

# The changing face of the industry – a view of the service provider

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## Abstract

In the 21<sup>st</sup> century, a staggering level of exploration and production investment will be needed to satisfy increasing worldwide demand, given the maturity of large producing fields. To generate higher returns, the industry must be able to cost-effectively discover and develop new reservoirs, and at the same time, improve recovery percentages from the traditional 25% to 35% to levels of 60% or more. This will require new technology, new workflows, highly skilled individuals and a shift from a product- and service-centred to an information-centred culture. In other words, an iTransformation is necessary, at the heart of which is the ability for anyone, anywhere to immediately access reliable, validated data and knowledge to aid decision-making.

The evolution of the service industry has been characterized by a few significant factors over the last 20 years. The key ones have been broadening of the service and product offerings by a few individual companies, sector consolidation through mergers and acquisitions, and a shift towards integrating cross-disciplinary services as a basis for constructing engineered solutions. In addition, oil and gas companies have cut back on R&D spending and reduced engineering staffing levels, focusing on core activities and leading to increased outsourcing and alliancing. Just as this responsibility shifted to and was shouldered by the service industry, so has the challenge for iTransformation. Leveraging IT services to provide information solutions based on real-time data through technical collaboration within and between companies will be key for both new field developments and increasing the drainage of existing reservoirs. This has been the driving force for the creation of Schlumberger Oil & Gas Information Solutions (SIS), a unique organization with a complete offering of software products, data management, expert consulting services and information technologies applicable from reservoir discovery to abandonment.

## Introduction

In the 21<sup>st</sup> century a staggering level of exploration and production investment will be needed to satisfy increasing worldwide demand, given the maturity of the large producing fields. To generate higher returns the industry must be able to cost-effectively discover and develop new reservoirs, and at the same time improve recovery percentages from about 37% to 60% or more. This will require new technology, new workflows, highly skilled individuals and a shift from a product and service centred to an information-centred culture. In other words an iTransformation is necessary, at the heart of which is the ability for anyone anywhere to immediately access reliable, validated data and knowledge to aid decision-making.

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integrating cross-disciplinary services as a basis for constructing engineered solutions. In addition, Oil Companies have cut back on R&D spending and reduced engineering staffing levels focusing on core activities, leading to increased outsourcing and alliancing. Just as this responsibility shifted to and was shouldered by the service industry, so has the challenge for iTransformation. Leveraging IT services to provide information solutions based on real time data through technical collaboration within and between companies will be key for both new developments and increasing the drainage of existing ones.

This is the reason why the information-centric divisions of Schlumberger have been combined under the umbrella of Schlumberger Oil & Gas Information Solutions (SIS). Schlumberger has long been proactive in IT, dating back to 1980. Most recently, the integration of Schlumberger and Sema has created a strong foundation for delivering real-time decision-making capabilities to the industry, leveraging the processes, experience and critical mass of a leading IT company. SchlumbergerSema specializes in the provision of

