



NDR8 conference

Cape Town

February 19-21st 2008

**Post Conference Report
Tracey Dancy
Paras**

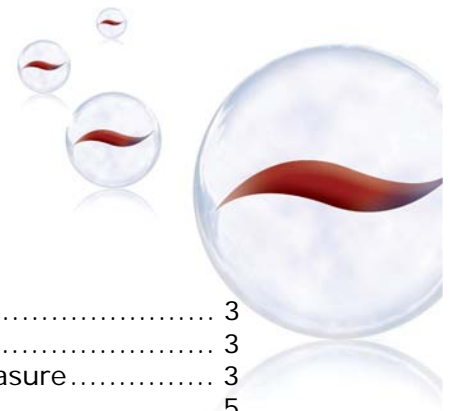


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Day One



Introduction and Welcome

The conference was opened by the CEO of the Petroleum Agency SA, Mr Mthozami Xiphu, who welcomed the delegates to the conference, the first on the African continent, and gave an overview of the role of the Petroleum Agency. Petroleum Agency SA is the organisation that promotes and monitors all data within South Africa, and in is required to disseminate and generally add value to the data in their control, making Petroleum Agency SA not just a repository, but a Data Centre.

Mr Thibedi Ramontja, CEO of the Council for Geoscience also welcomed delegates to the conference. Emphasising that the future of exploration in developing countries may well depend on the way that we manage our existing data repositories, Mr Ramontja explained that data collected by the Council – eg “geochemical” data collected for the solid mineral bank – can also be used in other industries, for example in agriculture and environment.

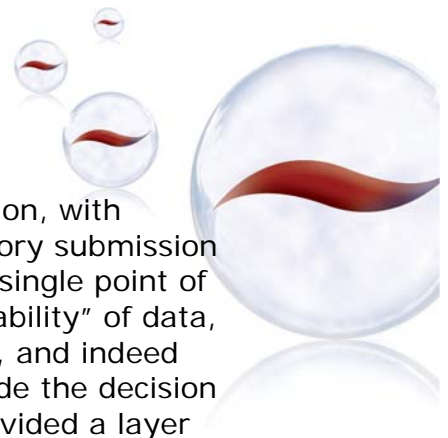
Innovation and Leadership in Managing Data as a National Treasure

The keynote address was given by Dr Martin Peersman, Director of NDR-DNO in the Netherlands, on “Innovation and Leadership in Managing Data as a National Treasure”.

Mr Peersman began by showing a short video of the work that is being done in the industry in the Netherlands. Energy supply within the Netherlands is a challenge – they are overcrowded, there are issues with pollution, and the government is having to look at alternative energy supplies. With a production profile that demonstrates the maturity of the area, potentially the Netherlands will very soon be struggling for indigenous supply. As a result, the Government took the decision to make all data available free of charge to exploration companies. This attracts investment capital, thereby extending the production life. The NDR is government funded - \$50 million per year.

The NDR has an integrated layer approach – the occupation, network and subsurface. The stakeholders come from various departments – Economic affairs, agriculture, archaeology, education and so on, creating the National Geological Information Infrastructure (NGII). This supports intergovernmental and multiple areas of political responsibility.

Mr Peersman noted that the challenges faced by the Netherlands are also global challenges. Here, as elsewhere, different departments use different software interfaces, there was a need for an integrated solution. It was decided that oil and gas would combine with other resources – but how do you integrate repositories that go back 80 or 90 years?!



Requirements for a successful NGII included onetime acquisition, with multiple usage public and private sector accessibility, mandatory submission of data and information by public and private sources, with a single point of political responsibility. There was a need to move from “portability” of data, to a net-centric “interoperability”. In order to implement this, and indeed any integrated solution, standards are required, and DNO made the decision to use service oriented architecture. Effectively, the NGII provided a layer between a variety of data repositories and the software user interfaces – a service “bus”. The cost of setting up the NDR was around 15 billion euros, a sum considerably outweighed by the perceived benefit of around 9000 billion.

Other qualitative benefits include:

- Use in law enforcement
- Improved security – net centric data
- Disaster prevention
- Improved policy making because of the integrated view

Mr Peersman then demonstrated via internet link the NGII website. Google Earth technology is used in conjunction with their own data sets, using layering techniques to look at all the information available. Information is also available in 3d grid format, for any given part of the Netherlands, showing anything from hydrology, spatial planning, soil make-up and pollution. The integrated method has - for example - allowed them to find data on sour gas fields – information previously held in two different places that did not communicate.

Mr Peersman finished with a question to the delegates – what about your NGII? Can you face the challenges? This keynote presentation provoked a number of questions. For example, he was asked whether the NGII had any problems with companies who have spent money initially acquiring data, and now being required to make it available free of charge. Mr Peersman pointed out that the relationship between the NGII and oil companies was mutually beneficial – the NGII equally makes data available to companies, ensuring value is given back. This could be in terms of making data from unexplored fields available to a new operator, or creating data rooms when licences are passed on or opened up for investment.

Mr Peersman was also questioned on NGII funding. While in the Netherlands the NGII is fortunate in being fully funded by the government, some data repositories have to sell the data they hold in order to fund the service. Here and elsewhere during the conference it was made clear that there are a number of funding models available to countries, and they should choose the model best suited to them.



eEarth and eWater

Mr Alexei Tshistiakov from TNO gave a presentation on eEarth and eWater – the European multilingual geological and hydrogeological information systems developed in the Netherlands.

eEarth objectives:

- to develop web based multilingual services
- to enable multilingual mobile services – ie on mobile phones/PDA's
- to make recommendations for new European standards.

The eEarth conceptual design includes four main components:

- Central multilingual web portal
- Distributed national multilingual web applications, independent from each other but having similar interfaces
- Mobile application module, including GPS
- Master Multilingual Thesaurus of geological terms maintained at one organisation (MMT)

The website can be found at: www.eearth.nl

The eEarth service currently provides ml access to 2.7 plus million boreholes from six EU countries. The joint eEarth web portal reduces the costs involved in data acquisition, while the Open source software solution developed by eEarth has already been used for integrating additional datasets into the system, which is designed to make it easy for new partners to join. The MMT additionally allows for future incorporation of new languages and new terms, and the same database is used for eWater. eWater is a targeted project for access to geographic information on ground water databases. As with eEarth, the system comprises a central web portal as a focal point for presentation of the hydrogeological data from participating partner countries across the EU, via multilingual interfaces. In line with industry objectives, the common data delivery is in XML format. The ewater website can be found at www.ewater.eu.

Country Presentations

Peru – Oscar Miro-Quesada

Perupetro SA is a national enterprise formed to promote investment in exploration and exploitation of hydrocarbons, as well as to negotiate, subscribe and supervise contracts. Since 1996 their National Database has been run by Schlumberger. As with many countries, the benefits to Perupetro from establishing and managing a modern database, are to attract external investment in Peruvian exploration. Currently, the Perupetro data bank is made up from tables and a variety of archives, including tape, samples and technical. As it is not possible to view all the data in its current form (as with their wells database), Perupetro have a copying centre, where data is copied into a standard format for viewing, via data rooms. Currently there is no cost involved in accessing the data, simply the cost of any media

required for delivery. Their future aims include the establishment of an interpretation centre to save time for exploration companies seeing investment in Peru. For Perupetro, the establishment of an NDR has a fourfold purpose:

- to increase reserves and production
- improve efficiency
- offer investor a personalised service
- allow investor to follow the promotion and negotiation process



Poland – Knut Balow

Mr Balow is a long time advocate of NDR's. He began his presentation by emphasising the need for a multilingual environment, in particular the work done by 10 countries involved in the effort to build MMT. The amount of data is increasing rapidly as new countries join, and MMT is key in building collaboration between countries in any exploration environment – language stops at borders, but geology does not! He expressed the urgency of overcoming the barriers to effective exploration by providing this thesaurus. In addition, there is a Geophysical Multilingual Internet-Driven Information Service available at www.geomind.eu.

Mr Balow gave a brief overview of the situation in Poland, demonstrating that even within one countries there can be difficulties between areas. There needs to be leadership and ownership, with true participation from decision makers as within companies, people are key driving projects like NDR's forwards.

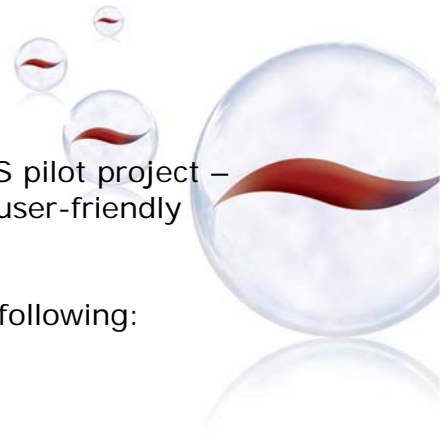
Western Australia – Jeffrey Haworth

Jeffrey Haworth is the Manager of Petroleum Geology in WA, and as he works on research, particularly into policy and so on, describes himself as a “user”. He described the challenges that Western Australia faces, as a region of Australia rather than an independent country. In many ways the challenges are similar to those experienced in Canada – a federal government with responsibility for the entire country, but with each jurisdiction responsible for managing their own data. Federal data is managed by Geoscience Australia, while WA data is managed by the DoIR.

The drivers for developing systems such as an NDR within Australia are mainly exploration expenditure, with increased growth in petroleum and minerals. Currently WA produces about 38% of Australia's export value, mainly from minerals and petroleum, with royalties to the commonwealth in the region of US\$1.8 billion.

The DoIR been in existence and collecting data since 1874, but has grown exponentially since 1950's. With 350 terabytes of data expected in the period 2000-2010, it is clear that there is a real need for the data to be managed.

