

ESRI¹ Petroleum Users' Group²



Sedgwick & Associates' georeferenced video service

Introduction

Numbers were up at the 2005 ESRI Petroleum User Group (PUG), with about 950 registered. The PUG focuses on what's new in ESRI's Geographical Information Systems (GIS). We spotted four themes at the PUG, not all new. What makes them important though, is the various stages of corporate take-up, and the different degrees of readiness of the software for real-world deployment.

Theme one, **live GIS data**, dates back a couple of years, but much of ESRI's clients' data (perhaps a majority in oil and gas) is stored and manipulated in 'dumb' Shapefiles. Some majors (notably Shell) are making moves towards corporate deployment of 'smart' SDE-based data stores. But these are not helped by a wide range of third party legacy applications which, although they may have 'ESRI inside,' are likely only able to spit out their geo-data in Shapefiles. The pipeline industry seems to be ahead of E&P, most pipeline software vendors seem to be able to manage data in SDE and some can even handle GIS reference streaming media (see above).

Theme two, **3D**, is likewise as old as the (3D) hills. But the absence of true 3D (as opposed to the 'extruded' shapes 2½D that ESRI currently offers) has led to the creation of a 3D PUG Working Group which is to thrust ESRI into the 3D world. It should then be possible to view and manipulate a Petrel or other 3D model from inside ArcGIS. The stated intent is 'not to rebuild a Petrel in ESRI.' But in our opinion, few in the ESRI PUG community would complain if something like this actually happened!

Theme three is of course, **Web Services**. Here ESRI is re-aligning its early ArcIMS web support with the new Web Services paradigm. For the time being, this appears to be a predominantly Microsoft .NET-based offering, but ESRI stated that the Java community is 'very important' to ESRI and assured that there would be better support for non-Microsoft environments in the future.

Finally, although it does not merit 'theme' status, the issue of **interoperability**, with third party applications, CAD and other GIS systems, is omnipresent. Here Open Spirit Corp. has found a niche in GIS—treating GIS as a CORBA-based service. Safe Software

¹ [ESRI](#) is not a listed company, but claims over \$ 500 million sales, generated by its 3,200 employees. Current revenue growth is running at around 10%/year.

² Some presentations are available on the [ESRI PUG 20005](#) website.

offers a competing solution which seems to have more support from ESRI—where SAFE’s FME is branded as ‘ESRI ArcGIS Interoperability Extensions’. Not the snappiest name—but it does say what it is.

Highlights

- [Shell’s GIS architecture](#)
- [3D Working Group](#)
- [ANGEL gas leak detection](#)
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Keynotes – Clint Brown and John Calkins, ESRI



Brown

Clint Brown believes that GIS has moved ‘from skepticism to converge with mainstream geography’. Brown recapped the ‘five pillars of geo knowledge’ – geodata sets, data models, process/workflow, maps and globes, and metadata – stressing the importance of the latter for documentation and cataloguing. ESRI’s map layers paradigm makes it possible to build high level cartographic objects e.g. for pipeline high consequence analysis (HCA), or to display multi sensor data such as LIDAR. Increasingly, GIS data needs to be managed as business data – including transactions.

GIS is big business. The city of Houston spends around \$100 million on GIS. GIS is the ‘crown jewels’ of petroleum data and can now ‘reach out’ across the organization for data, compute power and web-based services (a.k.a. ‘business logic’). ‘Emerging’ GIS deployment model is through a central Portal and Metadata Catalog (c.f. Shell’s metadata server). In 10 years ‘pervasive’ computing will offer 100 times today’s compute capacity and 1,000 times storage and perhaps 5,000 times network capacity with Tera bps networks. ArcGIS to go on the Austin supercomputing center (Dell cluster).

New ESRI technologies include an [ArcGIS 9.1](#) desktop ‘swipe tool’ for paging between different datasets for change detection and a cute 3D view (of Lincoln’s Inn Fields in London) for publishing ArcGlobe documents. The web services-based ArcGIS Server unifies ArcGIS, ArcIMS and ArcSDE, lets users create complex, dynamic maps which can be served to remote web clients via SOAP/XML. ArcGIS Server should help companies integrate software environments although it currently only supports the Microsoft .NET framework. Brown insisted that ‘web services are in the mainstream of ESRI development’—even though they are currently ‘a bit shaky’. Microsoft Visual Studio 2003 was described as ‘fragile.’ Popup killers present a danger for web services and performance varies. ESRI is testing integration with SAP’s NetWeaver platform.

A demonstration video showed how ArcGIS could be deployed at a gas call center. A Trouble Ticket Responder is initiated when someone smells gas and maps customers, locates a field engineer and sends SMS. [Geodatabase XML](#) is key to multi-mode GIS data delivery.

A new [ESRI Developer Network](#) subscription is available offering all ESRI products and development tools for a modest subscription.



Calkins

John Calkins (ESRI) offered a GIS fireworks display analyzing satellite imagery over what was presented as a ‘nuclear fuel enrichment facility’ at Natanz, Iran³. QuickBird satellite data shows ‘fortification, air defenses and buildings being buried’. Calkins (an ex-geologist) showed how geoprocessing was used to ‘explore’ for similar facilities, taking account of constraints such as proximity of roads, distance from centers of population and especially, earthquakes. The latter led to Calkin’s ‘aha! moment’ as the reason for the Natanz site became evident. Metadata can be attached to buildings and can refer to specific points in time. Time variant data in ArcMap was used to ‘replay’ the history of construction. Calkin suggested this could be leveraged in oil and gas exploration for competitor analysis. Data ‘quality’ can be captured as metadata and indicated by a pop-up. Metadata can track what is known and ‘where there be dragons’.

Odd bits and pieces data can be incorporated using the ArcGIS data interoperability extension from SAFE software (see below) to read in text file and produce latitude, longitude. Also used PDF, ‘The most interoperable map format in the world’, distributed with ArcReader. The Natanz study finished with a fly through video of a Predator mission developed using the AGI/STK UAV ‘SOAP⁴’ mission planner. The study, which took 5 weeks, was performed with publicly available data.

Another somewhat off-topic demo showed the use of Network Analyst 9.1 to model Washington DC’s sidewalks, roads, and one-way systems that change direction at rush hour. This provides rules based driving or walking directions between locations and delivery routing – a variant of the traveling salesman problem.

Corporate GIS – Gregory Schutz, ChevronTexaco

Gregory Schutz showed how pervasive GIS has become in ChevronTexaco (CTC). From plate tectonic reconstruction, through competitor analysis, seismic well and pipeline planning to retail market location of service stations. Other applications have included wind turbine location and IT systems planning following the Chevron Texaco merger (an ArcIMS website showed all the joint IT resources before and during rationalization). In California, a spill response database contains ‘bio-resources’ expert contact information.