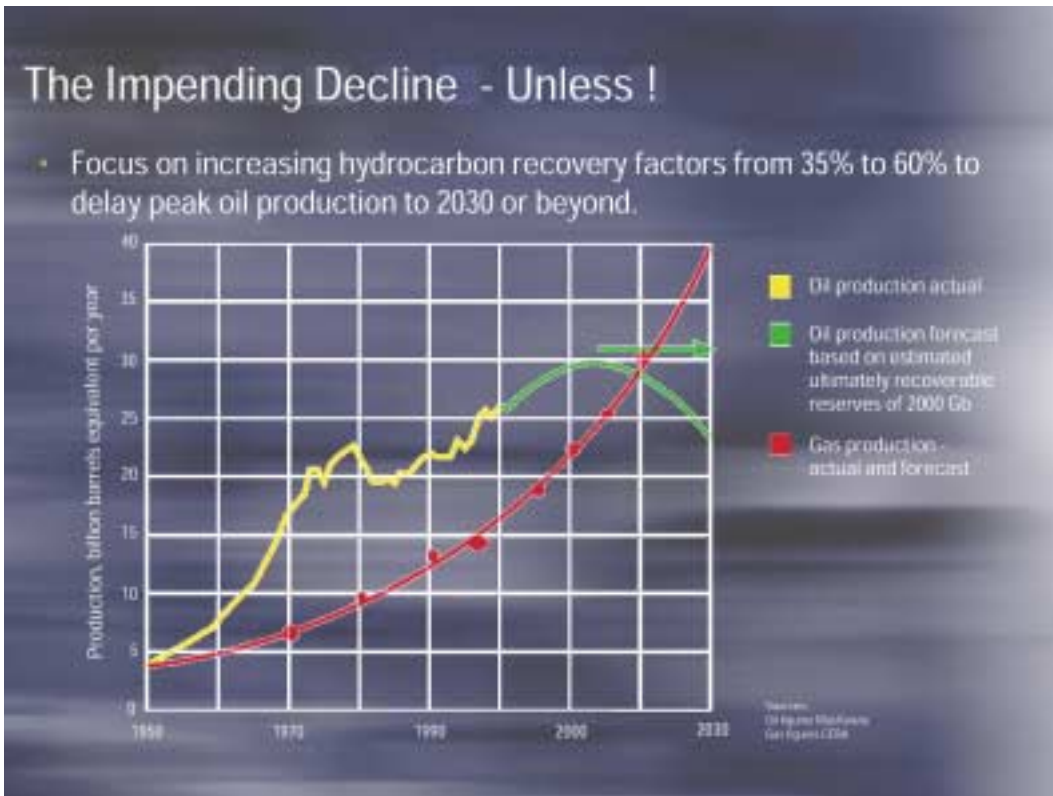


Figure 1: showing world production forecasts

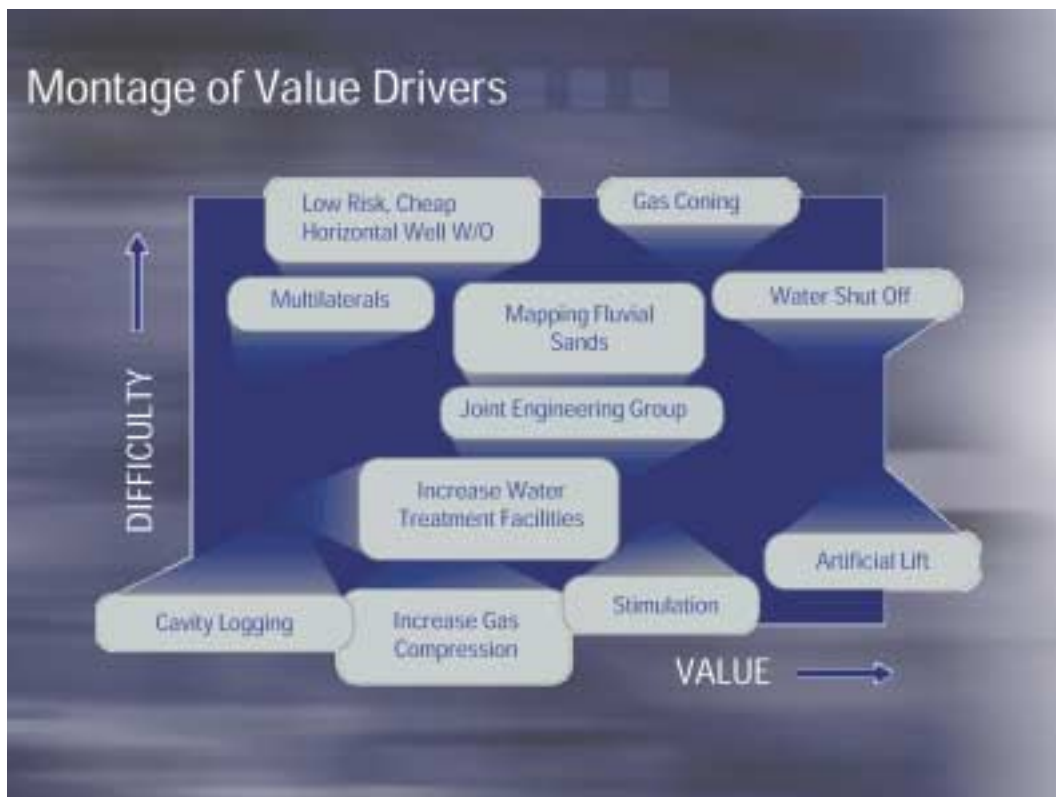


Figure 2: showing montage of operators drivers

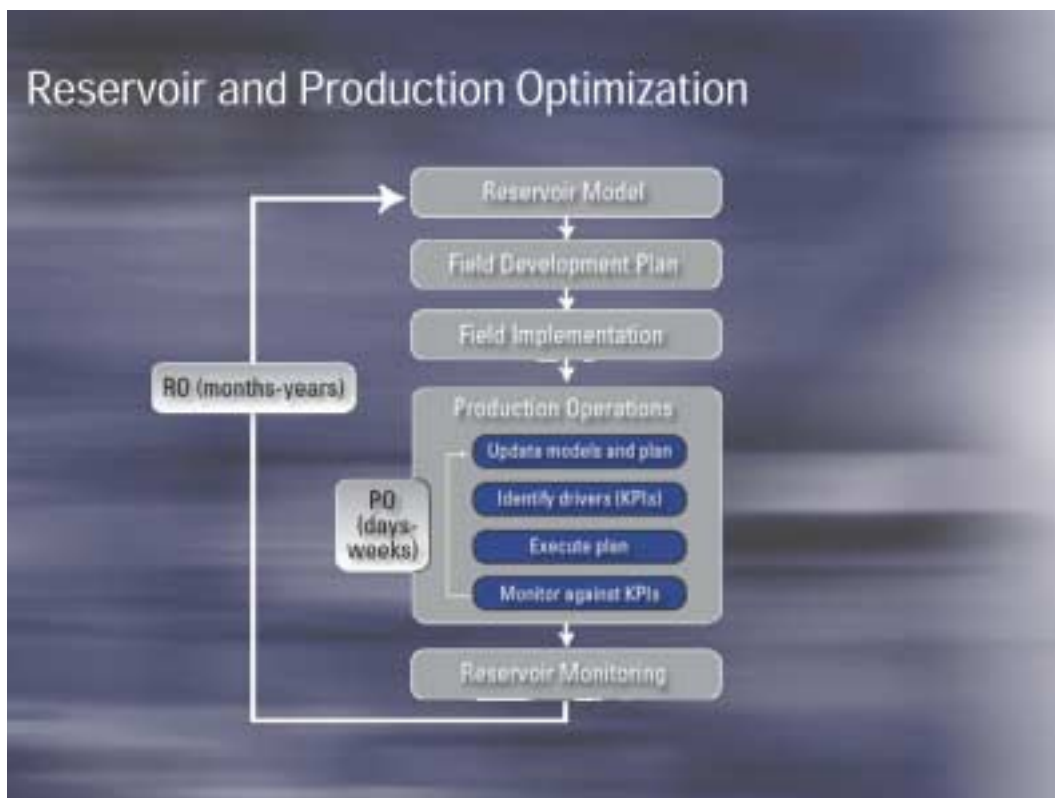


Figure 3: RO-PO loop

consulting services in business and technology, process systems integration and development, specialized industry software products, and IT outsourcing across a broad spectrum of industries. In the oilfield arena SIS has unique capabilities with a complete offering of software products, data management, expert consulting services and information technologies applicable from reservoir discovery to abandonment.

## Industry challenges and opportunities

The E&P industry faces mounting pressures to reduce finding and producing costs, increase recoverable reserves and maximize asset value. Stockholders and the investment community are demanding higher returns from an industry that has traditionally lagged the financial performance of other commercial enterprises. Oil and gas company restructuring and mergers, have principally been aimed at improving efficiency and financial returns. As operators focus on their core business, all other activities are increasingly being outsourced. Previous cornerstones, in-house proprietary technology developments, are giving way to either developing with or using, what is available in the industry and exploiting them innovatively to establish a competitive advantage. There is thus a redefining of traditional roles and an evolving relationship between Operators and the service industry.

