

Challenges of Information Management in the Oil and Gas industry

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Abstract

For information managers working in the oil and gas industry, there are a number of systems specifically available for managing the geophysical and technical data typical within this sector. The challenge however lies in identifying cost effective solutions that also offer plenty of scope for innovation and further development as requirements change in the future. This paper aims to discuss some of the challenges faced by information managers in the industry, and how one person in particular successfully implemented a creative solution to meet one part of the information management needs of her company.

Oil Search, one of the largest upstream oil and gas companies in Australia, implemented a Trimagic solution in 2005 to manage their technical data. Joy Horton, the Data Manager at Oil Search, chose Trimagic as her systems vendor. It was apparent that the solution being offered would not only meet the immediate goal of managing technical data, but had the flexibility required to integrate with a comprehensive global information management system being flagged for the future. The current system is browser based and accessible nationally and internationally, including the remote highlands of Papua New Guinea.

The story of developing software selection criteria through to the final implementation of a more innovative and customised solution is a fascinating one. Drawing upon specific experience within the oil and gas industry, and Oil Search in particular, this paper will focus on the process of selecting suitable information management software, the challenges faced by the Information Manager throughout the lifespan of the project, and the skills and strategies we see as important for successful project management.

Company Profile

Oil Search was incorporated in Papua New Guinea (PNG) in 1929. Following a brief period of exploration in Australia, the company began a systematic search for oil and gas in PNG. The years of perseverance paid off when in 1986 a major oil field was discovered at Kutubu, located in the geographically inhospitable southern highlands. Production began here in October 1991. Over the past decade, Oil Search has experienced major growth; several smaller oil fields were discovered and developed and a series of mergers and acquisitions took place.

Oil Search is now the third largest public upstream oil and gas company in Australia, and one of PNG's largest companies, consuming nearly 50% of the communications bandwidth between Australia and PNG. More recently, the company has been expanding their operations into the Middle East and North Africa. In 2002 Oil Search merged with Orogen Minerals Limited, and in 2003 assumed operatorship of the oil fields in PNG from ChevronTexaco. These events resulted in dramatic increases of staff, assets, operational responsibilities, and technical data.

Impact of the merger and acquisition process

By late 2003, Oil Search had grown from being a small exploration company to the major player it is today. Seemingly overnight, the company dramatically expanded its human resources – from a room full of staff to nearly one thousand personnel throughout Australia, PNG and the Middle East. Apart from human resources, the assets acquired included very large amounts of technical data. Unfortunately in both cases of merger and acquisition, these data resources were managed with little thought, despite the fact that much of the value in acquisition resides in those very information assets. Terabytes of data were removed from pre-existing data management systems and dumped into the very simplistic Oil Search server filing structures at each of the main working sites. What resulted was a set of folders that had been divorced from the meaningful structure formerly in place, which according to Joy, was like inheriting a library without a

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catalogue. Not only that, different record types including technical, operational and business, were blended together in one illogical mix.

To make matters worse, the data was dispersed between Oil Search sites in Sydney, Port Moresby and the Ridge camp (the remote highlands site in PNG close to the oil wells), with little or no connection between any of them. As a result, instant data silos were created. The lack of communication bandwidth across PNG and between PNG and Australia that continues even today, has entrenched these silos.

Background to electronic information management at Oil Search

Prior to the acquisition of huge volumes of data from Oregon Minerals and ChevronTexaco, Oil Search obviously had a sizeable amount of its own data, gathered electronically by the team and “packaged” for future use into hardcopy resources e.g. tapes, exabytes etc. This information is utilised by scientists to determine exploration activities. In the 1970’s, the Sydney office of Oil Search decided to create a database of assets, comprising typical information for this industry including well and seismic data, technical reports and maps.

The system evolved through a few iterations, but remained largely unchanged until the early 1990’s, when it was transferred into an Oracle One database. For the next decade, nothing further was done apart from putting the front end into browser format. By this time, the number of records had grown to approximately 50,000, representing the index to a sizeable part of the entire collection of technical resources throughout Australian and PNG.

The situation reached a crisis point when it became increasingly obvious that it was not only impossible to find information, but the company was in danger of losing what they had due to unstable technology. The decision was made in late 2004 to appoint a Data Manager to sort out the mess!

Role of the Data Manager

As can be gathered, being the Data Manager for a large oil and gas exploration company is a very challenging role, requiring the management of enormous volumes of highly complex and priceless geophysical and business data. This information is critical to the operations of the company, and therefore an irreplaceable asset. Joy joined the company in late 2004. Today, together with her dispersed team, Joy is responsible for library and data management services, providing information to approximately 1,500 full-time staff and contractors in the region.

The scope of Joy’s position at the time of appointment was “a records and data policy and procedure setting role”, reporting both to the Assurance and Compliance department, and the IT department. Her overall goal was to implement a strategy to manage not only the company’s technical data, but also business data including emails, contracts, legal documents, commercial information etc, which was (and still is) inaccessible via a document management system.