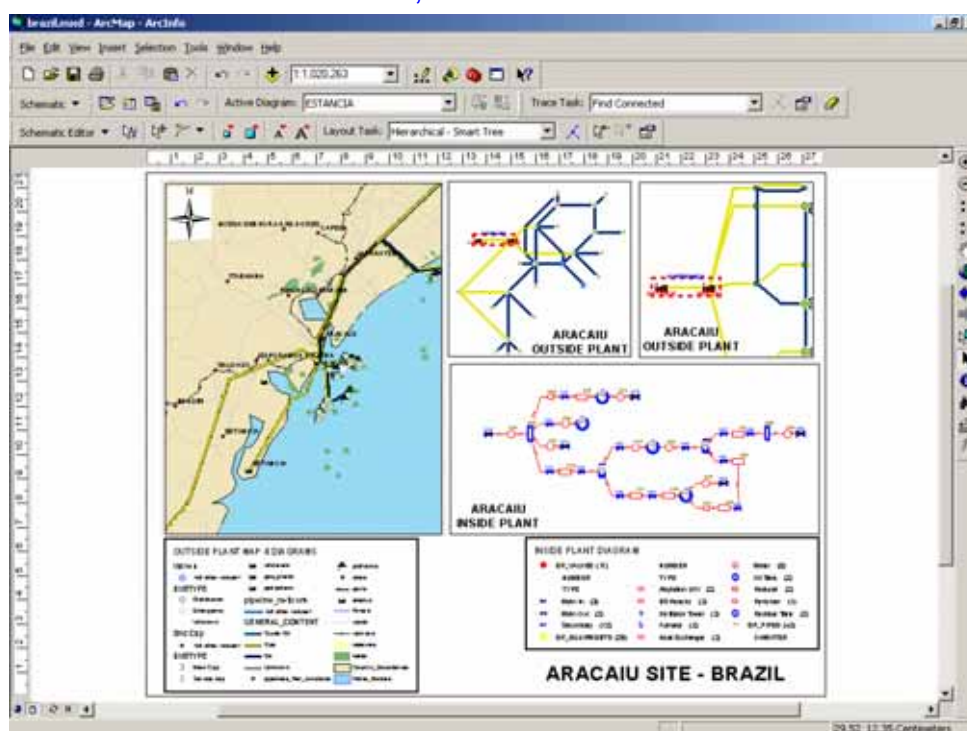
One intriguing application involves CTC’s 50,000 strong tanker truck fleet. The truck’s tachometer is coupled to a real time GIS/GPS route tracking system and can be used to observe excessive braking or acceleration. Such information can be used to coach driver behavior or, in extremis, a supervisor can call the cops and hit a button that slows

³ *One has to take all this with a pinch of salt. A couple of years back, Calkins presented ‘Intel’ from Baghdad that purported to support military action in Iraq.*

⁴ *Soft SOAP perhaps?*

the truck down to 5-10 mph! Potential anti-terrorist legislation may require this. For truly global GIS, datum management is the key. CTC's vision is for all data in single database image, enabled by SDE. But the reality is that GIS 'is one small part of G&G applications.' CTC's Internet Decision Support Integrated data environment (iDeSIDE) offers unstructured document access via MetaCarta, ArcMap and Spotfire Decision Site. The ISA's A2Z Bridge connects to Z-Map to offer hi-end contour in a 'user friendly' GIS. Also ran, CTC's supply chain optimization, asset disposal *à la* IndigoPool and refinery shut-down, where 'full disclosure is important'.

ArcGIS Schematics : Patrick Dolemieux, ESRI



ArcGIS Schematics

Dolemieux's demo showed ArcGIS schematics used to build 'data driven networks.' Various views of the Brazilian pipeline network above help understand the network either through a schematic view, or re-arranged with one plant as the root of a tree. All helped by relating features to the map view.

High Consequence Area demo – Jeff Archer, ESRI

Archer showed how ArcMap and ArcInfo can be used to calculate a 'PIC⁵ footprint' and leverage an address notification system to mail shot households in the vicinity. The software linked to a list of addresses in Crystal Reports and the [GeoZone web service](#). A GeoInfo method publishes a 'serialized print' that anyone can use (although it looked like binary rubbish!) and generates maps and driving directions to the location for emergency services. A dynamic map is embedded into Crystal Report showing current status.

GeoSpatial 'One Stop' Architecture – John Calkins, ESRI

Earlier this year, ESRI won a \$2.4 million contract from the Federal Government for the revamp of its Geospatial One Stop Portal. The ESRI solution leverages IBM's

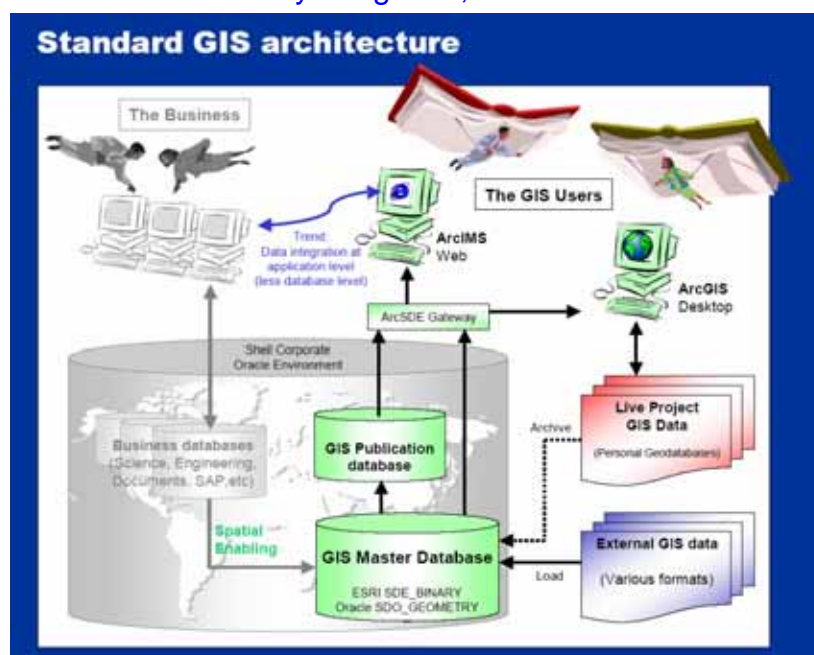
⁵ Potential Impact Circle.

WebSphere Portal, the [JSR 168 Portlet](#) specification, WMS, WFS/GML and the Open GIS Consortium's [Open Location Services Gazetteer](#). A spatially enabled version of the Google Search Appliance also ran. A moment of humor occurred as Calkins announced 'This is our vision,' and a '404 – Page not found' appeared on the screen. Calkins muttered, 'I'm really tired of doing web services demos!' A visit to www.geodata.gov lets you Google for 'aeromagnetic' on the metadata. Most people don't search with pan-zoom and prefer the Google approach. A search for 'Denver' plus 'flood' – the system returns 'do you mean flood in spatial extent of Denver Colorado, or Denver, Florida?' Also turn around and use Google search to locate spatial data in geodata.gov from google.com⁶.

What's next? – Clint Brown, ESRI

Plans are afoot to 'make the **desktop** easier and more fun,' to introduce '**intelligent cartography**' and editing with 'human artistry,' working on time-based data and scientific data analysis with batch geo-processing. A **new Geodatabase** is in the offing – a file-based geodatabase which will be 'faster than Shapefiles, much more scalable and which will ease updates, replication and synchronization'. **Smart client** technology will be developed for both .NET and Java environments. A new **ArcGIS for Java** will be deployable as J2EE beans along with a developers guide and documentation. 'This community is very important for ESRI.'

Shell's Standard GIS Architecture – Thierry Gregorius, Shell



Shell's Global GIS deployment

Thierry Gregorius presented Shell's global enterprise rollout of ArcGIS 9—under a 'groundbreaking agreement' with ESRI. Gregorius recommends such a deal, involving centralized support, bypassing local ESRI representatives, for companies with a 'few hundred' users. For Shell, GIS is the 'Swiss army knife' of the energy business. Each regional office has a GIS master database with binary data in SDE, and geometry in Oracle SDO. Project environments leverage the ESRI Personal GeoDatabase to offer

⁶ An interesting development here is Google's acquisition of www.keyhole.com. This company offers a pretty compelling browser based view of satellite data à la Arc Globe.

live GIS data at the desktop. The Shell Portal gives ‘seamless’ web-based text search for any GIS feature. Users click on a feature and a keyword is passed all ‘Google’ tools available.

