



## Managing Your Business of Drilling

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### Abstract

The definition of “Drilling Optimization” is expanding from one that focuses on the drilling process, to one that includes the “business” or “management” of drilling. The business environment today is driving the need for tighter controls, more timely decisions and streamlined operations to make larger contributions to the bottom line. A new set of technologies has been introduced to advance the capabilities for operators and contractors and improve their drilling business performance. Such technologies include rig site instrumentation with satellite communications, and automatic data population into reporting systems and drilling business applications and databases. In this paper, we will be addressing points beyond data acquisition to the ability to develop reports and summaries populated with real time data and using that information to streamline and enhance drilling business decisions. The technologies are integrated in a manner that streamlines drilling operations and the use of real-time data delivers information immediately to support critical operations associated with well construction and well administration. In today’s business environment, where proactive risk management is essential, operators and contractors who use these technologies can more tightly manage risk, cost, and compliance in their drilling operations.

### Introduction

The removal of “flat” or “hidden” time within the drilling process has long been the focus of service companies, contractors and operators alike. This focus is now expanding to one that includes the “business” or “management” aspects of the drilling program. Problem areas that are now being examined include:

- Administration optimization; for example “bridging the digital gap” between field and office and removing flat time in the administration process
- Faster decisions via real-time analytical information (for both the drilling process, and the fiscal management of the drilling program)
- Expand the capability of the limited number of experts with critical skills and knowledge to cover more projects
- Integration of drilling information with business systems in order to support the decision process for management teams

Solutions to the above needs have driven an investment in infrastructure between field and office operations. Where couriers and fax machines were once the principal tools for communicating field activities to the office, today’s rigs are now justifying the use of satellite communications coupled with databases and reporting systems. These technologies are proving useful to operations, business managers as well as drilling engineers for reducing “flat time” and speeding up the decision processes. It is now a requirement for remote persons to have a “down to the second” or real-time view of their operations. “Performance driven products are resulting in significant cost reductions, even in mature fields. Value to their respective (customer set) is created by improving product performance of application-specific technology.”<sup>1</sup>

### Optimized Administration – “Bridging the digital gap” between field and office

Previously, the primary method of communication between rig and office was by courier, fax or phone if service was available. Thus the “data gaps” existed between electronic instrumentation systems, paper based reports, and systems back in the office. This gap between drilling events and management awareness could be significant and possibly costly.

In order to bridge this “digital gap”, yesterday’s rig instrumentation packages are maturing into rig information management systems. Several advancements have reduced the time required for administrative tasks on the rig, letting the users of the system turn their attention to drilling operations in a more focused manner.

An example of this is the IADC (or CAODC) report moving to an automated paperless model. Most EDR/PVT instrumentation packages now come equipped with reporting modules that allow users to automatically populate key sections of their IADC report. Other business-critical reports such as Morning Reports, Safety and Maintenance Reports can add hours to the daily job that the toolpushers and company men have to perform in addition to supervising the drilling process.

Some rig site drilling information systems now include the ability to cross populate between reports so that information is entered only once and reused on other reports in an automated fashion. The time spent on filling out reports is significantly reduced, allowing for improved focus on the drilling process. Drillers can spend time inputting data as they drill while the toolpushers are placed in an approval mode since most of the remaining data is cross populated from other reports on the system. As a result the toolpusher can save up to 80% of his administrative effort and focus more on his drilling operations. His timeliness is improved with reports being delivered on time and accuracy is increased due to the auto-population of data and streamlined approval and data transmission processes.

While reducing administration time at the rig site, this technology leads to tighter process links between office and field operations, resulting in a more streamlined administration and management of the drilling program. This first level of optimization (for example; report automation and satellite connectivity) sets the stage for driving productivity at the corporate office. Information must flow in seamlessly from one system / process to another in order to reduce the amount of manual data entry required while improving the overall data quality and accuracy at the corporate office.

### **Real-Time Distributed Decision Support**

While automated reports may address flat time associated with administration issues, other means are required to address issues associated with the real-time management of the drilling process. With the second level of optimization, the introduction of satellite communications creates a "digital easement" that allows for information to be distributed in a manner that supports both drilling and business decisions.

