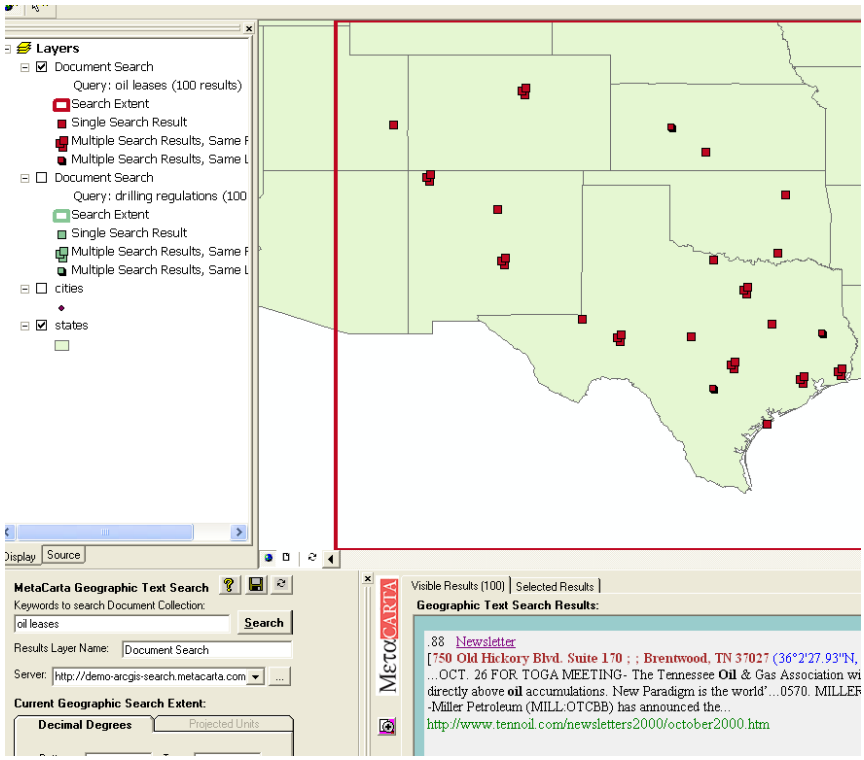
2003 ESRI Petroleum User Group

10th - 12th March 2003 – Houston



MetaCarta – from text to GIS and back again! – courtesy MetaCarta

Introduction

The 2003 ESRI Petroleum Users Group (PUG) was well attended - around 600 signed up for the Houston meet. ESRI's Geographical Information Systems (GIS) dominate upstream software and are making inroads into the midstream segment. The PUG steering committee includes representatives from five super majors and the main software vendors. This year, the PUG was graced by ESRI founder and President Jack Dangermond whose keynote address ranged from ESRI's successes with the US military and homeland security to a litany of oil and gas specific deployments. But Dangermond's favorite pitch is to the development community – and here there is something for everybody. ESRI software is migrating to componentized **web-services** infrastructure and is being offered in three flavors. For the Microsoft crowd – the **.NET** environment is king. For the **Sun/Java** brigade another spectrum of services is on offer – but interestingly for a major tool vendor, ESRI also supports 'generic' **open source** web services. ESRI functionality is leaping (not creeping) into new spatial domains with network topology **schematics**, **geoprocessing** and 3D – particularly with the spectacular **ArcGlobe**. Our star of the show award however, goes to a third party product **MetaCarta** which intelligently couples GIS and text search. ArcView-ArcGIS migration is a hot topic. **GIS data integration** is a popular route to datavisualization with a plethora of offerings from PetroWeb, R7 Solutions, Exprodat etc. IHS Energy made a particularly insightful presentation describing a novel deployment of the Open Source MySQL database. Company presentations from Shell and ConocoPhillips Alaska described major corporate GIS deployments, while ExxonMobil warned of weakness in the way GIS software exposes datum transformations. On the vendor front, pipeline software is moving beyond the all-purpose alignment sheet to occupy niches such as Tuboscope's pig inspection GIS, PBSJ's corridor constraint analysis and others.

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Introduction – Charles Fried, BP Amoco

The ESRI Petroleum User Group (PUG) is growing with 600 pre-registered and 50 vendor exhibitors. GIS is also growing in importance – Arc 8 is a 'wonderful tool' and today there is plentiful GIS data available. ESRI was founded in 1969 by Jack Dangermond. It remains today a privately-held company with 'user-focus' and has successfully avoided being 'seduced' – either by excessive science or the stock market.

Keynote Address – Jack Dangermond, president and CEO ESRI

The role of GIS is growing – driven by a science-based approach to decision making and problem solving in industry. Influences as diverse as a rising oil price, infrastructure vulnerability, pipeline regulations and IT standards are forcing widespread adoption of GIS. In the oil industry Dangermond cited Statoil (ESRI user for 10 years), Petrobras (Brazilian E&P National Data Store) BP Baku-Tbilisi-Ceyhan pipeline, Shell's 3D Analyst for subsurface and reservoir visualization, Tobin's coupling of disparate GIS and tabular data, Landmark's auto-generated contours etc. etc[1]. The Commercial Joint Mapping Toolkit - new digital mapping tools for the military commander to visualize the battlespace – has been 'an enormous influence on our directions'.

In ESRI 9x we will be focusing on Web Services, distributed GIS, process modeling, cartographic databasing, temporal (time-based) GIS and 3D GIS visualization. With ArcObjects all tools will be available at 'object level'. Arc 9.x will redeploy ArcObjects in two new environments – ArcGIS and ArcObjects. Dangermond refers to a standards-based environment allowing for loosely-coupled integration with enterprise GIS. As an example, a flight line may come from one data server, and weather from another – different servers, different refresh rates etc. In Arc 8x the focus is on 'making maps' – in Arc 9x you will be building applications using services. Dangermond cited the David Rumsey Map & Globe Collection[2] as being a good example of what could be achieved through meta data catalogues. ESRI will offer support for web services in three fashions – in Java (IBM/Sun), .NET (Microsoft) and for generic, open source-based environments[3]. With web services, vendors 'don't talk to each other, they talk to a protocol'. Another innovation in Arc 9.x is support for '**long transactions'** – i.e. the ability to disconnect a part of the GIS dataset – to take it into the field for data edit – and to repatriate the changes in a consistent and conflict-free manner. **Topology** is now stored as rules in the geodatabase (rather than explicitly) and software checks data against rules (determining for instance the relationship between county and state shared boundaries – and tested on the massive US TIGER census data set). Very large **raster** datasets can now be stored in the geodatabase and ESRI has been working with BAE and ERDAS on feature extraction. The advent of massive amounts of LIDAR data has led to extensions for terrain mapping with Triangulated Irregular Networks[4] (TIN). These raster datasets will also benefit from the new scriptable **geoprocessing** tools built into 9.0. These tools will allow for the computation of parameters such as remoteness index – or to perform ER-Mapper type functions. A new **schematic** option (incorporating technology from French startup NetGraph) allows for the extraction and manipulation of network schematic topologies along with a GIS view of feature locations. **Temporal** modeling will provide time variant representations for SCADA and control rooms.

[1] Dangermond listed a dozen or so examples of oil industry GIS – examples drawn from exhibiting vendor's software portfolios.
[2] This uses Telemorphic's Maplicity, a 'lightweight Java applet designed to work with ArcIMS Image Services'.
[3] For those interested, see Wrox's new book Professional Open Source Web Services.
[4] See for instance the US DOT LIDAR/TIN White Paper.

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Dangermond noted that GIS is moving into the enterprise[5] – and that the future for ESRI lies in standards-based GIS 'no more Shape files'. Web Services are at the heart of ESRI's future offering which promises greatly increased functionality.

ArcGlobe 3D GIS

A dramatic highlight followed Dangermond's presentation with a demonstration of ESRI's ArcGlobe – a 'whizz-bang' application designed to offer stylish demonstrations of 3D GIS data in the boardroom.

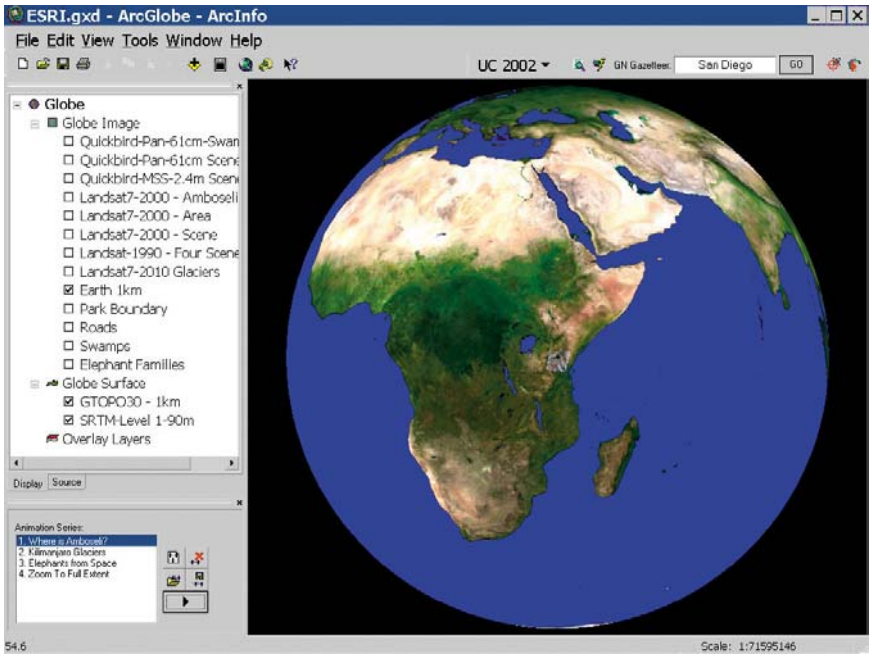

Figure 1 ArcGlobe - courtesy ESRI

Starting from a view from space (here the software resembles Space2Face from Ikonos) you can display – in the usual ESRI fashion – various themes – satellite imagery, roads, cloud cover etc. A geographical region can be selected from a gazetteer, targeted and zoomed in on. But the innovation of ArcGlobe is that the viewpoint can then seamlessly change from vertical to fly through of a digital terrain model. A great toy!

