

11th International PNEC Data and Information Management Conference¹**Houston, June 2007**

Another good turn out (around 400) for 2007 Houston PNEC with thirty plus papers presented in the three day plenary session. Increasingly, rather than talking about poor data quality and under funded data management initiatives – although these remain a staple of the PNEC, presentations cover success stories demonstrating that it can be done. Solutions include major data bases such as Shell’s corporate data store or ConocoPhillips Alaska’s ‘neutral’ technical database. Elsewhere, companies such as Anadarko are leveraging master data management solutions to ‘get a hold’ on their well data and eliminate ‘back door’ data management. Web Services are now a reality for Pioneer which is working with IHS and Schlumberger to consume E&P data from diverse sources in its One Map application.

How do you sell data and information management? Shell Canada used a ‘risk assessment matrix’ showing the likelihood of a data ‘incident’ against the severity of the consequences. This highlighted some costly past failures and persuaded Shell to spend \$4 million to sort things out.

The PPDM data model is the ‘first port of call’ for many data initiatives although HP’s attempt to shoehorn the model into a ‘facet-based’ taxonomy was an instructive failure. Kalido is claiming more success, using a trimmed down version of PPDM in its master data management solution for E&P. Chesapeake reports use of Oracle’s Hyperion master data management in a GIS-based roles and activity tracking system. On the real-time front, RasGas of Qatar reports programmatic access to the OSIsoft PI Historian for direct access to production data. Curiously, as PNEC began life as the Geoshare user group, Schlumberger is now virtually absent from the event.

Highlights[Shell’s corporate data store](#)[ConocoPhillips Alaska’s technical database](#)[Risk assessment matrix – Shell Canada](#)[Web Services – Pioneer](#)[Production surveillance – RasGas](#)[Kalido MDM for E&P](#)**Contents**

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Technology Watch subscription information

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¹ PNEC Conferences are run by Phil Crouse’s Petroleum Network Education Conference organization – <http://pneconferences.com>.

TW0712_1 Seismic data management system – Marlene Himel, Shell

Shell Americas' 'EPW' unit is developing a seismic data management system to manage both 2D, 3D, onshore and offshore seismic data. The solution targets online data, tapes, navigation and ancillary documentation. Landmark's PowerExplorer (with embedded ESRI GIS) is used as a front end. Landmark's PetroBank Corporate Data Store is in the process of customization for Shell (see the [presentation by John Kievit](#) below) to incorporate a range of new and future data types including depth data, migrations and pre stack. A standardized processing taxonomy was developed for the project.

Geomatics, wells, processing and interpretation teams were all involved in the project. It proved challenging to bring Shell's 2D/3D/onshore/offshore 'silos' together into common workflow and single interface. Gradual transition and change management was the key to success. Change was managed using Kurt Lewin's 'un-freeze' method².

PetroBank manages unique line names and aliases such as those encountered in document or tape management systems. The solution is 'aligned' with EPSG CRS³ definitions and Shell naming conventions. Data QC, load and project creation is largely automated in the 'workflow-oriented' solution. Business rules have been developed for data management, data collections, data purchase, processing and partner relations. Seismic data located in Amsterdam can be viewed and mounted from Houston.

Shell's EPICURE middleware and SOA⁴ infrastructure is leveraged to 'expose' data from the system to other communities and applications. In the future, Shell plans to leverage 'seismic SOA' to provide seismic objects to other applications and users via technical portals. The aim is for 'closer integration with data vendors and seismic processors'.

TW0712_2 Shell Corporate Data Store – John Kievit, Shell

Shell's US upstream arm manages some 3.6 million onshore and 58,000 offshore Gulf of Mexico wells. These are migrating to a global corporate data store (CDS) which will be an authoritative source for well header data, directional surveys and other reference data. The global CDS is a component of Shell's standard technical architecture of hardware, operating system (Shell Global Linux), database, applications, workflows and support. Hurricane Katrina forced Shell to relocate to Houston, accelerated the requirement for data transfer from Shell's legacy flat files to a new database system. The two year time frame shrunk to 'now!'

