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Breaking the Paradigm of Technology Services

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Abstract

A technological revolution has been ongoing for several years; however, the oilfield has been slow to embrace newer technologies. Rig time is now measured in minutes rather than hours. Data sets used to make real time decisions originate from many sources, but often are not compatible.

With the recent technology expansions comes the need for caution. It is critical to identify, understand and reach industry consensus regarding standards for the data being used. How should the data be viewed and stored? Who should view the data? How will the data be used in the future? Time is best spent using data, not trying to figure out how to use it.

This paper discusses the data formats and delivery methods available today, provides a realistic understanding of what is involved when providing these formats, offers guidelines for choosing data formats, and outlines needed data standards missing from the industry.

Introduction

For almost two decades, the oil and gas industry has relied on simple but proven technology and services to gather, transmit and store common well data. That is, the workhorse facsimile, the person-to-person phone calls, U.S. mail, and more recently, the dial-up phone line. In today's technology driven world, the software, hardware and experience base is readily available to implement better and more reliable well data gathering, transmission and storage systems, hereinafter referred to as "data systems".

Constructing data systems is no different than building a house. Blueprints are needed to avoid confusion that leads to arbitrary decisions. By dealing with data systems from a business perspective, the domestic oil and gas industry should take a common sense approach. That is, major and independent E&P operators should work with rig providers and with the major service companies to examine the current technology setup. They should evaluate the issues, then develop a blueprint that delivers a clear-cut capital and operating cost justification for data system standards.

The domestic oil and gas industry stands at the proverbial crossroad regarding adopting industry-wide data system standards. There are two logical choices, 1) stay with the status quo and continue to fall further behind, or 2) break the paradigm of technology services – get out of the box, walk the path of new technology and begin reaping the benefits. Either decision carries its own pros and cons, along with its supporters and antagonists; however, the fact remains that the current data system infrastructure is incapable of taking full advantage of the rapidly advancing technology. Outdated data systems can become a business liability. At stake are literally thousands of dollars in lost productivity, time, profit, and wasted human resources. This paper investigates the complex issues involved with data systems and offers a potential solution to the data system standard.

Why Change?

No one denies that existing data systems work, so why change? The reasons are many, but the primary driver is simple – better technologies lead to improved efficiency and higher profits. Using MWD (Measurement While Drilling) as an example, similarities can be drawn between current data systems and those used when MWD tools were first introduced in the early 1980s. Before MWD came along, wireline was the accepted standard for directional surveys and downhole formation evaluation logs. Oil companies embraced MWD and encouraged MWD technology development because it was easy to see the value MWD delivered in time and cost savings. Establishing MWD standards became necessary to further cost and efficiency savings; however, getting these standards adopted was easier due to the already existing wireline standards. Eventually, MWD displaced wireline as the standard for most open-hole formation evaluation applications.

Today, computers are capable of storing and analyzing huge volumes of data. Engineers and geologists find themselves looking at increasing data volumes and needing that data as soon as it becomes available. Everyone is surrounded by new technology. The growth of technology in the oilfield is not slowing. Often, operators are asking service companies to create integrated data sets or provide data to in-house systems for analysis. Back when MWD was introduced, no one could predict the rapid technical advancement or the huge economic impact the MWD function would eventually have on drilling and evaluation. Adopting needed data system standards holds the promise of revolutionizing the way well data is acquired, transmitted, received, and utilized by the end user. By embracing data system standards the oilfield should realize a positive financial impact, perhaps not as measurable as MWD but worthy of the effort.

Existing Services

Before making decisions regarding which services offer the most benefits and what future enhancements may be required, we first have to understand what is available now. Readily available services can be broken down into two categories, real-time data delivery, and static files. Although this may seem straightforward enough, these two categories are often confused.

Most Gulf of Mexico drilling rigs use some semblance of a real-time service, an example being a rig floor or company man display. These displays provide current drilling and formation evaluation data to a remote display, either on the rigsite or at some other location, e.g., an operator's office. All currently available real-time systems are proprietary in nature and are without standards regarding format or data structure.

Real-time displays are delivered in one of two formats, either through a Web interface (using a web browser like Internet Explorer), or by means of a proprietary viewing program. Proprietary viewing programs typically provide faster response, as they are specifically written to interface with the service companies' data structure. However, these proprietary programs should be considered the "old model". As technology services continue to grow and the need to share data also grows, it becomes increasingly difficult to support such applications.