ESRI product line – an introduction[6]

ESRI's product line is vast and confusing. At different times during the keynotes we heard top-level descriptions of the product line – for clarity we have grouped them together here in an attempt to demystify ESRI's offering. First thing to know about ESRI is that the whole product line has undergone a revolutionary change in the move from version 3 to version 8 or in other words from ArcView to ArcGIS. The old data exchange format – the shapefile – has been replaced with the Geodatabase. The scripting language, Avenue has been replaced with Visual Basic. Another key component of ESRI's toolkit is SDE which is a way of extending the tabular database (eg Oracle) to hold geographic information. All this leads to bewilderingly complicated infrastructures and deployment. Spatial data may be stored in a corporate Oracle database – with an SDE layer managing access. Elsewhere, departmental geodatabases may replicate corporate GIS data and add on more granular tabular data. Finally at the desktop, corporate, departmental and third-party, external data sources may be merged

[5] Dangermond spends some time lecturing to MBA programs on the virtues of GIS – get 'em young!
[6] This is an attempt at a description of ESRI's tools – there is overlap and we remain confused as to what does what. The product line is reminiscent of the service and tariff complexity practiced by the phone companies!

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into a single map view. Note that the current version of ESRI's product line is 8.3 – the 9.x release claims yet another radical re-vamp of GIS functionality.

Desktop/Web

ESRI offers scalable GIS for a variety of desktop users. The free **ArcReader** is the 'Acrobat Reader' of the GIS world. Increasing functionality is available from **ArcView** while more serious GIS data editing is available from **ArcEdit**. The top of the range **ArcInfo** offers full-blown GIS data manipulation and management.

Server/Infrastructure

ArcGIS is described as infrastructure for geographical info-systems. While **ArcSDE** 'manages large multi-user geographic datasets' – by moving GIS data into the database, Arc Internet Map Server – **ArcIMS** provides 'thin client[7]' maps over the web.

ESRI Technology review and plans – Clint Brown

Brown believes that the command line interface remains important to the GIS professional. So too are standards and Open Systems. ESRI now offers support for the ISO SQL/MM[8] sss multi media (text, spatial and image SQL) standard and the OpenGIS Simple Feature model. Brown observed that database blobs support is now good and fast enough for image incorporation.
A demo of ArcMap 8.3 showed how anomalies detected in pig surveys could be correlated with the grade of steel used in the pipe. Another functionality – **error rules** – shows where boundary conditions (for state or license contiguity for instance) are violated – allowing for zoom in and edit.
A 'persistent state model' in ArcSDE allows for '**long transactions'** – you can unplug a piece of the database for edit, then check it back in. **Check-out/check-in** is available in 8.3 – in 9.1 this will be extended to allow for tiered replication of subsets of the data. A demo showed a geologist checking out a map and editing it in the field. Note that such edits are recorded as versions of the data and can be rolled-back.
Patrick Dolemieux (who sold his NetGraph startup to ESRI last year) showed how spatial information in the geodatabase can be viewed in both map and **schematic** (see below) forms. Network topologies such as pipelines can be visualized in the schematic with click-through to tabular data on features such as pipes and valves from the schematic.

[7] Internet Browser.
[8] See for instance http://www.acm.org/sigmod/record/issues/0112/standards.pdf - but most of these references are rather old?

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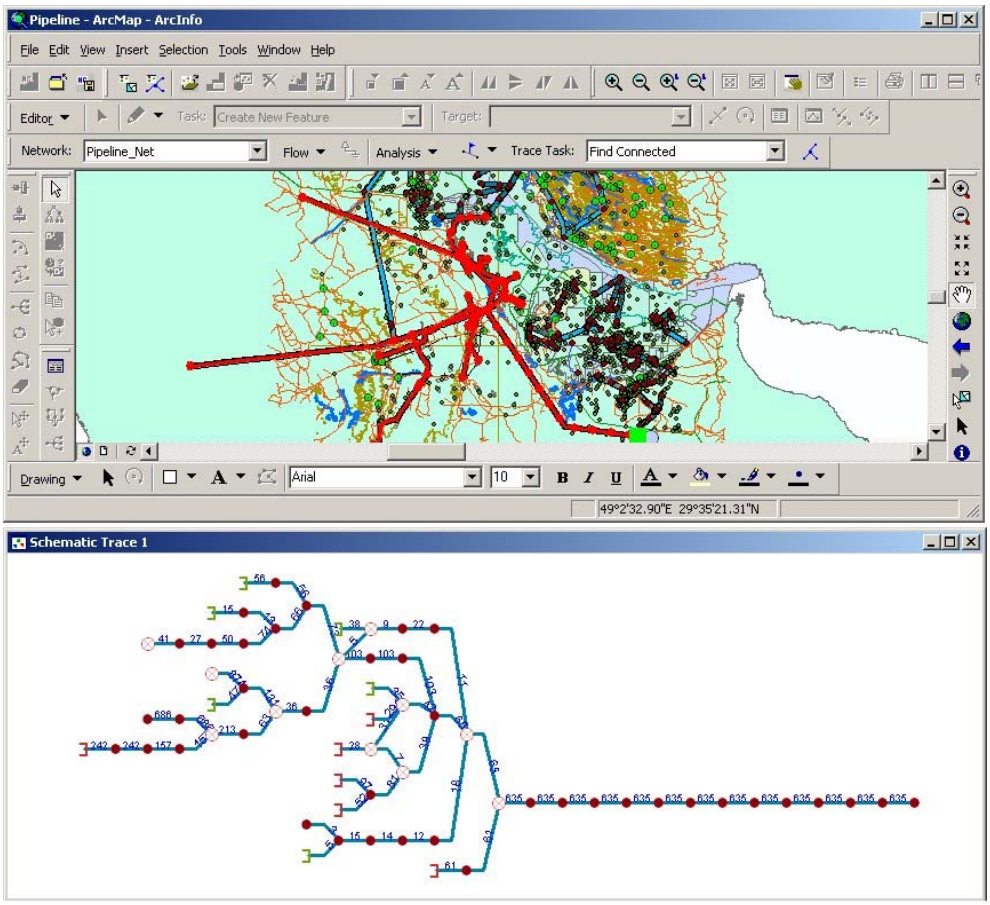

Figure 2 ESRI's Schematic - courtesy ESRI

Geoprocessing – John Caulkin, ESRI

Caulkin showed how raster maps of reservoir properties can be integrated intelligently with GIS and used for geoprocessing. Analysis suggested a complex predictive relationship between porosity and proximity to a fault. The relationship can be stored as rules – allowing for subsequent re-use. A rules network shows progress during geoprocessing – and recomputation after a change in input data is only performed where necessary.

Map Objects for Java

Map Objects for Java is written in 'pure' cross platform Java and is compatible with BEA WebLogic, IBM WebSphere and Open Source JBoss.

ArcGIS Pipeline Data Model

Last year we reported on the controversy behind the competing pipeline data models emanating from the PODS and ISAT organizations. The second model comes mostly from the MJ Harden company, while the PODS grouping is a competing development. Both models continue to exist and develop independently. When it comes to GIS enablement though, ISAT pulled off something of a coup with the announcement of an ESRI-backed ArcGIS pipeline data model. This uses ESRI's Geodatabase to leverage tabular data in ISAT. More from http://www.isatmodel.org/PipelineDataModel.asp.

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ArcView-ArcGIS migration[9] – John Lineham, Occidental

A rather detailed cookbook for what needs to be checked and worked on during an ArcView Arc8 migration. There is a lot to do, maybe too much. Themes and symbology should be saved as AVL files and read in after migration. Avenue Scripts do not port. The Avenue conversion tool brings over 80% of the code – but then hand tooling with Visual Basic is required. But many old Avenue scripts probably contain functionality which is built-in to Arc8 so check before re-writing code.

CAD – GIS Integration – Bryan Stoltenberg, Blue Sky Development

According to Stoltenberg, CAD[10] data is "trapped in its own methodology and environment." Likewise GIS is "a world unto itself." But in pipeline engineering, these are forced to cohabit despite different philosophies concerning accuracy, coordinate systems etc. Stoltenberg proposes a platform-independent data representation – moving data definitions to a common, open format. Data elements thus defined can be linked to their original source via a unique identifier (UID). A projection manager maintains references between platforms, a common rendering system addresses objects resident in AutoCad, MicroStation and ESRI.

Enterprise GIS at ConocoPhillips Alaska – Karl Fleischmann

ConocoPhillips Alaska uses GIS in geosciences, engineering, aviation and environmental and emergency response. Fleischmann is a strong advocate of managing GIS data where it belongs – in the database. "Get out of shapefiles and into the data store – spatial is just 'data'". Spatial data should be centralized in Oracle, managed with automated processes and accessed in place from 'shrink-wrap' tools. ConocoPhillips' Alaska Technical Database (ATD) manages technical and petrotechnical data using 'very robust' security – users see what they are entitled to see. Security cross references the user id and the business unit id in lookup tables. The ATD uses an ArcSDE data store along with the production data sets. Unix cron jobs build spatial features (such as well deviation surveys) on the fly. Interlocking processes assure data integrity – for instance tops are recomputed on the fly from well deviation surveys.

[9] Another detailed cookbook for ArcGIS migration was given by John Grace of Earth Science Associates.
[10] Computer Aided Design – for engineering and drafting.