The well data system is built around Landmark's corporate data store (CDS), Petris' Recall and the PetroBank master data store (MDS). Landmark's PowerExplorer is used for data management and as a 'power user' interface and the advanced data transfer (ADT) tool is used to transfer data from legacy stores including Shell's 'John Brown' geological database. A reference data manager (RDM) loads and manages metadata. A 'new well' workflow offers integration with well engineering.

The system supports data access through Landmark's PowerHub and Oracle SQL. Well data is also delivered via ESRI SDE, WebPortals and Recall. Quality metrics are measured using [Exprodat's IQM](#) and published as 'traffic lights' so that problems get fixed. A data blending function allows for fine grained control over which vendor data sources to use – or when these are to be overwritten by Shell's own value-add data. The project launched in 2005 as a component of Shell's Epicure roll-out. A global team was established to steer CDS and share development. A live demo showed PowerExplorer accessing remote data in Houston. The results were efficient rather than sexy. Getting users on board was facilitated by 'making it look like Excel.'

Q&A

What about interpretations?

Picks are stored in the CDS.

And seismic horizons?

Not yet.

PowerExplorer is a powerful tool but may be too complex for G&G user.

Yes there are some issues – but canned workflows are attracting more users. Actually it's not more complex than ArcGIS.

Is there an audit trail?

² http://en.wikipedia.org/wiki/Kurt_Lewin.

³ European Petroleum Survey Group www.epsg.org.

⁴ Service oriented architecture.

Yes, in the CDS.

What about QC of well pick data and reference to a standard stratigraphy?

We are using the reference data manager to manage with pick names and well curve mnemonics. Pick names are hard to standardize.

TW0712_3 The Seismic Data Graveyard – Guy Holmes, SpectrumData

The seismic data graveyard of the title refers to data ‘trapped’ on legacy media. This represents an increasingly severe problem as legacy tape drives are jettisoned by IT departments. There is a lot of debate as to a probable move from tape to disk-based archival. But ‘this will not happen in my lifetime’ as much effort goes to tape R&D. Hardware and software technology changes can cause data loss. Tape brand is a key indicator of tape life. Memorex ‘puts up transcription job costs threefold!’

The future will be driven by acquisition companies. IBM is the key manufacturer. Holmes warns of the move from SCSI to Fiber Channel tape systems. This is shaping up to be a ‘right royal mess.’ Recommendations – buy good brand tape, record what you have on what tape, include software versions, understand a technology’s lifespan, keep auditing data, steer clear of new technologies that look like ‘giant floppy disks!’

TW0712_4 GIS-based HR management – Irina Tucker and Blake Blackwell, Chesapeake Energy

Chesapeake is the N°1 ‘hedger’⁵ in the US with \$1.3 billion gains in 2006. It is also the N° 1 driller in the US. This paper describes the migration of Chesapeake’s geoscientists’ role assignments and operational hierarchy from a plethora of Excel spreadsheets to a GIS-based information system. Chesapeake’s ‘Team Table’ now offers map-based management of teams, audit trails and historical data that shows how the company was organized in the past – offering interesting possibilities for correlating organizational strategy with the bottom line. Team Table applications include Hyperion System 9 master data management and ESRI GIS. Roles can cross operational hierarchy boundaries and can be overridden at any level. Other components include Google MyMaps⁶ web map app, and [GeoCortex](#), an ESRI add on.

Q&A

Does the system track what geologist was working where and when?

Yes – this is one of the main reasons for using master data management.

Is there a tie to geotechnical systems?

Yes I believe so, bringing in 3D seismic survey outlines etc.

TW0712_5 E-commerce well log management – Eileen Mahlow, XTO Energy

Volante’s Enerconnect⁷ transfer provides ‘Amazon-like’ search/shopping for log data with real time pricing of commercial data based on XTO’s Energy’s current contracts. Data can be transferred to Petra or loaded to PIDM. Log purchases are tracked and supervised. The development required matching across Enerconnect’s log data catalog and XTO Energy’s internal systems. The system now allows ‘self serve’ data purchase and minimizes repurchase.