Until 1994, data was stored on “old” style media. The WAPIMS pilot project – based on the PPDM model – enabled the storage of data in a user-friendly format.



The WA Exploration DM Strategy report 1998 highlighted the following:

- Identified issues
- Recognised industry trends
- Determined both internal and external stakeholder requirements
- Aimed at high level – not tangled in technology
- Put forward strategies and options for managing data
- Formed the cornerstone for future developments

Mr Haworth recommended that anyone looking at developing an NDR should look at this study, which opened the way for progress in DM and accessibility:

- WAPIMS data scanning and transcription projects
- Online availability of WAPIMS data
- Stringent QC processes
- Setting national standards for data submission

Mr Haworth also mentioned the new Core library based in Perth. His conclusions on setting up NDR's in Australia included the following:

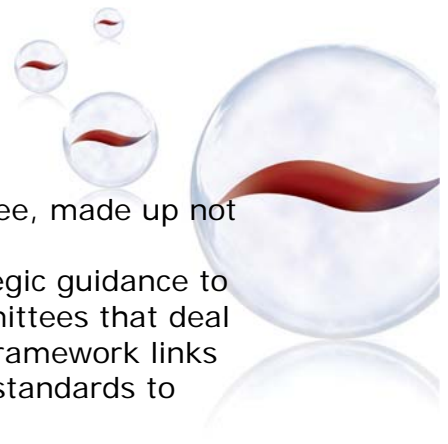
- The DoIR values data generated by the industry as a national asset
- WA has processes in place to ensure good quality data
- The DoIR is committed to having seamless approval processes
- In general, data centres are looked upon favourably by industry in Australia, they now just need the commitment to set this up.

www.doir.wa.gov.au

South Africa – Samuel Osei

Samuel Osei, deputy director Department of Land Affairs in South Africa, showed a short video, demonstrating the way in which South Africa is looking at data and data management as a national asset, and the way in which policy and regulation have been set up.

South Africa takes a national point of view, of which the petroleum industry and its associated data is a component. There is a distinction in SA between urban and rural areas – with the rural area for the most part being underdeveloped. Spatial data infrastructure (SDI), set up under section 31 of the SA constitution, which states that all sections of government must co-operation in mutual trust, involves various elements, to make data usable to improve rural and very poor areas.



The framework for this is an institutional one, with a committee, made up not only of government groups, but also (for example) university representatives. The committee was formed to provide strategic guidance to government on spatial data. Additionally there are sub-committees that deal with policy, standards, technology and so on. The technical framework links to other providers, and is involved with setting national data standards to supplement ISO standards.

The Policy Framework is one of custodianship – not owners but holders of information for stakeholders, and the pricing policy – is intended to make products and services available and accessible, in order to promote economic growth.

United Kingdom – Stewart Robinson

Stewart began by encouraging the countries new to the concept of an NDR – it is difficult to know where to start when you are seeing demonstrations of the end product of another country. The way to start is with small steps, similar to the way in which the CDA began in the UK.

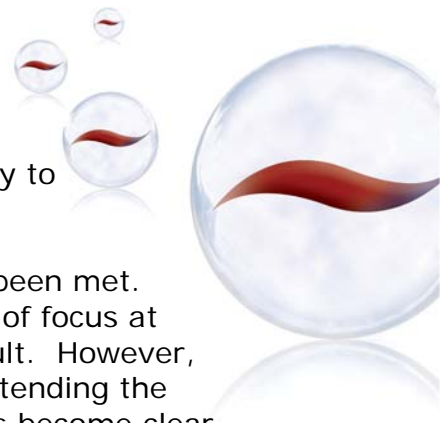
In the first instance, a meeting at Amoco with Harold Haroldson 15 or so years ago concluded with the consensus was that it would never happen. John Redfern at Hess took the lead to set up the repository with a small group of enthusiasts. At the time, Government was not happy with funding it – so it was set up by the oil industry. Seed money from the industry was provided to hire Paras as consultants to oversee the project.

A close look at the work in Norway and Canada led to a tender. Setting up an NDR takes time – it can never be done overnight, although now there are several proven models that can be used as the basis for new countries looking at their own.

From the initial idea in November 93, the tender led to award of contract in March 1995, with the logs phase going live a year later. Many teething problems were experienced, particularly with copies of log data being stored. A reorganisation in 1998 led to a more effective system by 1999, when Malcolm Flemming was appointed to lead the CDA. Unlike other NDR's, the CDA is effectively a portal to see what data is available and where.

Stewart's message was an encouraging one – while it can take while to set up such an asset, it helps to start small, and have a foundation to build on.

He then went on to discuss the conference in more depth. From a very small meeting in London, the NDR conference has become a forum in which ideas can be shared, and help and advice given. Co-operation between governments and the oil industry, working together with standards



institutions and so on can attract investment from the industry to underexplored regions.

The early ideals set by the NDR meetings have only partially been met. There is co-operation, but it is still in early stages, and a lack of focus at some of the meetings makes running and hosting them difficult. However, there is a sense of mutual support, and more countries are attending the conference, and beginning to build their own NDRs. What has become clear is that the issues and difficulties are similar in different regions, for example, on major issue is that of security of data, and entitlements. A major failing is that of standards, and it is vital that this is addressed. It is not the place of governments to set standards – rather it is vital for people to work together to create the standards that work. As an industry we should be working with Energistics to build the standards required for the industry.

Stewart went on to ask some provocative questions, including “Why have an NDR?” Reasons include:

- Cost reduction – good for oil companies
- Establishing a national archive
- Attract new participants

Do NDR’s deliver business value? Do they need to? These questions would be addressed during the rest of the conference.

The way in which an NDR is set up very much depends on a variety of things:

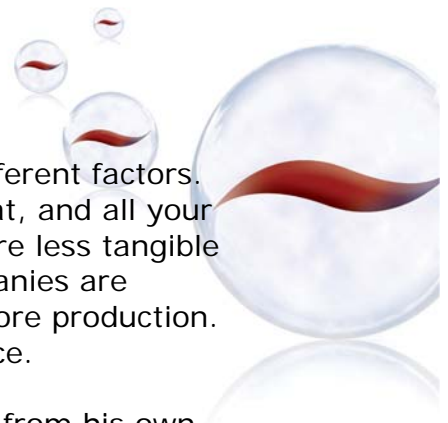
- Culture of the country – Russia might be different to the UK for example
- Maturity of the province – we need external investors
- Importance of oil to the economy

Setting up the CDA in the UK has resulted in a number of lessons learned, both for the country itself and oil companies:

- Data loading is a major task
- Data quality MUST be defined
- Legacy data and the associated costs
- Consensus building is a challenging process
- Is there a business case with realisable benefits
- Be realistic

Lessons for oil companies

- NDR’s are here to stay
- Include them in your business process
- There are tangible benefits
- Get involved, and influence the development



Defining the success of your NDR is based on a number of different factors. If your aim is to have all your log data stored in perfect format, and all your seismic data online, then that is achievable. Some benefits are less tangible – for example knowing that the energy minister and oil companies are happy, may result in renewed or extra exploration and therefore production. Successful licensing rounds are a measure of NDR performance.

Stewart concluded with an outline of the life cycle of an NDR, from his own experience:

1st generation

- Set it up
- Populate with data

2nd generation

- Change supplier – done twice in the UK
- Integrate with oil company processes (JV swaps)

3rd generation

- Integrate with regulatory processes

It is likely that even if a country did not previously see the need for an NDR, that it is required now. There are huge amounts of data being produced incrementally – more than it is possible to do anything with, and this needs to be stored and made available to investors. Major industry software suppliers now have NDR products available, and there is a step change towards co-operation amongst oil companies, regulators and suppliers.

Colombia – Adriana Arcila

Adriana Arcila, from the Colombian Petroleum Data Repository presented the work of EPIS.

Originally designed and implemented to serve the internal data management needs of Ecopetrol, it was transferred to Schlumberger in 2004. As well as a store for data, EPIS is a national repository of rocks. The annual costs associated with running EPIS are in the region of \$5million. This is not funded, but is sustainable on a different financial model than CDA – it is supported financially through subscriptions, with a small income from selling data. Costs increase when EPIS includes more services, capacity and functionality.

Adriana outlined the main actions taken and currently underway:

Improve the preservation

- Improve software and databases, with a set of detachable, best of breed QC tools.
- Check data without quality flag
- Manual delivery with strict parameters



Support internal DM processes for the industry

- Hosting data centre in Bogota
- Reduce management costs
- Infrastructure hosting – a commodity business
- Data centre operations – market competition between operators
- Software – leverage openness through the reuse of open software, open frameworks and open web services
- Technology must be simple to guarantee proper auditing.

High communication channels

- High availability cluster for public information
- Alternative backup data centre in cali-colombia
- Self-service downloading information access through dedicated channels
- Improve QC functionality
- Fully secure logon capabilities

For Colombia, an NDR is a primary vehicle to Promote exploration opportunities. On this basis, they have created single point accessibility using full text search, with faster web interface and several public layers of information. As a point of interest, ANH have looked at how the perception of NDR has affected the industry, and general consensus is good to excellent.

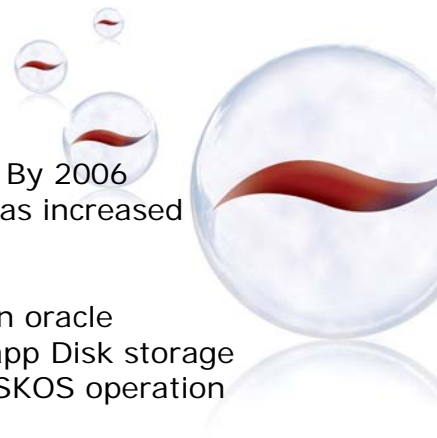
Ultimately the aim is to enhance electronic data submission capabilities, simplified and based on clear rules, and to franchise the reception and verification of the data and the physical media of the operating process, leading to more operators working in Colombia. Adriana concluded by stating that more administrative control is vital to ANH – a clear separation between the data as an asset, and the technology used to manage it.