Company Expectations

Initially, it was deemed sufficient for the Data Manager to formulate a data management policy, which would then dictate good practices. This idea was linked to some of the old fashioned management values still evident in PNG, where most companies operate within the command and control paradigm – what the boss asks for, the boss gets! Another misconception strongly held within the company was that a document management system would be the answer to all their prayers. In other words, they fully subscribed to the hype put out by EDRMS (electronic document and records management systems) companies about the power of automation. This high expectation of a quick solution needed to be carefully managed. Most librarians or information managers know that both of these approaches are doomed to failure.

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Given that Oil Search is mostly driven by employees who tend to make decisions about operations of the company in relative isolation, Joy and her team quickly realised the necessity of working closely with the various business units to understand what outcomes they are expected to deliver. It would then be possible to give them the information tools to achieve those goals. Policy was just one plank of the construction. It was also vital to shift from the expectation of a quick technology fix to an understanding of technology as the final outcome following a thorough analysis of the information challenge at hand.

Data Management Roadmap

Joy decided that her first task was to formulate a project plan, including what Joy refers to as a roadmap for the future.

“To act intelligently and effectively, we still must have a plan. To the proverb that says, ‘a journey of a thousand miles begins with a single step’, I would add the words ‘and a road map’. (Cecile M. Springer)

The roadmap described a broad framework for the data management group to work with over a 3-5 year period. Joy decided that rather than work on all components of the plan concurrently, it would be more effective to deliver regular, quick “wins” to ensure that the data management group remained visible and credible. The four main elements of the plan included:

1. **Current situation analysis:** Current information management challenge, including need to capture, store and retrieve information resources of Oil Search, including strategies to manage those information assets in immediate jeopardy of being damaged and/or lost.
2. **Business analysis:** including the identification of company functions and activities (to inform the taxonomy project) and critical activities (to inform the vital records register).
3. **Operational concept:** description of the desired information management environment.
4. **Roadmap:** the “selling” or marketing document, which paints the big picture and captures the vision for the way forward.

The roadmap outlined a range of key deliverables designed to:

- Establish data management champions at all sites.
- Develop a common logic for filing across the company (taxonomy, metadata, naming conventions) and for this to occur in collaboration with all relevant business units.
- Develop a document compliance register (and hence retention and destruction regime), based on government compliance regulations.
- Rollout data management training and induction.
- Complete the development of data management policies and procedures.

Limitations of the Oracle One system

The Trimagic Technical Library Database Project was a response to the immediate problem of “records in jeopardy”, and hence was the first part of the project to be tackled. Shortly after Joy’s arrival, the IT department issued an ultimatum that the Oracle system holding all Oil Search’s technical data as described earlier, had to go! The system was so fragile it was unable to be completely backed up, and this obviously posed a serious threat to data security, especially as the company had to upload high volumes of data from the Chevron and Orogen acquisitions, as well as accommodate the day to day work coming in. Being filled beyond capacity, the system was very slow.

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There were also a range of additional problems and limitations with the Oracle system. Use was restricted to one single person in the Sydney office who was forced to do data entry for all the data centres across the organisation. In order to both search the system and perform data entry and/or edit, this person required a good knowledge of the database structure. Given this, and her solo usage, she became the resident expert and most other people lost any capacity to search or manipulate data. The system could not be keyword searched across multiple fields and even barred access to some fields and records. It was impossible to incorporate a tracking system; loans were logged by editing the record with a borrower's name. This crude feature, together with a very limited capacity to design reports, made it almost impossible to capture and record the movement of materials as people exited or moved about the company.

The PNG side of the operation had no chance to control their own data flow; header details or title pages were photocopied and then sent to Sydney for data entry. Often an urgent loan bypassed the data entry step and data was being misplaced or lost. Without ownership for their own data entry, staff became disenchanted with the database, and the whole idea of effective information management. The inability to even search for their own data spelled the death knell for the Oracle system, and there were very understandable outbreaks of Access databases and Excel spreadsheets that became substitute data management systems.

Therefore, in early 2005, Joy was compelled to take the first step towards resolving the information crisis at Oil Search, which was to identify and implement an information system for the library of Oil Search technical resources.

The information challenge at Oil Search

When it comes to information management, Oil Search has some special organisational challenges. These challenges obviously influenced the selection process, as a successful system implementation can only occur with organisational support and participation. They are:

- Head office in Port Moresby: difficulty of finding suitably trained staff in PNG to both manage and work with a system.
- Staff mobility. Operational staff work for 28 days, then have 28 days off. Working these shifts, and in remote locations, presents challenges of communication and resource tracking.
- Infrastructure limitations: extremely limited bandwidth in the field, and minimal Internet access.
- Limited support personnel: Data Manager frequently responsible for both high end decision making, as well as those administrative tasks typically handled by technicians in a more traditional library environment.
- Corporate culture: The Chevron company culture in PNG is still alive and well despite a two year absence. Little effort has been made to remove Chevron branding, culture and habits. New staff find this barrier hard to break. The same situation exists at Hides, which has retained the old BP culture.
- Regional cultural issues, of which there are several: PNG has 800 language groups, and 85% of people live in an environment of subsistence farming, poor infrastructure, extreme danger on the streets of Port Moresby, clan lore and customs, security issues, and lack of equal employment opportunities for women; language and security issues working in United Arab Emirates, Yemen and Egypt; ventures in Africa are in early stages.