Loading proprietary software onto another company's computers usually results in a stumbling block. For example, say you are involved in two or three different wells, and each well is providing real-time data using a proprietary viewer. You now need to load three different and unique pieces of software onto your work computer. Adding further complexity, this differing software may or may not interfere with the operation of other programs on your computer. Software risk assessments would be required in the event vendors changed during the well or it became necessary to install additional software to your computer. This is one reason "Web" interfaces are gaining such popularity and increased demand.

Using a web interface allows both the service company and the operator to share data from a single web server and view the data in a web browser. Most drilling team members are already familiar with web browser operation, as this is a technology that permeates both their work and private lives. When upgrades become necessary, they are done on the server not on the work or personal computer.[1]

Static data, on the other hand, is not quite as straightforward as real-time displays. Static files can be broken down into three categories, digital files (ASCII or binary data stored in an industry-standard format), graphic images (view and print), and 3-D virtual files (put on specialized goggles and become one with the well). Of these static file types, only digital files and graphic images will be discussed.

Digital files, such as LAS, LIS, and ASCII, have been around for some time. LAS files, created by the Canadian Well Logging Society in 1989, are probably the most common file format. The intent was "to standardize the organization of digital log curve information for floppy disks." Recently updated to LAS 3.0 (in June of 2000), this format provides ASCII data in rows and (delimited) columns. LAS files are often used to input service company data into analytical program(s) used by the Oil Company. Whereas LAS files have been the workhorses of data formats, this file format is reaching its limitations. Working with LAS files is harder due to faster FE tools, the rapidly expanding number of data sets collected and the increasing size of the files themselves. This is especially true for the large time files associated with MWD pressure tools and with LWD (Logging While Drilling) memory data files. Remember, the LAS standard was originally designed for floppy disks, meaning large files often have to be broken into several smaller pieces and brought in one at a time. This is time consuming and greatly decreases productive time.

Graphic images are simply digital pictures (images) of logs. With no oilfield "standard" in place for graphic images, these images come in computer industry graphic standard and company proprietary formats. These formats include (but are not limited to) TIFF, GIF, PDF, and CGM. The TIFF format is a fax format and is the file type fax machines create and send to other fax machines. TIFF files can also be sent from an imaging program to a fax machine or can be viewed by another imaging program. TIFF files are typically black and white and are single images, meaning if the log is X number of inches long then the image is also the exact X number of inches long. A problem arises when dealing with long logs or images. One may assume that printing long logs would only take hitting the printer icon. Printing these files is dependent on the file, software and printer all working together. A disagreement between any of the three and the file will not print properly.

With all the different file formats and data types, it is no wonder some end users complain. Take, for example, the time frame required to generate a log internally at an oil company. The time frame can range from three days to three weeks. The first step is finding the log data (either in a data room or by requesting it from a vendor).

Then the person has to determine the data format. Is it ASCII or delimited? Is it wrapped or unwrapped? What interval is it on and will that interval work with the software being used? What is the file content and what do all the mnemonics mean? What presentation does the person requesting this data expect? After all of this is done, you still have to figure out how to print it. A TIFF may print to a plotter but not to a printer. The CGM file requires special software to view it. PDFs may be a single image or broken into pages. This all points to the lack of a standard for images. Furthermore, the printers and/or plotters capable of printing these types of media do not share the same specifications. Without a carefully crafted game plan, the oil and gas industry runs the risk of drowning in the ocean of available technology, thus the need to explore data system options and begin setting standards.

What Can Be Done Now

Solving the ever-growing data system puzzle is not an easy task, and will take a concerted effort by industry to be successful. Crucial is the ability to view the problem as a whole while concurrently taking advantage of today's services and shaping the services of the future. Establishing industry-wide standards allows businesses to be successful. Everyone knows that when a telephone is purchased and taken home the plug will fit in the wall jack because a standard exists. Why should the petroleum industry be any different regarding data systems? Imagine the potential cost savings if all drilling rigs adhered to a cable standard so sensors could be run through existing conduits rather than run each time a new company arrives on the rig (therefore saving both time and money).[2] Imagine getting a data set and knowing beforehand that the mnemonics were not company specific but met a standard. Establishing this type of data system standard is possible. When industry as a whole moves in this direction, everyone benefits.