Diskos – Eric Toogood

Eric Toogood of NPD gave an overview of the Norwegian Oil industry and in particular the impact of having Diskos – the Norwegian version of CDA - on the region. Oil is now the major industry in Norway, accounting for a total of 51% of their exports. The major challenge they face is to maintain oil production, as the north North Sea is a mature area, and gas production is starting to exceed oil. It is estimated that a third of the areas resources have already been produced, with 56 fields currently in production.

NPD was established in 1972, with around 200 employees. The report to the ministry, and advise on national plans. They have a particular responsibility for holding and making available industry data.

The DISKOS initiative began in the early 1990's. The NPD were facing a big problem in managing reported data – indeed the oil industry as a whole were facing major challenges in relation to data management. As in other regions, there was a vast increase in the amount of data being produced with the introduction of 3D seismic, as well as many poorly managed legacy data stores. The DISKOS database was established in 1995, by PetroData, with 5



members including NPD, and a strong focus on seismic data. By 2006 membership had grown to 16, and in 2008 the membership has increased dramatically to 46.

Mr Toogood presented the technical solution. DISKOS uses an oracle database of around 150Gb, with PetroBank software and Netapp Disk storage systems, a total of 100 Tb. A staff of 12 currently run the DISKOS operation on behalf of all 46 companies.

Mr Toogood also outlined the disaster recovery plan, consisting of a master data base in Schlumberger House in Tananger with a copy held elsewhere. The recovery site is available 5 days after shutdown, with a read-only solution for existing data. The DISKOS system is split to prioritise use in a disaster situation.

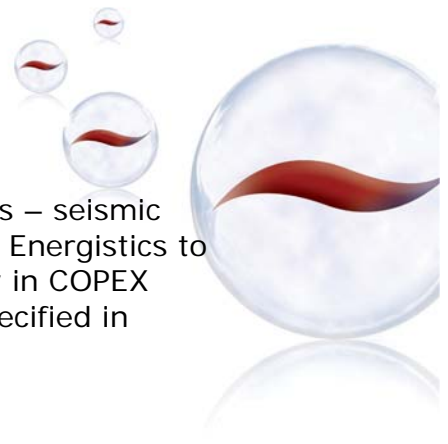
Datasets now stored in the DISKOS system include processed raw seismic, raw stack, raw and filtered migration, velocity and navigation data, and well data from the late 1990's onwards. Other data sets from 1980 onwards are provided with comprehensive coverage – it is vital when setting up such a depository that you discuss how much legacy data is worth in terms of how far back you need to go. Data from wells on the Norwegian Continental Shelf (NCS) include information on 1163 exploration and 3076 development well bores. Production data includes monthly allocated data, production and injection per well, installation and field data, among others.

Database management is outsourced to a private company – currently SINAS (Schlumberger). However, from 2009 the contract will change – Landmark will have responsibility under one contract for both operations and software.

Mr Toogood explained that while membership of DISKOS is voluntary, under the Norwegian licensing terms, there is a legal obligation to report data to the database, and make it available. Main user groups include well data and seismic data work groups, production data groups and a work group under OLF. Membership is open to universities for academic research, as well as oil companies. Non members have access to the data through the SINAS portal.

The business model for DISKOS again differs from CDA and the ANH model. Costs are shared for all operations and software, and divided among the members. There is a cost involved in loading or reporting data, as well as downloading data. Broadband access is paid for by the members, and the cost is determined by the size. Universities have free access to the database, although they have to pay for the bandwidth.

There is a strong relationship between DISKOS and the Norwegian government - efficient access to data is a key element in national petroleum policy. NPD is chairman of the DISKOS management committee and steering group, and has responsibility for management of DISKOS with co-operation on behalf of all members.



From the start there has been a strong emphasis on standards – seismic using SEG-Y and UKOOA, and NPD are currently working with Energistics to create well data transfer system. Production data is currently in COPEX format, but migrating to XML standards. All standards are specified in reporting regulations for data.

The benefits of the DISKOS system include:

- Quick and easy access to quality controlled data
- Reduction in duplication of data – store one copy + backup
- Essential store of the data for the NPD
 - Aggregated data available to the ministry of oil
 - Long term national archive function
- Attractive for new companies
 - overview of data available in Norway
 - Once they farm into a licence or are awarded acreage

When the oil price was low, DISKOS was used as a promotion for NCS – a positive for potential investors.

As with the development of CDA, DISKOS took a while to establish and implement. When the project began, there was no software available, so the time to implement a new system now would be shorter, as there are now multi-client database solutions available. Significant time was spent – and would still be required – in populating the database.

DISKOS has achieved a high quality database. Membership has exceeded expectations, and the policy of exposing the solution to market forces through tendering has resulted in good value for money. There are plans to include other data, including field and pre-stack.

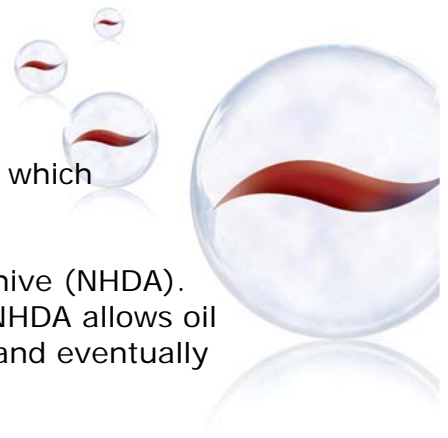
Future plans for DISKOS include in the short term the transfer to a new operator and the challenges that arise from that, including technical and contractual issues, with two competitors working together.

For NPD the future includes resolving issues relating to data access, in particular field and pre-stack data, efficient access from relinquished areas, and the need to include emerging data types.

CDA – at the heart of the UK's virtual NDR

Stewart Robinson spoke on behalf of Malcolm Flemming, who was unable to attend the conference. He began with an overview of the structure of well and seismic data, and the way that CDA works within that. CDA is also working towards the inclusion of seismic data.

Key to CDA is the DEAL website. Effectively this collects data from a number of sources, and creates links. Only log data is stored physically – the centre is a catalogue of where the data is, rather than a physical store. This



demonstrates the main difference between CDA and DISKOS, which physically stores data in a repository.

In addition to the CDA is the National Hydrocarbons Data Archive (NHDA). In the UK it is necessary to keep data in perpetuity, and the NHDA allows oil companies to offload legacy data. Logs etc are sent to CDA, and eventually reside in the NHDA database.

Governance of this model is very different in the UK. It is not government led, and is complex, but fits together well. It is funded entirely by its members, except for DEAL, which is 90 funded by Oil and Gas UK, and 10% by BERR. The cost of archiving to NHDA is met by licensees via endowments, and release agents are self-financing commercial ventures.

CDA is in the 3rd cycle operationally, changed through a tendering process over a six year cycle:

1. QC Data
2. Landmark
3. Schlumberger

The strategic aim of CDA is to fully integrate well datastore services into members normal business workflow, such that they may if wished rely entirely on CDA for UKCS digital well data storage and services. Unlike DISKOS, CDA started with well log, rather than seismic data.

There are many perceived benefits from CDA, including:

- Cost savings from the elimination of redundancy
- Secure storage and disaster recovery
- Simplified data transfer
- Instantaneous partner data distributions
- Quality improvements
- Access for entitled users, anywhere anytime
- One place to search and one standard interface
- Tracked entitlements
- Regulatory compliance
- Cycle-time reduction
- Integration with other data systems
- Data sharing opportunities

Ongoing challenges include discussion over what should be in DEAL and what should be in govt (BERR). The next stage of CDA is to be a catalogue of where seismic data is.

Stewart concluded that while CDA and DISKOS operate in a very different way, they are both successful in their outcomes, and demonstrate that different models work in different situations, and it is important before starting such a project to decide which model – business, funding or otherwise – is appropriate in the region.

Day Two

National Data Centres in Demanding Times

Day two of the conference was chaired by Rick Johnston of Schlumberger. The keynote speaker was Adil Mukhitov, also of Schlumberger, who presented on National Data Centres in Demanding Times – the pro's, con's pitfalls and lessons learned. "An E&P National Data Repository (NDR) is an agency created by a geopolitical entity such as a country, state, province or government entity to be the custodian of the national exploration and production (E&P) data assets" stated Mr Mukhitov, opening his presentation, focused on a case study, of an implementation at PeruPetro. The main purposes of an NDR for Peru included:

- Collect, protect, manage and provide secure access to the physical and digital intellectual assets related to a country's natural resources.
- Promote investment in the industry through an expanded set of services
- Streamline interactions among oil companies, regulatory bodies, government entities, universities, the public and service companies.
- Effectively manage compliance of investors to coordinate reserves development

Increased oil production in Peru is significantly impaired by an opaque environment. The introduction of an NDR would create tangible value and attract investment.

Mr Mukhitov then gave an overview of the situation globally. He demonstrated the impact of increasing demand and declining production, but stating that by 2012 we will be 18.7 million barrels of oil per day short.

We are now at \$100 dollar oil, and access to proven reserves is difficult for private investors - by far the largest reserves are owned by NOC's with no equity access. Less than 25% is accessible to private investment capital.

There are other urgent industry requirements – for example the 2008 Rig count showed a huge shortfall. Additionally, the demand for seismic acquisition is still exceeding the reported capacity growth. Vessels are currently at more than 100% use, and there is not enough.