A ‘sophisticated’ support model is being rolled out, linked to Shell’s global, 7x24 IT help desk. Asked how GIS could be improved, Gregorius requested, ‘No more bugs please!’ According to ‘a study,’ GIS produces some of the most bug-ridden software of any industry. Gregorius observed that while Portals are great, ArcGIS cartography and high quality paper maps remain ‘core business’ to Shell. Metadata and catalogs make predictable and reliable retrieval of relevant data. Top GIS issues for Shell include integration with Petrel, SAP, coordinate integrity across the subsurface application workflow, and gridding with geological faults.

Shell has developed around 100 ArcGIS extensions (too many according to Gregorius). The worldwide deployment involves Shell’s three hubs in Houston, Amsterdam and Kuala Lumpur. Connectivity in The Netherlands is 10GBps, between the EU and US is 1 – 2Gbps, with the rest of the world, under 1Gbps. Software rationalization has brought Shell’s application count down from 7,000 in 2003 to an anticipated 2,000 in 2007. Each regional office will have a GIS master database with binary data stored in ESRI SDE and geometry stored in Oracle SDO. ‘Live’ project data is loaded to a Personal GeoDatabase for desktop use. This provides ‘tight data integration’ at the application level.

Q&A

If you could change one thing in GIS, what would it be?

No more bugs please! The GIS industry produces some of the most bug-ridden software of any industry. Paradoxically, today there are too many bug fixes in Arc9, too ‘fast and furious.’ Shell can’t roll out all fixes. Some bring new issues such as raster datum transformation – which ‘used to work in 8.3’. Shell’s office in Syria has the least technical issues. In fact it has none at all, because US export controls stop bleeding edge technology from getting in? But ESRI is now to produce less new stuff and to ‘make it better’.

Global enterprise deployment can be dangerous – faster screw-ups. Also – to educate users MXDs with hundreds of layers from 50 servers is not a good idea!

What is your interoperability solution? Open Spirit, ArcGIS Interoperability Extension?

There are indeed two camps. Geodetic coordination integration remains a critical issue across applications. ArcGIS custom datum validation plug-in was developed by Shell and Woodside. This checks that data information exists and is in a pre-approved list. Standards are slowly making it, e.g. APDM.

Portals are great but ArcGIS cartography and high quality paper maps are still core business.

Metadata and catalogs make retrieval predictable, reliable and relevant.

GIS Workflows in OMV - Achim Kamelger

Following its acquisition of Roumanian oil company Petrom last year, Vienna-based OMV now has 65,000 employees. OMV’s GIS projects are of a similar scope to CTC above and depend on consistent attribute names in layer files and SQL queries to build useful maps. OMV stores its GIS data in a geodatabase on an SDE server and is ‘trying to eliminate Shapefiles’. Problems include the fact that not all mapping applications can plug in to the SDE server, locking of the personal geodatabase and user management

(hard to synchronize with LDAP, Active Directory). OMV's MIS system gets production data from the field and serves maps and pie charts over ArcIMS 'an excellent front end for management.' Future developments will include metadata enhancements and links to Petrel, GeoFrame, OpenWorks, Eclipse and Petrosys. Open Spirit will likely be a key component of the solution. OMV's GIS is also moving mid/downstream.

[Pipeline Data Management - Shawn Hansson, Shell Oil Products](#)

Shell Oil Products is using pipeline data management to support risk and integrity assessment in its Equilon joint venture with Texaco (pre the Chevron merger). Much impetus for the work came from the US DOT risk management program which mandated inspection programs that matched local conditions and also led to consequence modeling. With help from Geofields, Shell uses GIS analytically in its risk assessment program. This is scheduled to last four years and will cover 10,000 pipeline miles and over 100 terminals. Project Luminon, SOP's SAP implementation, included enterprise GIS development to meet NPMS (national pipe mapping system) requirements. SOP has produced Risk Assessment Data Sheets (RADS) for its 10,000 mile pipeline network and 100+ terminals. In 2004, a corporate 'U turn' led to a vast amount of the pipeline business being sold off. But GIS carried on as 'essential to integrity management.'

[Web Services - Brad Taggart, Petroweb](#)

Taggart is enthusiastic about web services in ArcGIS server. Service oriented architecture (SOA) is not new, previously there were DCOM and CORBA. But these have been 'eclipsed' by web services. ArcGIS 9 provides new SOA technology leveraging UDDI (a Microsoft and IBM standard). 'Try www.uddi.org and enter ESRI⁷'. Web services are platform neutral and 'easier to develop' than DCOM. The downside is performance, 'your mileage may vary.' Taggart suggests that if all you need is to put a map on a web page, then use ArcIMS. But ArcGIS Server provides the whole functionality of ArcObjects including geocoding and geoprocessing over the web. Current Petroweb projects include an area of interest (AOI) application which kicks off proximity searches across multiple databases. Subsequently, web services monitor events occurring within the AOI and notify users when new data arrives. Taggart also cited the [Whitestar elevation service](#) which returns digital elevations from a terrain model server and ex DEM. The State of Texas online [T4 Permitting service](#) was also cited.

[3D working group – Brian Boulmay, Shell](#)

The 3D working group is attempting to help move ESRI technology into the 3D modeling field – recognizing that it would be unwise to 're-create Petrel in ESRI'. The ESRI user community would like to be able to drop a Petrel (or other geoscience) model into a future 'voxel-enabled' 3D ESRI product. Shell and others consider the lack of true 3D functionality in ArcGIS as 'the main roadblock' on ESRI's further progress in the oil industry. Today, ESRI's products support only 2 ½ D – i.e. they can model simple, vertically extruded shapes like buildings. Current thinking is that ESRI will not hold the master copy of a 3D model. Linkage could be via Open Spirit, Petrosys tools or using ESRI/Safe Software's ArcGIS Data Interop plug-in. Boulmay described Shell's workflows as 'huge processes' involving spatializing OpenWorks data, loading to ArcScene and archiving in SDE. The possibility of Landmark and

⁷ We tried – and got nothing!

Schlumberger storing data in SDE was raised, but it would seem that ‘neither want to store data in a proprietary [ESRI] data model.’ Hence the desire for an ‘open’ 3D model. The working group’s goal is to ‘influence ESRI’s future development, not to create solutions’.

For Boulmay, 3D GIS could be defined as the ability to perform any Analyst function in 3D. Shell, and others in the industry are pushing for the ability to drop a Petrel model into a voxel-enabled 3D ESRI. In previous meetings, ESRI brought in a 3D software vendor [nGrain](#), for discussions along the lines of extending ArcGIS to include gridding and contouring and Shell met with ESRI to discuss gridding and contouring. Here, ESRI recognizes inadequacies and is ‘ready to make improvements’. For Boulmay – these are exciting developments – but ‘they may take years to realize.’ 3D visualization requirements include the ability to visualize 3D ‘without excessive import-export,’ with minimal interpolation, to 3D GIS spatial queries, to handle skewed and irregular grids and for better integration with the subsurface portfolio. Boulmay notes that ‘ESRI will never be the master.’ Petrel, or whatever, will always have the master copy of data. One solution would be to have a public data model for 3D that vendors write to, or an Open Spirit type connection.

Q&A - discussion

How about POSC RESCUE as a data model?

RESCUE would be a lowest common denominator. Petrel can hold 20 attributes.