Q&A

What data model is used? PPDM?

A proprietary model. PPDM is overkill for a catalog.

How do you manage vendors’ information?

Volant manages vendors’ catalogs in-house with a weekly download and cross reference with XTO’s data.

Will this be extended to more data types?

Yess this is under consideration.

And will you add GIS?

Yes.

⁵ Chesapeake’s hedging program ‘locks- in’ future natural gas prices.

⁶ <http://maps.google.com/>.

⁷ <http://www.volantsolutions.com/ECtransfer.htm>.

TW0712_6 International PetroBank project – Ivan Mischeef, Hydro

In 2004, Hydro needed better management of its international data with a common front end GIS view across seismic navigation and velocity data. This led to the development of Hydro's International PetroBank. This uses Landmark's PetroBank as the primary source of navigation and seismic data. This is the same solution as used in DISKOS with extensions required to solve the challenge of international geodetics. Data load was performed by Schumberger's SINAS unit and Norwegian GeoTjenester's TapeMaster⁸ tape library software. A rules-based operation merged data from TapeMaster, Finder and GeoFrame. The process was tracked using Documentum. The GIS view was useful in that it avoided the repurchase of a Russian dataset in 2005. Now that Hydro is merging with Statoil, the project's future is unclear.

Q&A

Is geodetic information converted when stored in PetroBank?

All data is converted and stored with the PetroBank datum.

So you loose the original data?

No, we also store the original data.

TW0712_7 Integrating G&G/D&P in a 'neutral' database – Dede Schwartz, ConocoPhillips

ConocoPhillips' Alaska (CPA) has integrated its geoscience, drilling and production processes into a 'neutral' Oracle database, the Alaska Technical Database (ATDB). The ATDB holds 7,900 wells (growing at around 100 wells per year) and acts as a single point of access and a control point for well identifiers. Schwartz described the unique identifier delivered and managed by the ATDB as a huge benefit in bringing different systems and applications together. Applications are 'not eternal' – but the ATDB allows CPA to retire systems and upgrade gracefully as new technology comes along. The ATDB offers essential functionality such as resolving data from horizontal wells that penetrate tops in multiple/reverse order.

Current applications that leverage the ATDB include OpenWorks, Geolog, Zmap and OFM. The ATDB is also integrated with drilling applications and directional survey data is distributed to well planning, reservoir analysis etc. Drilling KPI⁹ management is now migrating to ATDB. ESRI SDE and Exprodat's NitroView¹⁰ offer GIS-based data browsing. Well interaction studies are performed with ESRI ArcEditor. ATDB also acts as CPA's production data historian and as a hub for EMIS, Novistar, SAP and field data from SCADA, LIMS and field notes. The ATDB supports production and drilling performance optimization. The ATDB also houses value added data, which otherwise is often 'isolated and hard to integrate.' The secret of good data management is, 'Just say no to Excel!'

Q&A

What, if any, standard data model does the ATDB use?

The ATDB was initially loosely based on Finder.

How many people work on the ATDB?

The manpower required to maintain the ATDB is about 1.5 FTE (full time equivalents).

Who develops the links to the ATDB?

Data extraction is performed by 'the duct tape guy' whose Perl scripts 'can extract data from anything.'

TW0712_8 Well data delivery for Anadarko – John Pomeroy, Petris

An initial deployment of Petris' Recall well log data management package in 2003 was a success, but a large ongoing drilling program swamped the operator, compromising data quality. Data was being delivered piecemeal to multiple stakeholders and it was hard to ensure that digital data sets were clearly identified. Direct delivery to asset teams 'escaped' corporate data management.

Service companies now log onto Anadarko's website for the correct well identifier before uploading their data. Petris' solution rationalized and automated data delivery to a unified central source. A 'staging' database inside Anadarko's firewall receives raw data which is QC'd before reception in the OFDB¹¹ and the online corporate

⁸ www.geotjenester.no

⁹ Key performance indicator.

¹⁰ http://www.exprodat.com/downloads/products/NitroViewKeyFeatures_610.pdf.

¹¹ Recall original format data base.