Ultimately the basic NDR premise still holds true. It is vital that NDR's hold a more strategic role, in an industry where transparency and accessibility have moved to the forefront. Other domains related to Oil and Gas – CO₂, Minerals, water, environmental should be included. NDR's can be very useful in tackling other future challenges – CO₂ and water.



Mr Mukhitov concluded that NDR's must continue to evolve and adapt to a changing environment. He stated that controlled access to reserves will impact operation directions (licensing rounds ->operatorship. Building NDR's with the ability to include expanded services and emerging technologies will extend the role of NDC's, and must include other relevant domains.



Political issues relating to National Data Repositories/Centres

Kjell Reidar Knudsen, senior advisor – Norwegian Petroleum Directorate, began by giving us an overview of what exactly is meant by “Political Issues” – broadly these are as follows:

- ◆ Issues relating to government policy making as distinguished from government administration (practical solutions as a consequence of policy)
- ◆ Major political issues (in a democratic country) will involve political parties because of importance (size, time perspective, consequences....)
- ◆ Most political issues (related to NDR/C) are decided by Government (Ministry), with advice from a directorate
- ◆ More detailed political issues may be decided by the directorate

With reference to NDR's, political issues are more specifically:

- To have one or not!
- How tightly they should be connected to government body
- Relationship or influence of state owned oil companies
- Influence of private oil companies
- Ownership and confidentiality
- Objective and urgency
- Organisation/responsibility/relevance

Political issues are more important, more difficult and take more time than people believe. They can stop the project before it even gets started, and it is vital to a successful outcome that they are considered right from the start of any NDR project. Mr Knudsen advised that guidance on political issues can be gained from a variety of sources – from Laws, Parliament papers (White papers etc) (Ministry's policy) and written strategy/policy documents, as well as from Regulatory Agencies (Petroleum Directorate, Geological Survey, etc), and also from the State or National Oil Company.

Mr Knudsen gave examples from Norwegian Petroleum Law, quoting:

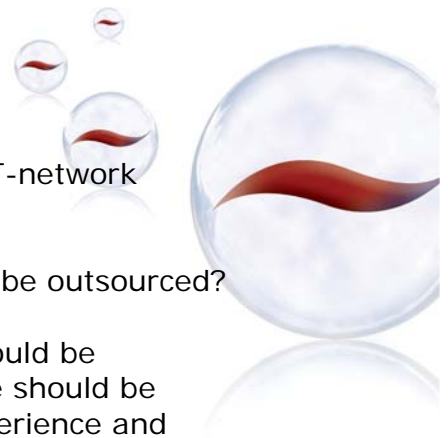
Production of petroleum shall take place in such a manner that as much as possible of the petroleum in place..... will be produced...in such a manner that waste of petroleum or reservoir energy is avoided”.



This demonstrates that in Norway at least, while there is no imperative in this statement in terms of time or money, it is important extract hydrocarbons in the best way possible. Access to the best possible data is therefore vital in obtaining this legal objective.

Mr Knudsen then looked at some specific political issues in more depth, concentrating on enabling those looking at creating an NDR to ask the right questions, rather than giving answers:

1. To have one or not, and for which data
 - Definition – what does “national” mean?
 - Which data and what format?
 - Physically inside national territory, or as a portal?
 - Should storage or processing and interpretation capacity be included?
2. How tightly should an NDR be connected to the government body?
 - Full technical capability inside government body?
 - Physically inside government body?
 - Legally and practically independent of commercial interests?
 - What should the financial model/funding be?
3. What should the Relationship/influence of state owned oil company be?
 - Definition of SOC
 - Do they all have data?
 - Do they have different incentives than a national oil company?
4. How much influence should privately owned oil companies have?
 - Technical skills
 - Financial capacity
 - Ownership of solution
5. Ownership and Confidentiality issues
 - Maintenance responsibilities
 - Public data
 - Transparency
6. Objective and Urgency
 - Don't rush into easy short term solutions – you will have to live with solutions for decades
7. Organization/responsibility/relevance
 - Petroleum Directorate
 - Geological Survey
 - Mining Directorate
 - Bureau of statistics
8. Regional cooperation



- Competence/experience/ physical storing/ standards/IT-network
9. Independence to contractor/software vendor
- Contractual, competence, financial – how much should be outsourced?

Mr Knudsen concluded by summarising specific areas that should be considered when developing an NDR. He emphasised that we should be aware of possibilities and pitfalls by learning from other’s experience and adapting that experience to our own circumstances. We can also help to educate politicians and public on the importance of NDR’s, by learning about the existing political situation and preparing easy-to-understand presentations to facilitate discussions.

However urgent the need for an NDR, it is vital to “think big but start small” - understand the ultimate goals but work carefully towards a successful outcome.

Financial Challenges and Models

Rick Johnson of Schlumberger Information Systems opened by asking some pertinent questions that anyone planning to develop an NDR should consider:

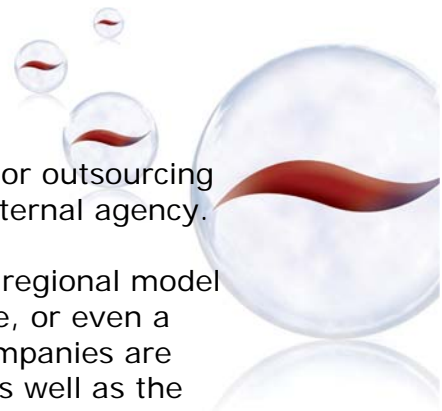
- Do I understand the costs?
- Do I understand the value?
- Do I understand the political environment
- How can I support my efforts to create an NDC?
 1. DoIR – study is key, legislative support
 2. Peru – show value to have accessible data
 3. DINO – consolidation of systems
- What support can I provide that shows value?
- Treat it like a business or strategic initiative – many politicians come from the business world and will understand a business case
- Asset protection

Mr Johnson then outlined the dramatic costs and related value of exploration:

\$320,000,000,000	E&P expenditure annually
\$40,000,000,000	spent on downhole yearly
\$8,000,000,000	spent on seismic annually
\$3,000,000,000 +	value of seismic for a moderately active country
\$5,000,000	Annual NDC expenditure

And asked “is there value in managing a \$3billion asset?”

There are various different funding models that can be considered. The National Oil Company could finance an NDR as an Information Management instrument, making the data available to outside investors, but intrinsically retaining ownership of the data. Government/Ministries could consider



financing an NDR as an investment vehicle – either internally or outsourcing the development, then assigning the finished product to an internal agency.

In some countries it might be appropriate to look at a shared regional model – countries such as Australia or Canada with state governance, or even a collection of countries such as the EU. Privately owned oil companies are often drawn to the idea of NDR's – there is a political value, as well as the potential for reduced operational costs. Service vendors too have an interest in funding NDR's, particularly if they already have tailor-made software developed. This business model would be P&L driven, and require a certain level of transactional volume to be worthwhile.

In some examples funds have been made available from membership. CDA for example was funded by the initial members, and is now supported by its membership.

An operational funding model can be developed in different ways. Government – either ministry, national or regional – can be paid for through taxes, investment or royalties, and supported by concession activities. This can be multi-ministry or regional. In developing countries funding can be made through loans or regional development banks – an NDR could be seen as a significant investment opportunity.

Subscription Services and Usage fees can create a different funding model - Member companies commit to pay multi-year annual fee, usually with support included in PSC's or permits. This scheme requires a larger number of "member" member companies prepared to support the NDR in this way on a long-term basis. Usage fees for licence round support, data packages and hosting can also be used to fund ongoing operational costs, given a sufficient community.

Mr Johnson emphasised that it is not necessary to have the same business model for set up and maintenance – for example government funding could be used to set up an NDR, while ongoing costs could be met by usage or membership fees (for example).

In summary – NDR's should be treated as a business, with good strategies and business models in advance. NDR's should be self-funding, and it is vital to find the right funding model for your region.

Legal Framework – Western Australia

Jeff Haworth, Manager, Petroleum Geology, DoIR, outlined some of the legal issues that can arise when developing and maintaining an NDR.

Enabling legislation:

- Policy – the first step, define what your government requires to ensure good stewardship and benefits the national interest.



- Legislation – converting policy into tangible set of roles and responsibilities
- Procedures – defining workflows, approval processes etc
- People – ensuring the people who are assigned to enact the legislation are trained and understand the legislation

When defining policy, any government needs to determine what it feels is good for the nation:

- Responsible exploration and exploitation of resources
- Reasonable returns – royalties
- Practical for government, industry and other stakeholders – environment, HSE etc

There should be continuous consultation with all stakeholders, and it is important to ensure that legislation does not conflict either with itself or with other existing legislation, for example freedom of information and copyright laws.

Good legislation involves stewardship – requirements for data submission should be set in place, so that the government can be assured that titles are being actively explored, and that exploration techniques are valid and meet best practice.

Any Legislation has to be written for the “worst case scenario”, and therefore has to be precise and ready for anything.

Copyright law

It is vital to be aware of any copyright laws, as they can trip you up. If you are going to release data, you must ensure that it does not breach any copyright laws for the country. If copyright exists, the enabling act must address it as a “right to copy” and industry is aware that submitting data to government enables the government to release copies of the data to the public.

Data regulation and NDR

For a publicly available NDR to be effective it must have the legislative back up to enable it to work. In order to do that, countries need to have policies in place that value exploration and production data. This will enable legislation to be drawn up to include:

- Compulsory submission of data by industry to government
- Flexibility in how the data is to be submitted
- Provision of release of the data after set periods of confidentiality
- Incorporate the ability for private industry to be able to release data

Mr Haworth concluded with an overview of how Western Australia has succeeded on a legal basis. Australia as a whole has a multi-jurisdictional environment and legal framework, and a strong belief in the value of exploration data. The way in which data is submitted allows the government

to ensure good stewardship of its resources, thereby promoting the prospectivity of the country.