Before satellite connectivity to the rig was available, the majority of drilling process decisions occurred at the rig where real time data was available to support decisions in a timely manner. The limitation of having real time information available to only rig site personnel resulted in the following issues:

- When rig site personnel felt that a decision requires additional expertise, delays can be introduced when time is spent calling the remote team at the office.
- Related to the above, the inability to make a timely decision could result in damage to the well. When asked to contribute to operations remotely; "There are many times when there is just not enough time to really properly analyze information that might be available in the field."<sup>2</sup>
- Without timely cost plan vs. actual with forecasting information, drilling budgets become difficult to manage tightly, resulting in cost inefficiencies.
- Quality of a decision is typically relative to the experience of the individual making the decision.

Thus, organizations typically have engineers and geologists that specialize in managing certain drilling processes. If an engineer or geologist is dedicated to a single rig location, that individual's expertise becomes unavailable to other rigs, resulting in potential losses for the other rigs.

As rig site EDR/PVT systems deliver decision support for rig based personnel, the addition of remote and local databases and satellite communications can build the infrastructure that allows for the real-time sharing of drilling process information with remote decision makers. Such technology facilitates distributed decision support wherever a company's expert resources may be located. These technologies are now offering remote users much of the same capabilities as local users so that decisions are made based off the same information set. Specific examples are:

- Timeliness of data (a 1 second view of drilling information)
- Ability to manage data in a traditional EDR/PVT manner (e.g. strip charts and gauge views)
- Selection of data channels for monitoring / trending
- Ability to set local alarms for specific data channels
- Ability to customize views to end user requirements
- Ability to access information using standard Web based tools

Access to the rig's current activities is immediate and readily available. This enables experts to simultaneously view and manage many projects from a single workstation. This expansion of the decision support network allows remote experts to augment a team of entry or intermediate level resources so that mentoring can occur while a higher level of quality decisions are being made.

"Integration and automation improve efficiency, saving time and money... In the past, someone watching a gauge would pick up a two-way radio and tell an attendant to manually open or close a valve until a desired pressure was reached. 'We run with about half as many people (as the older systems did)...'With a collaborative, real-time approach to work processes, both office based experts and field engineers can improve decision making and reduce cycle times in developing reservoirs..."<sup>3</sup>

Another key result is that instantaneous information can allow for effective risk management and facilitate fast communication before serious problems occur. This greatly improves cost control as situations can be avoided and managed prior to becoming expensive problems to fix and work through.

In this manner, the definition of "team" is expanding to include remote personnel. The result is the removal of "flat time" associated with the decision making process

and a much closer management of rig operations in terms of plan vs. actual.