Shell expounded on a typically complex well bore workflow. Data in OW is spatialized via ArcScene and stored in SDE. This is ‘a huge process that needs to be simplified’.

Other options include a review of Safe Software and Open Spirit’s interoperability offerings and ‘leaning on’ Landmark and Schlumberger to support 3D data to GIS

Why don’t Landmark and Schlumberger store data in SDE?

Neither wants to store its data in a proprietary (ESRI) data model. This is why the Working Group wants an open model. [Petrosys](#) is ‘doing a great job’ offering read/write to SDE. ‘They would make a good target for an acquisition!’ Landmark was less interested in this functionality although Safe is now working on ZMAP interoperability tools.

[\[Zolnai\]](#) Spatial PPDM is inherently 3D.

The 3D Working Group wants to steer clear of re-creating a modeling package. An open, freely available data model is required with direct read and supporting faults, complex grids, skewed, irregular cells and folded surfaces.

A challenge is the resistance to using GIS in the subsurface. ‘We need to avoid stepping on toes’. ‘The goal is to influence ESRI future development not to create a solution.’

Gas Leak Detection, [Darryl Murdock](#), ITT Industries

Visual Basic and ESRI tools were used to develop ‘ANGEL’, an airborne leak inspection system. Twin data streams allow for plane routing and targeting of sensors. Tortuosity parameters and ‘wifferdils’ tune the flight path. An extended ArcGIS tool bar allows for post flight data analysis, with videos linked to maps of pipe routes. Leaks are detected using a Laser by measuring minute changes in ground reflectivity. Software performs methane visualization, spatial filtering and anomaly ‘book marking’.

The [ENVI Rasterization](#) tool (developed by RSI in Boulder) was used to view anomalies and set detection thresholds to look for other leaks with similar sensor signatures. The US DOT sponsored a test at the Rocky Mountain Test center over a simulated, leaky pipeline.

3D GIS – Tracy Thorleifson, Eagle Information Mapping

Thorleifson showed a 3D interpretation of the Green Canyon ‘Bullwinkle’ field. Seismic contours and salt body geometry were converted into a ‘multipatch’⁸ and viewed in ArcGlobe 3D. Block boundaries were plotted at sea level, or draped over the sea bed. It has the aspect of a true modeling tool like Roxar’s Irap–RMS but is short of true 3D analysis and integration/editing tools. Another demo showed an onshore HCA⁹ pipeline study. A 3D analysis merged topography and pipeline route to check valve positions re hydraulic head and risk analysis.

The OCS Connect Project : [Eddy Krumholz](#), [Booz Allen Hamilton](#)

The US Minerals Management Service’s Offshore Continental Shelf Connect project is bringing e-business to the MMS’ activity in the field of lease management, environment, G&G reviews etc. Current tools deployed include Plumtree, SiteMinder, WebLogic, Apache, Documentum and eRoom. This infrastructure is to migrate to a new system which will be built around Schlumberger’s Decision Point (with add-ons from ESRI, Crystal Reports + e-signatures and BPM workflow). Schlumberger’s Finder is to be replaced by the new Seabed database.

World energy products’ (WEP) portal – [Chris Skinner](#), USGS

The energy program of USGS studies oil, gas, coal resources and assesses reserve potential 30 years out. 200 basins have been studied and results are provided free over the web. The USGS current website ‘falls short’ because of static html and high maintenance. Hence the move to ESRI’s ArcIMS–based metadata server. Users can search for 1,500 products by location or geologic province with results ranked on spatial relevance. The USGS website is built around a Metadata Server, an ArcIMS–based document catalog based and a framework for application development. Includes publications, documents, graphics and multi-media – as well as GIS. A gazetteer of place names is available. Metadata creation was ‘very time consuming’. It was necessary to create new XML metadata from extant bibliographic database. The FDGC metadata clearing house was used. The downside of metadata is that it is hard to ensure consistency in the document-based solutions, and spatial search can be slow. The ‘new improved’ WEP homepage is at <http://certmapper.cr.usgs.gov/rooms/we/index.jsp>, the energy program homepage, <http://energy.usgs.gov>.

The ESRI PUG List

ESRI users requested support for standard MetaData and or Dublin Core with some spatial attributes. A simple solution using XML stylesheets for editing is needed. Other List topics include 3D, Geodetics and integrating third party databases with the geodatabase and Pipeline. Shell’s global support deal got a lot of interest. The Shell ‘Assist Desk’ uses ‘[Primus](#)’ for Knowledge capture and to create ‘how to’ documents – described as a ‘very exciting’ tool. The change to global support avoids regional

⁸ 3D Shapefiles.

⁹ High Consequence Area.

sales/franchises. Clint Brown noted the relationship with Shell as ESRI's first international support deal, ESRI was previously reliant on strong local presence. Brown also announced that ESRI was putting its bug reporting system on line, with notification as bug tracks through system (applause). Internally, ESRI uses Clear Quest and Star Team source code control system. Scott Hills reported strong support for the 'third party data integration' issue and asked if, 'Web services are the only way forward?' Brown relied, 'No, this can be done on a case by case basis. By building a bridge to say ER Mapper. Although a 'configuration approach' would be preferable. The trouble is that most third party products 'come from the SQL world', the geodatabase is 'unknown territory'. Finally, the addition of a double precision coordinates data type was met with strong applause from a few.

Vidar Andresen, Innerlogix

Wellogix defines poor data quality through a variety of metrics such as non-unique well ids, inconsistent, out-of-sync data stores, inaccurate (poor geodetics etc.) and 'not fit for use' (poor naming conventions). A 'DMAGIC¹⁰' process is used for QC and general process improvement. QC Rules are stored in a straightforward (and rather simplistic) XML format and allow for minimal constraints on attributes.

Q&A

These are all 'hard' metrics – what about 'soft' data quality issues?

No answer yet – we are working on this.

IHS Energy, Tor Neilsen

There are many initiatives in Web services and XML-based standards. The field is in a 'state of flux'. IHS Energy's earlier 'Lonetree' initiative used ArcIMS. This is migrating to SOAP web services and is now called 'Enerdeq'. The ASCII plain text of a SOAP request makes it easy to figure what's going on. The XML Schema defines both request and response. There are also schemas for reports, graphs etc.

The Digital Pipeline – Robert Maggio, Petris Technology

Maggio traced the history of pipeline IT from the 1980s – with paper alignment sheets in drawers to the 1990s – with SCADA automation and GIS and on to the 2000 with automated one-call processing and field data recording to pipeline databases. Current issues include regulatory compliance, integration etc. Questions like, 'What happened on my pipeline yesterday?' may be how to answer. Pipeline databases are now mainstream providing an enterprise-wide system to support the 'digital pipeline'. The pipeline database is a 'live creature', feeds on data. While there are 'lots of tools for this and that,' data destinations need planning. The trick is to combine applications with the database to build automated systems for maintenance etc.

Tobin Land Suite – Veer Surapaneni, P2ES

This paper showed the application of ArcGIS 9 in Land – where multiple GIS data sets need to be accessed. ESRI is a *sine qua non* of Land because data management – especially SDE. Tobin has operations in 10 countries where SDE is used. Data sharing is especially through Shape Files – everyone reads shape files. Can go to next level – talk to SDE database. Analysis is wizard-based, can move to one central repository. The demo of Zapata country Texas showed t data sets, turning on/off and zooming, context sensitive display of image data. Production data can be accessed from foreign

¹⁰ Define, measure, analyze, group, improve, control.

database – or from anything configured by administration. Quite a tour de force in data drill-down from map. Map of the Gulf of Mexico showed the 100 mph tunnel of hurricane from Impact Weather (supplied as Shape File).