Making the tough decisions on what services are needed first means understanding what services are already in place. Key to this process is the ability to understand the big picture from bid solicitation all the way through to well abandonment. Know what service is necessary at what stage in the process. Understand that any service has multiple pieces, the two primary pieces here being the medium and the media.

Understanding Medium Vs Media

It is not necessary to be an IT (Information Technology) expert to understand what is needed to provide services; however, a basic IT understanding will go a long way toward making quality decisions for the well. How "it" gets there is called the transmission medium. "It" can refer to real-time data, e-mail, LAS or image files. Transferring these files can be accomplished by dial-up phone-line or network connection. Each connection can be broken into sub categories providing key benefits and restrictions based on the nature of the connection. Dial-up connections can be established using a cell phone, shared rig phone or dedicated dial-up connection. Cell phone connections are the least reliable of all the connection types. This is due to the relatively low signal strength of the cellular unit. Cell phone transmission is typically noisy and results in slower transfer rates. Cell phones are the most expensive method of performing data transfer services.

Dial-up connections can also be made using a rig site telephone connected by the communications company (also known as the "communications provider"). The telephone line can be a shared line or a dedicated line. Shared lines are the most cost effective, but limit line usage as the person or company sharing it may be using the line. A shared line should be used only for non-critical well data. However, the shared line is useful as a back-up system to primary lines that may already be running on the system. Dedicated lines can send both static data files and real-time streaming data. A dedicated line connection is the best selection if a network connection is not available.

Network connections can be provided on either the operator's network or the service company's network. Typically, a network connection is established through a service company provided computer or an operator-owned PC in the service company's cabin. When required, the entire service company cabin's PC inventory (up to 20 PCs) will be placed on the operator's network. This connection configuration often violates security models and is the bane of the IT community. Other existing options include a service company tying into the contracted communications provider's digital radio or providing satellite based communications. These types of connections allow the service company to connect to its home network. Well data are then faxed or transmitted to a location accessed by the operator or to a central distribution point where the data can be provided later to the operator. These last two options provide the added benefit of allowing the service company internal access to its own network, yielding a higher level of technical support and data analysis than would be available over a dial-up line. Keep in mind that these two connections are not equal.

The service company, using its own satellite system, will likely be the most expensive of all the connections discussed. Primarily due to high connection cost, satellite connections are not typically active all the time, thus restricting this connection to static data transfer. The other option, allowing the service company to connect to the communications provider, works as follows:

- A network router is placed in the service company cabin.
- A network line (typically fiber-optic) is run to the radio room.
- The network line is then connected to the digital microwave or satellite radio.
- The service company works with the communications provider to separate a portion of the band width provided to the rig and isolates the band width.
- The isolated bandwidth is then connected to the service company's network, allowing a fast and dedicated network connection to the rigsite for support, advanced services and data transfer.
- Well data can then be sent static or real-time.

Allowing the service company to tie straight into the communication provider's system (radio or satellite) represents a win/win situation for the service company and the operator. The operator obtains critical well data faster while the service company gains direct access to the offshore cabin for improved technical support, data monitoring, and quality control. Critical to a successful implementation of any network connection is working out the logistics and cost structure. It is highly recommended that operators plan ahead and contract enough bandwidth from the communications providers to allow the service company to network in its rig site cabin (as described above). Voice communications are necessary at any well, and allowing the service company to install a router eliminates the need to run a phone line (either shared or dedicated) to the service company cabin.

Security is perhaps the most important, but least understood aspect of any data system. Just mentioning the ability to "connect to a network" sends shivers, and this can be avoided by a little preventive education. Even with security measures such as encryption and Secure Socket Layering (SSL) not all companies are comfortable placing their well data on the Internet. This is especially true of exploration data where security fears are the greatest. Norwegian companies have created an interesting solution to this dilemma by creating a private oil field network. The SOIL (Secure Oil Industry Link) network in Norway allows a secure extranet site that is not Internet accessible. This allows oilfield operators in the area and service companies a location to run server and move data in a protected environment. This environment allows web access from within a company's firewall. Home users connect first to their company then to SOIL. This also provides faster data movement than can be afforded over the Internet. And the environment is controlled, not open to the general public.