### Real-Time Business Integration

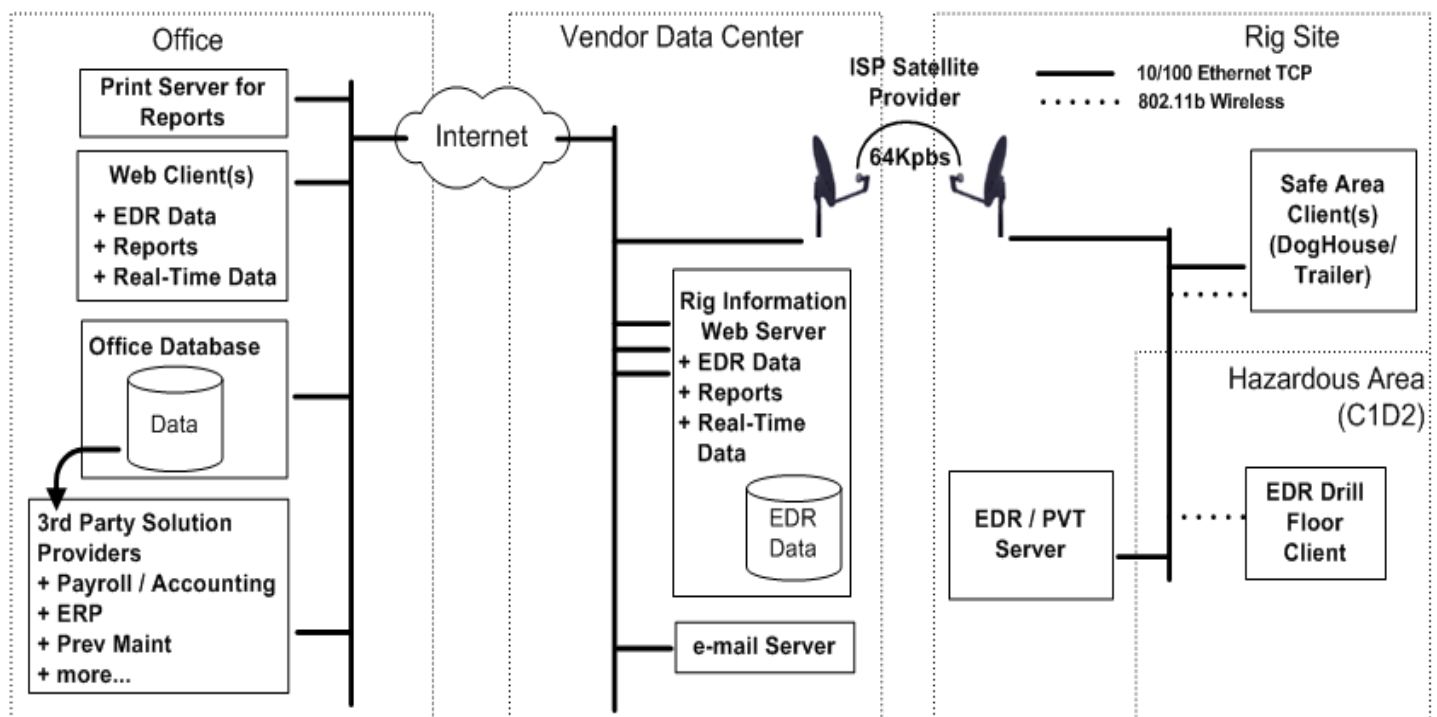
While decisions at the rig site can ensure that a quality well is constructed, quality decisions at the corporate office ensure that the business is operated in a manner that reduces risk and that the business performs to stated fiscal objectives. To support business performance goals, flat time in the management / administration of a fleet of rigs has to be reduced. Failure in managing and meeting performance targets can mean losing the next contract or lease to a competitor that is winning on the business front with better information and controls.

For those operators and contractors utilizing legacy paper based forms or at best a spreadsheet, the “day to day” administration activities associated with well construction involve operation teams dedicated to collating reports in preparation for data entry into numerous business systems within the office. For the office team, data entry activities involve processing cycles that are measured in days, or often times weeks. With this “paper oriented” process, decisions based on Key Performance Indicators (KPI) for both the well construction cycle and business support activities, are not made in a timely manner. This can impact multiple aspects of well construction ranging from maintenance, safety, payroll, accounting, and other decisions associated with both the drilling business and the drilling process of specific wells.

By adopting the latest in rig/fleet information systems, an instantaneous and paperless electronic process can be used to replace legacy “paper oriented” systems. The result is that electronic versions of rig activity reports are streamed directly into office and web accessible databases. Thus, decision makers have immediate access to KPIs from secure internet connections and from business systems that are immediately updated as information is received from the rig.

The impact of remotely monitoring instrumentation and related operations on the rig facilitates proactive notification of possible problems and maintenance concerns. The user gains efficiency and therefore can deliver additional value to their customers in providing a more timely, and higher service level.

Figure 1 below depicts the high level architecture to integrate the drilling process into business objectives. Key components consist of basic data acquisition systems feeding a database on the rig. As an example, a large land contractor recently reported that by automatically populating the time distribution hours from the IADC report into their billing system, customer invoice processing time, in some cases went from a 10 day paper oriented process to a less than 1 day electronic “paperless” process. This billing process takes place at the end of the month or the end of the well. The decision makers had more timely and accurate information while capital, traditionally tied up in receivables (and other activities) was now available to help fund other aspects of their business.



**Figure 1 – Basic Paperless Drilling Information System**

Also freed up was the amount of time spent by 5 data entry clerks during the first 4 hours of every day. Such efficiencies become possible as administration staff are now in an approval mode and can focus on more productive tasks, as opposed to spending their time focused on data entry. These 5 individuals were subsequently assigned new responsibilities which add value to the organization as well as an enhanced career for themselves.