Efficiency and productivity improvements are essential. To generate higher returns, the industry must be able to cost-

effectively discover and develop new reservoirs and, at the same time, improve recovery percentages for existing reservoirs from the traditional average of 37% to 60% or more. The average size of new fields today has dwindled from 200 million barrels in the 60's to about 50 million barrels today. New prospects, by and large, appear to be in deeper waters and remote areas where costs and risks are higher and field developments more complex. In developed fields, since around 63% of the oil that has been discovered is still left in the ground, the prize is enormous. Each 1% increase in recovery equals one year's consumption at current demand. A focus on production and reservoir optimization is thus inevitable.

Reviewing a montage of an operator's drivers as pictured from a recent workshop, the challenges are evident for existing and new fields. Mature brown-fields have to compete for corporate investment in the wake of declining production, increasing water cuts and rising costs.

In our view, future success depends on a shift from a product and service-centered to an information-centered culture. Reservoir characterization from high definition seismic, new logging measurements and improved modeling and simulation – together with reservoir and production data from permanent sensors linked to intelligent completions that can modify multiphase fluid flow profiles – are fundamentally changing the way reservoirs are being managed. Instead of reacting to remedy the problems after they occur, we have predictive information to anticipate reservoir behaviour, optimize sweep and flow of hydrocarbons and improve

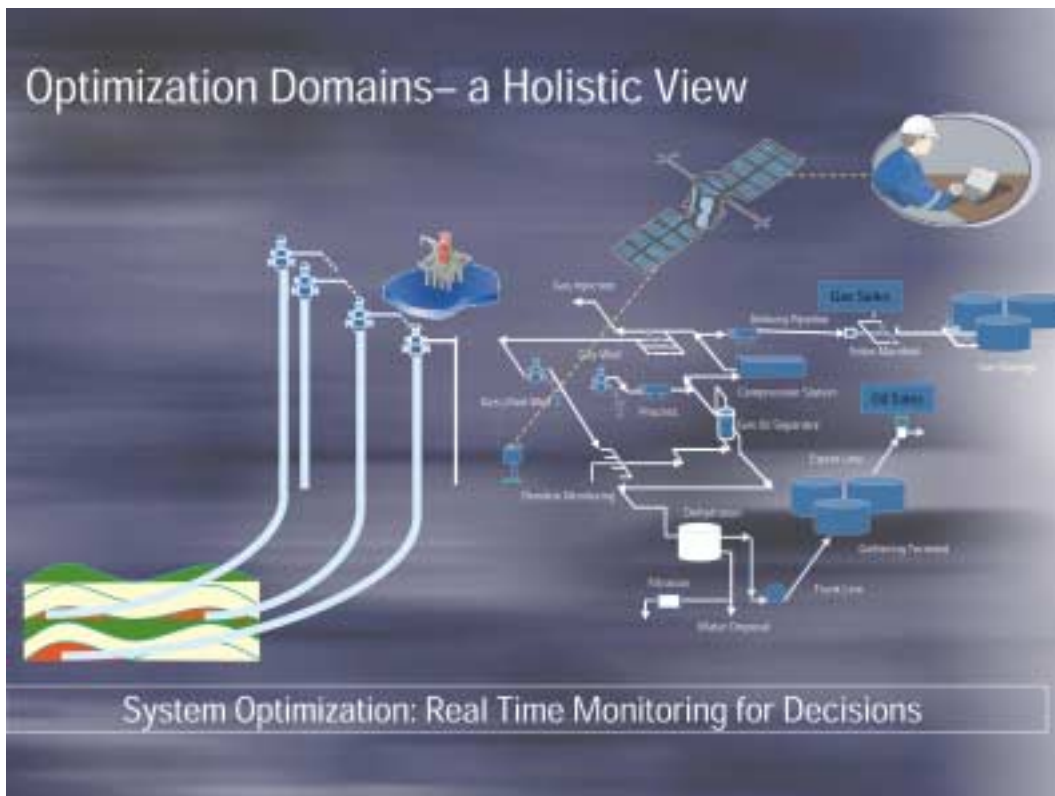


Figure 4: Optimization Domains

overall recovery. At the heart of this transformation is the ability for anyone, anywhere to immediately access reliable, validated data and knowledge to guide decision-making.