To illustrate this, imagine a company connected to RigNet, which in turn connects to SOIL (Fig 1). The company's home network is also connected to SOIL. A similar scenario could also be arranged in the Gulf of Mexico or in North America. This would allow Internet functionality on a private network, thus diminishing security fears. This would also allow operators and service companies the ability to readily share data and information.

The SOIL solution while providing higher security also caries with it a price tag associated with establishing a private network. A similar yet more cost effective solution could be created by creating a Virtual Private Network (VPN). This solution uses a technology called "tunnelling" to create a secure connection between two (or more) networks over the Internet. The Internet is only the transport mechanism. Data is "tunnelled" from one companies network to another. Most companies already have a connection to the internet, this connection is then used to create the "tunnel" to another company. Providing the same "Virtual" structure as seen (Fig 1) at a fraction of the cost.

Media - The Data or Image

Media can also be looked at in two ways. LAS files are digital media. Printer paper is also called media. Once in hand or on a computer, the data are referred to as media.

Fax machines have long been a staple for the transmission of oilfield data. The older thermal fax machines allowed continuous prints of logs from the field; however, this type of fax machine is getting harder and harder to find. Although the oil and gas industry represents big money from a business perspective, it is not a large volume purchaser of media devices. As such, the oil and gas industry is forced to pick from what is available. Current trends suggest that the rolled paper thermal fax is a dying commodity.

Revisiting the static media issue, with the fax machine fading from existence, there will be an increase in demand to provide digital images that can be viewed and printed in the office. Without image file standards, the possibility for problems with printing and plotting becomes enormous. Untold amounts of money are being spent in lost man-hours at the office attempting to make files print or simply show up on the monitor.

A good example is the PDF file format. PDF is an Adobe Acrobat software product. It is gaining widespread popularity as it is used across many industries, including the Internet. The viewer is free and is already installed on most PCs. However, one of the main reasons the PDF format has become so popular is because it is very flexible, meaning images can be made to almost any size, or broken into little pieces of any size. Again, without standards it is common for one company's (Company 'A') PDF format to be one size, say 8.5" X 11", while another company's (Company 'B') format is something altogether different. Both images can be opened and viewed, but when Company 'A's image is printed to a plotter, the result may be a log that is 36 inches wide and cuts off at each page. Try printing the image to an Epson 1520 and it prints fine (assuming the printer settings are correct). Print the same image to a different printer or plotter and it is broken into pages, but the image may be to scale or it may be compressed. It is also possible for Company 'B's file to print fine to a plotter, but only the header prints to the Epson 1520. Multiple partners, each having different printers and media, add further complexity. These scenarios are real and cause undue stress and cost.

The time has come to face reality – the fax machine will eventually go away, and may be gone faster than anyone expects. The example in the previous paragraph may lead you to think, "forget these images, I just want my fax." Remember why images are better, they are clean and they are in color. Clean means the digital image does not degrade each time it is transmitted, the way a fax image does. It is also easier and more economically feasible to store 1000 digital images than 1000 printed logs.

Digital images are the future, but the oil and gas industry must set rules or chaos will reign supreme. Service companies all have their own digital image "standard", with some of the larger service companies having multiple standards within their own organizations. Wireline files are often in a different format than LWD or Mudlogging files. Before pounding the table and chanting, "fix the service companies", remember there are two pieces to media. Some consensus must be reached about hardware used at the well site and in the office for printing. This is not to imply that everyone must use the same printer/plotter brand or model. It just points out the need to agree that the print device will support the adopted media standard (provided a standard is adopted).

Earlier, it was mentioned that real-time data services include proprietary software and browser or web type access. This can be further broken down into single machine, network accessible, and hybrid systems. A single machine system, as the name implies, is one machine in an office or on the drill floor that grants the user access to that machine only. Single machine systems typically represent a proprietary software package, but a Web access system could also be configured in this manner. A single machine system could also be a kiosk machine located in a central workroom whereby personnel go to that machine to access the data. The kiosk configuration is usually chosen due to software, network or security limitations. In this case, the software is unable to provide data to multiple locations, the network access has been restricted due to IT policy, or Security requirements (usually tight hole information) restrict access by location. Either way, the single machine system is the most limiting way of presenting information.

Mr. Robert Peebler wrote an article in November 2000 suggesting the direction E-business should take in the oil and gas industry. In his article, Mr. Peebler states, "The Internet is a powerful force in enabling more profitable decisions, because it is all about connecting people with information in real-time."[3] His conclusions were that oil companies would see the greatest business success through the ability to pass and share data (utilizing Internet technology) not through E-commerce. Quite simply, the reason to drill is to seek information on the success of the project and begin laying the groundwork for future projects.

