without rationalizing or standardizing. Conversely, large multi-national super-majors with stringent IT standards and enforced standards can have lower complexity metrics than other organizations of similar "size".

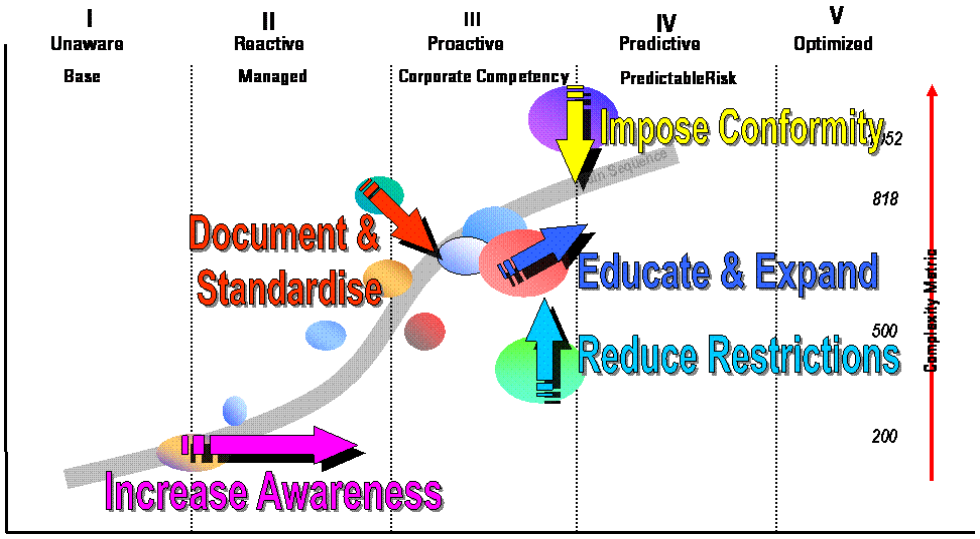
There are a number of observations to be made about this depiction. The first is that most companies lie along a "Standard Sequence" that tracks the increase in complexity that can be supported by more mature organizations. The second observation is that the larger E&P companies tend to have a higher maturity level. This appears to arise from the fact that investment in data management awareness can be shared across the company, so a proportionately lower investment can be more widely effective in a larger organization. Of course the other side of this is that larger companies need to develop more mature data management environments in order to function.



This type of plot has similarities with other types of allometric studies yielding a "main sequence" in the biological sciences. For example a graph[4] of the optimum flight speed against mass for a variety of insects, birds and airplanes shows an underlying consistency and change trajectory for the performance and benefits of different approaches to the same technical problem.

The similarity to the data maturity plot comes from the same relationship of complexity and maturity between the underlying mechanisms, with each point representing a single current solution to optimizing a situation. As with the flight example not only do different types of organizations occupy a unique space on this plot, but they have distinct benefit curves in response to changes in budgeted IM spend targeted at moving along either axis. And like with the biological example, organizations that stray too far off the "main sequence" will not fly.

[4] The image here is from the Wikipedia article on "Allometry"



This is the main benefit from performing a standardized analysis of an organization's position on the maturity model. International site assessments show that the location within this space indicates a "theme" for the strategic direction of the next step that a company should undertake. In the cases above a suggested strategy has been added for five of the companies, again based on the detailed site assessments used to develop the metrics. These strategies have been implemented with measurable benefits at the targeted organizations

Of course any "high level" strategy must be translated into a programme of projects each of which can be justified on its own merits. Creating an individual cost/ benefit case for each project still requires an appreciation of the detailed issues that affect business effectiveness. However these themes help to focus attention on the projects that are most likely to help optimize the complete picture. In our case we wish to use the plot to not only identify a given organization's "ideal" position on the sequence as it grows and becomes more complex, but to identify optimum strategies for moving up the maturity model with maximum benefit and ROI.