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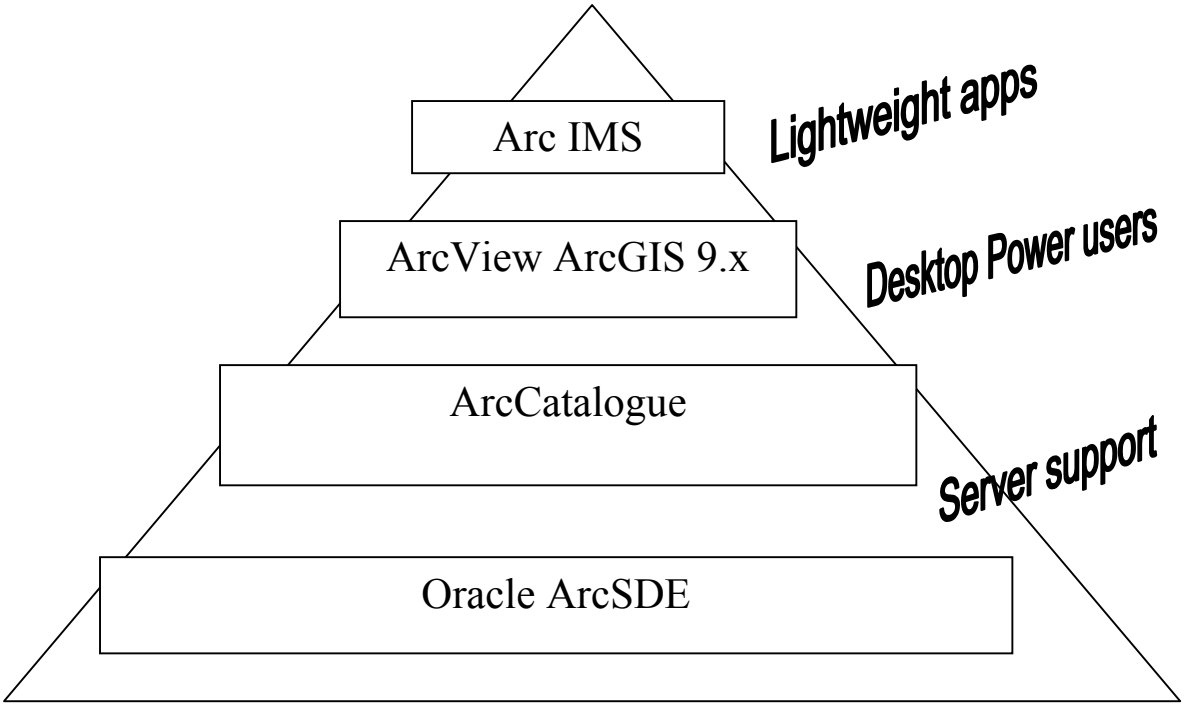

CPA's dataset includes 900GB of aerial photography and satellite data. Maps are stored in ArcCatalogue – and stored as templates. CPA uses Microsoft's .NET architecture to serve reports in XML. Reports are stand alone .NET apps which can be run inside ArcIMS. Although this may appear counter-intuitive, maps are prepared and stored as pdf files which are updated on data change. ConocoPhillips deploys a managed software environment for all its clients. Users fill out a check box request for software – which is installed on client machines on reboot.

GIS – the 'Moulinex' of E&P – Gareth Smith, Exprodat Consulting[11]

Smith believes that GIS is the equivalent of the Moulinex food processor for the upstream. Exprodat has developed a 'cookbook' strategy for GIS deployment. The aim should be to provide a simple interface 'for the masses' first. These should offer 'compelling' content – leveraging high value corporate data and trusted external sources. They also should provide linkage to interpretation systems. Next the 'back office' support infrastructure can be established. Exprodat advocates using flat files and native raster imagery to avoid the cost and complexity of SDE. Problems were experienced with the ArcIMS generic Java viewer and Exprodat developed an 'enhanced HTML' viewer themselves.

[11] See also our Technology Watch report from the 2003 SMi Data and Information Management Conference.

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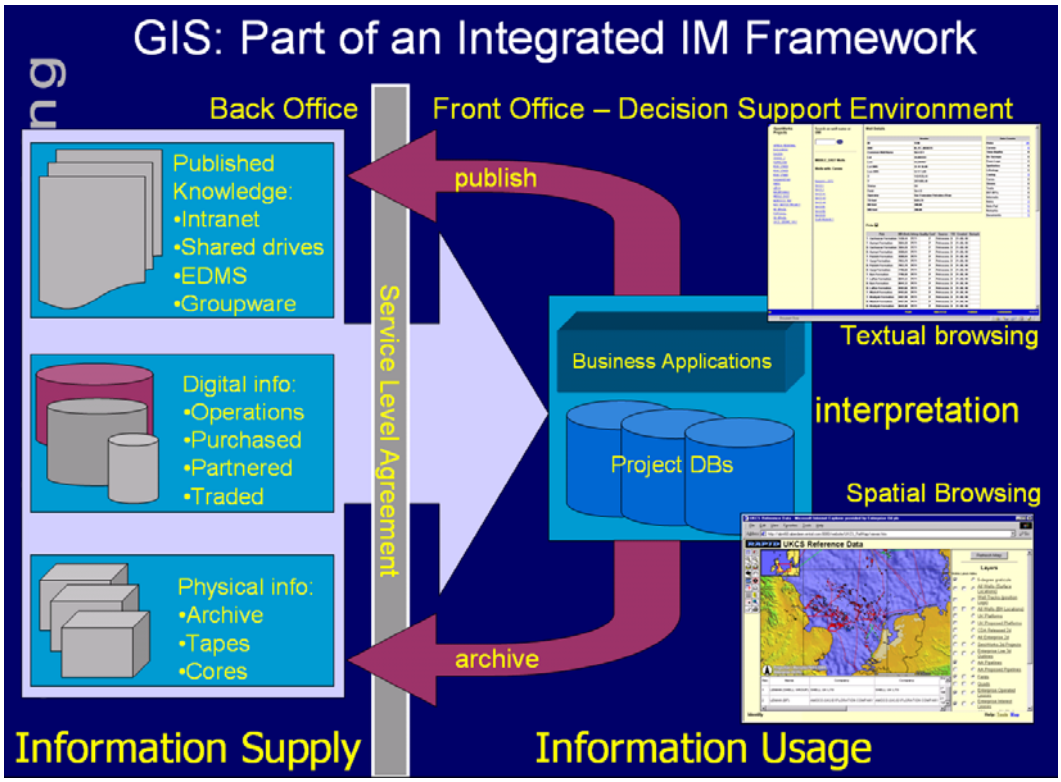

Figure 3 GIS - front office, back office - courtesy Exprodat

IHS Web Services and tuning workshop – Tor Nielsen, IHS Energy

IHS Energy embarked on its Common Architecture Project in 2001 – this has resulted in a web architecture based on J2EE, Web Services and ESRI GIS Technologies. The first web/GIS application – EDIN-GIS has been rolled see below.

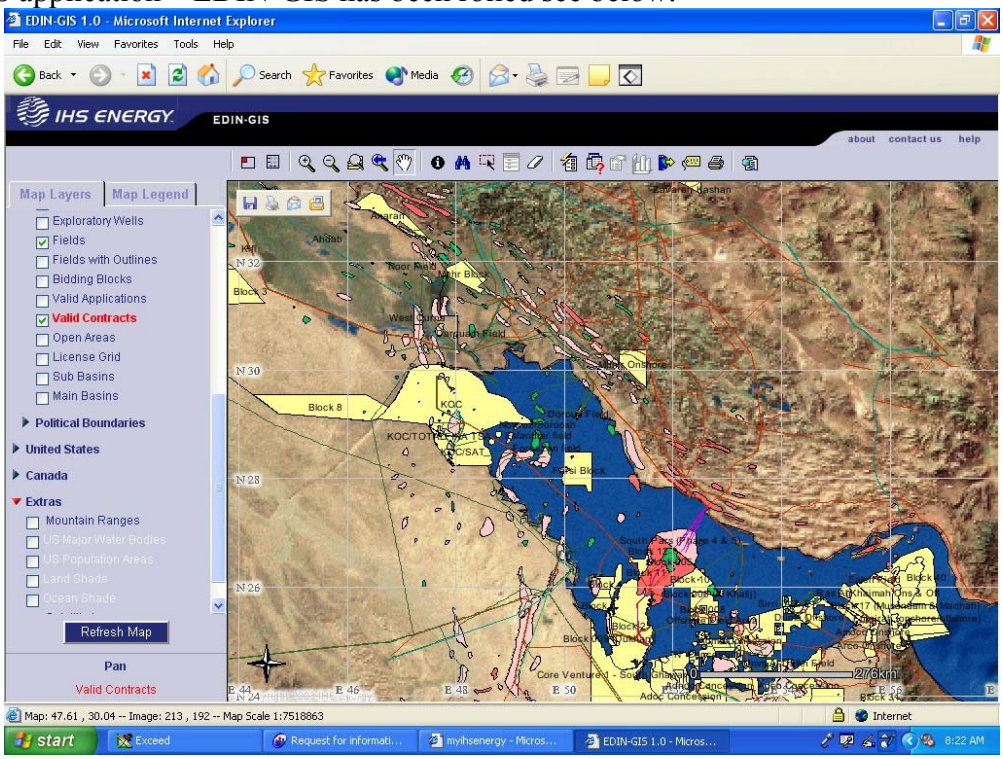

Figure 4 EDIN-GIS HTML web browser - courtesy IHS Energy

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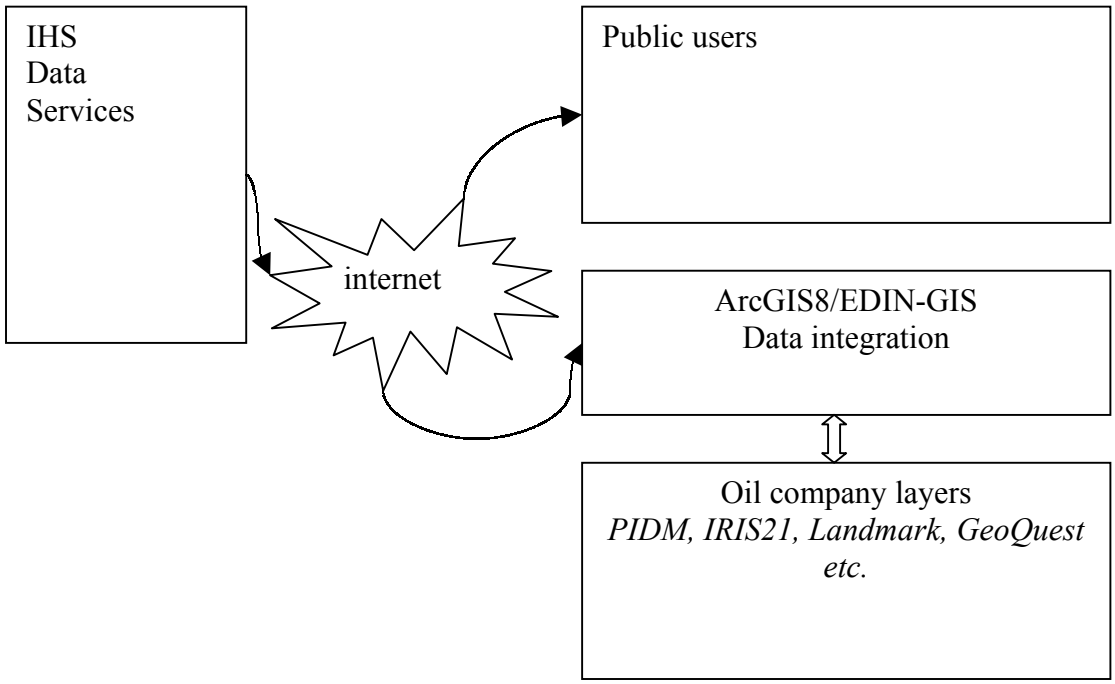
The schematic below shows how the internet is now the vehicle for data exchange within the oil company and outside – to IHS Energy and public data sources.