LiDAR – Mark Wagaman, Veritas

Veritas uses a combination of Light Detection and Ranging, LiDAR, and GPS to map ground covering prior to acquiring a seismic survey. Reflections from both tree tops and the ground gives ground and a vegetation profile. This is data and processing intensive. The output grid is imported as a raster to the Spatial Analyst or 3D analyst. Hill shading is used to study relief. Radio Frequency shadow zones are used to study radio communications. A Digital Terrain Model is created from Arc Scene and a fly through – a ‘very expensive video game!’ Seismic use of LiDAR to plan and calibrate between vibrator and dynamite shooting. Compared LiDAR heights with GPS – differences under canopy. Veritas performed 3 elevation surveys to check – which agreed with LiDAR. The GPS was wrong under the trees. DEM slope analysis was used for conformance with BLM restrictions on operation vehicle (slopes < 14%). Also moved ‘expensive’ points to a cheaper location with considerable savings.

Spatial Data Management – Jon Stigant, Devon Energy

According to Stigant, mapping is a ‘core competency’ for Devon Energy, the largest US independent. Stigant is a proselytizer for doing it right – ‘if you don’t manage datums etc., you have a small chance of getting things right’. For example, a 4000’ difference in boundary location. Such errors happen all the time. In Devon alone, Stigant estimates around 200 geodetic data busts occurred in the last year. One ‘worst case’ double conversion error resulted in 350 meters error and \$300 million dry hole. All applications are prone to such problems – Open Works, Finder, GeoFrame, Geographix, Kingdom Suite, Trango, Probe, Petra Epos, Open Spirit etc. Most E&P applications have retrofitted spatial capabilities to legacy applications. These are ‘kludges’ and are very vulnerable. One involved a 500 m shift in seismic datum resulting in a bad transformation and put the well in the wrong place.

In drilling there is a different culture and vocabulary, but the same scary tales. Stigant puts it very strongly ‘nobody is doing this right – this is a terrible indictment of how we manage spatial data.’ One directional survey bust resulted in a target off by 520’. Other problems occur in the pipeline business where geoid and terrain may mean you don’t know which way is up!

Part of the trouble comes with distributed/desktop IT. Today, everybody is a cartographer – but no one is trained. Companies should ask, ‘Who is minding your spatial data store?’ Audit data whenever you can – clean pre-lease cheap data. Audit interpretation systems. Send surveyors to the rig to QC deviation surveys and MWD. Audit software – including ESRI – they did not start out doing this – problems remain especially coordination conversion.

What makes these problems hard to address is that they cross function boundaries. Companies should have ‘corporate’ level responsibility for spatial data management.

Q&A

What’s the largest error you’ve seen from a bad datum ?

850 m.

Interviews

Charles Fried, BP and ESRI PUG

What do you see as important in GIS today?

At the PUG you can see a lot of activity in pipelines. The US pipeline regulations are now having a significant effect on operators. GIS in exploration and development is also picking up.

We see a move from ‘dumb’ Shapefiles to live data on maps – where is BP in this?

It’s a mixed bag – we have more live data – or layers are updated monthly. It is still an acceptable strategy to update Shapefiles on a regular basis. BP is a highly decentralized organization. I’m trying to find out what’s going on myself! BP’s GIS specialists are meeting in parallel with the PUG. We have a Pipeline initiative for HCA, information and maintenance. I’m also pleased with upstream take-up – there is a lot going on. Half of BP’s top ten GIS users are geoscientists. ESRI is a great integration tool. It fills a role that Landmark does not.

Doesn’t Landmark embed ESRI tools in its software?

Yes and no. OpenExplorer embeds ArcView 3.2. This is 5 year old, Shapefile based technology that has not evolved. It is good at supplying Shapefiles to other applications. In contrast, Schlumberger’s Finder is spatially enabled with SDE. Landmark hasn’t really ‘got it’.

What about 3D in ESRI – isn’t a tool like GoCad more suited to this?

How far along the Shell road of corporate GIS is BP?

We are some way along the road, but we don’t have a global initiative although there is a push to standardize on Arc9.

And what about web services and .NET etc.

We are not doing this. This needs a top down approach to IT infrastructure. Houston’s server is ‘on its own’. We don’t have ArcIMS.

What are your current GIS projects?

I see GIS as a part of the move away from Microsoft Excel-based decision support. GIS is the equivalent of Microsoft Office for mapping. With ArcMap and ArcCatalog, ESRI has really got it as far as metadata is concerned – and also with regard to ‘mix and match’ projections on the fly for the Gulf of Mexico. You can drop data in one CRS¹¹ in feet onto a metric map in a different CRS. This saves on data maintenance. Our geoscientists are now publishing metadata along with map layers. They have ‘seen the light’. The map can be parked as a Shapefile on the server – there will be more SDE usage in the future. Today we use MXD files, a map document comprising a layer and defining rendering etc. This points to data in Shape, SDE & Microstation CAD. CAD documents can be CRS savvy too. ESRI has built a great integration platform that works and is getting serious about 3D.

Another project involved the development of a risk mapping system – part of a standard way of evaluating prospect risk. We tried using the geoprocessing capabilities of Spatial Analyst, but this didn’t work so we ended doing our own development with Arc Objects.

When will we see 3D seismics in ESRI?

¹¹ Coordinate reference system.

Not for a while yet: But this is where the debate is going. The current 2½D offering has a lot missing. The 3D Working Group is contributing a lot to ESRI here.

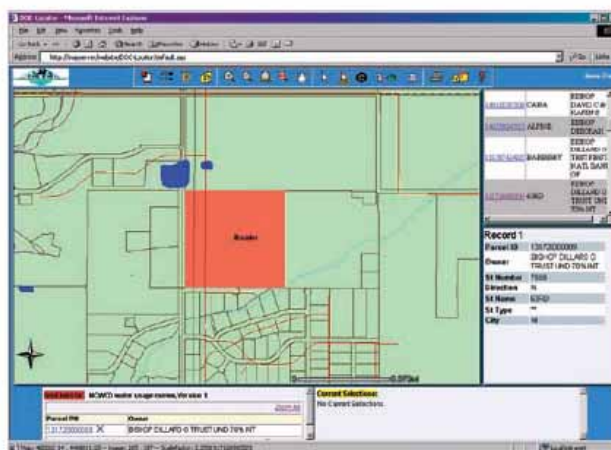
Hugh Ritchie, Hummingbird

Hummingbird is bringing together the world of documents and GIS, leveraging spatial relationships for information discovery and decision support. In most organizations, information about an asset such as a well, pipeline or facility is spread across multiple departments. The legal department manages contracts, engineers assets and maintenance. By tying everything to a map, companies remove the need for lawyers to learn engineering vocabulary to access asset information. Common locations remove boundaries, bringing space and content together.

DMS used to be a ‘tactical’ decision. But as records managers shifted to management information systems, others got interested in this approach. This has elevated GIS and DMS to the cross departmental, strategic level. Users have visibility of other departments’ information, e.g. engineers access ‘as built’ and right of way contract information. From up to date maps and drawings. Executives see this and say it needs to be ‘owned’ not just managed.

Technology leveraged in oil and gas contexts includes COTS Hummingbird document management and ESRI. Rules-based workflows include Outlook routing e-mail according to metadata content to different repositories. A ‘lifecycle document management link’ to the GIS ‘makes content visible to the organization’ and supplies an audit trail.

Partner [Farragut Systems](#)’ DOC-Locator ‘brings the pieces together.’ Farragut has worked with Ricoh on GPS-enabled cameras which allow for map plots showing where photos were taken. This could be used on wells, pipes and rights of way.