Recall data store. Users are notified when new data is available (typically within 15 minutes of logging). Urgently needed data goes straight to user applications on demand.

Anadarko's 3 TB database now holds data from 300,000 wells and a million scanned films are registered. The Recall Autoloader was used to merge huge data sets from acquisitions. The solution is deemed SOX-compliant as acquisition artifacts are captured. 'Back door' data management (email, 'sneakernet'), has been eliminated and consistent naming implemented.

Q&A

How do you do survey data QC?

This is done in the well master database.

Where and when do you check location and API number?

This is done upfront and captured by the logging engineer.

Do you do interpretation in Recall?

Some but most is done in other applications.

Any issues with vendor image logs?

Yes – this is an age old problem – you can convert them to pdf.

TW0712_9 The risk assessment matrix – Duncan Stanners, Shell Canada

Shell Canada's first attempt to tame the IM 'elephant' was a 'complete failure.' The early Livelink EDMS implementation led to multiple repositories and copies of data. Users couldn't find their data and didn't know what was there. Shell's information specialists recognized the problem but were lacking a telling argument to sell an IM improvement project to management. With help from Flare Solutions consultant Alan Bayes, Stanners developed a 'risk assessment matrix' plotting the likelihood of an incident against the severity of the consequences. Rather than focusing on costs savings Shell looked at real events. In one oil sands project Shell failed to put the correct protocols in place governing its relationship with the engineering contractor, resulting in two truckloads of paper being delivered and 'costing millions to sort out!' The risk matrix persuaded management to devote \$4 million to solve the problem. A Shell analysis supported the IM framework, putting people first, then process, then tools. Shell also noted that one size does not fit all. IM support for a deepwater well is different from that required in a Peace River CBM development involving 200 identical, \$2 million wells. Flare's E&P Catalog, a hierarchical metadata repository, points to Livelink but in future, repositories will include Halliburton's OpenWells and OpenWorks. The key learning? Standard reference data is king!

Q&A

Devon – how do you align E&P systems with the well hierarchy?

This is built into the well delivery process. Well names may change, so you have to revise reference data. This is now being extended to reserves data updates.

How do you connect OpenWells and OpenWorks?

If we have a URL for a report it is easy to link to. If it is a dynamic report from the application it is harder – we've not tried yet.

TW0712_10 IM best practices – Haris Rahi, Landmark

Active archiving is or should be a critical component of upstream information management. Getting data off systems gives users more space for data. But archiving also expands the data volumes that need to be searched by users and applications. Backup windows are not growing. Users are arbitrating as to what not to back up¹². Archival removes data from the backup cycle and guarantees availability for future generations of users.

Which is all very well but, like broccoli, it's good for you but do you eat enough? Rahi suggests using a resource reporting tool to understand storage utilization, what content is where, how long since access and flag duplicate files, etc. Next implement active archive tiered storage strategy with a primary tier for production data and a second tier for archive. Enabling technologies include archiving software, content addressed storage and 'single instance storage' – eliminating duplicates.

Q&A

Will you be able to retrieve stuff 20 years from now?

¹² Note the distinction between backup and archive. Backup is for day to day changing data – stuff that might be needed immediately in the event of a power outage. Archival concerns longer term 'static' data storage.

We are looking at VMware as a solution to this issue¹³.

How do you manage versioning of a composite file such as a montage so you can tell when it has been changed?

This could be done with algorithmic discovery. There is technology for tamper proof files.

Is there user interaction for archival and cleanup?

Yes. People and process are key. This offering is not too hard a sell to most clients.