IHS Energy has great experience of managing the huge US well dataset and has opted for a strategy of denormalizing the layers such as well data for performance. A single table contains the most-used well metadata (20-30 attributes) and two other tables – feature table and spatial index are used. Context sensitive pop-ups access tabular data. A single sign-on (since last week!) allows for controlled access to all sub-datasets including production, imagery. Data can be downloaded for project creation in a variety of formats. Note that the ArcIMS HTML viewer (not Java implementation) is deployed (see PetroWeb). JavaScript[12] provides client side rich functionality. IHS Energy is working with Shell to provide 24x7 access around the world to its datasets – 'no more CDs'! A bespoke layer has been created to Shell's specifications showing Shell's partnerships and interests.
Various options were evaluated for remote database query – Microsoft's .NET, J2EE and 'homebrew' C++. IHS is currently working on moving the core engine to the server and deploying web services with Sun's J2EE. Note that cross-dataset query implies consistent or known units of measure (UOM) and nomenclature. There are 'many matching issues – there is no easy answer'.
Performance is critical and this has been achieved by denormalizing the business table. SDE views gave poor performance. Oracle has been optimized. The cost-based optimizer worked very well (as against the rule based optimizer). Two deliverables are still required – browser and desktop – thin and fat clients – mainly to cater for different bandwidths and performance limitations. Security has proved very costly to implement – you need experts involved at the outset – but it is still hard. Security is hard to implement across multiple clients' firewall policies. ARC SDE/IMS is fast – but not the fastest! This has led to two developments – one for users, another for marketing! Attempts to extend the 'out of the box' HTML edition of ArcIMS 'got out of hand'. Mention was made of the 'Magic Servlet' problem.

[12] JavaScript has no relation to Java! Originally developed by Netscape, JavaScript is now a widely-deployed tool used on most modern websites.

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IHS Open Source deployment

On the economic front, IHS Energy deems **Linux** to be very interesting although IHS 'will stay with Sun for the next couple of years'. The price difference is however 'too big to ignore'. Another sortie into Open Source territory involves trialing of **MySQL** – the Open Source database management system. Oracle is very expensive for multiple offices and data centers due to its CPU-based licensing. Moreover most Oracle licenses in upstream are effectively read only. So MySQL's transactional shortcomings are irrelevant. ESRI is porting major pieces of code to Linux/MySQL[13]. Finally Nielsen gave a thumbs-up to Apache Jakarta - **TomCat** – and **Jboss** components which 'can take you a fair way along the road.' Again – such tools are better suited to the remote center but BEA or IBM tools are needed for development and maintenance. All in all, Nielsen counted 28 technologies which are deployed in web services infrastructures. Far from complicating things, these 'are all related, talk to each other – which was 'not the case two years ago'.

Some of Nielsen's 28 software tools…

FME (Safe Soft)	J2EE	Solaris	Oracle
SDE	ArcIMS	Apache	Java
jUnit	Log4J	Eclipse IDE	Ant
MagicDraw	XML	HTML	DHTML
Java Server Pages	JavaScript	XSLT	HTTP
Etc.			

IHS Energy's new web architecture will be a common source for graphs, reports, queries, maps, entitlements and authentication. Query Services are a single, database independent point of access to all data sources. Documentation will be available for third parties to write queries to these interfaces. Next, individual services will replace EDID-GIS from VisualBasic or Java Swing which will issue requests to map services. These are coming together in IHS Energy's 'Yucatan' project – Java Classes communicate through ArcIMS to ESRI's Java Connector and interact with other common services for query, graph, report, etc.

Landmark's Arc 8 migration, life after ArcView – Robert Warford[14], Landmark

Landmark invested around $ 1 million in ArcView extensions – notably for its OpenExplorer GIS interface. Then 'along came Arc8!' Lots of Landmark products run on UNIX – and could not be ignored. Landmark was never very happy with ArcView extensions – which adversely affected performance – and OpenExplorer never integrated well with other data formats. Landmark is a big Java shop and looked into ArcObjects – but these only run on Windows – so Map Objects Java was chosen as promising[15]. MapObjects has around 900 components and offers 'impressive lightweight, robust, quickly built applications – the network becomes the access protocol'. With the acquisition of PetroBank, Landmark now offers a 3 tier architecture as follows:-

Surf & Connect Web
PetroBank Application and Data Server (with ArcIMS)
E&P DataStore

[13] Contact Alan Jackson.
[14] Paper co-authored by Dwayne Dick and Brian Prather – Shell Oil Co.
[15] We heard a contradictory view from a software developer who had tried Java Map Objects. These were deemed un-implementable because of different browsers and Java run times. The issues are probably resolved with a homogenous operating environment such as deployed in an oil major.

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Map Objects are deployed at the top tier Surf & Connect Web edition. ArcIMS has extended seismic data visualization to the desktop – this is now being extended to other data types. Map Objects make Surf & Connect platform independent – running on Windows, Linux and Unix. Various embellishments result from MO deployments – maps are scale sensitive – more detail is revealed on zoom. It is also possible to display gridded data from OpenWorks (not available in OpenExplorer). Surf and Connect Web will replace OpenExplorer.
Shell's Bryan Prather told how S&C web was used in Shell to access corporate data in Oracle Spatial along with external maps from ESRI's shopwindow GeographyNet. Prather noted issues with software acquisitions and burgeoning portfolios which were never rationalized – and client directed development – making developers 'face all ways at once'[16]. A demo showed blocks from Shell's New Orleans server and well bore trajectories from Houston. Cross-database geographical selection is 'a powerful tool'.

Leveraging GIS with Web Services – James Maupin, Schlumberger Information Solutions

For Maupin, Web Services is the IT equivalent of the hi-fi RCA plug – allowing interconnection of disparate systems and data sources. The building blocks are SOAP for messaging, WSDL for service description and UDDI for resource location. The business benefits are unequivocal for users and developers (although the ability to change vendors might not please all vendors) and to 'ease outsourcing'. Maupin showed how the USGS supplies DRG/DOQ from its Raster Image Server – Microsoft TerraServer. Schlumberger has a 'deep and deepening' relationship with ESRI and is working on WebMap – a test of re-projection on the fly. Panning around a map of the US shows State Plane used onshore and WSGS offshore – this uses an ArcIMS Web Services 'wrapper,' the coordinate reference finder[17]. Maupin recommends the WebServices Org[18] portal as a source of information.

[16] The same could be said of the vendors themselves!
[17] Despite the 'deep and deepening' relationship – this all smacks of skunk-work at the present.
[18] This is actually a commercial newsletter – discussions are very poorly followed. The W3C is the real source for web service standards and debate.

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PPDM Spatial Project – Ian Batty, PPDM Association

The new PPDM well module incorporates a spatial component which uses linear referencing – this will be released in 2003.

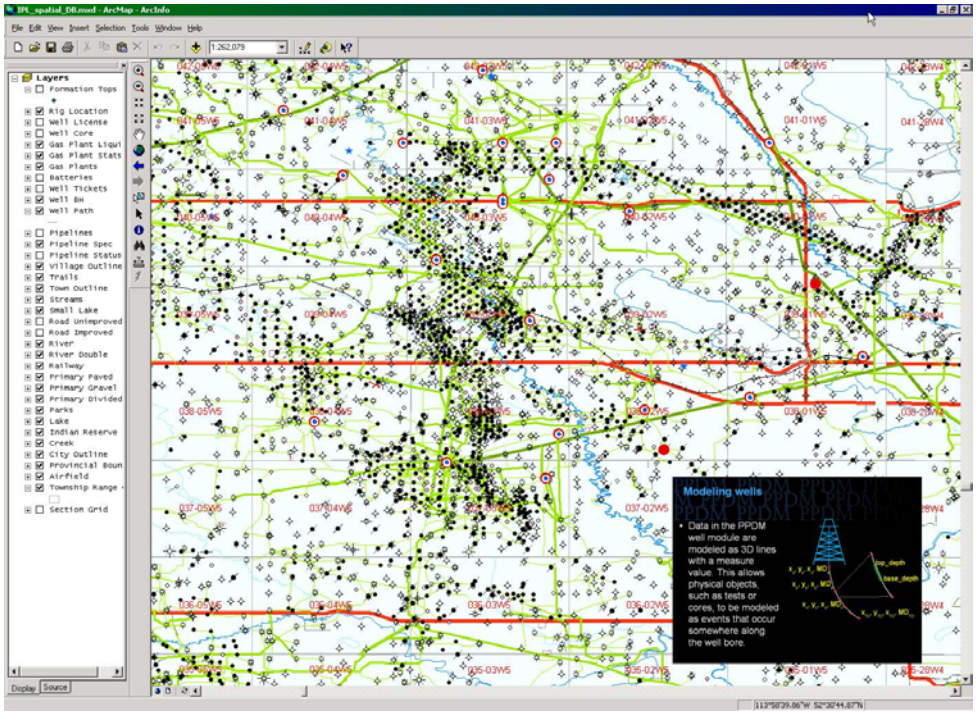

Figure 5 ArcMap view of PPDM data types and linear referencing (inset) - courtesy PPDM Assoc.