Farragut’s DOC-Locator

More from <http://www.hummingbird.com/solutions/business/gis.html>

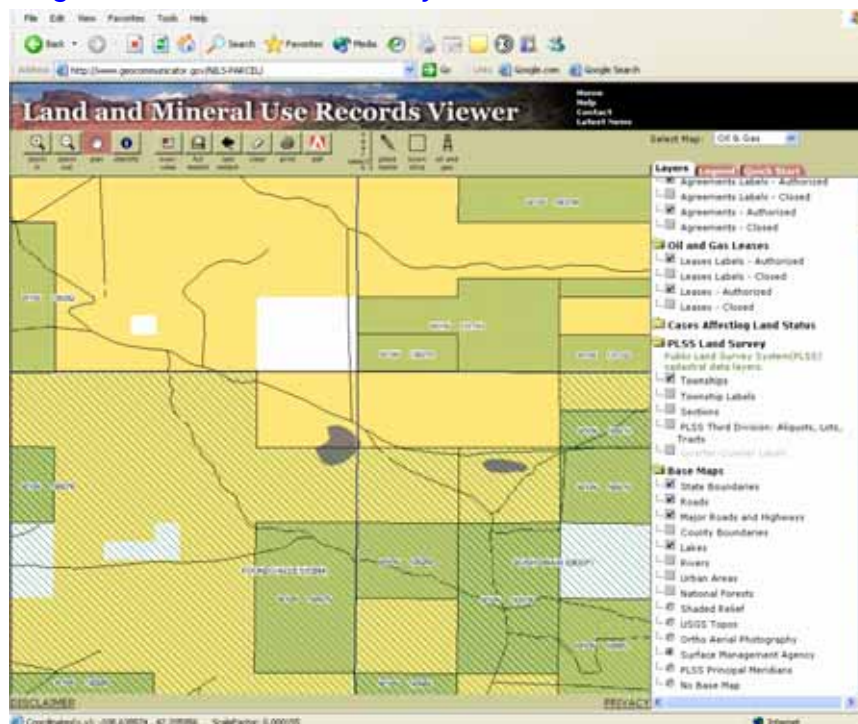
Exhibitors

Blue Sky Software

Blue Sky Software markets PODS Manager and ISAT Manager along with Loaders for these and in-house operators’ databases with automated processes. This keeps data current – a key for compliance issues. There used to be a six month lag in data loading. Blue Sky’s flagship is AlignDB, which generates alignment sheets from live data in

AutoCad, MicroStation and Arc GIS. Blue Sky uses ‘seed files’ to assure adherence to company standards. Blue Sky is watching the APDM model closely. While a move to APDS is generally anticipated, today 80% of clients use PODS, although El Paso’s huge pipeline mileage means that its ISAT model dominates in managed miles. More generally, 70% PODS, 25% ISAT and 5% proprietary. Today ESRI’s APDM is ISAT-based (MJ Harden/GE). There may be a PODS geodatabase solution soon...

Bureau of Land Management – National Land System.



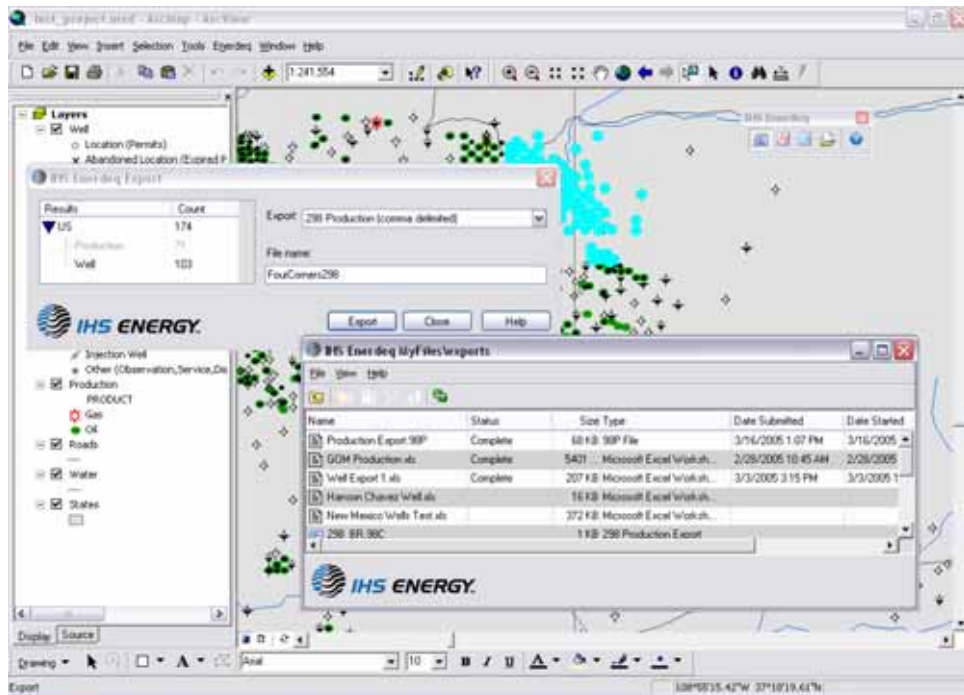
BLM's GeoCommunicator showing Oil & Gas lease and Agreement parcels

BLM [Geocommunicator](http://www.geocommunicator.gov) is a website for distribution of spatial data from the US [National Integrated Land System](http://www.blm.gov) (NILS). Offers Land Survey Information and land records. Leslie Cone – leslie_cone@blm.gov.

GE Energy Oil and Gas

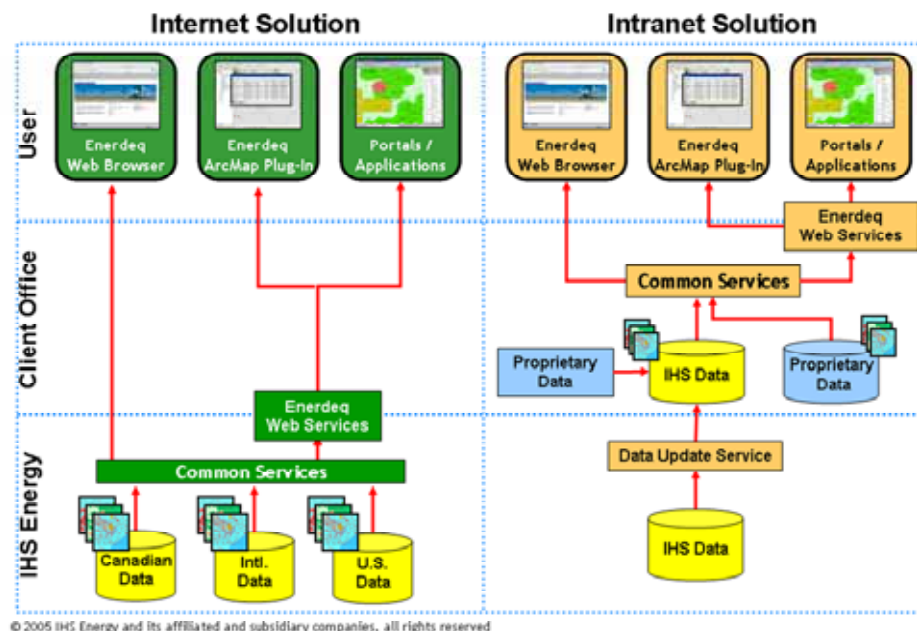
Release 2.0 of [GE Pipeline](http://www.apdm.net)'s (formerly MJ Harden) PipeView for Arc GIS promises support for the ESRI APDM. More from www.apdm.net and the new [APDM Charter](http://www.apdm.net). GE Energy's take on APDM is that the ESRI geodatabase model was developed 'from PODS and ISAT' so that users can leverage ESRI tools out of the box for maintenance.