Even though the industry is awash in data, it lacks the infrastructure to effectively classify, verify, interpret and translate these data into information, knowledge and ultimately decisions. Classified, verified data and information are vital to improve operational and financial performance. Success hinges on our ability to make effective decisions and take corrective actions. These are essential to reduce cycle time and gain efficiency improvements and will fundamentally change the way our industry works and uses its expert resources, creating a more efficient and technically competent process. Knowledge management systems based on best practices will greatly reduce repetition of errors and enhance consistent quality in global operations. This capability, founded on leading-edge information technology solutions and multidisciplinary technical collaboration, will allow the industry to achieve its ultimate goal: real-time optimization of reservoir performance. We would like to call it iTransformation.

## Real-time optimization of reservoir performance

Optimizing reservoir performance requires a closed-loop process that spans reservoir characterization, development planning, field implementation, and monitoring and control. The methodology is applicable both for cradle-to-grave optimization of a new field or extension of the economic

lifetime, productivity and reserve recovery of an existing field. A full spectrum of oilfield technologies and disciplines is required—from geologists and geophysicists to drilling, production and reservoir engineers and financial planners.

There is an outer loop to the process representing the macroscopic phases of discovery, initial development and large-scale surveillance, like time-lapse 4D and multicomponent seismic. This loop has a cycle time ranging from months to years. Reservoir and production data are used to continuously update the reservoir model and guide decision-making on corrective steps to improve production potential.

Within the outer loop resides an inner, or production, loop representing daily decisions and actions to keep the asset operating at peak performance. Typical feedback time here is hours or days. Incremental improvements are realized quickly. Surveillance data is high-rate, like bottomhole pressures and flowrates, and must be analyzed, interpreted and acted upon rapidly.

The domain where both the short-term and long-term loops are deployed can be broken down into four distinct, but related elements. First is the reservoir, where the hydrocarbons reside, providing the primary source for value generation. Second is the wellbore, constructed to optimally access the hydrocarbons and placed to ensure efficient, cost-effective recovery. Third is the production system and handling facilities for process and transport to the point of sale. Finally, but not least important, is the monitoring and telemetry