Subsequent to the PUG, we spoke to Ian Batty of the PPDM Association who explained how the Spatial II project has evolved since we last reported (see Technology Watch Report from PPDM 2002 Fall AGM).

The PPDM Spatial II project was initially predicated on a very close involvement with ESRI. The original intent was to build a PPDM-version of ESRI's Geodatabase[19]*. This has changed following feedback from industry*[20] *and from a closer examination of ESRI's Geodatabase technology. ESRI's database technology is somewhat antiquated and does not allow for compound keys (essential to the PPDM data model).Also, the Geodatabase requires that all reference values are kept in a single table – whereas PPDM stores reference values in some 400 separate tables. The solution that has been adopted for Spatial II is to use linear referencing*[21]*. Well data (and other linear features like seismic lines) are to be modeled using linear referencing – so that a single spatial geometry set can be created for a well and any attribute can be accurately spatially positioned through its measured depth. This decouples the PPDM spatial data from the GIS technology deployed – which can still be the Geodatabase.*

[19] Similar domain-focused ESRI data models have been built for Facilities and Pipeline. These however are closely associated with vendors (Miner and Miner for facilities and MJ Harden for pipeline).

[20] It was observed in Oil IT Journal and elsewhere that such a close association with a proprietary technology ill-became a standards body such as PPDM.

[21] 'Linear referencing' is ESRI terminology – elsewhere this is referred to as 'root event' or 'dynamic segmentation'.

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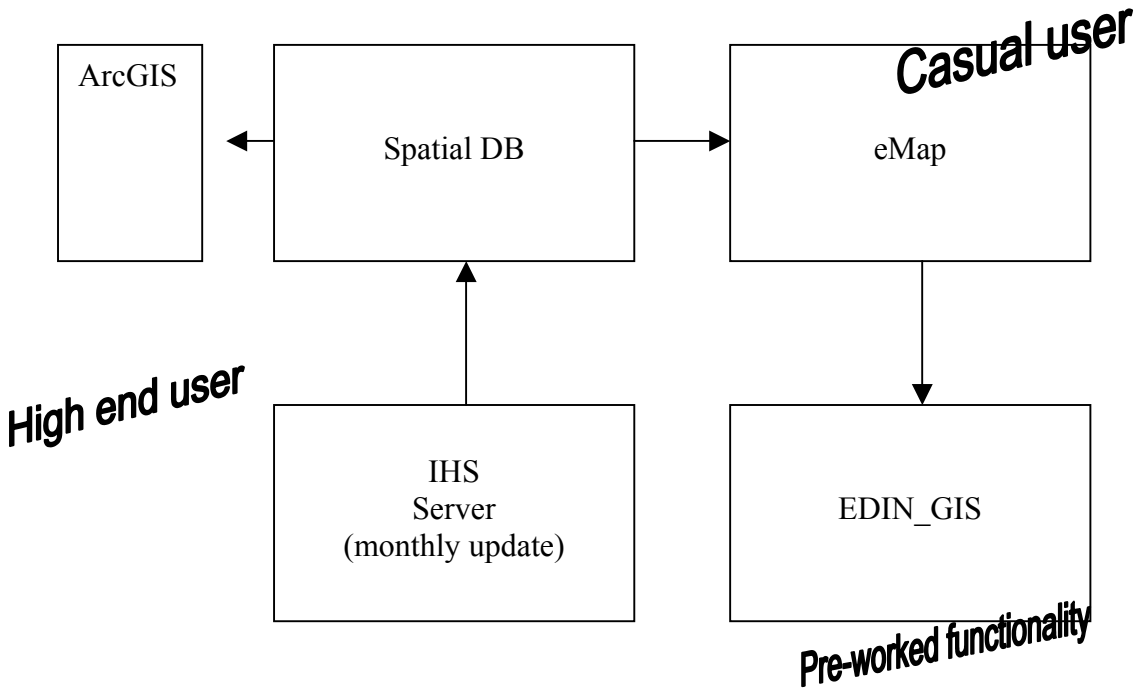
Shell Spatial Database – Con Goedman, Shell International E&P.



Shell has moved to a central corporate GIS using Oracle Spatial and ESRI's Geodatabase with ArcGIS and ArcIMS desktops. Shell's ArcIMS implementation "e-Map[22]" shows what data exists, where it is and who owns it – these questions can be answered from any point on the Shell intranet.

The PUG Wish list – a.k.a. "The List"

The list is the ESRI PUG's wish-list of bug fixes and enhancements. While in the past it gained a reputation for some spirited discussion, today it fails to excite quite so much interest. We report on the top few List items. The List contains around 50 'open' issues of varying severity.

Arc8 does not support 'push' installation (e.g. Microsoft System Management Server SMS)

This should be fixed in 9.0 with a dependencies database. Note that Shell has scripted the install process using the Wise Script language.

Arc9 will drop CGM support

CGM support will not be dropped (still considered very important to PUG users – as witnessed by a show of hands).

One to many table joins in ArcGIS

Query in geodatabase is less flexible than earlier versions – grayed-out options pop up now and then. ESRI response unclear – there 'may be some issues for complex labeling'.

Cannot edit a geometric network in a projected ArcMap

This is desirable but 'problematic' – work in progress.

[22] An intriguing warning on the e-Map screenshot – "Please do not use the STOP button on your browser".

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Datum information not exposed as required for transformations and QC

There is no transparency regarding datum shifts applied to data. This is very important for international use (see paper by Richard Wylde). This topic is a recurring theme in the PUG list. ESRI's response failed to convince here. ExxonMobil suggested a need for a joint industry project to address this issue – need a standard for datum metadata. Suggest that the European Petroleum Survey Group is a focal point and that work already done by POSC and PPDM should be included.

Web enabled enterprise GIS – Joe Kostecka (Marathon) and Darcy Vaughn (PetroWeb)

Kostecka provided an update[23] on Marathon's dual level portal deployment. Marathon uses several 'second level' vendor portals from Paradigm, Tobin and Landmark. All these are accessible through the top-level PetroWeb portal. GIS is a common interface to all data. Vaughn described how PetroWeb provides access to distributed data stores and how proprietary stuff like land positions remain within Marathon's firewall. PetroWeb uses a thin client browser offering easy deployment and satisfying corporate IT security – 'firewall friendly'. PetroWeb tried the 'thick client' (Java Map Objects) before abandoning it[24] – today 'there is little which can't be done on a thin client'. ArcIMS is the publishing solution for all GIS. This blends multi-source data at the desktop – from around 40 data vendors with arrangements with PetroWeb. ESRI has given a 'big kick-start' to spatial data provision. Shape files are a thing of the past – data is now served from the spatial database. See also PetroWeb vendor résumé below.

What makes coordinates unique? Richard Wylde, ExxonMobil

Wylde explained the fact that coordinate systems require a reference framework for precise location. Most interpretation applications fail to manage coordinate reference systems (CRS) in a rigorous manner. This can (and has) led to catastrophic failures – mis-located infrastructure and worse. GIS developers need to be aware of these issues and the European Petroleum Survey Group is preparing a guidance note for GIS developers.

Nota bene

- Coordinates do not uniquely describe a location
- A coordinate reference system is needed
- Tools to manage a CRS are also required.

Exhibitors

Baker Engineering accident and incident management

Baker's I-Track accident management Operational Dashboard is used by BP and others to interface with Baker's AIMS (Accountability and Incident Management) database. BakerItrac is a GIS-based vessel and helicopter logistics application that provides route planning and analysis offshore platforms. The Operational Dashboard includes modules for compliance, 'people on board', emergency contact management and key performance metrics.

[23] See our previous report on the 2002 PNEC Data Integration Conference.
[24] One wonders if the problems reported with Java have anything to do with Microsoft's foot-dragging non-compliance – as witnessed by the ongoing courtroom battle over Java support in Windows XP.

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Figure 6 Safety and compliance monitoring - courtesy Baker Engineering.

Baker also manages the US Government's National Pipeline Mapping System – a nationwide repository of pipeline data for analysis of vulnerability to disasters and for planning and safety. Baker provides data collection, management and GIS services to the NPMS.

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GeoFields FacilityExplorer – GIS to SAP interface

GeoField's FacilityExplorer is a GIS interface to facility data housed in an SAP data warehouse. SAP segments can be located geographically and identified – and then retrieved as either tabular data or as attached documents such as alignment sheets and CAD diagrams.

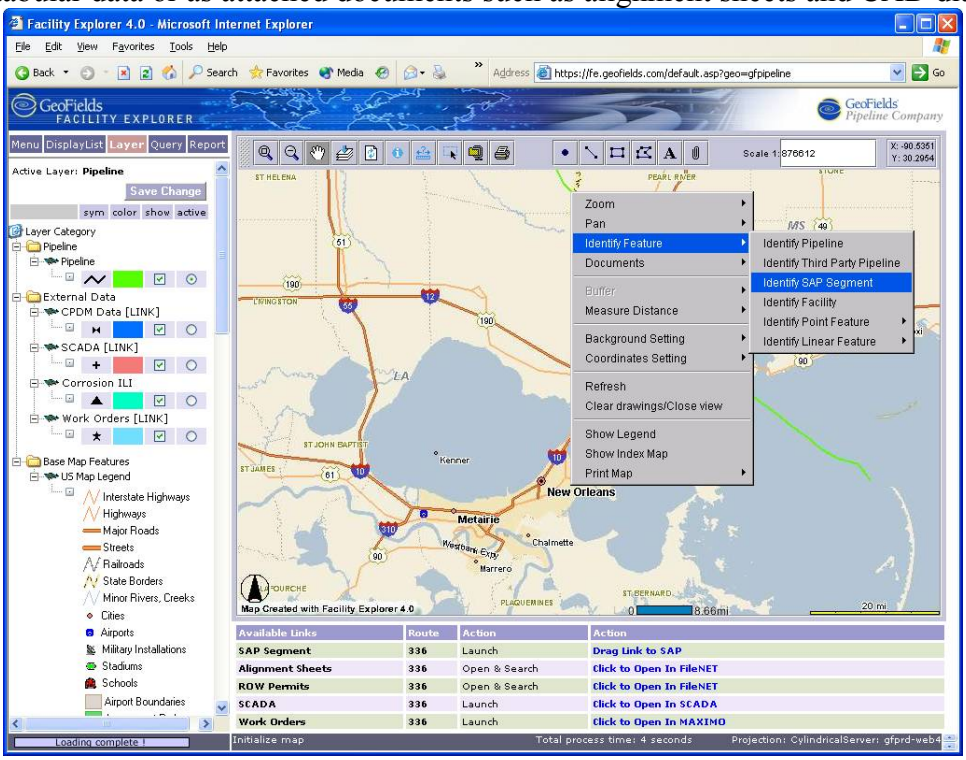

Figure 7 SAP Segment identification in Facility Explorer 4.0

Idea Integration – multi-database GIS integration

Idea Integration is a specialist in .NET and Arc8 integration. Idea developed Burlington's land management and mapping solution. This is currently migrating to a new desktop environment and the Web. PLAT (Petroleum Land Analysis Tool), is a desktop mapping system that allows Burlington Resources to streamline and manage their extensive oil and gas land assets. Idea developed the system to leverage existing enterprise applications to allow users to browse, query, and display land information from a single interface. PLAT executes analytical GIS functions not previously available. Idea is a subsidiary of MPS (Modus Group).