IHS Energy's new 'Enerdeq' map browser



IHS Enerdeq

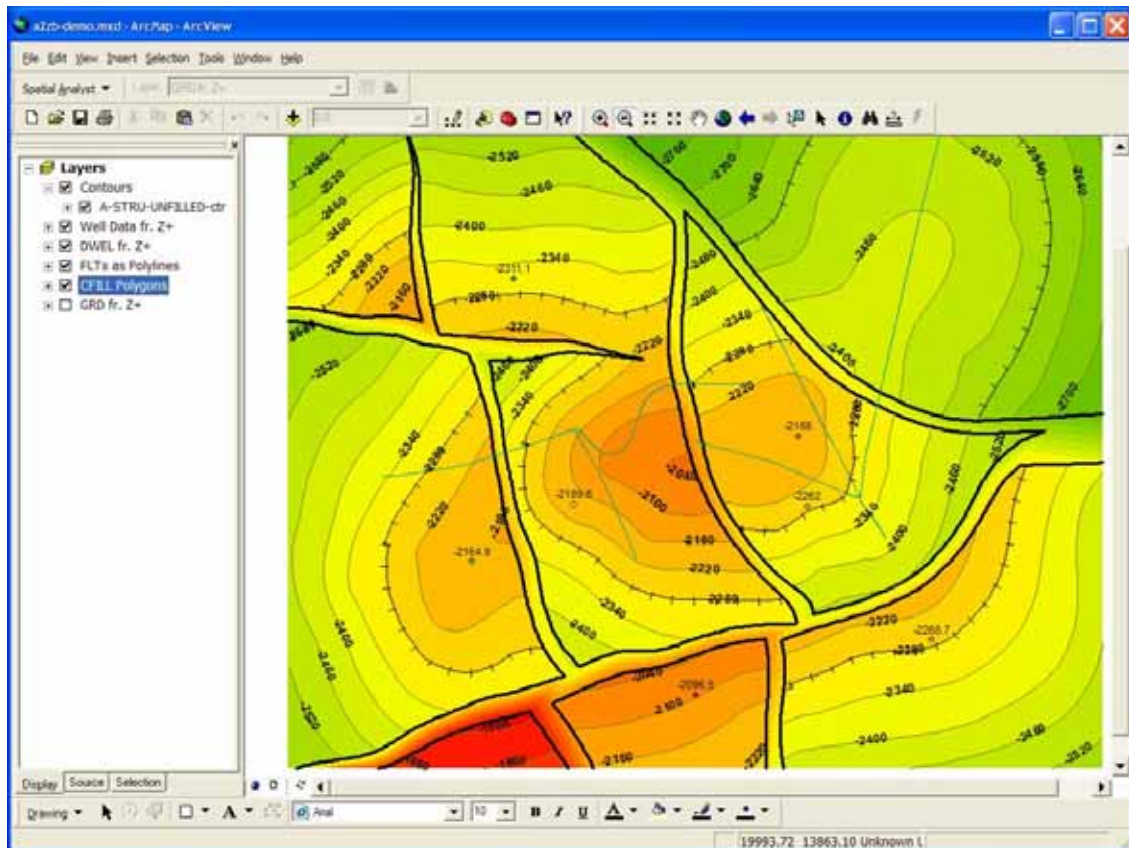
IHS' Enerdeq delivers content from IHS through a variety of access methods. The Enerdeq browser allows for features selection and query via a map interface, a text-based query, or a combination of both. Data can be browsed as listings, reports graphs or exported. Both ArcMap extensions or Web services are supported for integration with proprietary and third-party systems.



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Enerdeq deployment options

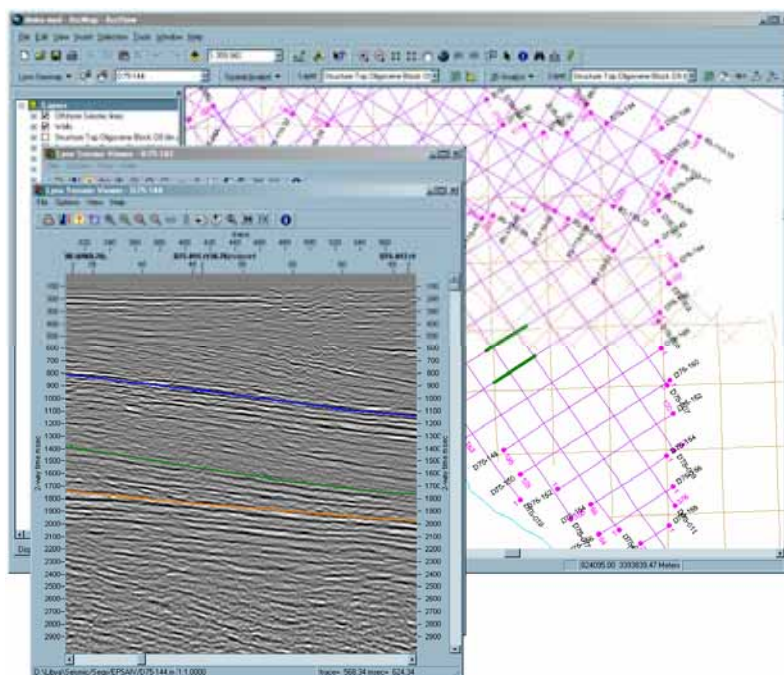
ISA A2Z Bridge – bidirectional link from ZMap to ESRI



A2Z Bridge – data from ZMap in ArcMap

ISA Americas' A2Z bridge can import ZMap grid and contour data, well and seismics into ESRI Shapefiles, MFDs or ZGFs, etc. New workflows include OpenWorks data to ESRI and SeisWorks horizons. Also new is a 'SZ Connect' product that links Paradigm Geo's [SeisX](#) 4.0 to Landmark's ZMap Plus. More from info at isaamericas.com.

Lynx Seismic Viewer



Lynx' Seismic Viewer

Lynx' [Seismap](#), a seismic viewer extension for ArcMap, displays seismics and current shotpoint range in map view. Surfaces can be overlaid on the seismic profile as horizons and faults. The viewer allows control over display scales, various display options and full-scale printing.