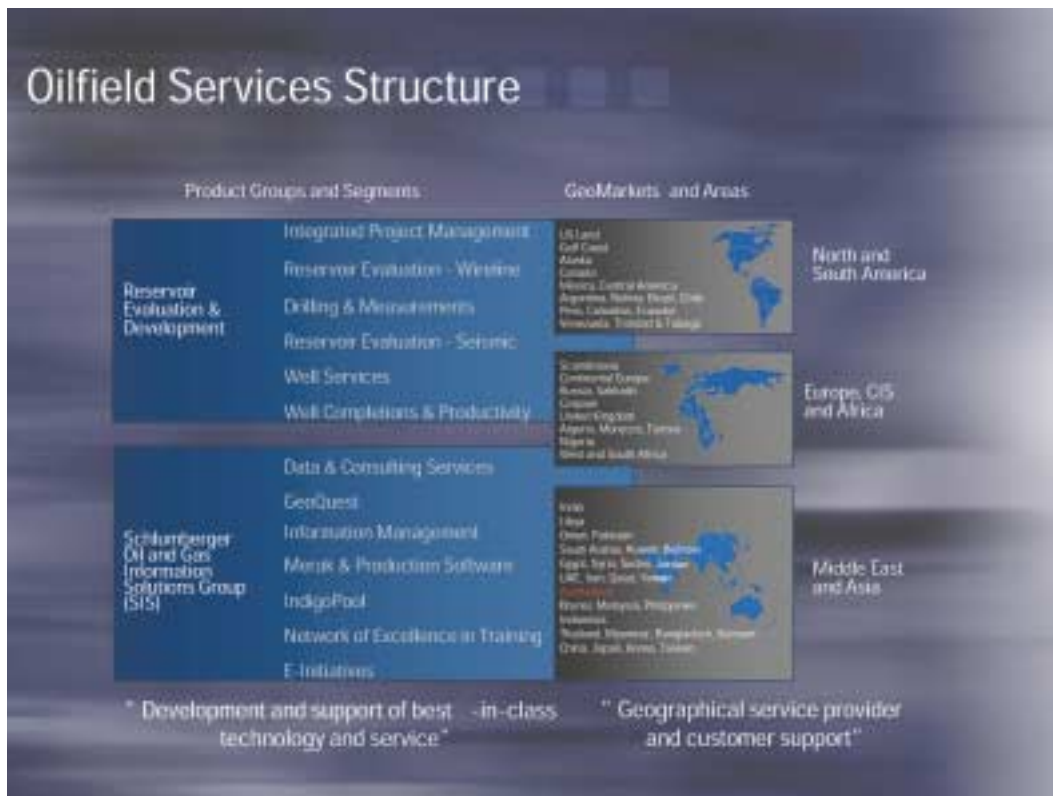


Figure 5: Schlumberger Organization

system. This is the essence of iTransformation, making the data available to the decision makers in real time. The entire domain must be seen as a single system, with each link being vital to success.

## iTransformation - the transformation to an information-centric oil field

This iTransformation is today at the very heart of Schlumberger Oilfield Services. Looking back at history a few major factors characterize the evolution of the oilfield services industry over the past 20 years. The most important of these are: Broadening of the product and service offerings by a few individual companies, sector consolidation through mergers and acquisitions and a shift towards integrating cross disciplinary services as a basis for constructing engineered solutions. Today, less than one fourth of the companies that provided wellsite equipment and services in 1985 remain in business leaving the industry with larger and more globally diverse players capable of operating on a lower cost basis.

Schlumberger has evolved from a wireline logging company in the 1930's to a full spectrum oilfield services supplier focussed on the reservoir. Most recently, the integration of Schlumberger and Sema has further strengthened capabilities for delivering real-time decision-making information to the industry. In Oilfield Services, Reservoir Evaluation & Development (RED) and Schlumberger Information Solutions (SIS) are the product groups comprising thirteen segments providing a full range of advanced technologies,

which form the basis of solutions implementation in the field. The field is customer focused with twenty-nine "GeoMarkets" organized along geographical lines into three Areas where this technology is deployed to provide multi-disciplinary solutions to our clients. The combination of RED and SIS allows Schlumberger a provide a complete offering of exploration, well construction, production, software products, data management, expert consulting services and information technologies applicable from reservoir discovery to abandonment.

Following the mid-1980s oil crisis, many industry initiatives centred on increasing the efficiency of specific operations, primarily within single disciplines. These efforts succeeded because of rapid growth in computing power and communications infrastructure, where IT played merely a supporting role.

But, moving forward will depend on applying fully integrated information solutions that bring a multidisciplinary technical collaboration and connection layer to individual performance-enhancing tools. Substantial investments in technology will be needed, merging knowledge and process to streamline workflows, increase efficiency and reliably deliver—in real time—relevant, verified information to anyone, anywhere as a basis for rapid, accurate decision-making on enhancing reservoir performance.

The industry must migrate from the traditional product and service-centred culture to an information-centred culture that leverages information technology to streamline operations,



Figure 6: Schlumberger Intranet - Sinet

reduce cost and generate added value while enabling a level of technical collaboration never before achieved. This is not an incremental adjustment but a quantum shift in the way oilfield business will be conducted.

## Key elements of the i-Transformation

The two principal elements of this iTransformation and enablers for optimizing reservoir performance are having a strong IT backbone and an environment and capability for multidisciplinary technical collaboration.

Key infrastructure requirements will include: broadband connectivity from the wellhead to the decision-maker; a standard IT environment promoting interoperability and open standards; data-management systems with clearly defined storage and retrieval policies; integration of both new and legacy systems to bring all appropriate information to decision-makers; and robust authentication and security systems—based on smart-card technology—that ensure confidentiality. For multidisciplinary technical collaboration, it is essential not only to have the skill sets but also the software and tools which allow participative work both within a company and across corporate boundaries.