If the ability to rapidly access and assimilate FE data is accepted as one of the paramount keys to success, then why isn't industry pushing harder for network accessible data systems? These systems allow end users to access and evaluate critical well data from virtually anywhere there is a computer, at the office or at home. The most common network installation places a web server inside the operator's firewall allowing access of the data for any computer that has access to the operator's network. This is beneficial for the operating company, but leaves support teams and partners out of the loop. Recently, network data systems are moving to the Internet, thereby allowing the same access from the desktop, but also allowing both service company and partners access to the data. This does not mean that anyone can access and view the data. These sites are secure access sites and the operator controls access.

Even though placing data on an Internet site is a great step forward, it still leaves a few matters unresolved. Real-time data is not the end all of data services. Yes, it yields a picture of current events, but geologists and engineers still need to move the data into programs for manipulation, evaluation and modeling. Some real-time systems have data export capabilities, but few to none have the ability to directly interface with other systems or programs used by the oil companies to perform the evaluation and modeling work.

To satisfy end of well requirements, data export, import, and specific file generation is needed. End of well data could even be carried a step further. For example, if a service company has to leave a rig site or if different service companies monitored previous wells, why shouldn't the data be importable to the new service company? The biggest hurdle is, once again, the lack of a standard for the data structure itself.

Each service company uses different data structures. This is not to say all service companies must use the same software, but rather, a data structure guideline needs to be defined and agreed upon so all service companies adhere to the same standard. One prime example is mnemonic names. An article in the Winter 1999/2000 Oil Field Review states that "currently there are more than 50,000 different types of well-log traces", and that "it is not uncommon for purchased data to be – in effect- thrown away, because it would cost more to understand the data than it would to reacquire the data."[4] Imagine the frustration of a geologist attempting to model a well using data from different LWD, wireline, and surface logging companies. Different names would exist for each resistivity data set, and for each curve within the resistivity data set. Most operators would not know a RPCHX from a PSR_RT. It is not logical to force operators to learn a catalog of different mnemonic names.

The electronics industry has set a good example with all its semi-conductor components. Regardless of the manufacture, anyone can pick up a resistor, look at the color bands and know all the information needed about that particular component. The same is true for transistors, diodes and other electronic components. Just like the electronics industry, the oil and gas industry can adopt a standard naming convention for well data, thereby promoting understanding without confusion. The naming convention could be a breakdown of the data by reading, characteristic, measurement, measurement specifics (reading, depth of investigation and frequency). For example, an induction resistivity tool reading the phase characteristic of a 400 kHz wave with a 36-inch depth of investigation could be represented by RIP400K36i.

Adopting any standard will require a great deal of time and commitment from operators and service companies alike, but the end justifies the means. Time is best spent using the data, not trying to figure out what it is. A standard naming convention is the best first step to accomplishing global data standards.

The Bid

Some sort of data service is required in virtually every well that is drilled. As early as possible, the operator should take the time to thoroughly evaluate the data requirements to be provided by the service company. An evaluation is especially important to help determine data system feasibility and compatibility, reducing start up errors. Any data system solution requires a combination of time and planning, but planning should start with the bid process and end when the final well data are submitted.

When requesting a bid for data services, be sure to include the printer types available to the geological, petrophysical and engineering teams. Ask the IT department to list what web browser software they use and what version. Include any IT policies that the bidding company needs to be aware of. List IT contact names in the bid request so that technical staff can get questions answered and provide the best solution in the least time. Provide the name of the communications provider being used at the well site.

Getting these items early in the bid process allows the service company to discover any pitfalls such as equipment incompatibility, inability to provide requested service, and to identify training issues. Although it will take a little longer to gather this information, the result will be less wasted time fielding information calls from all the different service companies. Ask the bidding company to provide example log files. Provide these log files to the IT department for evaluation of the right software and hardware to utilize the files. Though it might seem odd involving IT in the bid process, they are the resident experts in software and hardware related issues and need to understand the file types being worked in order to ensure compatibility. Getting IT involved early on will only help speed the bid process and lead to a better end result.