Country Presentations

Kenya – Mwendia Nyaga

Mr Nyaga is the Managing Director of the National Oil Company of Kenya. Kenya has 36 exploration blocks, and while the national situation is not entirely suitable, there is good potential for an NDR and other Data Management improvements.

The NOC is state owned, and established in 1981. Their purpose is threefold – to prove stability in the market by commercial importation, distribution and exportation of energy products, to facilitate and participate in the exploration and exploit of petroleum resources, and to act as Kenya’s agent for national energy data, petroleum laboratories and the development of alternative fuels.

Kenya has exploration potential in four basins, and while there are no proven reserves, there is good geology. In terms of legislation, Kenya uses Production Sharing Contracts (PSC).

The NOC is the government agent for national energy data – a central repository for oil and gas data reported from companies, with historical data going back to 1950’s. A wide range of data is available, from seismic, exploration reports and well data – though still as paper logs.

Kenya is looking at developing a virtual NDC to bring everything together. Part of this will involve creating digital data. Along with many other countries, they have a number of Data Management challenges, including project implementation, funding and technical capabilities, as well as data quality and human resources, specifically a lack of trained data managers, with data processing and interpretation skills. With an objective to increase exploration in Kenya, the creation of a functioning NDR is seen as a high priority in Kenya.

Angola - Isabel Policarpo

Isabel Policarpo is the Director of the Data Management Division of Sonangol, the NOC of Angola. Sonangol represents Angola for all activity in exploration in Angola – external oil companies have to deal with sonangol for licensing and concessions, and as well as being an operator, Sonangol is also an investor.

Angol has good prospectivity both on and offshore, with major involvement from external majors – 9 operators and 35 partners. They currently have plans for organising, managing and promoting all E&P data in Angola. While Angola does not currently have an NDR, they realise the benefits to Angola:



- Promotion of data for concession rounds
- Protects data from loss and degradation
- Uniform quality of data
- Reduces redundancy

Sonangol carried out an assessment of all their data management capabilities and where there was room for improvement. Specific areas for improvement include Methodology and practices, access, data quality and completeness. Since 1994 Sonangol have carried out a number of improvements to their data management, including initiatives in archiving and data packages. In 2008 they began a project to build the infrastructure of the Angola Data Warehouse.

Canada - Lorne Meunier

The CNSOPB is the independent joint agency of Governments of Canada & Nova Scotia, responsible for regulation of petroleum activities in the offshore Nova Scotia, including:

- Health & safety
- Protection of the environment
- Employment & industrial benefits
- Issuance of offshore licences
- Management & conservation of offshore petroleum resources
- Resource evaluation, data management & distribution

Lorne continued with an overview of the prospectivity of Nova Scotia, including seismic, offshore wells and so on.

Nova Scotia has a Data Management Centre (DMC), a database of offshore digital well, seismic & GIS data. The DMC is accessible on the web via user friendly map interface, and provides effective and efficient systems for the management of digital petroleum data. Later phases in the development of the DMC include HSE and environmental data. The CNSOPB have a long term vision of enabling electronic submission of all required data. Explorers in the region can successfully evaluate large volumes of data, and easier regulatory compliance. The DMC pilot project will facilitate the development of a full Canadian NDR.

Lorne concluded by noting that unlike some NDR's – CDA for example – data is stored physically within CNSOPB. Finally, he gave an overview of how the DMC works, in bringing together the relevant information required, for example on a given well. More information can be found at www.cnsopbdmc.ca.



Malaysia – Idrus Shuhud

Mr Shuhud is from Petronas, the NOC of Malaysia. Petronas, a fully integrated company (both upstream and downstream) has the exclusive rights to explore, develop and produce resources within Malaysia.

The Petroleum Management unit of petronas has specific roles, as the regulator of the Malaysian E&P sector, as well as being the domestic petroleum resource owner and manager. Key responsibilities include:

- Regulate and facilitate E&P activities
- Regulate data submission
- Market exploration opportunities
- Evaluate, optimize and grow the value of domestic E&P assets
- Provide a conducive and progressive business environment

Mr Shuhud continued with an overview of the exploration opportunities in Malaysia, together with their acreage and production rates.

Petronas has fairly stringent data management regulations, relating to both the company and their PSC partners:

Petronas

- Owns Malaysian E&P data
- Entitled to copy and duplicate all data under PSC
- Regulate the data format and medium standardization
- Authorize the access rights and entitlement of data

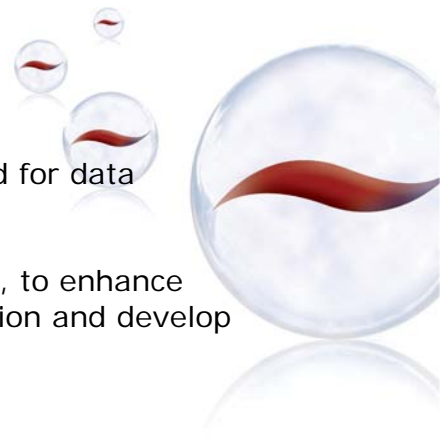
PSC Partners

- Have the right to access data within awarded acreage
- Need approval to access data outside area
- Required to submit a copy of all data to Petronas
- Must relinquish all data upon expiry of the PSC

Petronas have yet to establish full-fledged NDR, although the foundations have been laid. The move to the twin towers drove the move to scan all documents in 1997/99, and thence to an E&P strategy study in 1999.

The initial requirements were for internal improvements – addressing legacy data, scanning and transcribing old documents and tapes. Now that the majority of the data management systems and infrastructure have been established, the need is to clean up the data, and fill any gaps.

Like many companies looking to establish an NDR, there have been lessons learned along the way. The need to be persistent is vital - to start small but retain the big vision. Industry review and benchmarking needs to form a large part of the project, along with management support and end user buy



in. Petronas are customer focussed, and understand the need for data management personnel to be passionate about their work.

Mr Shuhud concluded by outlining the next steps for Petronas, to enhance data submission and service delivery, accelerate data population and develop an NDR roadmap.

Mozambique - Inocentia Maculuve

Ms Maculuve began with a detailed E&P overview of Mozambique. Mozambique has 2 basins, with 89 wells, of which 16 are offshore. There is a fair amount of activity, with external majors including Hydro, Anadarko and ENI involved in exploration. They are currently in their 3rd licensing round.

Mozambique has an NDR – called NAPD or National Archive for Petroleum Data. The NAPD is within the National Petroleum Institute under the Ministry of Mineral Resources, based in Maputo and established in 1999. It is guided by the Petroleum Law of 2001, and funded by the national budget and INP funds.

The goal of the NAPD is to ensure that data & information from petroleum activities is made available, to develop a consistent knowledge base for petroleum activities and become a reference point for the region.

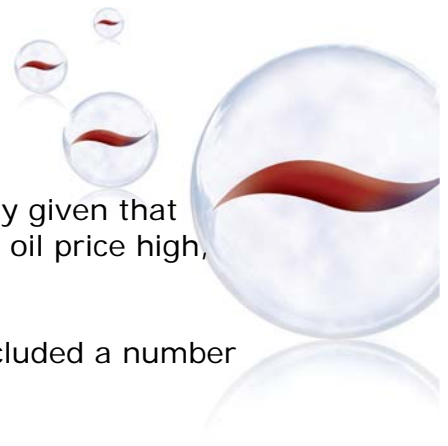
Some functions of the NAPD have already been achieved. Field tapes have been reformatted to a modern standard, and an access database has been built to track all seismic tapes. Ongoing functions include:

- Receiving and integrating data
- Compiling hydrocarbon reserves and production data
- Updating technology, equipment and standards
- Management of petroleum operations
- Make proposals of standards for reception and delivery of data
- Make public data available

The NAPD is well on its way to being fully functional, though currently it serves mostly internal purposes. The long-term challenge is to turn it into an NDR. Mozambique has a memorandum of understanding with Tanzania, and are working with South Africa and Namibia also. Future plans include the continuation of data loading, and also extending the data types being used.

New Zealand - Richard Garlick

Richard is the Data Development Manager for Crown Minerals in New Zealand, the Business Services Branch attached to the Ministry of Economic Development (MED). Their responsibilities include the design of allocation regimes (petroleum, minerals and coal), promotion and management of the Crown Mineral Estate, and financial and geotechnical compliance. Crown comprises a total of 33 staff, 6 of whom manage data.



Richard noted that New Zealand is under-explored, particularly given that there is a plate boundary right through the country. With the oil price high, there is currently a lot of exploration investment.

Initiatives arising from a review of Crown Minerals in 2003 included a number of measures to encourage exploration:

- Review of the royalty regime and tax regime
- Development of targeted investment strategies
- Improved access to information

An emphasis on online services and digital reporting resulted in 2 key IT initiatives to support business:

1. Development of a permit lifecycle database
2. Implementation of a data management system

Data Management is tightly integrated into business processes including work programme compliance monitoring. Third parties are used for project work, for example tape transcriptions. The legislative framework is similar to Norway and others, and policies have recently been updated to include minerals and petroleum.

The funding model for the New Zealand NDR is 50% by the Government, as part of Crown Minerals baseline operating budget to support investment, and 50% through collection of fees from permit holders, which is incorporated into annual and application fees. While data is provided free of charge, there are costs involved in recovery of media, freight and transcription services.

All data is submitted to the Crown, including interpretation data and reports. The data is assessed against work programme. New regulations, supported by guidelines, specify content and format. Data types include:

- Petroleum, Mineral and coal exploration data
- Production data via permit database
- Annual mining activity reporting and statistics

IT systems include a technical database built on landmark technology, which went live in April 2007. This incorporated legacy data. Additionally they have disaster recovery data centres, hosted by MED.