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Researching a solution

Joy initially investigated a range of document management and other industry specialist systems, but it became apparent to her that most of them “weren’t really designed to manage physical assets”, were prohibitively expensive and not always SQL compatible. Joy knew that the existing data would need extensive “massaging and cleansing” to make the system useable, therefore anticipated additional customisation costs. Therefore, in taking into account the full range of cultural, technical and budgetary issues, the system chosen had to be:

- Easy to manage internally with limited vendor support.
- User friendly, supporting simple and intuitive “Google” type searching interfaces, and also more advanced interfaces.
- Affordable – it is possible to pay up to \$400K for specialist systems in this industry, excluding the additional costs involved with data cleansing and customisation.
- Streamlined in terms of design and workflow, in spite of the complexity of data being managed.
- Web enabled.
- Operable within a difficult, low bandwidth environment.
- Easy to use in order to minimise training and support for remote PNG staff.
- Robust
- SQL compliant.

It was decided that information management would be the responsibility of a team of seven, drawn from the Sydney, Port Moresby and Iagifu offices. Iagifu is located at cloud level in the remote Highlands of Papua New Guinea, approximately two hours from Port Moresby, and referred to as “the Ridge”.

Reasons for implementing a Trimagic solution

Finding the right solution was proving to be a difficult task, the systems available were prohibitively expensive and did not offer the flexibility Oil Search required to expand into the future. Given this difficulty, Joy decided to broaden her search to include other general information management systems (i.e. not specific to the oil and gas industry). At this point, Joy approached Trimagic to discuss her needs, and was presented with a solution that was implemented within six months.

Joy selected a Trimagic solution for the following reasons:

- Fulfilled technical criteria listed above.
- The solution solved the problems of today and offered rich additional functionality and flexibility for the future.
- Connectivity was tested from Iagifu and delivered excellent results rapidly.
- The company has good market penetration and longevity – over 20 years.
- Ability to source personnel with general Trimagic system experience who are easier to train
- Strong technical support available locally in Sydney.
- Direct vendor relationship, therefore minimising delays with the delivery of products and services.
- Total solution very cost-effective.
- Friendly staff. This factor was important due to the challenging and complex nature of the project. Joy felt that as heavy demands would be placed upon all parties involved, a good working relationship would be essential.

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Trimagic solution delivers a cost effective result for Oil Search

Oil Search is now using a highly customised, secure and streamlined system comprising three integrated databases. These databases include a Technical Library which is an index to the entire collection of Oil Search technical data, a Details database for individual physical items relating to technical library resources such as boxes, exabyte tapes, CD'S and DVD's etc and a Digital database which is an index to soft copy content stored on digital media such as CD's & DVD's, all seamlessly integrated to offer streamlined workflow and ease of use.

The system offers restricted and secure editing and loans processing access via browser for the information management team. For other company personnel, search-only access is provided via the intranet linked to email for requesting items. This is a significant benefit to Oil Search as it enables company personnel to gain access to business critical data from any location, even when in the field. Portable and wedge-style barcode readers are used for resource tracking and stock takes of physical items in remote locations and items in storage such as maps, well logs, exabyte tapes etc. Search screens enable very narrow (by material type) or broad searching, and archival material can be included or excluded in the search result, as required. Given the complexity of data being managed, search results are organised very logically enabling the searcher to start from a minimal view and "drill down" to larger amounts of linked and related information, all from the one results screen.

A unique numbering system was inherited from the Oracle design and replicated in the Trimagic system to prevent record duplication. Controlled "pick" lists are used extensively in the design to assist with data entry and to ensure data integrity by only allowing entry of valid terms into particular fields. Specific search and entry forms are associated with the different material types being indexed, and the overall design concept applies to managing all format types to facilitate ease of use. After what Joy describes as an "emotional process", she is delighted that for the first time in the company's history, people from "the Ridge" can input and edit their own records! This is possible because the system is web-enabled allowing staff to search and contribute content from any location.

Future Projects

After consolidating the Trimagic system, Joy is keen to design comprehensive asset reports for delivery to external interested parties, taking advantage of the superior report-writing functionality of Inmagic software. She also intends to utilise Trimagic Profiler, an automatic email alerting tool to send out email updates to company personnel on subjects of interest to them. Another goal is to extract existing electronic data from CD ROM's to include in the system – this will eliminate the need to lend and track hard copy resources and the attendant shortcomings associated with this approach.

The oil industry also relies heavily on images to transfer information about remote sites to staff, suppliers and contractors. A picture says a great deal about the technical difficulties of many sites, and about the specific engineering set-up in various locations. In the future, Joy hopes to amalgamate this very dispersed collection into the existing information system, along with actual images for viewing and/or downloading. Two other large projects are to refresh the company wide filing taxonomy and associated metadata and naming conventions to assist with streamlining data entry and maintaining data integrity.