James W. Sewall Co. QTools GIS data QC

QTools is an automated toolkit that evaluates the quality and consistency of data as it is migrated to geospatial databases. QTools inspects a database system and compares feature and object attributes of the data being loaded with a defined database schema. QTools checks the data before bulk loading, validating its compliance to established database rules and definitions. QTools works with ESRI modeling tools and with Microsoft Visio.

LandWorks – the Landman's Toolbox

LandWorks is a leading supplier of land management software for upstream, pipeline and utilities. Flagship software is Landscape GIS which includes the Landman's Toolbox – just ported to ArcIMS for Anadarko. LandWorks is a reseller and integrator of WhiteStar Corp.'s US datasets. Clients include BP, Conoco, Apache Corp, Encana, Oxy and Anadarko.

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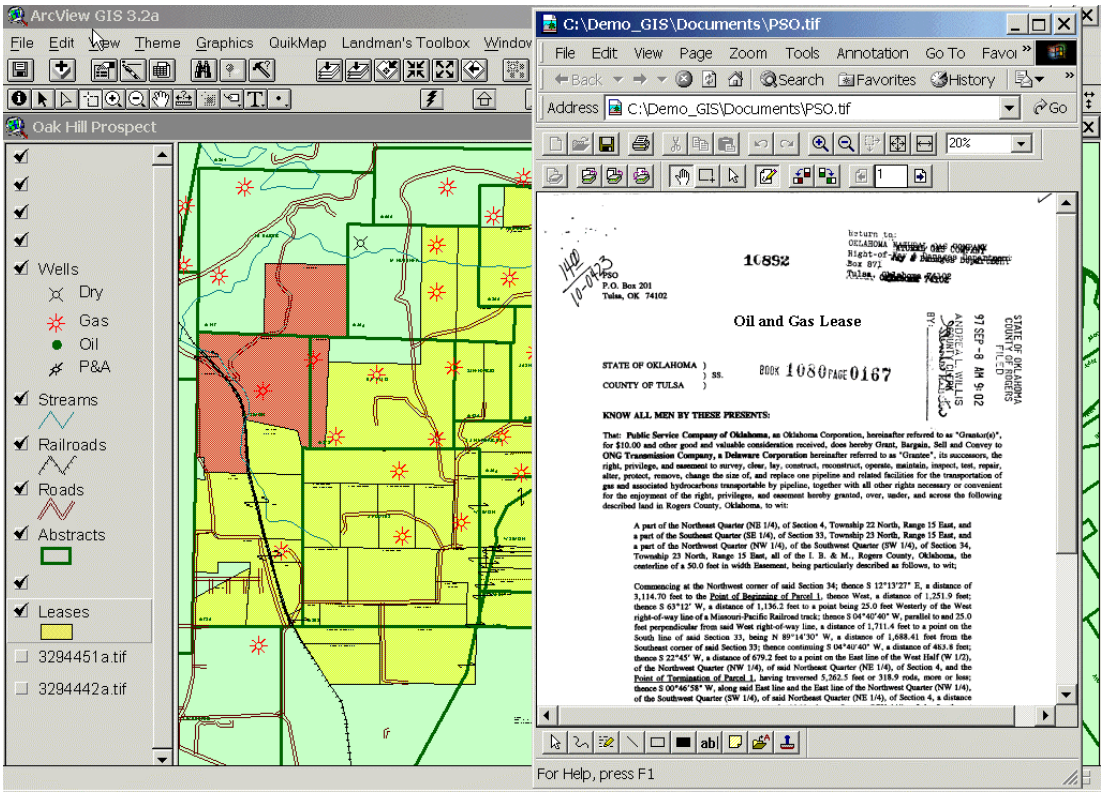

Figure 8 Scanned document GIS integration in Landman's Toolkit - courtesy LandWorks

LogicaCMG – Shell's KID shrink-wrapped

See previous Technology Watch reports on Shell Expro's Discovery project. Here, a continuum of 'knowledge, information and data' – KID is managed as an ensemble thanks to the use of a metadata catalogue. This work is now part of a POSC project. Logica got the IPR from much of the Shell Expro Discovery work and also has the right to use the KID name. Flare did the catalogue, Logica did the IT.

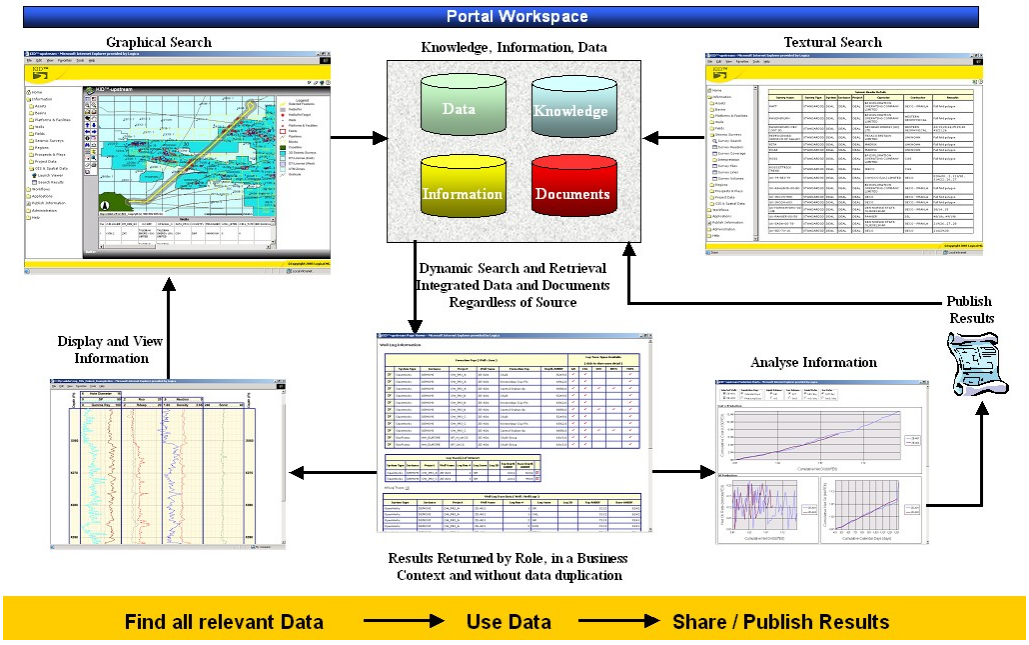

Figure 9 Upstream Knowledge-Information-Data (KID) - courtesy LogicaCMG

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MetaCarta – from text to GIS and back again

This software was conceptually the most innovative thing we saw at the PUG. MetaCarta couples GIS and text by integrating a geographical place-name lexicon with a GIS search engine. Office and HTML documents are indexed by MetaCarta's Geographical Text Search (GTS) engine such that all place names recognized in free-text documents are spatially located. This then makes for interesting to and fro searching between text and spatially-delineated areas. We tried the software on some place names from the Paris basin and it immediately located an oilfield – even though it only had a single document reference in the test dataset. An intriguing tool; no doubt it will prove significant once the input text data is properly controlled – i.e. it would work even better searching semi-structured corporate document management systems.

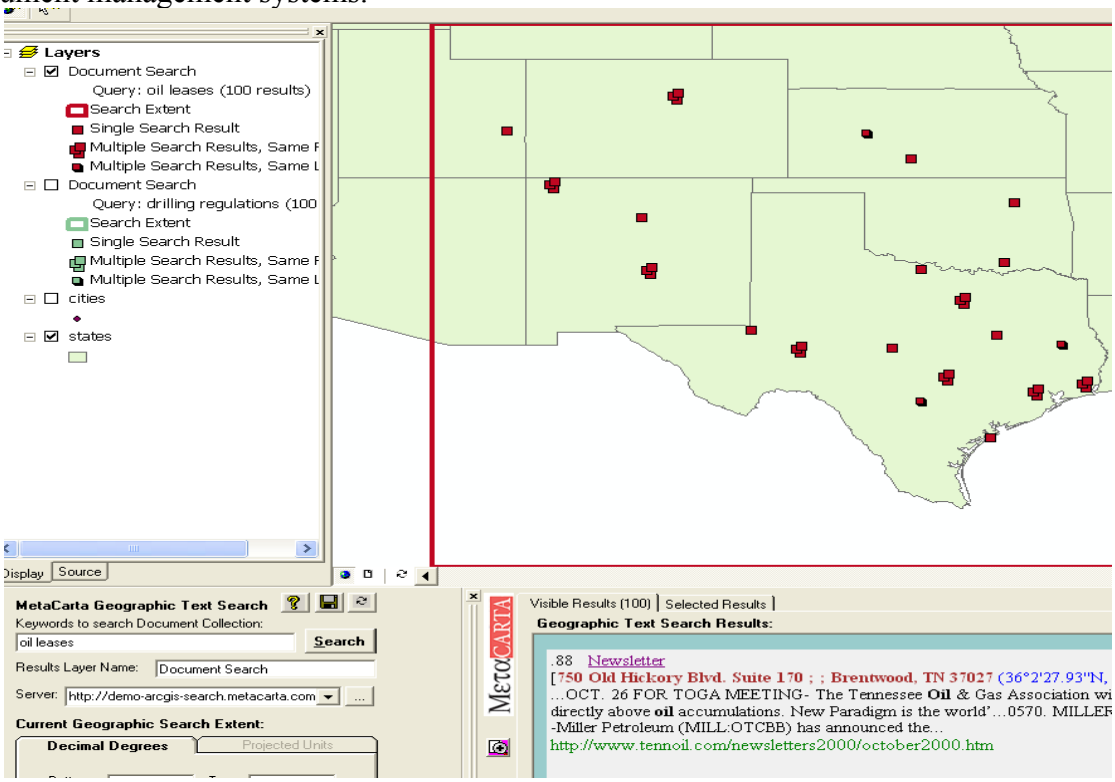

Figure 10 MetaCarta's GIS/text engine (courtesy MetaCarta)