[TW0712_11 Web services and One Map – Carol Tessier, Pioneer](#)

Pioneer is betting on web services for data delivery. Users want to pull more and more disparate data together. G&G want to see engineering, financial, land etc. Expectations are growing, driven by Web 2.0 consumer mash ups and RSS feeds. In general, such composite use ‘has not been anticipated by vendors.’ In the past, interoperability was hampered by IT standards wars between COM, DCOM, CORBA etc. Today, a ‘universal adoption’ of web services means that there is ‘no longer any argument between Sun, Microsoft, SAP etc.’¹⁴

With help from IHS and Schlumberger, Pioneer is moving to data services, applications and portal-based data search. Web services mean that ‘the IT standards wars are over.’ The POSC/Energistics ‘meta catalog’ is the key to integration. This describes data schema in XML and was donated by Shell to the industry. This approach offers ‘more flexibility than a data warehouse.’ Pioneer’s One Map application (developed by Schlumberger) plugs into IHS Enerdeq and PI data as well as collecting data from Landmark’s TOW and Pioneer’s financial system. IHS is also looking for better ways to feed data into client application by blending public and private data and reduce distribution costs by consolidating data access mechanisms.

Pioneer’s ‘One Map’ application was developed by Schlumberger on ESRI GIS. This plugs into IHS’ PI Denver data, Enerdeq and other data sources. Pioneer is also working with Trango to integrate their seismic application as a web service. Autonomy search is also provided as a web service. Tessier suggested that more industry involvement in this activity would be beneficial, suggesting an independent third party to guide us as an industry. In other words, an ‘OASIS for oil and gas.’

[TW0712_12 Spatial data browsing – Clay Harter, OpenSpirit](#)

At the 2006 PNEC Harter introduced the concept of geo-mashups¹⁵ – mapping data from E&P repositories using Google Earth. This paper extended the concept to [NASA’s WorldWind](#) (an open source, cross platform Google Earth clone), [Microsoft Virtual Earth](#) and ESRI ArcGIS Explorer. Virtual Earth can ‘digest’ a location based news feed in [GeoRSS](#). Integration with OpenSpirit means that these tools can ‘listen’ for OS data selection events and display in map. An excellent movie showed the results from the magnificent Teapot Dome structure with well spots, seismic outlines etc. A typical mash up takes a couple of hours work with the Google Maps API.

Q&A

What about the accuracy of the resulting maps?

This is an unknown quantity. You can compare road positions with imagery. But you should definitely not locate a well on satellite imagery! Caution is required. ESRI is working on quality of service in geo data.

What about the performance of different platforms? It doesn’t take much to stop the Google Earth spinning!

Google Earth is pretty good for 1,000s of points, pipelines in GOM. ArcGIS Explorer doesn’t scale too well. None of these tools compete with desktop GIS. But they get better with new releases. They are OK for smaller data sets but you need to tune data served to map resolution.

[TW0712_13 Master Data Management - Hakan Sarbanoglu, Kalido](#)

Master data management is an old problem – applications need to share common data, business intelligence and analytics need consistent information. But common objects such as wells or pumps and valves are not always called the same thing in different systems. Master data management (MDM) therefore starts with a process of cleansing and harmonizing reference data to produce a ‘single version of the truth.’ MDM can be deployed in an

¹³ Probably by ‘cocooning’ applications and operating systems along with datasets.

¹⁴ That’ll be the day...

¹⁵ TW0608_11.

operational context, although it is cheaper and easier to deploy for analysis. Kalido's MDM for E&P offers companies a 'kick start' to their MDM initiatives with a 'simple subset' of PPDM delivered in Kalido.

TW0712_14 PPDM in a faceted taxonomy – Paul Haines, HP

PPDM Lite is now considered as a spatially-enabled data warehouse. This study investigated how the PPDM data model could be used to manage a facet-based taxonomy¹⁶. A facet-based taxonomy allows documents to be stored in one location, but viewed from multiple hierarchies. For instance a well final report may be 'located' in a field, company or license folder. The intent was to take the PPDM Lite table structure and map it to a faceted taxonomy. But this didn't work! Some PPDM Lite tables (seismic, well, fields, land, production and contract domains) can be 'shoehorned' into a faceted taxonomy. But key E&P facets of interest are not covered in PPDM Lite. PPDM 3.8 adds 'CLASS_%' tables which can be used to build an enterprise content management system. This may be considered for a future project.

Q&A

Why not use the taxonomy from Shell?

The Flare/Shell catalog is very detailed and has an acquisition focus. We wanted something simple but with broader scope.