Current Data Management Projects include:

Back-scanning of reports

- 100% Petroleum, 75% Minerals, 40% Coal scanned
- Residual scanning to meet client orders

Preservation of field data on tape

- Transcription of all field tapes pre 2003 to LTO2

- Archive moved from 60,000 to < 200 tapes

Crown funded seismic surveys – NZ\$21M

- Regional surveys to support bidding rounds
- Free distribution of data, and reports to support offers

Data is released after 5 years and is made freely available.

The current status of the NDR in New Zealand, is that technical data went live to the public in April 2007, with Permit data in June 2007. The NDR is managed by the Ministry, and it is compulsory for all data acquired to be submitted. All legacy processed data has been loaded, and the loading of well curves has been started.

Benefits achieved for technical data:

- Raising the bar - enhancing services to clients
- Tightly integrated into business process
- Centralised management of technical and spatial data
- Permit boundary information - linked to live databases
- Central process for client orders
- Exposed more data – uncovered more issues

Benefits achieved for permit data:

- Supports business processes – consistent and transparent
- Manage compliance
- Online transactions to come – applications, reporting, payment

Mr Garlick concluded by outlining the future challenges facing Crown Minerals and the NDR. As with other countries, there is an adjustment needed to gain acceptance of new processes, with a focus on data quality and standards. Data loading is ongoing, with a need to extend data types – in New Zealand this includes mineral, coal and geophysical data. New Zealand will continue to outsource client orders and tape management.

The day ended with break out sessions, to be presented on day three.



Day Three

Increasing Opportunities and Investment Through Public Data Browsing



Keynote speaker on day three was Atul Solanki, Managing Consultant with Landmark. His presentation was based on work done by Landmark for Crown Minerals in New Zealand. The challenge was to attract more international petroleum and mining companies to explore and invest in New Zealand, and the solution was to develop a robust national online geotechnical data bank.

Mr Solanki began by asking what the technical challenges are for a Geoscientist. Effectively they are the same as in many other countries around the world – finding the right, quality data, in a timely fashion, and being able to access from different sources within the same context.

Landmark came up with PetroBank Explorer – a new web portal, to provide a consistent web interface enabling a broad audience to access published E&P data from many sources. Web portals have a number of benefits – to improve productivity through the use of a single interface and remote access, to accelerate decision making and reduce data management costs. The key features are the ability to browse and to publish data in a consistent format, regardless of where the data resides or what type the data is – so the user doesn't need to know where the data is stored in order to be able to access it.

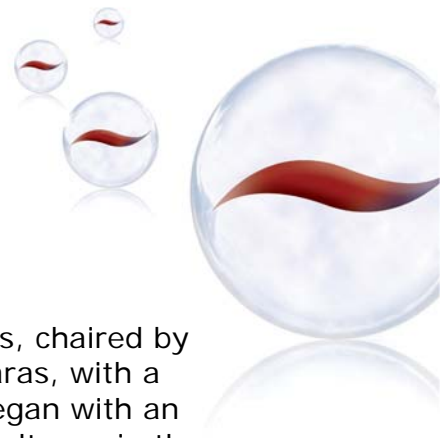
The portal is designed with logical navigation, giving access to applications in context, and enabling functional organisations to work securely together.

A databank should offer:

- Management of newly created, raw or real time exploration and production data in a single location
- Quality data at a corporate, regional or national level for rapid distribution to an individual or network of clients
- A secure environment along with a flexible system of entitlements, supporting both individual company and multi-client access models

Mr Solanki went on to discuss current trends for NDRs, as environments for multi-disciplinary integration and optimisation. The need is for openness, integration, visualisation and optimisation. The trend is towards Linux platforms, and away from tape-based towards disk-based storage of seismic data.

In conclusion, Mr Solanki gave an overview of what was new at Landmark, including a demonstration of how PetroBank works.



New Technologies

Paras/Fivium – Alan Smith

This part of the conference was a section on New Technologies, chaired by Knut Balow. The first presentation was from Alan Smith of Paras, with a presentation co-authored by Clayton Blake of Fivium. Alan began with an overview of Paras and Fivium. Paras are a management consultancy in the E&P industry, specialising in strategy development for business and IS. More specifically, Paras has wide experience in solution independent advice for NDR's, and working with governments on promoting inward investment. Fivium are a provider of licensing and regulatory solutions, based on an open standards toolkit (FOX), used by CDA in the UK.

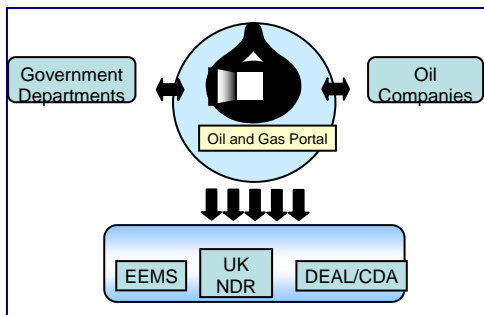
Alan went on to ask "Why do you want an NDR?" Just because everyone else has one, that doesn't mean it's a good idea! However, they will help with regulatory compliance, promotion of inward investment and cost savings. Alan did warn his audience that you should expect change over time – in terms of software provision, regulations and other needs.

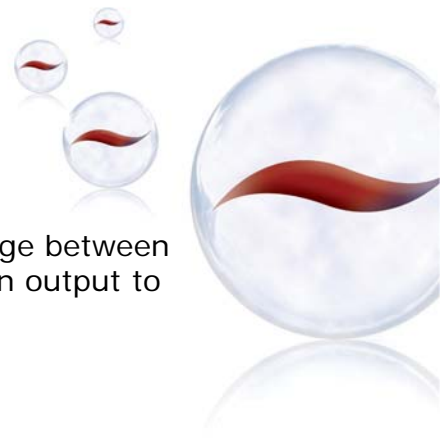
Alan then spoke about the need to combine people, process and technology – all three need to be in place for a successful outcome.

The Technology part is in some ways the easy "bit" – several vendors already have suitable software available off the peg. Alan then took us through the process of submitting data to NHDA – the National Hydrocarbon Data Archive in the UK, using a role activity diagram process to demonstrate a high level strategy map. He then moved to people, emphasising the need for a good programme of change management to be in place.

To introduce Fivium, Alan spoke briefly on linking the regulator to an NDR. The UK have several "eGovernment" initiatives in place, some of which are linked to CDA/DEAL, in particular emphasising the paperless process and eSignatures.

Fivium were presented with a challenge: To create a Standard Platform on which to build strategic applications to support the UK Government's work with the Oil and Gas Industry.





The solution was to create an oil and gas portal, for interchange between government departments and oil companies, that could in turn output to EEMS, UK NDR and DEAL/CDA.

The major areas of functionality are:

- Fields / Licenses / Wells / Onshore
- Decommissioning
- Environment
- Infrastructure
- Maps
- Statistics
- Downstream
- Data Release
- Historical Data

The portal has a number of significant features, including the use of XML standards, paperless workflow and digital signing, and an underlying development toolkit, enabling rapid enhancements and developments. The portal is a proven system – proven development team, methodology and technology.

Alan then went through a short demonstration of how the portal works. In conclusion, he advised the audience to know what they want to use an NDR for, to remember People, Process and Technology, and make sure you understand and simplify your processes before making them electronic.

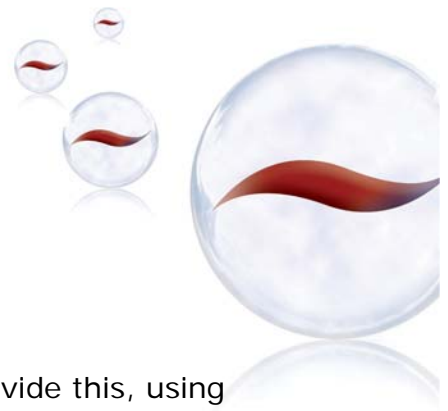
Enigma Data Solutions – Peter Copley

Peter Copley's presentation was entitled New Technologies in Data Storage and Archiving.

Enigma has its headquarters in Sussex, United Kingdom, where the development and testing teams are based, along with support and professional consulting services. The Sales & Support Office is in Houston, Texas.

Peter asked whether Project archiving can teach NDRs anything, before outlining the different types of data that can be archived. He suggested that an "archive wish list" might include the following:

- Ability to store complete information with referential integrity
- Multi-disciplinary
- Easily accept new data
- Well described and indexed
- Searchable
- GeoSpatially located archives



- Secure with offsite copies – good disaster recovery
- Available on demand
- Implementation and management affordable
- Evergreen – vendor neutral?
- Energy efficient

Peter then gave an overview of how Enigma solutions can provide this, using PARS initiation and capture, consistent with a standard WOW interface, and showing extended support for versioned copies of CDA.

Peter also commented that there might be a future for tape archiving. As well as being much cheaper than disk, among other advantages it is naturally record oriented, and can store high very high capacities. That being said, Peter emphasized the advantages of VTL – Virtual tape libraries. Designed as a fast alternative for backup systems, VTL's are effectively disks posing as tapes, and can provide data compression and de-duplication.

However, VTL's do have some disadvantages, when used with out Enigma IDS. IDS connects to multiple, physical tape libraries, providing a logical copy of VTL tapes to physical tape, and importing and exporting is greatly simplified.

Peter then gave an overview of other archiving techniques available through Enigma, including Plasmon archiving, Optical storage, and MAID. Peter concluded by telling his audience about the Storage Networking Industry Association (SNIA), and their XAM Initiative - Information independence for applications and storage. SNIA is a Data Management Forum, and a global, multi-agency group working to define best practices and storage standards for long-term digital information retention.