Paradigm – community awareness program

Paradigm offers a service of community awareness to pipeline operators. Operators must inform the population living within a certain distance of a pipeline of its existence and supply safety information. Paradigm uses pipeline centerline data to locate people living within the specified distance. This can save considerable postal costs over bulk mailings to the postal carrier route or to the whole zip code. Another Paradigm service offers pipeline inspection flight pilots a user-friendly data capture interface. Finally a real-time feed from inspection vehicles allows operators to stay in touch with field inspection personnel. This uses Cloudberry AVL tracking and 2-way communications on the Cingular network.

PBSJ – corridor constraints analysis

Corridor constraint analysis (CCA) helps environmental workers permit oil and gas pipelines. The software is tailored to meet the requirements of the FERC 7 (c) permit. CCA automates spatial analysis and cataloguing of environmental constraints relative to pipeline corridors and produces data table suitable for permit applications.

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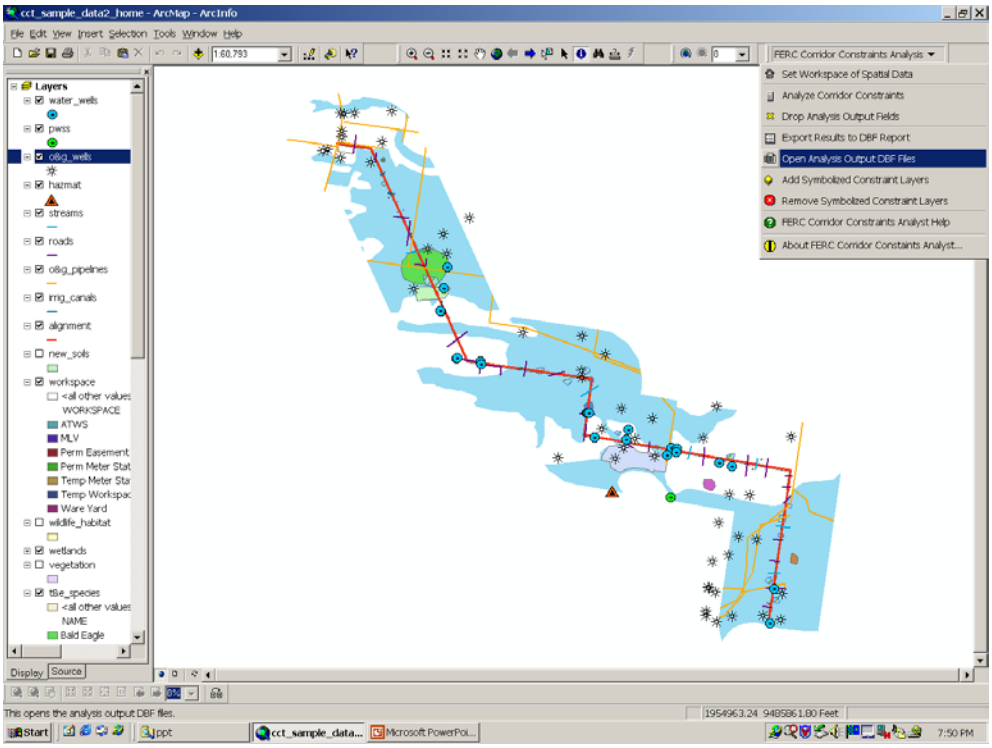

Figure 11 Corridor Constraints Analysis – courtesy PBSJ

PetroWeb – The GIS 'blender'

PetroWeb's 'blender' merges GIS-based data from multiple sources – see above paper by Jo Kostecka, Marathon for more. After having tried to use ESRI's Java MapObjects, PetroWeb abandoned them in favor of a vanilla HTML development. The new 'blender' integrates GIS data sources in and out of the firewall into a single web interface.

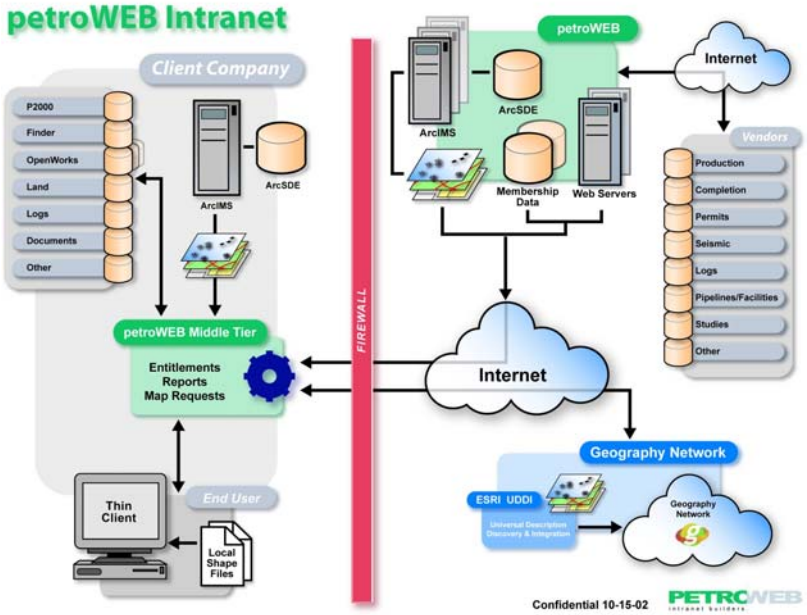

Figure 12 The 'middle tier' GIS blender – courtesy Petroweb.

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R7 Solutions P2000 – Finder GIS integration

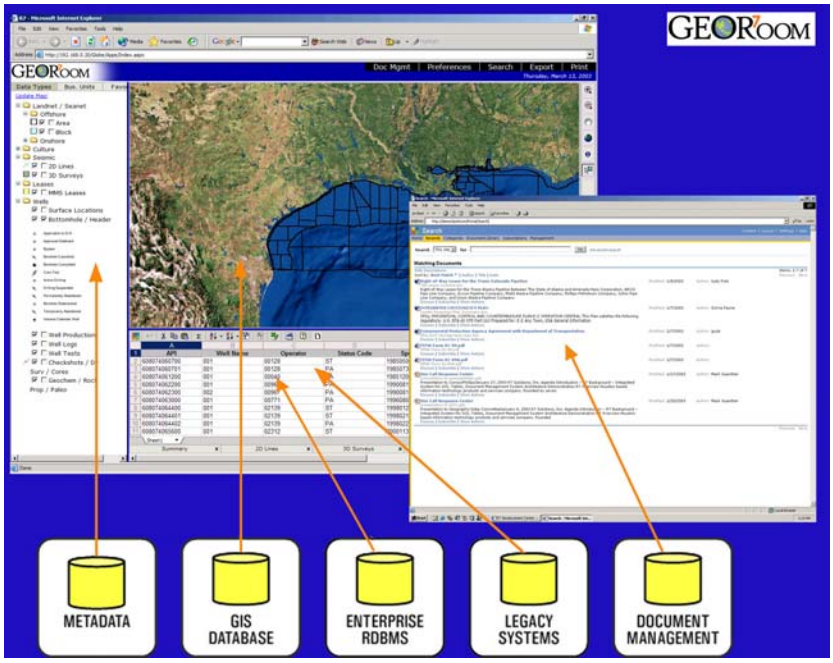

Figure 13 P2000, Finder and enterprise integration - courtesy R7 Solutions

R7 Solutions has just released GeoRoom – a front end to data in disparate datastores such as Finder and P2000. The software offers the casual data room user a single entry point to spatial data – avoiding multiple interfaces. Amerada Hess is a user. Uses Microsoft SharePoint Services and has hooks into FileNet (Hess' document management system). Communication uses .NET XML Web Services and ArcIMS. Office XP Web Components (and the ASP .NET data grid) are used for distributing tabular information.

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Schlumberger – GIS browsing with ProSource

Two new products out end March – ProSource[25] and PointSource.