What the Future Holds

The major information technology trends for the future are the increased availability and speed of mobile communications and the proliferation of devices that will be able to access information on the Internet. It will be possible to host web servers containing drilling and formation evaluation information on any rig and give almost instant accessibility to anyone with the appropriate security permissions to access that server. Access devices will include mobile telephones and Personal Digital Assistants (such as the Palm Pilot) as well as the current techniques of using computers with web browser software. It will be possible to update project databases in oil company offices in real time.

This will enable multi-disciplinary projects teams to analyze wellbore positioning relative to the reservoir model while drilling, and maximize the productivity of the well. A project team need no longer be located in a single office when wide area networks provide instantaneous access to information from anywhere around the world. In difficult drilling conditions, oil company and/or service company experts in different locations will interpret real-time drilling information and provide feedback to the drilling team at the wellsite.

The use of live connections to rigs can also enable remote monitoring of the drilling process from a shore-based office that can handle multiple wells simultaneously. This can be used to cut the cost of having people at the wellsite and also to share experience of a core group of experts among multiple jobs for operations such as reservoir navigation (a.k.a. "GeoSteering"), drilling optimization or wellbore stability analysis. This concept is currently being implemented in the Baker Hughes Team 2000[TM] facility in Scavenger, Norway and in the North American Region Data Center located in Lafayette Louisiana.

As information transmission and distribution becomes easier, it is more likely that this information will need to be shared between different applications running on different computers and operating systems. This will require establishing of oil industry standards for exchange of information. The WITS standard has existed for a number of years to define formats for the transmission of wellsite data from one location to another, but it is currently in need of expansion and updating for use over Internet based systems.

In November 2000, an alliance of E&P companies and service companies entered into an agreement called Open*Spirit*[TM]. The idea was to create a vendor-neutral, platform-independent application framework that allows E&P companies to select and integrate best-in-class applications, independent of their chosen data management solution.[5]

Looking at other industries, the trend for information exchange in the future is to use XML (eXtensible Markup Language). This can be thought of as the next generation of HTML, the formatting language used to present web pages. XML adds the ability to define data formats that can be transferred over the Internet and manipulated by software running on different computers and operating systems. In order to refine the use of XML for the oil industry, it will be necessary to come to agreement on how to represent drilling information in XML format.[6] Some work has already been done on this by Landmark with their DEX[TM] system and by POSC with WellLogML and some other schemas for drilling and completions information.[7]

There is also a new oil industry initiative called WITSML (formerly known as the "Willowfork" project) involving oil companies and service companies working together to define wellsite data interchange standards. The aim of this project is to define an up-to-date standard for the transfer of drilling information between service companies at the wellsite and oil company software systems in the office.[8] This will make it much easier for oil company project teams to monitor the progress of well trajectories, formation evaluation data and drilling information in real time in the context of the reservoir models. For example, a mudlogging company could transmit drilling data records, an MWD company could transmit formation evaluation and downhole mechanical data and a directional drilling contractor could provide wellbore trajectory information. All of these data sets which were probably generated on PC Windows[TM] systems can then be loaded into OpenWorks[TM] or GeoFrame[TM] running on UNIX[TM] workstations without any need for further re-formatting or processing. A common standard such as this enables oil companies to get the same level of data delivery from any of the service companies which support the standard. For the service companies, it means that they can compete on the strength of their tools, data acquisition and processing rather than on the presence of proprietary ties to specific software systems.

Conclusion

Data systems in place today have come a long way towards providing data in the formats and speed required by the oil and gas industry. However, they are only a stepping stone to where industry needs to head. Projects abound (and more will be started) that begin to address portions of the problem; however, no initiative has been started that addresses all areas requiring attention. Standards must be established in a number of areas to truly reap the benefits of the information age. Some recognized areas for standardization are:

- Require rig providers to install a permanent bundled cable standard so that cabins are connected in hours not days.
- Mnemonic naming standard to reduce confusion and increase understanding for all well data.
- Data base storage standard to allow better information sharing.
- Data transmission standard that goes beyond WITS and allows for WEB access.
- Graphic images file standard to produce logs.

Incorporation of these standards will reduce expense, time, and frustration and make it possible to provide the highest quality of service. But none of these needs will ever take form unless the oil and gas industry demands it to happen. Creating any one of these standards must be joint decision between the service sector and the operators, and the decision must be followed through to completion. It starts with gaining a better understanding of what is asked for in a bid for services and it grows by asking WHY? Why is this file or image being used? Completion comes when the oil and gas industry forms a committee dedicated to changing the way data system business is conducted. The choices are simple. Industry can use the technology available to it to break beyond the boundaries of what is known or industry can continue to seek individual solutions to industry problems. Demand more from the data services received. Break the paradigm of technology services and evolve the industry.