Open Spirit – Bart Stafford

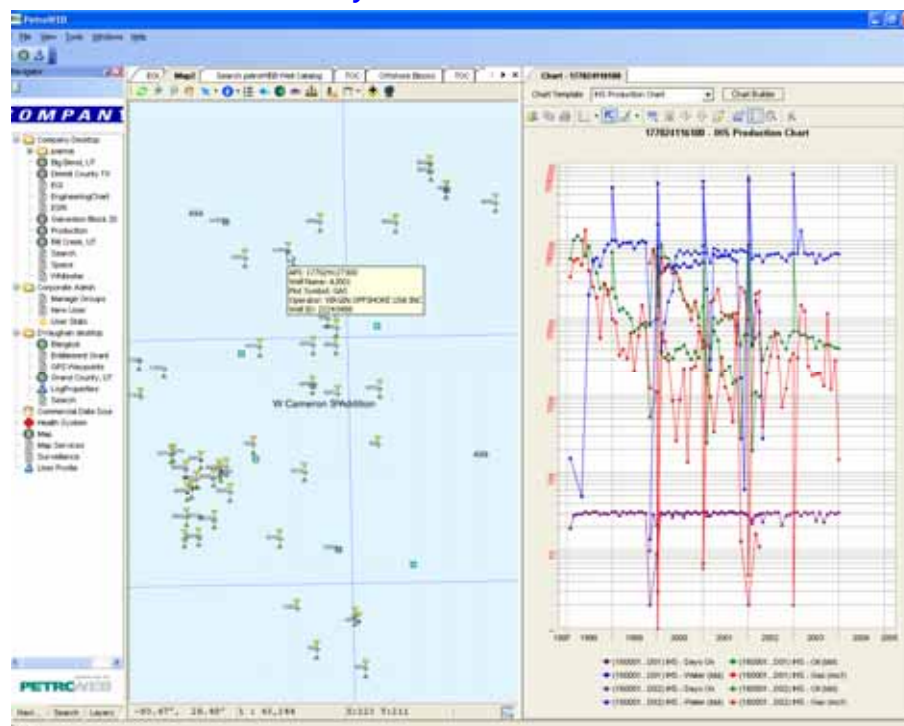
Open Spirit Corp is working with Roxar on an Arc SDE server under Roxar's SARP contract with Statoil. The generic SDE server for cultural and (maybe) well data will allow any OS client to read from an SDE data store. Roxar is also working on OS-enabling Irap-RMS. Landmark is also understood to be working on an Open Spirit link to allow Geoprobe to access of data in other OS applications. Open Spirit is also working on a prototype of an OS web services 'consumer'.

Open Spirit Corp. – GIS Integration Utilities

These are ArcView extension, Scan utility and SDE option for scan utility. The AV extension sends Open Spirit cursor location, data selection and GIS feature selection events to other OS enabled applications. Scan scans online projects to collect GIS Features as Shapefiles or S-enabled features. SDE option puts this data straight into spatial layers in an SDE database.

Pennwell MapSearch

Pipeline database – used by oil and gas companies to evaluate deals and acreage. New – Mexico and Middle East databases. Note no relation to PennPoint. Contact Ted Miranda.

Petroweb's new Microsoft .NET Gateway*Petroweb's .NET-based Gateway smart client*

Petroweb released its 'Gateway' Microsoft .NET-based Enterprise. Gateway supplies over 800 oil and gas map layers from some 50 different vendors. Corporate internal GIS architecture can blend in-house map data with external sources such as the Geography Network and ESRI ArcWeb Services.

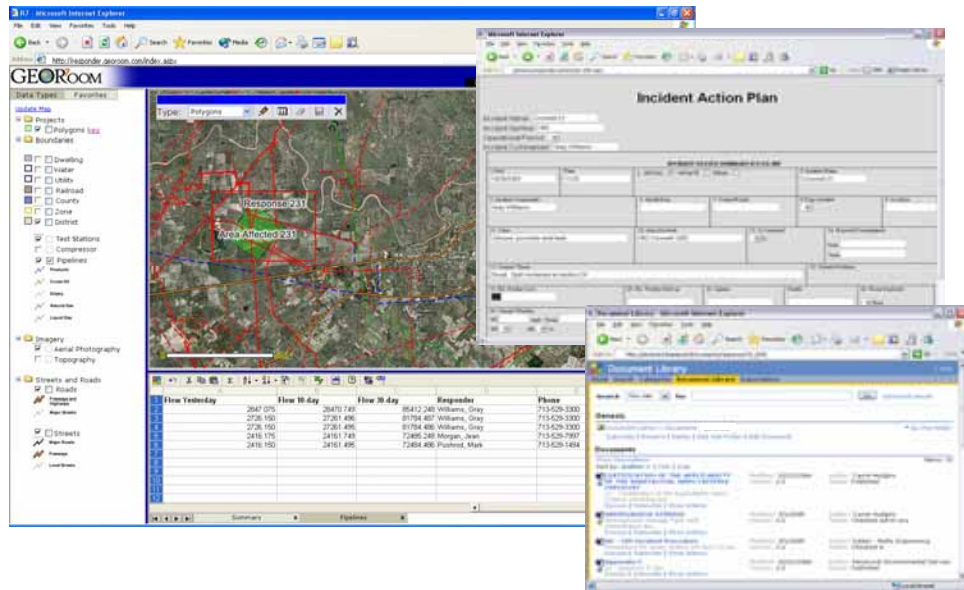
ArcIMS and ArcGIS Server are supported as is the ArcGIS Data Interoperability extension. The ArcSDE API, and ArcObjects utilities are 'orchestrated' to ensure availability and currency of ArcSDE data. Petroweb Gateway support application integration – third party developers are developing plug-ins for OpenWorks, GeoFrame and others. Petroweb also released an ArcIMS Plotting module at the PUG.

PPDM – Trudy Curtis, Kirk Cameron

The pipeline open data standard, PODS and the Public Petroleum Data model association, PPDM, shared a booth at the PUG. We will be attending the joint PODS/PPDM data management conference in Houston shortly and will be reporting on these initiatives in a later Technology Watch report. Meanwhile, we observe that PPDM and POSC are working on connectivity between the two data models and the PPDM 'Lite' data model which is not itself 'spatial' will have its own ESRI personal geodatabase version – real soon now. There are also Postgres and PostGIS versions of PPDM Lite on the PPDM website.

In the context of pipeline data models, the ESRI Arc Pipeline Data Model (APDM) has stolen some of the thunder from the standards organizations. Our understanding of the state of play of pipeline data modeling is that at one level, the APDM is a spatialization of the open, PODS data model. Another opinion expressed was that APDM comes more from the MJ Harden ISAT data model – and that PODS is 'GIS-neutral'. APDM is arguably a doubly proprietary data model because of its affiliation to both MJ Harden and ESRI.

R7 Solutions' GeoRoom GIS data browser



R7Solutions' GeoRoom

R7Solutions' GeoRoom incorporates data from diverse sources in a web-based GIS interface. Map layers, non-spatial databases, documents, workflow tools can be combined with analytical tools. More from Bryan Hassin (bhassin at r7solutions.com) and www.r7solutions.com.

Red Hen Systems – Digital Video in ArcGIS

Provides random access to digital video – uses COTS video hardware. ArcMap index layer contains flight path which is tied to video frames. Allows for added rich multimedia content – and ad hoc attributes. Used by BP Pipelines and Duke Energy for gas leak detection. David Wright www.redhensystems.com.

SAFE Software

FME for ArcGIS – Format Pack for ArcGIS Data Interoperability. FME Suite can be used as middleware à la OS. Offers 4,000 geodetic systems including EPSG-approved conversions.

Sedgwick & Associates



Geo-referenced Video services

Sedgwick & Associates offers aerial photography and video for the pipeline industry. Geo-referenced video links to a moving map for computer visualization. Navigating the video is achieved by clicking on the GPS Index track on the moving map. Video freeze frames can be captured, used in reports or e-mailed to team members. Offered as a stand alone system or as an extension to existing ESRI ArcGIS system. More from Ken McBee (sapgis at sbcglobal.net) and www.sedgwickassociates.com.

Spescom Software – eB Pipeline

Pipeline integrity management software. Integrated with EAM (Maximo, Indus), CAD (AutoCad, Microstation) and ESRI. More from www.spescomsoftware.com and info-us at spescom.com.

ESRI Press

[Designing Geodatabases](#) – Case Studies in GIS Data Modeling, David Arctur.

[Connecting our World](#) – GIS Web Services – Winnie Tang.

[GIS and Land Records](#) – The Arc GIS Parcel Data Model.

[ESRI Online GIS Dictionary](#).

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