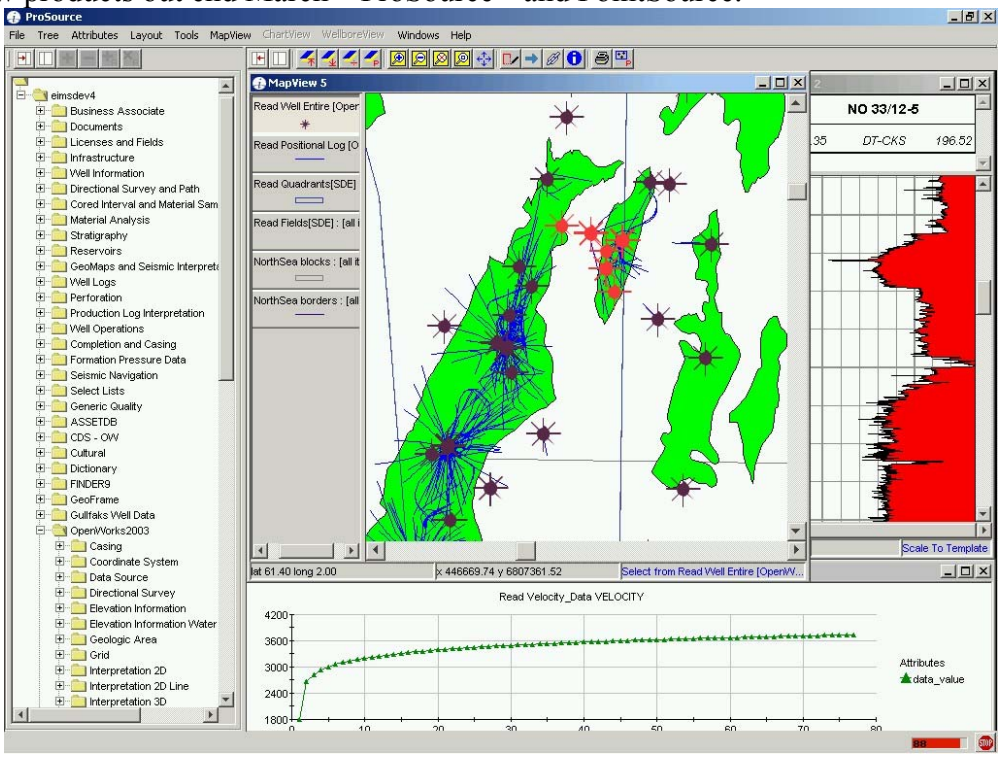

Figure 14 ProSource – courtesy Schlumberger Information Solutions

ProSource is the high end GIS data-management focused tool. ArcIMS is 'definitely ready' for prime time – and is deployed in IndigoPool'. ProSource 'browses and manages information in multiple distributed repositories'. The ProSource GUI can be customized to display multiple data types and to integrate users' workflows. PointSource is an ArcIMS-based end-user browser.

[25] These products derive from the PetroBank Surf and Connect browser – the IPR having transited through Statoil and into Schlumberger.

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Tobin Vendor Data Index

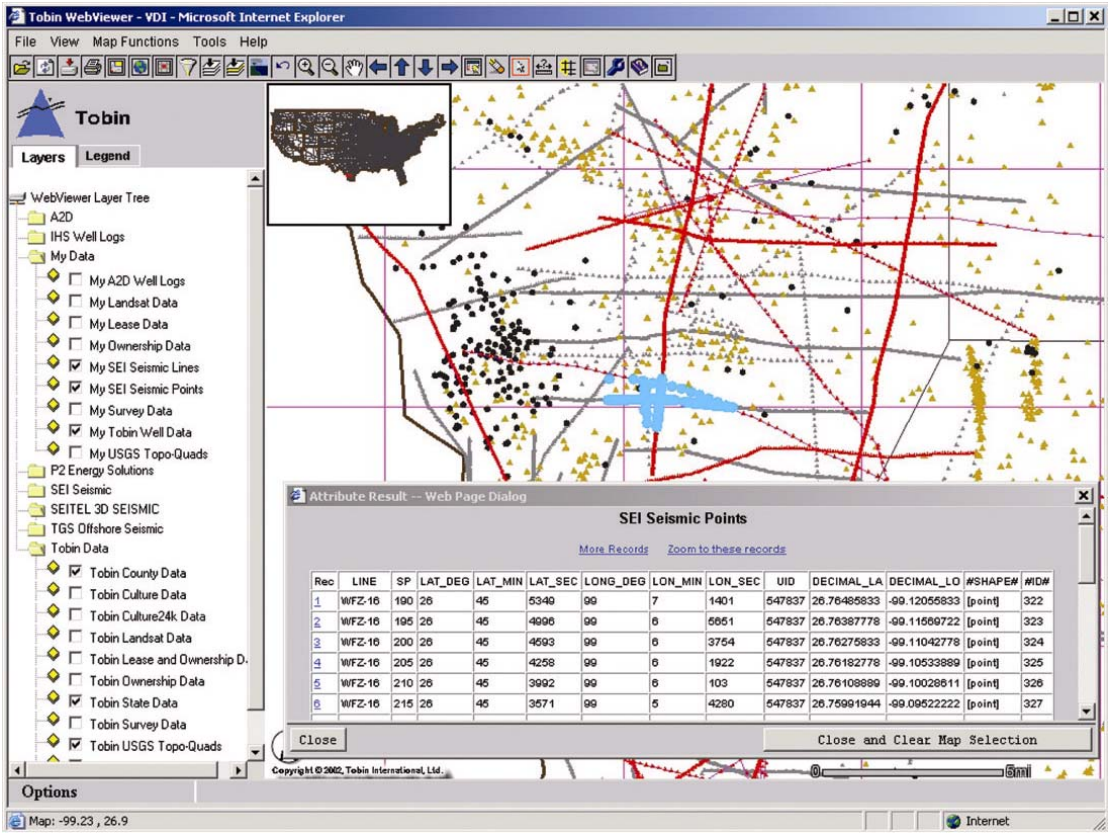

Figure 15 Tobin Data Index and web viewer - courtesy Tobin

The Tobin Vendor Data Index allows users to search data from multiple vendors from a single map interface and to overlay and compare with in-house data. Information on data located though the WebViewer can be listed in terms of header information and spatial representation. Data types include seismic, well logs, production and other Tobin Data. The Vendor Data Index is a part of the Tobin InSight and can be expanded to include additional types of in-house data such as financial, human resources and legal[26].

[26] A useful format specification resource is available on the Tobin website.

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Tuboscope – pipeline integrity mapping

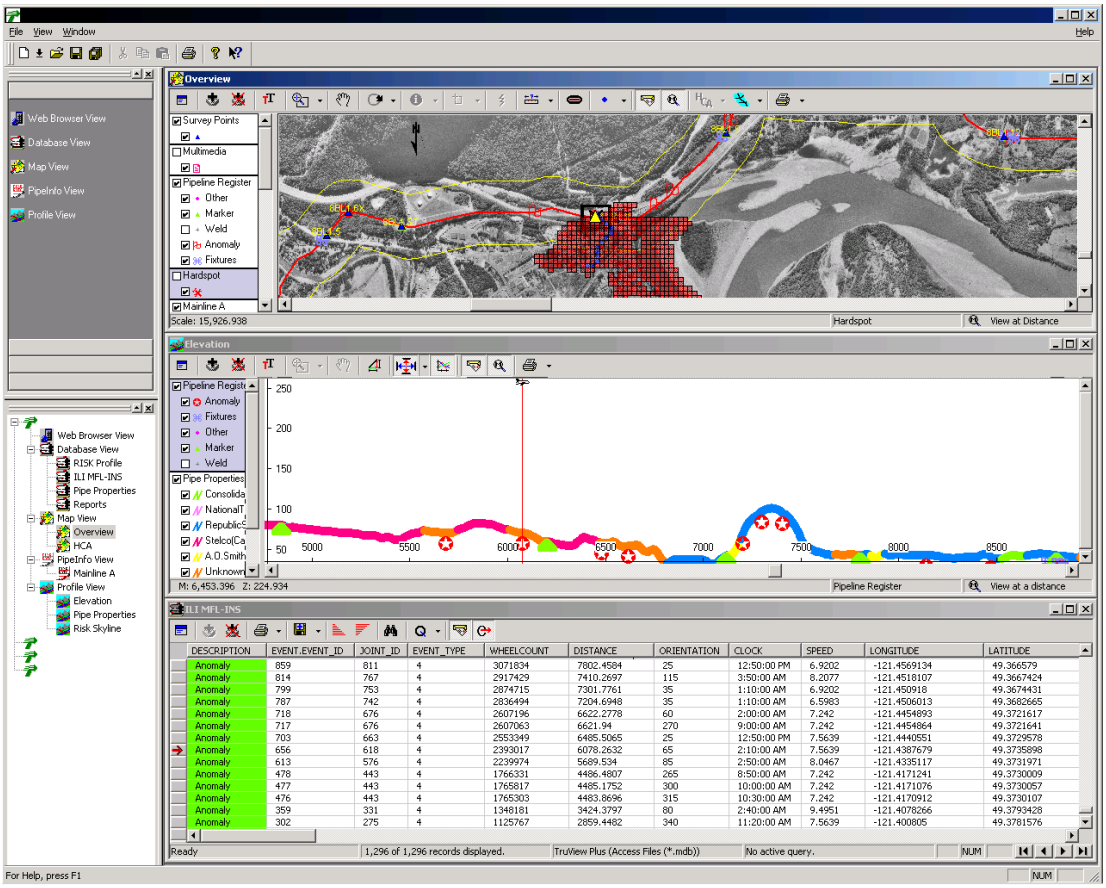

Figure 16 GIS in pipeline integrity management - courtesy Tuboscope.

TruView[27] GIS provides a visual representation of the history, results and mitigation of integrity concerns along a pipeline and surrounding area.

Notes

IHS Energy – Enhanced Spatial Layers

New international spatial layer for oil fields released in January 2003.

Leica Geosystems Image Analysis for ArcGIS

Image processing tools embedded into ArcGIS uses ERDAS' Imagine technology. Due for release March 2003.

MJ Harden

Field data collection – new tool. ArcPipeline Data Model – IPR donated to SRI. Compaq iPaq is OK for occasional field use – not for field engineer. Working with ESRI on pipeline specific schematics. ArcPad embedded in MJ Harden applications.

Quorum GIS Solutions

Quorum business solutions' flagship product – TIPS performs gas pipeline accounting. Other tools manage land information, right of way access (this module originally developed by Chevron). Other recent modules have been developed for Environmental management, integrity management and contracts.

[27] The TrueView name is disputed and may change.

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Safe Software – Feature Manipulation Engine

Safe Software has extended ArcGIS functionality with FME Object technology to offer direct access to many additional data formats. FME can also read and write both personal and ArcSDE geodatabases, ArcSDE and Shape files. See the white paper FME Meets ArcGIS Geodatabase.

Omni Replicator – cross-platform database replication

Real-time, bi directional database replication. Does cross-platform Oracle to DB2 to SDE/Oracle and SQL Server. Change-based replication. Not GIS-specific.

BaseLine technologies/GeoNorth – new alignment sheet

A new alignment sheet package is being released by BaseLine technologies. This was developed in conjunction with GIS specialists GeoNorth.

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