Nomenclature

ASCII = American Standard Code for Information Interchange
CGM = computer graphics metafile
E&P = exploration and production
FE = formation evaluation
HTML = hyper text mark-up language
GIF = graphics interchange format (Compuserve*)*
kHz = kilo hertz
LAS = log ASCII standard
LIS = log information standard
PC = personal computer
VPN = Virtual Private Network
PDF = portable document file
POSC = Petrotechnical Open Software Consortium
PSR_RT = phase shift resistivity real time
RPCHX = resistivity phase compensated high (2 MHz frequency) transmitted
TIFF = tagged image file format

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References

1. McGinley, P.: "Leveraging off Advances in Internet Technology to Bring Data to the Expert OnShore," SPE Paper No. 56687 presented at the 1999 SPE Annual Technical Conference and Exhibition, Houston, Texas, Oct. 3-6.
2. Hammons, L., Zamora, M., and Istre, R.: "The Permanent Bundled Cable System – A Major Advancement in Data Communications," SPE Paper No. (not yet assigned) to be presented at the 2001 SPE Annual Technical Conference and Exhibition, New Orleans, Louisiana, Sept. 30 - Oct. 3.
3. Peebler, R.: "Time Running Out for E&P's E-business Operations," PennWell Offshore November 2000.
4. "Classifying Oilfield Data", Oil Field Review Winter 1999/2000.
5. http://www.openspirit.com ,: Open*Spirit* web site.
6. http://www.xml.org,: XML web site.
7. http://www.posc.org ,: Petrotechnical Open Software Consortium web site.
8. http://194.128.29.83/willowfork,: Willow Fork web site.

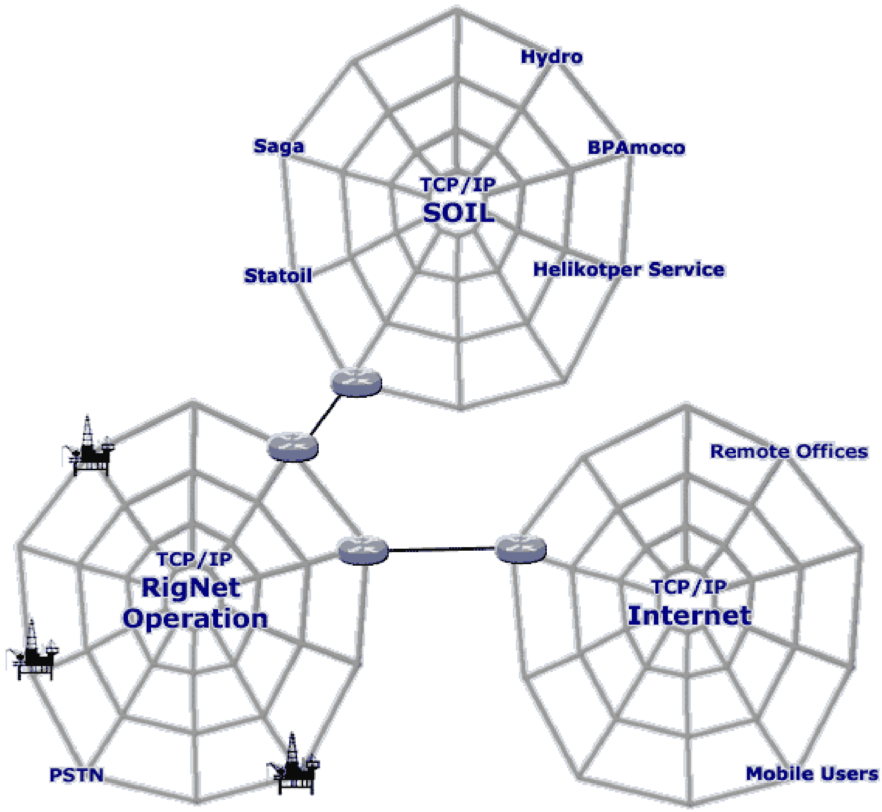

Figure 1 – SOIL Network