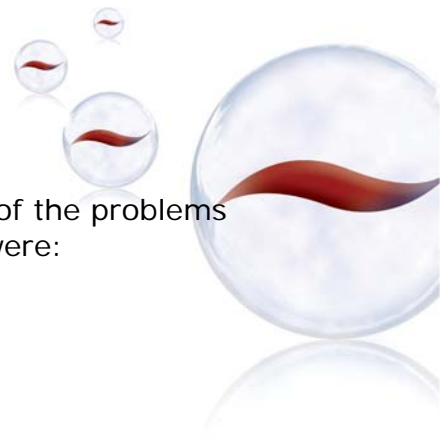
Fugro Data Solutions – Kerry Blinston

Kerry spoke on how recent technological developments support the role of NDR's. He began with a brief stakeholder analysis, suggesting that they include:

- Shareholders
- IOCs and NOCs
- Ministry, NOC, NDR owner
- Government
- Population

And that the difficulty is in balancing these. Customer needs vary too – internally there are the NDR personnel, depending on the model chosen, and external clients. When building an NDR and deciding on the model, it is important to look at these personnel breakdowns.

Kerry then gave an overview of the web portal, and the number of visits, and compared that to traditional licence round promotion.



A survey of participants in NDR6 in Utrecht, stated that 80% of the problems in establishing an NDR, were not related to technology, and were:

- Financing – implementation and operation
- Legal – modern laws, regulations and directives
- Government buy-in
- Industry buy-in

The question then is what do we require technology to do? H suggests that we need it to reduce costs, address customer needs and reach the maximum audience possible.

Kerry then gave an overview of how the Fugro software can help customers, in particular web enabled user control of data entry parameters. The main barrier to widespread usage is the level of bandwidth globally – some areas still do not have enough to enable good web access to data. Fugro technology has begun to address this issue, attempting to make data volume more manageable by:

- a) Only serving the part of the image being viewed.
- b) Using a resolution suited to the scale.

One step further would be to enable customers to have interpretation as well as the data. Ideally this should be produced dynamically, and ultimately the goal would be to portray this in 3D.

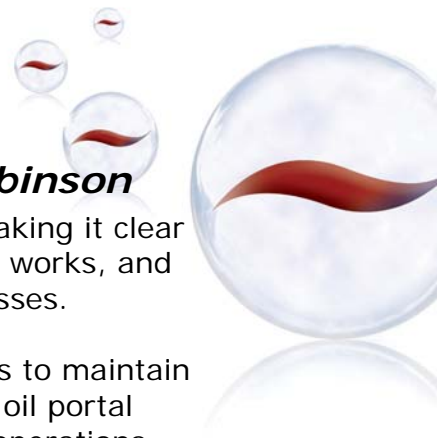
In conclusion, Kerry stated that technology supports NDRs through Metadata capture, QA/QC and web-based visualisation. The emphasis at all times should be customer focussed.

John Redfern – Digital Earth

The Oil industry no longer at the cutting edge of technology. In fact it is the consumer space where the interesting DM stuff is being done, google for example. As an industry we are fixated on security of data, and regulations, and the implementation of new technology is slow.

John stated that most of the data we produce should be public – to enable onward exploration. Data archiving is not “sexy”, but data that is linked and accessible is. Digital Earth is linking with data providers all round the world through a portal - crawling the web for public sources, tagging and categorising the relevant data it finds. This adds value to existing data, as does investment in NDRs and data cleansing.

Digital Earth is still being developed, and will be able to store indexes from NDR's to enable search from the web. Another area they are looking at is clustering results in an interactive way. If your search tool knows that what it is looking at – ie understands that it is well or field data for example, you can look up “wells” in a public way and get the information you need.



What is happening in the UK? – Stewart Robinson

Stewart Robinson of BERR spoke on “The Accidental NDR”, making it clear that he doesn’t claim the UK has the best solution, only that it works, and demonstrates the benefits of linking NDR to Regulatory Processes.

Stewart also noted that BERR does not collect data – its aim is to maintain interest in the UKCS having passed peak production. The UK oil portal regulates the oil industry and is “Paperless and Digital” in all operations. There are close links with DEAL and EEMS, and with NHDA.

Stewart stressed the need for common standards globally, stating that we should be working with Energistics to develop and deploy standards internationally.

Stewart gave an overview of Portal technology and what it can do:

- On line forms data entry
- Workflow
- Document generation
- Web services
- Data reporting
- User account management
- Security (digital signatures)

He went on to show how licence applications can be done online, using Foxopen technology (www.foxopen.org), that builds oil regulatory systems quickly and cheaply. Fivium have worked with CDA in developing this system.

Still to be done, is agreement on who releases what data, and agreement on data exchange standards. Also possible are web services for metadata, production and licensing data, onshore data and maps. It would also be a big step forward to change internal oil company procedures to use web services – as with many changes, good management is vital to ensure success.

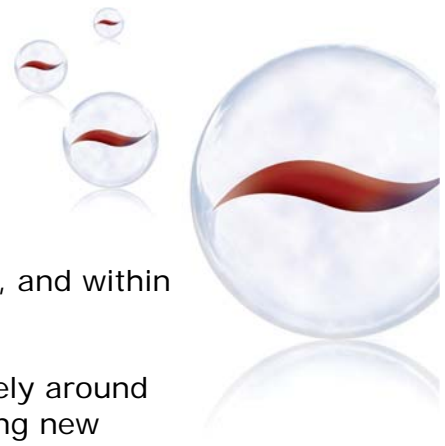
Other services that could be made available include:

- When a drilling permit is issued
- When an assignment is made on a licence
- When a seismic survey is issued
- When discoveries are made

Stewart concluded by taking us through the setup of CDA and the associated NDR in the UK. Firstly the costs:

CDA set up	approx £6million
NDR set up	approx £2 million
Deal website set up	approx £750k

UK oil Portal – Fox approx £3million
Regulatory-applications approx£2million



The UK justified this through tangible cost reductions for CDA, and within BERR, the need to move to eBusiness.

The outcome was demonstrated in identifiable benefits – largely around extending the life of North Sea prospectivity, through attracting new investment, and changing the nature of partnerships, for example JOA for operator partnerships.

The UK is a good place to do business – the UK oil portal fits into company processes, and has good, easy to navigate websites. There have been other benefits – BERR have saved at least 4 posts, and reduced IT costs by £250k per annum, savings which will have their equivalents in every oil company.

Breakout Sessions - Feedback

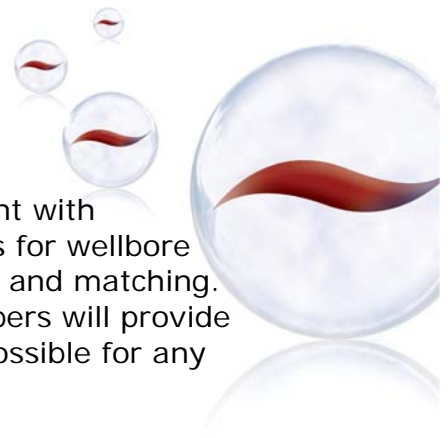
Erik Toogood chaired the final session, on feedback from the breakout sessions on day two.

Energistics standards – Alan Doniger

Jerry Hubbard briefly described the Energistics organization and its activities with an emphasis on the formation of active Region groups. He mentioned the search to identify a member lead representative for the Africa Region and plans for an Energistics Region meeting in Africa early in 2009.

Jerry then shared highlights on the Drilling Standards known as WITSML. He explained the purpose, scope, and benefits of these Web Services and XML Data Exchange Standards with an emphasis on the contribution of WITSML to improved operational efficiency and greater flexibility in choosing products and services. He quoted WITSML Special Interest Group member objectives as better communications between service companies and operators, more automated data flows, neutral data formats for data retention, and data availability anywhere.

Alan Doniger described the context, history, status, and plans for the Global Unique Well Identifier (GUWI) initiative. There was a great deal of interest from the attendees to understand the initiative and to project its implications for their country and their organization. Alan explained that the degree of potential need and potential benefit will vary according to the practices in the country or countries associated with an organization and the nature of the organization. For example, an NOC operating all resources in a country that has a good well/wellbore identification system in place may not realize any substantial benefits. An international energy company, however, may appreciate significant benefits by having a uniform, global well identification system.



Alan explained the pending standards and service arrangement with designated primary service provider, IHS, including provisions for wellbore registration, industry accessibility, public data set availability, and matching. He explained how sponsorships from active work group members will provide the funding to ensure that universal use of the services are possible for any and all industry organizations.

Finally, Alan gave a short update on the production optimization standards initiative, PRODML. He explained how a great deal of progress has been made in only two years of work. The second release of the PRODML Web Services and XML Data Exchange Standards is due in the 2nd quarter.

PRODML Standards provide a framework in which innovative production optimization processes can be realized to support highly instrumented fields. Some of the implementation pilots completed over the past two years are progressing into actual field deployment solutions.

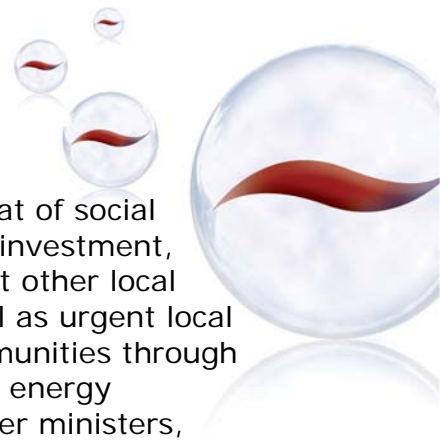
The Special Interest Group of about 25 companies is gearing up for 2008 with an array of functional teams and a policy of honoring new development requests only from serious field deployment projects from member energy companies.