It is not only about saving administration time and dollars. Of significant value is the information captured in the drilling database. Immediate access to drilling information means more time can be spent analyzing drilling processes and looking for ways to optimize them. With the information available one can now match flat time in the EDR data with information in the Morning Reports. The rig drilling operations and drilling programs can now be tuned as a result of the specific data, and tuned in a more timely manner. In this fashion multiple departments can have immediate access to information that was not previously available or readily available:

- For operations managers, proactive maintenance programs can be created as a result of equipment cost and reliability detail being summarized in a single database.
- For safety executives, safety is more tightly managed with all safety records recorded in a single place for monitoring.

Contractors become more efficient and valuable to the operator because they can optimize performance immediately and tune processes accurately on the spot.

## Conclusions

Despite the size of the drilling budget, money may be left on the table due to slow decisions, lack of plan vs. actual comparison tools and program projections. Satellite communications combined with a paperless reporting system integrated with the EDR/PVT package, can provide instantaneous tracking of KPIs and optimization of both administration and drilling process activities.

Invisible/lost time is encountered when filing out paperwork, transmitting reports, fixing data accuracy, inefficient process decision support of the drilling activities and poor plan vs. actual comparisons. As a result, lost dollars exist in the administration and management of drilling activities. Our industry is more willing to invest in the infrastructure required to remove much of this waste; in a manner that allows for real-time information to support distributed decision making for both process activities and business activities.

The differentiation is encountered with a customized reporting package that optimizes the population of reports in a manner that reduces time typically

associated with a "paper oriented" process. Further differentiation occurs when reporting capabilities are made available via web and office based applications.

Communication packages that bridge the "digital gap" between the field and the office allow key decision makers to manage both the process and business of drilling more efficiently. Bi-directional communication is mandated to drive the team involvement for smoother operations with both the Operator and Contractor. "(Real-time data) allows us to keep most of our engineering experience in a centralized location...without having to send people to the field to oversee operations every single time. While at the same time allowing better communication from the field back to the office"<sup>2</sup> Real time data view is required for the monitoring of drilling process information so that the team making the decisions can include experts wherever they may be located.

"Key technologies such as real-time data transmission, communications and three-dimensional visualization tools are incorporated...enabling geologists and engineers to visualize, and interpret reservoir, completion drilling and operational data in real time."<sup>2</sup> Four of the top five largest land drilling contractors<sup>4</sup> in the United States have begun investing in these technologies, not only to become more efficient themselves but also serve their customers (the Operators) better. Investments in this area are showing returns on both the process and business sides of the house.

Higher productivity is possible when adopting these real-time data technologies hosted in a central drilling database. As soon as the company man and toolpusher meet on the well site, the company man can give the toolpusher his drilling curve to load into the toolpusher's rig site information system mentioned above. The progress of the job can be tracked exactly to plan as a team effort with specific issues being compared to history and new issues addressed as they occur. The extended team in the office can be brought into critical situations instantly with real-time data for fast resolution. The operation has a minimum of flat time and a true partnership develops enabling better performance of both parties. The team and the organization have more time to provide a better service and typically receive incentives for such performance. For the organization, this means a more marketable drilling program.

As operators and contractors strive to become more efficient and stretch their investment dollars, it is imperative that instrumentation providers become a partner in their respective business models so they can contribute directly to those efficiency gains. As more contractors deploy rigs equipped with rig information

systems, satellite communications, and drilling operations databases, the technologies should be exploited to streamline rig site operations and drilling programs in a manner that maximizes efficiencies between actual operations and the corporate office.

As real-time data matures, operators exploiting it can improve management over drilling risks, investments, programs and processes. Contractors will not only be able to improve operational efficiencies but will be able to extend more services to their customers than ever thought possible. As a result the operators stand to gain even more as their drilling investment goes farther and higher drilling productivity is obtained.

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### Nomenclature

*EDR* = *Electronic Drilling Recorder*

*IADC* = *International Association of Drilling*

*Contractors*

*CAODC* = *Canadian Association of Oilwell Drilling*

*Contractors*

*PVT* = *Pit Volume Totalizer*

*KPI* = *Key Performance Indicators*

### References

- 1 Sinor, Al., "The Importance of Being Value Driven," *Journal of Petroleum Technology*, (August 2004) 20.
- 2 Smith, M., "Centrestage", *New Technology Magazine*, October November 2004, 20-21.
- 3 Roche, P. "Refining the Concept," *New Technology Magazine*, (October/November 2004) 38-39.
- 4 RigData, "Top 100 Drillers Ranked By Footage," (October 2004).