## The Schlumberger approach

Major oilfield service suppliers are working with oil and gas companies to deliver the broad range of technologies and

solutions just described. In Schlumberger, we have taken a number of key steps, both organizationally and technically, to equip the company to work effectively in the information-centric oil field. One, as stated earlier, is the creation of a fully enabled, cross-disciplinary organization in the GeoMarkets focused on the needs of asset teams at the local reservoir level. We have supplied this organization with the latest information technology and Web-enabled tools, fuelled by one of the world's largest private intranets—connecting 38,000 users at 800 sites in more than 100 countries. We are building a knowledge-sharing culture where technical communities of practice interact and exchange information to deliver global experience and expertise anywhere, rather than just the know-how embodied in a few local individuals. We have established several regional centers of excellence focused on the specific needs of a given oil-producing area or oilfield discipline. Examples are the Deepwater Center of Excellence in Houston and a “Well Bore Stability” Centre in Kuala Lumpur. And, through the use of the Internet, our intranet and knowledge-sharing communities, we have created an electronic environment for quick and efficient solution of operational problems.

Our information-centric divisions now reside under one umbrella. Schlumberger has long been proactive in IT, dating back to 1980 with investments in smart-card technology. The integration of Schlumberger and Sema has brought the processes, experience and critical mass of a leading IT company to enhance the delivery of real-time decision-making capabilities to the oil industry.

Customized IT solutions are required to match the needs of individual oil and gas assets. Solutions can be tailored—from outsourcing of desktop support to provision of worldwide networking, data management and systems integration. An example of this outsourcing is a shift in the role of internal oil and gas company information technology departments from providing expertise in applications development, networking, hardware and deployment to becoming architects of their company's vision and discerning buyers of products and services. As a result, many companies are choosing to work with credible service suppliers to outsource all or part of their IT infrastructure and support services.

In the past several attempts at multidisciplinary technical collaboration have been made through the use of visualization centers with mixed success. These centres, originally dark rooms, are now replaced by lighted rooms with whiteboards where collaboration becomes much easier. Interconnected, real-time applications—from field data capture to modular data sources and analysis tools—can be provided at the client's desktop, eliminating geographical barriers and borders, reducing costs and fostering collaboration across disciplines and time zones.

## Collaboration in action : InTouch

An example is an initiative called InTouch. InTouch provides direct information exchange between our experts at worldwide technology centers and field personnel. The goal is to “apply everywhere what we learn anywhere.” The latest information technology and communication tools allow user-friendly interchange and access to validated knowledge repositories and training aids. This means that a global knowledge base is available at all times to field personnel—leveraging expertise, streamlining communications and speeding solution of field problems.

The key components of InTouch include:

- our global intranet
- a standardized computer platform
- a single portal into the company's technical resource and knowledge base
- online, interactive training and distance learning, and
- evergreen, online documentation.

## Author

SANDEEP SHARMA has a Bachelors in Electrical Engineering (India), Post Graduate Diploma in Business Management (UK), Fellows Program (Sloan School, MIT) and is a member SPE and SPWLA. He joined Schlumberger in 1981 and has since worked all over the world in a variety of field, marketing, product development and management positions. He is currently, Business Development Manager for Reservoir Solutions for Australasia region.

Prior to InTouch, there were often significant delays in problem-solving, as queries made their way up the filed organization chain to headquarters and finally to the person or group that could develop a solution. Additional delays were often encountered in the opposite direction, getting the response back to the user.

With InTouch, however, there have been several direct benefits of including a 95% reduction in the time spent in solving technical problems and a 75% reduction in the time necessary to update engineering modifications.

Extending an InTouch type approach to enable greater collaboration between operator and service company technical experts at various stages during the reservoir optimization process will help reduce cycle times, cut costs and increase recovery potential.

In conclusion, the E&P industry faces a host of challenges in its quest for greater efficiency and better financial results. The vehicle for achieving these objectives is the ability to optimize reservoir performance in real time. Implementing this process depends on creating an information-centric culture based on a multidisciplinary workforce that “applies everywhere what is learned anywhere.” Schlumberger's approach to addressing this challenge is based on a structured, holistic approach integrating the key elements of : advanced technology measurements, information technology infrastructure, decision tools, information management and expert services.

## References

Grijalva, V.E., Solberg R.A., The role of Service Companies in the Petroleum Business structure. World Petroleum Congress, Calgary, July 2000.

Mullen D, The Information-Centric Oil Field. Strategic Technology for Exploration & Production Conference, Houston, July 2001.

Pai, S, The Digital Oil and Gas Enterprise. Industry white paper, 2001