The session ended with an expression of interest to follow-up on several of the subjects discussed, especially in the context of meeting the needs of the industry in Africa through the activities of the Energistics Africa Region.

Selling National Data Repository investment to your Energy Minister – Robert Winsloe

Robert began by running through the slide set a second time for the people who did not attend this session yesterday, suggesting future statements that an energy minister might make, for example: "Economic growth fuelled by investment in NDR" says Energy Minister or "Oil Minister makes NDR investment his number one priority for 2008" or even "Queen Elizabeth makes bid to host NDR9 at Buckingham Palace". He asked delegates what might convince an energy minister to make such statements. Ultimately that depends on the minister – not only what "gets them excited and keeps them up at night" but what is actually in their job description. It should be remembered that most ministers are in-situ for a limited time, while an NDR can take years to implement.

What was clear from the breakout session that the main priorities for the delegates included maintaining a secure and sustainable supply, and territorial and data integrity. Other issues, very much region dependent, included environmental issues, political security, the political affiliation of the minister and so on.



One area that may not have appeared initially important is that of social development and community impact. NDR's promote inward investment, and for an external oil company it would be relevant to look at other local issues, for example water, ground water and land use, as well as urgent local social issues, such as infrastructure and support of local communities through employment, education and so on. This would go beyond the energy department, involving other ministries and influence from other ministers, although it may well assist in securing industry funding. For example, Is there a way to get an oil company to fund an NDR so that their entry into a country can have a beneficial effect on the locals? As with all similar projects, it may be necessary to start at project based level and then grow to encompass more.

Robert pointed out that NDRs can influence OPEC quotas, as they demonstrate data transparency and therefore proven reserves.

Robert concluded with demonstrating that while NDR's can take a long time to develop and implement, it may well be worth looking at ways of circumventing time-consuming actions, for example not ensuring that the master database is populated before implementation, but building projects where the database can be populated later. Robert's suggested NDR strategy is to have a big vision, to start small, and deliver value in 3 to 6 months.

Technology Session - Martin Peersman

Martin began by listing the challenges short term, as put forward by 27 participants in the session:

- IT infrastructure (storage, hardware, web access)
- Software (what to choose?)
- Management IT process (development, operations)
- Security
- Data management (quality, size, format)
- Legacy media (how to handle it)

And the long term challenges:

- Finding/Access (Anywhere Anytime Everything)
- People (how to find them, keep them motivated and involved)
- MultiResources (coupling of domains)
- User Skills (user friendliness, novice/expert)
- Miscellaneous

The main issues appear not to be around technology, but the lack of human resources - how do we recruit and retain the best staff to work within the technology? Martin suggested that the key is retention, and this can be best achieved by allowing personnel to work in a context, where they are seeing

the full results, not only their portion of the work. Workflows need be attractively implemented to improve retention. User interfaces could be improved – for example simpler interfaces through GIS, there are already examples available in the GIS and SDI worlds. Having a fast view on what is available, with easy accessibility to information, will also make work easier and more attractive to existing personnel. Technology already exists for all of these.



Web2 features are equally attractive, increasing the influence of the user to annotate, rank and select data. User friendly and personalised workflow environments will enable users to be up to date and comfortable with their working environments.

Long term it is important to widen the view on technology, to encompass not only the traditional E&P software but also mainstream ICT. Concepts such as spatial data infrastructures, SOA and business process modelling are available, and while it may look awkwardly complex, it is more than feasible.

Organisational issues relating to NDR's - Rick Johnston

Rick suggested that the required organizational areas should include the following:

- Establish/refresh
 - Project management
- Maintenance
 - Operational management
- Interaction outside entities
 - Government
 - Industry and other agencies
- Governance
 - Standards
 - Members
 - Regulations
- Personnel development

Rick gave some examples from the industry on how organisations could be set up. Firstly he used PeruPetro as a typical operational organisation, with a service manager at the top with clear lines of responsibility.

He suggested project management team organisations, and how they would fit into the development and implementation of an NDR project, and also demonstrated the way in which NPD and DISKOS are organised.

Rick's summary echoed much of what Martin Peersmann had suggested, that personnel motivation and retention is key to a successful outcome. He suggested the following as ways of achieving this:

- Must have ongoing training program
- Teach cross-domain



- Career advancement process

NDR/NDC's will have ongoing project and organizational issues, by their very nature. Rick suggested that refreshing technology – perhaps changing vendor – and regularly updating contracts may help with this issues. Ongoing operations are usually aligned along domains with a central supervisory and/or managerial component, and Best Practice would suggest that a governance council or representative is needed to interface with other agencies, members, and so on.

Legal Issues – Jeffrey Haworth

Jeff took the delegates through a series of issues that had been raised during the break out session.

Copyright – any data is subject to copyright, and when writing the legislation for data, it is vital to check the Copyright Act and Freedom of Information Act to ensure any petroleum act is compliant.

Another issue was over the interpretation and execution of government policy. Policy is developed by government agencies, and industry lobby groups. It is important to maintain continuous liaison between stakeholders, and be clear, avoiding policy that can be easily confused.

Jeff then gave an overview of prescriptive versus objective legislation.

Prescriptive		Objective	
Pros	Cons	Pros	Cons
Clear, get what you want	Inflexible, difficult to amend Can easily become out of date	Flexible, less need to amend as data changes Win-win negotiations UK amended con for NHDA Regarded as ideal for NDR	Can lead to confusion and don't always get what you want UK had clause on companies keeping data in perpetuity

The following countries follow either prescriptive or objective legislation:

- **Prescriptive:** USA, States in Australia, Norway, Nova Scotia (but are looking at going objective), Netherlands, South Africa, Malaysia
- **Objective:** Commonwealth of Australia, UK, Uganda (but going prescriptive)

Formats and standards are another potential issue. For example, within a "standard" there can be varying locations within the file for the same data, and there can be a lack of understanding of the data by government. Jeff



suggested that the way forward would be to look at what others have done, and be clear about the route you have chosen.

Confidentiality issues vary from country to country, for example Malaysia only “gives” data to companies who are within a concession. The role of the NOC in the nation’s data may affect the confidentiality framework. When implementing an NDR there is a need to review datatypes and confidentiality – again, look at what works elsewhere. Always ensure there is a clause to enable negotiations, and discern between:

- Stewardship – why you want data submitted
- Promotion – why you want to release the data

The subject of retrospective changes to legislation was raised, and the unanimous vote was not to do it. Retrospective changes create issues with litigation, and results in souring relationships between government and industry.

Should punitive measures be used in cases of non compliance? Jeff made a number of points relating to this:

- You can have punitive measures in legislation, but you must have the political will to enforce them
- In the US and Australia – linked to Criminal Code
- In the UK – linked to Civil Law
- One alternative would be to have 10% of work program monies in a trust account which can be accessed by government for company failure to comply
- Ultimately you can remove the company’s licence
- WA Minerals – no argument – failure to comply will have your permit cancelled

Finally, the issue of third party contracts with government was raised, for example ANH Columbia is run as a Service Level Agreement (SLA). The Government must be fully aware of what it wants – and not waver. All services required must be fully covered by the contracts, as well as ensuring an exit strategy.

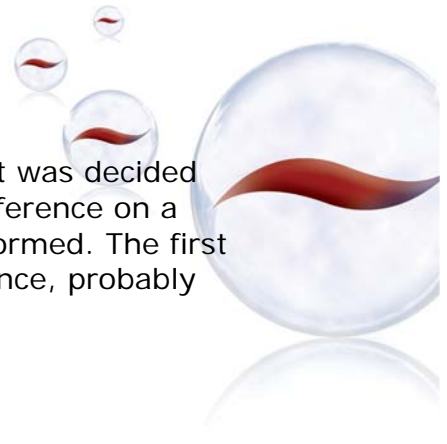
Closing remarks – Mthozami Xiphu

Mthozami Xiphu, CEO of the Petroleum Agency closed the conference by thanking delegates and presenters. It was felt that the conference had been a great success, well organised and much enjoyed by the delegates.

NDR9

After the lunch break, there was a short discussion, led by Steward Robinson of BERR, on the future of the conference, following the great success of NDR8, in particular focussing on the fact that it is growing year on year. As

yet there has been no offer to host the next conference, but it was decided that rather than put the onus of hosting and organising a conference on a particular country, that a committee of volunteers would be formed. The first task would be to arrange a host and set dates for the conference, probably during 2009.



Comments and Feedback

I just will like to thank you again for the great event you and the Petroleum Agency SA organized for us last week in Cape Town.

All the conferences and recreational activities were great, I really enjoyed all of them, you take very well care of the minimum details.

The impression I got from Cape Town and its people could not be better, I hope to I will be able to go back again some time.

Regards,

Adriana Arcila

Thank you again for all the work you put in to make NDR8 such a success! I know from experience that it is the work that goes on behind the scenes – organizing the conference venue, the buses, the excursions, the gifts, herding the attendees and their partners – that makes the real difference. And I sense that most of this was achieved through the work and dedication you put into it. You must have been exhausted at the end of the week. Hopefully you felt it was all worthwhile because I for one felt it was one of the most valuable and best organized events I have attended.

Kind regards,

Robert Winsloe

I don't have words to thank you support in the past week. The whole event was wonderful (included cruise tour), indeed and you did a very good job.

Ana Maria Lopez

On behalf of Enigma Data Solutions I would like to say a big Thank You to you for organising such an informative and enjoyable event.

Are you involved in organising the World Cup 2010 – you should be!

I look forward to visiting Petroleum Agency SA and Cape Town again soon.

Best Regards

Peter Copley

Enigma Data Solutions

Again, congratulations for NDR8 and thanks for your hospitality!

Best Regards,

Heron Miguens