TW0712_15 Panel discussion

Data quality means different things to different people – for instance if you are working in a three well basin in China, on a major offshore deepwater development or a 4th generation flood in the San Joachin basin. Data quality can be hard to define. Reference was made to the seminal work of the Minerals Management Data Management workgroup. A rather plaintive entreaty was made for others to engage in this sort of work with participation in PPDM and/or Energistics SIGS.

On the subject of 'location, location, location' there is a need to teach geodetics in college and GIS should be added to the SPE IT SIGs mandate. One major's large SDE database 'protects' users from geodetics – all data is loaded by data management.

One observer remarked that data management 'just isn't sexy' and that this community should engage in an 'outreach' program. One major observed that while employees were rotated around – this did not include data management. Perhaps data management 'backgrounders' for all would be a good idea.

TW0712_16 Well data change tracking and QC system – David Ning Li, Saudi Aramco

For Saudi Aramco's well data management group (part of the Exploration Data Management Division - EDMD), data quality is a 'big issue.' Data from diverse sources goes into an in-house developed Master Well Database. A complete audit trail of well data changes (who did it, when, why...) is supported. When data is flagged as 'good,' the process is kicked off to populate projects. Quality controlled data is exported to GeoFrame, OpenWorks and Geolog projects by EDMD. Weekly stats provide quality metrics for management.

Q&A

What tools are used to push data to OpenWorks etc.?

We use our own scripts for OpenWorks? It is a bit harder populating the other applications. We also have developed custom rules for QC and how synch is performed.

How many wells in the database? Do you use Oracle streams for change track/alert?

We currently monitor 40 active wells. We don't use streams, we have developed our own tracking.

How many wells in the database?

70.

TW0712_17 Production surveillance database – Brian Richardson, RasGas Qatar

Qatari LNG exporter RasGas' production surveillance database began life when a project failed because a vendor failed to 'provide the goods.' RasGas then decided on an in-house development with help from The Information Store (iStore)¹⁷. iStore leveraged the OSIsoft PI API to turn 'somewhat incomprehensible' raw PI Historian files into something that was 'understandable for users'. PL/SQL is used to perform various calculations and populate live tables. PI data now streams into Oracle tables with overnight UOM conversions etc. The system has replaced

¹⁶ See for instance, <http://nasataxonomy.jpl.nasa.gov/faq.htm>.

¹⁷ www.istore.com.

multiple Excel spreadsheets, introduced standard units and achieved a complex aggregation of tag information. RasGas is now planning ‘date-effective’ tag management for historical analysis. The system models objects such as well, platform, pipe and slug catcher with standard units and supports complex aggregation of tag information. The next step in the project is to address high frequency data with upwards of 5,000 tags per minute with optimized code for inserts to the Oracle database. More use of Dynamic SQL is planned for date-effective tag management for history and a GUI is in development for meta data, model maintenance and process scheduling.

Q&A

What tools do you use to read the PI Historian data?

iStore has tools to read from the PI API.

TW0712_18 KM in software and data management – David Smith, Halliburton

Knowledge management (KM) is about, inter alia, ‘finding somebody to talk to.’ Halliburton’s Knowledge Central system provides KM for training and new hire ‘onboarding’ via threaded conversations monitored by knowledge brokers. Hal added 12,000 employees in 2006 and will add another 13,000 in 2007 when almost half the workforces will have less than 2 years experience. Previously it took, on average, 14 months for a professional to become self sufficient. Smith’s team was told ‘make it 9 months’. Moreover, management wants new hires to ‘work like 30-year employees.’ This is to be achieved through knowledge management. For example, new hires are afraid to initiate a discussion. Old timers know how to use the computer and can initiate a knowledge sharing exercise. KM helped Halliburton with its SAP upgrade. Halliburton has built its own collaboration tool and tested it with the above KM discussions. One community covers Landmark’s drilling and consulting, another handles OpenWorks R5000. FAQs are ‘very new’ and are being rolled-out for selected customers.

Q&A

Do you monitor activity?

Yes, discussions are monitored by knowledge brokers who are also key to keeping communities alive.

TW0712_19 Technology Watch subscription information

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